

Award Number: W81XWH-11-2-0198

TITLE: Advanced Pediatric Brain Imaging Research and Training Program

PRINCIPAL INVESTIGATOR: Catherine Limperopoulos, PhD

CONTRACTING ORGANIZATION: Children's Research Institute  
Washington, DC 20010

REPORT DATE: December 2018

TYPE OF REPORT: Final Report

PREPARED FOR: U.S. Army Medical Research and Materiel Command  
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT: Approved for Public Release;  
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# REPORT DOCUMENTATION PAGE

*Form Approved*  
*OMB No. 0704-0188*

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|   |                    |                                       |                                   |  |  |
|---|--------------------|---------------------------------------|-----------------------------------|--|--|
| <b>1. REPORT DATE</b><br>DEC 2018   |                    | <b>2. REPORT TYPE</b><br>Final Report |                                   | <b>3. DATES COVERED</b><br>15 Sept 2011 – 14 Sept 2018 |  |
| <b>4. TITLE AND SUBTITLE</b><br>Advanced Pediatric Brain Imaging Research and Training Program  |                    |                                       |                                   | <b>5a. CONTRACT NUMBER</b>                             |  |
|   |                    |                                       |                                   | <b>5b. GRANT NUMBER</b><br>W81XWH-11-2-0198            |  |
|   |                    |                                       |                                   | <b>5c. PROGRAM ELEMENT NUMBER</b>                      |  |
| <b>6. AUTHOR(S)</b><br>Catherine Limperopoulos, PhD<br><br>E-Mail: <a href="mailto:climpero@childrensnational.org">climpero@childrensnational.org</a>   |                    |                                       |                                   | <b>5d. PROJECT NUMBER</b>                              |  |
|   |                    |                                       |                                   | <b>5e. TASK NUMBER</b>                                 |  |
|   |                    |                                       |                                   | <b>5f. WORK UNIT NUMBER</b>                            |  |
| <b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b><br><br>Children's Research Institute<br>111 Michigan Ave., NW<br>Washington, DC 20010   |                    |                                       |                                   | <b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>        |  |
| <b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b><br>U.S. Army Medical Research and Materiel Command<br>Fort Detrick, Maryland 21702-5012  |                    |                                       |                                   | <b>10. SPONSOR/MONITOR'S ACRONYM(S)</b>                |  |
|   |                    |                                       |                                   | <b>11. SPONSOR/MONITOR'S REPORT NUMBER(S)</b>          |  |
| <b>12. DISTRIBUTION / AVAILABILITY STATEMENT</b><br>Approved for Public Release; Distribution Unlimited   |                    |                                       |                                   |  |  |
| <b>13. SUPPLEMENTARY NOTES</b>  |                    |                                       |                                   |  |  |
| <b>14. ABSTRACT</b> Brain injury is a leading cause of death and disability in children. Recent advances in pediatric magnetic resonance imaging (MRI) techniques are revolutionizing our understanding of brain injury, its potential for recovery, and demonstrating enormous potential for advancing the field of neuroprotection. We have created a highly structured, collaborative, and multidisciplinary training program in <b>BRAIN (Brain Research Advanced Imaging with NMR)</b> to advance research skills of investigators from all branches of the US military focusing on pediatric brain injury. Our goal is to train, with the highest rigor, military trainees in conducting clinical research using advanced brain imaging technologies to study the causes and consequences of pediatric brain injury. Training in this new field of advanced pediatric MRI technologies will open critical windows of therapeutic opportunity and facilitate the formulation of effective anticipatory and neuroprotective strategies. |                    |                                       |                                   |  |  |
| <b>15. SUBJECT TERMS</b><br>training program, advanced MRI, brain injury.   |                    |                                       |                                   |  |  |
| <b>16. SECURITY CLASSIFICATION OF:</b>  |                    |                                       | <b>17. LIMITATION OF ABSTRACT</b> | <b>18. NUMBER OF PAGES</b>                             | <b>19a. NAME OF RESPONSIBLE PERSON</b>           |
| <b>a. REPORT</b>  | <b>b. ABSTRACT</b> | <b>c. THIS PAGE</b>                   |                                   |  | <b>USAMRMC</b>                                   |
| U   | U                  | U                                     | UU                                | 327  | <b>19b. TELEPHONE NUMBER</b> (include area code) |

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## INTRODUCTION

This report documents the activities conducted for the “Advanced Pediatric Brain Imaging Research and Training program” project over the course of the funding period. The primary goal of our Department of Defense BRAIN (**B**rain **R**esearch **A**dvanced **I**maging with **N**MR) grant is to advance the training of military clinician scientists in the field of investigative brain imaging technologies to understand the causes of brain injury and the mechanisms underlying brain plasticity following injury. We implemented an online learning management system and creating and implementing methods for converting the existing in-classroom presentations into self-directed online learning modules and courseware. Specifically, we developed a web-based portal site located at [www.MilitaryMedED.com](http://www.MilitaryMedED.com) that users can search, upload, and house online training and education-related information. We created 33 SCORM-compliant online training modules that were completed by 145 military and civilian clinician-scientists. The portal site is modular with various simple and complex databases, and latest features such as SCORM-compliant training modules, learning and communication plugin widgets, and external instructional and productivity tools.



## **BODY**

Innovations in eLearning technologies are revolutionizing educational initiatives, allowing learning to be individualized, transformative for instructors, and collaborative between learners and instructors. The integration of eLearning solutions into medical education can spark a shift where educators no longer serve as distributors of content, but as facilitators and assessors of competency(1-3).

A major focus of our BRAIN training program has been to successfully convert clinical teaching seminars into a web-based format so that all military and civilian trainees can have access to the training curriculum. There were a total of 145 trainees that completed the BRAIN e-learning courseware over the course of the funding period. Our survey data from the in-person lectures and online assessment scores demonstrate that both in-classroom and web-based approaches to teaching topics within the BRAIN program had significant training benefits for healthcare providers across multiple specialties and subspecialties.

## **BACKGROUND**

The focus of this grant is to advance the training of military clinician scientists in the field of investigative brain imaging techniques. Upon receiving notification from the Department of Defense that the **BRAIN (Brain Research Advanced Imaging with Nuclear Magnetic Resonance)** training grant was funded, we embarked on an extensive recruitment effort to solicit applications from military trainees. Although both candidates were very interested in participating in the BRAIN training program, they ultimately declined because this would result in a significant reduction in their current salary and they were not prepared to lose the military benefits that they accrue for each year of military service. Although we counter-offered by proposing a significant increase in their salary, both candidates indicated that the primary reason they declined participation was that they did not wish to come off active duty.

Despite these challenges, in July 2012, we officially recruited two high-caliber military trainees who began their training in BRAIN. Our first research scholar, **Dr. Gerald E. York** is a neuroradiologist from Brooke Army Medical Center (BAMC) in Houston, Texas. Our second scholar, **Dr. Nicole Dobson** is a neonatologist at Walter Reed Army Medical Center from Uniformed Services University in Bethesda Maryland.

Drs. York and Dobson completed an intensive two-week course on Introduction to Clinical Research at Johns Hopkins University School of Medicine. To reinforce and compliment this intensive two-week course, each trainee also participated in the **Children's Research Education And Career Training (CREAT)** Program at Children's National Medical Center. Both trainees successfully completed the on-line Collaborative Institutional Training Initiative (CITI) course on responsible conduct of research within the first three months of training actively developed their research projects under the supervision of their mentoring team. Dr. York's project focused on the application of serial and quantitative MRI techniques to examine structural, functional, and metabolic changes following mild traumatic brain injury (TBI) in children. Dr. Dobson's project was an investigation of the mechanisms of injury to the developing brain and potential neuroprotective strategies in premature infants. Drs. York and Dobson actively participated in the BRAIN curriculum that we developed which included teaching seminars on the Principles of Pediatric Brain Injury and Advanced Pediatric Brain Imaging Techniques. The trainees also benefited from hands-on training in MR imaging acquisitions and advanced MRI post-processing. Available to each trainee were the five imaging training cores including magnetic resonance spectroscopy, diffusion MRI, Perfusion MRI, Morphometric MRI and functional MRI training core, as well as our Neurocognitive core with designated lead mentors for each core by our Children's National Medical Center (CNMC)-NIH team of investigators.

***Obstacles encountered in maintaining the two trainees in the program***

**Dr. Dobson's** unexpectedly decided to discontinue her training in the program in November 2012 for reasons related to a change in her career plans. Prior to resigning, she had defined a research project that examined the potential neuroprotective effects of caffeine on the preterm brain, using advanced brain imaging techniques. She had assembled a dedicated mentorship team of Dr. Catherine Limperopoulos (PI; MRI morphometry training core lead), Dr. Adre du Plessis (co-investigator and Associate Director of BRAIN), and Dr. Carlo Pierpaoli (co-investigator and diffusion MR training core lead). Dr. Dobson had also started hands-on training in the application of advanced MRI techniques. Her leaving is regrettable on a number of fronts including the amount of time and effort spent in coordinating her team and studies.

**Dr. York** made significant progress in the data acquisition and processing phases of his research study. He was actively immersed in his training at Children's National but his progress was derailed as a result of a military travel moratorium and our inability to enter into an institutional agreement with this home institution (described below. In order for Drs. Dobson and

York to begin their training in BRAIN, we were required to establish agreements with their home institutions (Walter Reed Army Medical Center [Dr. Dobson] and the Brooke Army Medical Center [Dr. York]). Children's National executed an agreement with National Capital Consortium permitting Dr. Dobson to participate in the BRAIN program at Children's National in July 2012. Unfortunately, Children's National was not able to enter into an agreement with the U.S. Government permitting Dr. York's participation in this same program despite the fact that Children's National remained available to comply with the contract terms and other legal terms required for Dr. York's participation.

### **RESTRUCTURING OUR DOD BRAIN TRAINING PROGRAM**

Despite the above challenges, the growth of the academic program in BRAIN had exceeded our expectations. We developed a highly structured, collaborative, and multidisciplinary training program in BRAIN to advance research skills of physicians from all branches of the US military focusing on understanding the causes and consequences of pediatric brain injury. The training program was developed under the hospice of three specific aims which focused on developing (i) the scientific rigor necessary to perform effective high-quality clinical research through instruction in epidemiology and biostatistics, (ii) an in-depth understanding of the underlying pathogenetic mechanisms of injury to the brain and its recovery, and (iii) the necessary skills to apply advanced MRI techniques to specific clinical research questions.

The development of this curriculum would not have been possible without the DoD training grant support and will be very difficult to sustain without continued support. The program pulled together a diverse group of scientists with a remarkable depth and breadth of expertise. Particularly gratifying was the growth and accumulating expertise behind the seminar series, which are attended to maximum capacity, as well as the confluence of multidisciplinary expertise enabled by this grant support. The program demonstrated significant training benefits not only for the recruited military trainees but for our civilian trainees and junior faculty across multiple specialties including fetal medicine, neonatology, neurology, critical care medicine, radiology, biomedical engineering, cardiology nursing, psychiatry and psychology.

In 2014, we received permission from the DoD to restructure our program without the onsite presence of military trainees. By embarking on an e-learning BRAIN curriculum (described below) we were able to further expand the scope of the didactic seminar series into the mechanisms, consequences, and recovery from pediatric brain injury and propose to create remote videoconferencing capabilities for military institutions, both locally and nationally. In fact,

we were successful in setting up videoconferencing access to our BRAIN lectures for Dr. York (following the travel moratorium that was instituted late 2012), in order for him to continue to benefit from the educational curriculum that we developed.

Children's National Medical Center is the pediatric education training partner for the National Capital Consortium (NCC). NCC radiology residents are required to complete a three-month rotation in pediatric radiology at Children's National Medical Center, providing their only exposure to the unique complexities of pediatric neurodiagnostic imaging and radiology. Each year, Children's National train's military radiology residents (e.g., 26 residents in their 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> year of training rotated through Children's National Medical Center in 2012). These radiology military residents benefited from our comprehensive DoD BRAIN educational seminar series in person while rotating through Children's National and had continued access to these seminars once they return to their home institutions. During their rotation, these trainees benefited from training and access to state-of-the-art MRI scanner platforms and leading edge brain imaging protocols for advanced neurological imaging applications, with which could bring back to their primary military base. Our successful transformation of the BRAIN seminars into e-learning courseware is summarized in detail below.

***Statement of work-progress to date:***

Specific Aim 1: To advance the understanding of the fundamental principles and clinical application of sophisticated MRI techniques that is revolutionizing clinical research into the causes, consequences and care of pediatric brain injury.

The PI together with Ben Scalise (instructional designer/multimedia developer) and Jeff Sestokas (instructional designer) worked closely with our subject matter experts (SME) to develop novel e-learning courseware on the fundamental principles and applications of advanced MRI techniques. We successfully conducted ongoing field tests at Children's National Medical Center main campus and at Walter Reed National Military Medical Center. A total of 145 trainees completed the 33 e-Learning BRAIN modules (Appendix A) over the course of the funding period. The medical backgrounds of trainees included: radiology, neonatology, neurology, critical care medicine, biomedical engineering, nursing, psychiatry and psychology. The main site is located at [www.MilitaryMedED.com](http://www.MilitaryMedED.com) (username: test, password: Demo@123 – The “D” is capitalized). The course content can be accessed from the homepage on the dropdown tab “My Courses” at the top of the homepage or accessed from the homepage icon

All Courses > Neurology > Brain Seminars. The MilitaryMedED landing page can be accessed at: [http://www.developingbrain.org/MMedEd\\_Landing/index.html](http://www.developingbrain.org/MMedEd_Landing/index.html). A detailed update on our progress on the e-learning module development and performance system is summarized in section: BRAIN e-Module Training Design/Development.

*Specific Aim 2:* To enhance through didactic and clinical teaching the basic science and clinical understanding of the causes, mechanisms, and consequences of pediatric brain injury.

We have effectively developed comprehensive e-learning modules on pediatric brain injury that capture a wide scope of themes in pediatric brain injury including Resting State Functional MRI in fetuses and newborns, image processing where users learn about the broad principles of image acquisition as well as numerical image processing techniques, Cerebral Metabolic Rate of O<sub>2</sub> using MRI, CMRO<sub>2</sub> as an important parameter for the brain function and activities and advanced MR Spectroscopy. Our progress in transitioning these seminars to web-based e-learning modules is detailed in section: BRAIN e-Module Training Design/Development.

*Specific Aim 3:* To provide training in clinical research methodology through courses and seminars in biostatistics and research design, and responsible conduct of clinical investigation.

For our e-learning BRAIN modules we have consolidated our on-line FACTS (Focus on Clinical and Translational Science) curriculum with extensive resources (*archived lectures, tutorials, publications*) covering central research thematic areas including study design, developing goals and objectives, research implementation, statistical analyses, sources of error, etc.

## **BRAIN e-MODULE TRAINING, DESIGN, and DEVELOPMENT**

Development of the online portal and training modules began following the design phase. There were two primary objectives for this phase. The first was to develop a web 2.0 responsive portal that would house the instructional content. The portal can support online activity and resources such as archived lectures, SCORM-compliant training modules, quizzes, and videoconferencing and interactive capabilities. Site security policies ensure that users are safe and security is

maintained. Additionally, the web portal is flexible in meeting different user needs, preferences, and situations while adhering to Government section 508 accessibility standards such as screen reader emulator compatibility (e.g. *Fangs or Nonvisual Desktop Access*) and other web browser accessibility extensions. Further, open source activity plugins such as quiz and game makers, electronic journals, discussion boards, blogs, wikis, podcasts, and live virtual classrooms are available to course creators. Site and course activity was monitored through a progress assessment engine and designated site administrators are able to run custom workflow and learning engagement analytic reports to view the completion and scoring of individual and cumulative learning objects such as training modules and assessments. A self-registration feature allowed users to sign-up for an account. Account requests were sent to a secure administrator's email account for review and approval. When approved, users were sent a personalized confirmation email with instructions on how to login and use the system. Finally, an automatic enrollment feature enabled course instructors to enable the system to electronically enlist users into courses. Once the web portal and module content was storyboarded, the second objective was to develop the training modules with any embedded multi-media or dynamic interactions. The training module player includes the following features: 1.) Navigation pane, 2. Main stage, 3. Volume control, 4. Play button, 5. Control bar, 6. Rewind button, 7. Next and previous buttons.

### ***Design Accomplishments #1: Scaffold Knowledge with Learning Objectives***

The first stage of the design process involved ensuring the instructional efficiency and proper organization of the training by breaking down the content into two categories (*pediatric brain development; modules 1-3 and MRI fundamentals; modules 4-6*) and six instructional modules (Table 2). Module 1 examined the corpus callosum and other major cerebral commissures through the lens of normal and abnormal development. Module 2 focuses on normal and abnormal development of the cerebellum by reviewing the cerebellar Anlagen, cerebral hemispheres, and vermis. Module 3 connects both categories together by investigating brain plasticity and connectivity with structural MRI techniques while providing an overview of brain plasticity and describing how MRI and the limitations thereof, can be used to measure changes in brain structure due to plasticity. Module 4 provides an introduction to MRI by reviewing basic magnetic physics and describes the origins of the MR signal and how precession is formed from longitudinal to transverse magnetization. Module 5 reviews the fundamentals of digital imaging by providing an overview of digital images, multidimensional data and reviewing medical imaging

and their modalities. Finally, Module 6 walks learners through the topic of pediatric MRI without sedation by summarizing key components of a successful pediatric non-sedate MRI program. Learning objectives were identified for each instructional module and Subject Matter Experts or SMEs created storyboards (Appendix B) as a visual representation of their presentation content that included navigation directions. The storyboard served as a tool to communicate the SME's narration and intended direction to the instructional systems designer and/or the multimedia specialist and what each course/lesson/learning object should actually look like online in a screen-shot format.

### ***2014 & 2015 Design Accomplishments #1: Scaffold Knowledge with Learning Objectives***

Module 7 provides an overview tutorial of the tortoise software program which is a well-known diffusion MRI software processing package. Modules 8 and 9 discuss the inner workings of MRI safety including medical and support devices, the use of metal objects in the MRI environment, floor plan zones and signage, acoustic, cryogenic, and electrical hazards, and emergency response and shutdown protocols. Module 10 explains the mechanisms and neuropsychological effects of Traumatic Brain Injury (TBI), specifically brain development factors and outcomes following brain injury. Module 11 helps learners understand the basics and process of how diffusion is measured in MRI along with explanations of how directional information of water movement can be extracted. Module 12 provides an overview of the processing steps for robust diffusion MRI data, the effects within each step of the outcome, and any resulting effects in analysis. Module 13 discusses the basics of perfusion and non-MR perfusion imaging with or without contrast agents and arterial spin labeling. Finally, module 14 walks learners through Magnetic Resonance Spectroscopy including how to interpret NMR Spectra (*electron shielding, spin spin coupling, field linearity, and sample chemical composition*), nuances of Lorentzian Function and Line shape, signal to noise, and brain chemical in  $^1\text{H}$  &  $^{31}\text{P}$  NMR as well as new research in NMR Spectra for DTI acquisition and procession and gray matter tissue segmentation.

### ***2016 Design Accomplishments #1: Scaffold Knowledge with Learning Objectives***

Module 15 provides an overview of Neuropsychological Outcomes in TBI. Discussed in the application is evaluation and management of concussion, tools to assist evaluation & management and how to begin evaluating and managing concussion. Module 26 discusses

Resting State fMRI in Fetuses and Newborns where the learner becomes familiar with the properties of resting state networks, learns ways to analyze the data, and how it is applied in fetal & neonatal imaging. Module 17 & 18 explains the role of MRI pertaining to Fetal Supratentorial Brain Development that describes cerebral development, appearance of normal development, the Germinal matrix and myelination, Neuronal migration and gyrification, as well as structural and metabolic maturation. Module 19 elaborates on NMR Spectroscopy with understanding ex-vivo Spectroscopy using High Res R Spectra, learning Metabolic Identification and Neurochemicals as well as Metabolic Pathways and Single Model Spectral Peaks. Finally, module 20 demonstrates the Broad principles of image acquisition, Understanding & defining Numerical Images, learning the basics of Image Quality Assessment and Understanding the applications of Image Processing for Medical Image Analysis.

### ***2017 Design Accomplishments #1: Scaffold Knowledge with Learning Objectives***

Modules 19-21 provide an overview and understanding of what Resting State Functional MRI in fetuses and newborns is. Discussed in the application are the properties of resting state networks, ways to analyze resting state data, and how resting state functional connectivity-MRI (rs-fcMRI) is applied in fetal & neonatal imaging. Modules 22-23 introduce image processing where users learn about the broad principles of image acquisition as well as numerical image processing techniques. We also present applications for Medical image processing, discussing the basics of image quality assessment and the applications used to acquire data. Modules 24-26 explain how to measure Cerebral Metabolic Rate of O<sub>2</sub> using MRI, CMRO<sub>2</sub> as an important parameter for the brain function and activities, understanding the Fick principle, using magnetic resonance imaging to quantify blood oxygenation. Other topics include the basic method of measuring T<sub>2</sub> of blood and method for measuring blood flow, learning the pros and cons of alternative methods for quantifying blood oxygenation and blood flow as well as alternative methods for CMRO<sub>2</sub> measurements. Finally, modules 27 and 28 discuss advanced MR Spectroscopy. Whereas in our Introduction to Spectroscopy course we discussed the basics on how to interpret NMR Spectra from Electron Shielding to Sample Chemical Composition and Research Directions in NMR Spectra, here we learn more advanced concepts such as Point-Resolved Spectroscopy and understanding how to quantify metabolites.



## ***2018 Design Accomplishments #1: Scaffold Knowledge with Learning Objectives***

In the final year, we developed 7 new comprehensive e-learning modules on pediatric brain injury that capture a wide scope of themes in pediatric brain injury including Role of MRI | Part1, where users learn what Fetal MRI can reveal about cerebral development, Role of MRI | Part2, where users become familiar with the appearance of the normally developing cerebrum, Respiratory Distress in the Newborn | Introduction to the Delivery Room, where users learn about the delivery room, procedures and equipment within, Respiratory Distress in the Newborn | Case Study 1, where users learn to use a physiologic approach, Respiratory Distress in the Newborn | Case Study 2, where users learn to understand and differentially diagnose the most common causes of respiratory distress, Respiratory Distress in the Newborn | Case Study 3, where users learn to recognize clinical symptoms and radiographic patterns, and Respiratory Distress in the Newborn | Case Study 4, where users learn to understand appropriate management strategies. Our progress in transitioning these seminars to web-based e-learning modules is detailed in section: E-Module Training Design/Development.

### *A continuous design phase (Training Modules #19-20 & 29-33)*

During the 2018 design phase, we:

- Developed 7 new (33 total) SCORM-compliant online training modules on the fundamentals of MRI and fetal development. SMEs converted their Power Point presentations by storyboarding (Appendix D) their content for instructional technologists and multimedia developers to begin producing interactive learning objects and assessments.
- Held internal workshops to teach SMEs and Co-PIs how to design, develop, and implement online BRAIN courseware training modules #19-20 & 29-33 (see Table 2).
- Performed field testing of the learning management system and 6 online BRAIN seminar courses. Conducted field tests at Children's National Medical Center main campus. There were 145 total field testers (37 trainees in last 12 months) across all evaluated courses with an average of 3.63 years of experience in neurology, radiology, computer science and neuroimaging. The average rating for how beneficial the web-based instructional content was to their learning showed a combined average of 3.6 on a scale of 5 (1=No improvement to 5=Exceptional improvement). Trainees' scores improved 50.6% from their pre to post assessment scores (combined pretest AVG =62.48% to

combined post test AVG=94.1%). The scores demonstrate that online multimedia learning provides a highly engaging educational method to teaching complicated topics about the developing pediatric brain and MRI techniques

- As with the first 26 training modules, we used the same five-stage design approach that incorporates learning objectives, learner abilities, instructional methods, module content, and assessment method into the training delivery (Table 1).

**Table 1. Methodology:** *The Five-Stage Design Approach* into the online BRAIN curriculum

| <b>Design Requirements</b>                     | <b>Description</b>  |
|--|---|
| 1. Scaffold Knowledge with Learning Objectives | Organize knowledge and skill components for each instructional module scene in a sequence from basic to complex units of learning.  |
| 2. Learner's Abilities                         | Account for the learner's prior knowledge and skill development.  |
| 3. Instructional Methods                       | Establish the approach for presenting the lesson content.   |
| 4. Module Content                              | Focuses on the pediatric brain and MRI fundamental concepts and ideas that a medical provider would need to know.   |
| 5. Assessment Methods                          | Provide knowledge checks before, during or after user engagement with the lesson content. Assessment methods include true and false, multiple choice, multiple response, fill in the blank, drag and drop, and essay. |

*New Training Module Overview*

Within Modules 19-20 users learn what Fetal MRI can reveal about cerebral development, Role of MRI | Part2, where users become familiar with the appearance of the normally developing cerebrum.

Within Module 29 users learn about the delivery room, procedures and equipment within.

Within Module 30 users learn to use a physiologic approach.

Within Module 31 users learn to understand and differentially diagnose the most common causes of respiratory distress.

Within Module 32 users learn to recognize clinical symptoms and radiographic patterns.

Within Module 33 users learn to understand appropriate management strategies.

**Complete BRAIN Training e-Module Overview:**

**Table 2.** Online Training Modules for the BRAIN program (Appendix A)

| Module Title  | Learning Objectives   |
|---|---|
| <b>PEDIATRIC BRAIN DEVELOPMENT</b>  |   |
| <p><b>Module #1:</b> Corpus callosum and other major commissures: anatomy, normal and abnormal development (Dr. Gilbert Vezina)</p> | <ul style="list-style-type: none"> <li>• Discuss the corpus callosum and other major cerebral commissures looking at their anatomy through the lens of normal and abnormal development.</li> <li>• Understand why a full radiologic assessment is necessary to properly categorize a case of abnormal corpus callosum.</li> <li>• Understand the basis of the abnormal corpus callosum development and its genetic and clinical implications.</li> </ul>          |
| <p><b>Module #2:</b> Normal and abnormal development of the cerebellum (<i>Dr. Adre Du Plessis</i>)</p>                             | <p>Review the cerebellar anlagen</p> <ul style="list-style-type: none"> <li>• Flexing of the rostral neural tube</li> <li>• Defining fundamental territories</li> <li>• Mesenchymal-neuroepithelial signaling</li> <li>•</li> </ul> <p>Describe cerebellar hemispheres and vermis</p> <ul style="list-style-type: none"> <li>• Cellular proliferation</li> <li>• Cellular migration</li> <li>• Cellular differentiation</li> <li>• Neural organization</li> </ul> |
| <p><b>Module #3:</b> Investigating brain plasticity and connectivity with structural MRI techniques (Cibu Thomas)</p>               | <ul style="list-style-type: none"> <li>• Review the concept of brain plasticity</li> <li>• Describe how MRI can be used to measure changes in brain structure due to plasticity</li> <li>• Review the limitations of prevailing MRI studies on structural plasticity and how one can circumvent the limitations</li> </ul>  |
| <b>MRI FUNDAMENTALS</b>   |   |
| <p><b>Module #4:</b> Introduction to MRI</p>  | <ul style="list-style-type: none"> <li>• Review basic magnetic resonance or</li> </ul>  |

|   |  |
|---|--|
| (Dr. Iordanis Evangelou)  | <p>MR physics</p> <ul style="list-style-type: none"> <li>• Describe the origins of the MR signal</li> <li>• Discuss the concept of protons, spin, the Lamor equation</li> <li>• Review precession and how the MR signal is formed from longitudinal to transverse magnetization</li> </ul>   |
| <b>Module #5:</b> Fundamentals of Digital imaging (Dr. Ahmed Serag)                           | <ul style="list-style-type: none"> <li>• Discuss the fundamentals of digital images and multidimensional Data</li> <li>• Review medical imaging and their modalities</li> </ul>  |
| <b>Module #6:</b> Pediatric MRI without sedation: Is it the art or science? (Dr. Raymond Sze) | <ul style="list-style-type: none"> <li>• Review the role of a Certified Child Life Specialist</li> <li>• Summarize the key components of a successful pediatric non-sedate MRI program</li> <li>• Identify ideal candidates for attempting a non-sedate scan</li> <li>• Describe three major benefits of creating and implementing a pediatric non-sedate MRI program</li> </ul> |
| <b>Module #7:</b> Tortoise Software Tutorial (Dr. Okan Irfanoglu)                             | <ul style="list-style-type: none"> <li>• How to use the TORTOISE Diffusion MRI Processing Package</li> <li>• What can be accomplished with TORTOISE Diffusion MRI Processing Package</li> </ul>  |
| <b>Module #8:</b> MRI Safety Part I (Dr. Stanley Fricke)                                      | <ul style="list-style-type: none"> <li>• MRI Suite Floor Plan</li> <li>• Medical Devices, Implanted or Support Devices, Various types of Metal in the MRI Environment.</li> </ul>  |
| <b>Module #9:</b> MRI Safety Part II (Dr. Stanley Fricke)                                     | <ul style="list-style-type: none"> <li>• MRI Suite Zones and Signs</li> <li>• Understanding Acoustic, Cryogenic &amp; Electrical Hazards</li> <li>• Emergency Response &amp; Magnet Shutdown Procedure</li> </ul>  |
| <b>Module #10:</b> TBI Mechanisms &   | <ul style="list-style-type: none"> <li>• Define Traumatic Brain Injury and its Mechanisms</li> </ul>   |

|  |  |
|--|--|
| Neuropsychological Effects (Dr. Gerry Gioia)   | <ul style="list-style-type: none"> <li>• Identify Factors Involved in Brain Development</li> <li>• Describe Neuropsychological Outcomes Following Brain Injury</li> </ul>  |
| <b>Module #11:</b> Introduction to Diffusion Weighted Imaging (Dr. Joelle Sarlls)  | <ul style="list-style-type: none"> <li>• Understand the Process of Diffusion</li> <li>• Know the Basics of how Diffusion is Measured in MRI</li> <li>• How Directional Information of Water Movement can be Extracted</li> </ul>   |
| <b>Module #12:</b> DTI Processing Software Overview (Dr. Okan Irfanoglu)   | <ul style="list-style-type: none"> <li>• Processing steps for Robust Diffusion MRI data based analysis</li> <li>• Determine the effects within each step of the Outcome</li> <li>• Determine if processing software selection has affected an analysis</li> </ul>  |
| <p><b>Module #13:</b> Introduction to Perfusion Imaging Part1 (Dr. Wesley Zun)</p> <p><b>Module #14:</b> Introduction to Perfusion Imaging Part2 (Dr. Wesley Zun)</p>  | <ul style="list-style-type: none"> <li>• Basics of Perfusion</li> <li>• Non-MR perfusion Imaging</li> <li>• MR Perfusion Imaging with Contrast Agents</li> <li>• MRI Perfusion Imaging without Contrast Agents &amp; Arterial Spin Labeling</li> </ul>   |
| <p><b>Module #15:</b> Introduction to Magnetic Resonance Spectroscopy Part1 (Dr. Stanley Fricke)</p> <p><b>Module #16:</b> Introduction to Magnetic Resonance Spectroscopy Part2 (Dr. Stanley Fricke)</p> <p><b>Module #17:</b> Introduction to Magnetic Resonance Spectroscopy Part3 –Clinical Application (Dr. Stanley Fricke)</p> | <ul style="list-style-type: none"> <li>• How to Interpret NMR Spectra <ul style="list-style-type: none"> <li>- Electron Shielding</li> <li>- Spin-Spin Coupling</li> <li>- Field Linearity</li> <li>- Sample Chemical Composition</li> </ul> </li> <li>• Discuss Facts and Fiction <ul style="list-style-type: none"> <li>- Lorentzian Function and Line Shape</li> <li>- Signal to Noise</li> <li>- Brain Chemicals in 1H &amp; 31P NMR</li> </ul> </li> <li>• Research Directions in NMR Spectra <ul style="list-style-type: none"> <li>- DTI Acquisition and Processing</li> <li>- Gray Matter Tissue Segmentation</li> </ul> </li> </ul> |

|   |  |
|---|--|
| <p><b>Module #18: Assessing Neuropsychological Outcomes in TBI (Dr. Gerry Gioia)</b></p>  | <ul style="list-style-type: none"> <li>• Articulate knowledge of evaluation &amp; management of concussion</li> <li>• Describe tools to assist concussion evaluation &amp; Management</li> <li>• How to begin evaluating &amp; managing concussion in your practice</li> </ul> |
| <p><b>Module #19: Role of MRI Part1 (Dr. Gilbert Vezina)</b></p> <p><b>Module #20: Role of MRI Part2 (Dr. Gilbert Vezina)</b></p> | <ul style="list-style-type: none"> <li>• Understand what fetal MRI can reveal about cerebral development</li> <li>• Become familiar with the appearance of the normally developing cerebrum</li> </ul>   |

|   |   |
|---|---|
| <p><b>Module #21: Resting State fMRI in Fetuses &amp; Newborns I (Dr. Josepheen Cruz)</b></p> <p><b>Module #22 : Resting State fMRI in Fetuses &amp; Newborns II (Dr. Josepheen Cruz)</b></p> <p><b>Module #23 : Resting State fMRI in Fetuses &amp; Newborns III (Dr. Josepheen Cruz)</b></p>                                      | <ul style="list-style-type: none"> <li>• Understand what resting state functional MRI is</li> <li>• Know the properties of resting state networks</li> <li>• Learn ways to analyze resting state data</li> <li>• Learn how resting state functional connectivity-MRI (rs-fcMRI) is applied in fetal &amp; neonatal imaging</li> </ul>   |
| <p><b>Module #24: Measuring Cerebral Metabolic Rate of O2 using MRI-Introduction(Dr. Feng Xu)</b></p> <p><b>Module #25: Measuring Cerebral Metabolic Rate of O2 using MRI II - Application (Dr. Feng Xu)</b></p> <p><b>Module #26: Measuring Cerebral Metabolic Rate of O2 using MRI III Clinical Application (Dr. Feng Xu)</b></p> | <ul style="list-style-type: none"> <li>• CMRO2 as an important parameter for the brain function/activities.</li> <li>• Understand classic Fick principle for measuring CMRO2</li> <li>• Understand the mechanism of using magnetic resonance imaging to quantify blood oxygenation</li> <li>• Understand basic method of measuring T2 of blood</li> <li>• Understand basic method of measuring blood flow</li> <li>• Discussion for pros and cons of alternative methods for quantifying blood oxygenation and blood flow</li> <li>• Discussion for pros and cons of alternative methods for CMRO2 measurement</li> </ul> |
| <p><b>Module #27: Advanced MR Spectroscopy (Dr. Subechhya Pradhan)</b></p>  | <ul style="list-style-type: none"> <li>• Reintroduce MR Spectroscopy Basics</li> <li>• Learn Point-Resolved</li> </ul>  |

|  |  |
|--|--|
| <b>Module #28: Advanced MR Spectroscopy - Clinical Application</b> (Dr. Subechhya Pradhan)   | Spectroscopy <ul style="list-style-type: none"> <li>Learn about quantifying metabolites</li> </ul>   |
| <b>Module #29: Respiratory Distress in the Newborn   Intro to Delivery Room and Clinical Management</b> (Dr. Shannon Brockman)<br><br><b>Module #30: Respiratory Distress in the Newborn   Case1</b> (Dr. Shannon Brockman)<br><br><b>Module #31: Respiratory Distress in the Newborn   Case2</b> (Dr. Shannon Brockman)<br><br><b>Module #32: Respiratory Distress in the Newborn   Case3</b> (Dr. Shannon Brockman)<br><br><b>Module #33: Respiratory Distress in the Newborn   Case4</b> (Dr. Shannon Brockman) | <ul style="list-style-type: none"> <li>Learn about the delivery room</li> <li>Learn to use a physiologic approach</li> <li>Understand and differentially diagnose the most common causes of respiratory distress</li> <li>Recognize clinical symptoms and radiographic patterns</li> <li>Understand appropriate management strategies</li> </ul> |

*Novel Visual Enhancements*

Over the course of our funding period, we continued to create, improve upon and implement multimedia objects (E.g. graphics, audio, animations) throughout application scenes to assist learners in the visualization of new knowledge and concepts. For example, in module 29 scene 4, multimedia objects containing layered graphical element illustrates the delivery room and the equipment and activities within. As the SME narrates the scene, the multimedia object illustrates vital clinical symptoms and radiographic patterns to become familiar with and the equipment needed to treat these symptoms (Figure 1). These objects were created not just to convey instructional points, but also to promote active engagement and immerse learners by conveying the phases to recognize and understand symptoms, and identify equipment needed to treat the patient. The text elements, interactive and composite still graphics were used to accommodate the visual learner while the audio narration supports the auditory learning.

Figure 1. Novel Learning Application Example

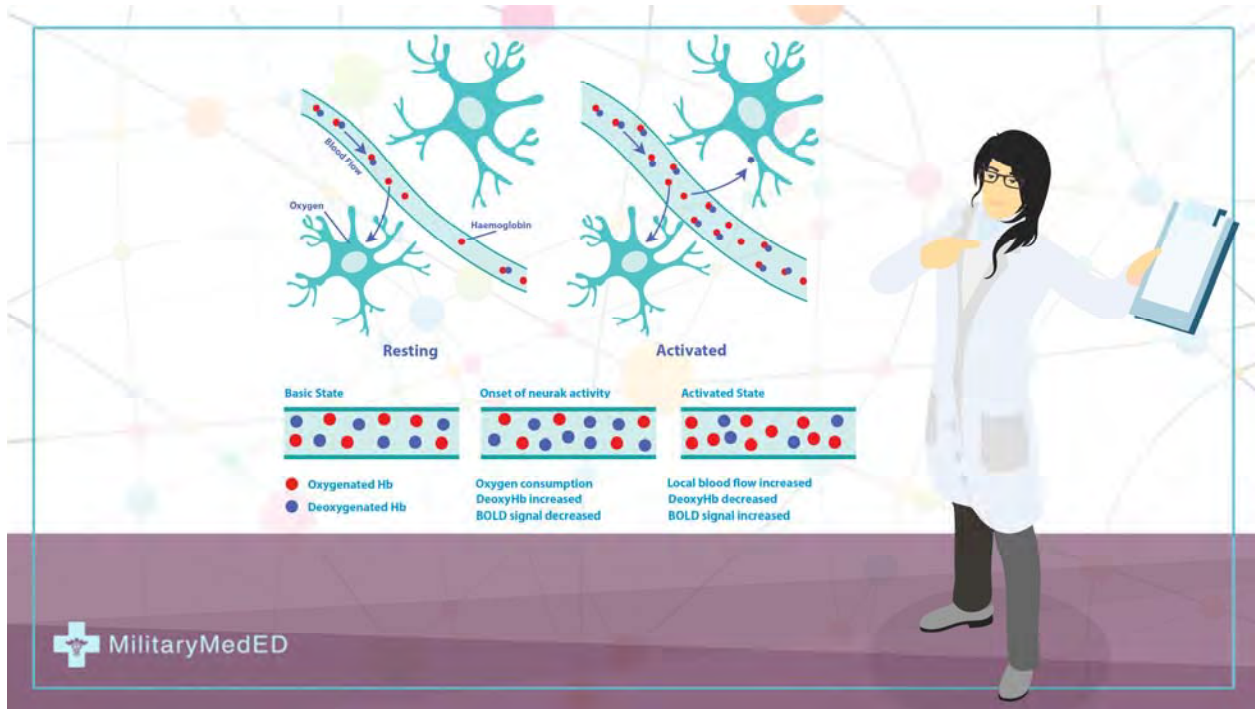
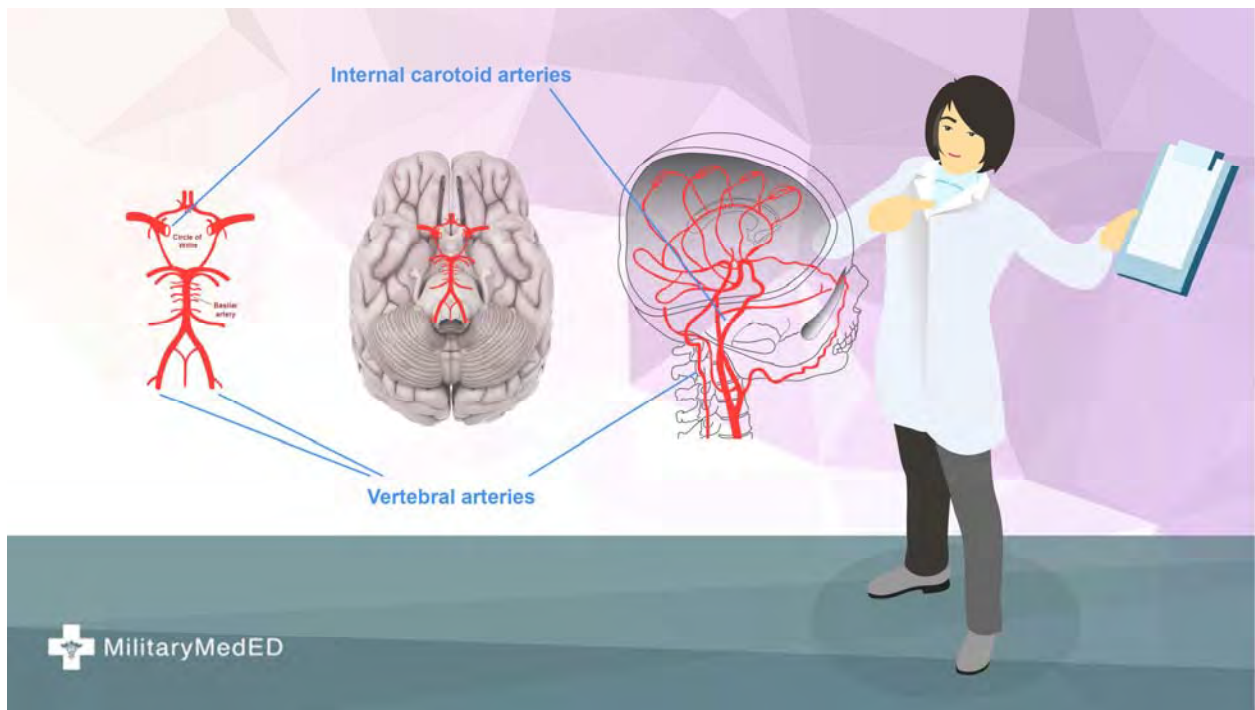


Figure 2. Novel Learning Application Example





### Training Module Player Requirements

As in the case of training modules 1-28, the visual elements presented in modules 19-20 and 29-33 use a variety of graphical elements such as:

- A slide title shown at the beginning of the module
- Multiple levels of bulleted text.
- Still composite graphics
- Custom animations such as animated diagrams or illustrations with text or image fade-ins
- The training modules are BEST viewed using the latest Adobe Flash plugin, which provides a screen visibility of the animated content. For operational purposes, the screens were designed to have a resolution of 1280 x 1024 and 1024 x 768.

### **B. Knowledge Assessments**

Pre and post assessment were continuously developed and implemented (Appendix C). In addition to the pre and post assessment data, we gathered participant feedback using a post-run module questionnaire accessible from inside the training portal. The post-run module questionnaire depicts information pertaining to perceived improvement of the module learning objectives, usability, organization and challenging/engaging nature of the instructional content as well as open-ended responses on what they liked and didn't like about the module, and recommendations for future module development.

### **BRAIN COURSEWARE-FIELD TESTING**

#### ***2015 Internal Field Testing: Test Pre and Post Assessment Summary***

In Spring 2015, we performed our initial field tests with of first six online training modules. The field tests were facilitated by Ben Scalise (Multimedia Developer and Instructional Designer). There were 41 total field testers with a distributed average of 14 clinician participants across all six evaluated courses with an average of 5.8 years of experience in neurology, radiology, computer science and neuroimaging. The average rating for how beneficial the web-based instructional content was to their learning showed a combined average of 3.6 on a scale of 5 (1=No improvement to 5=Exceptional improvement). Trainees' scores improved 29.5% from their pre to post assessment scores (*combined pretest AVG =64.5% to combined post test AVG=94.04%*). The scores demonstrate that online multimedia learning provides a highly engaging educational method to teaching complicated topics about the developing pediatric

brain and MRI techniques. This field test(s) included a (pre/post: pre-test vs. post-test) mixed design, with training being a between-subjects factor. We randomly assigned participants to the training condition of different brain seminar topics.

The next section focuses on discussing the post-module survey results in which participants documented their reactions concerning improvement of stated learning objectives, content relevancy, and recommendations and improvements for future module development.

### **Questionnaire Results**

At the conclusion of the first field test, participants were asked to rate their progress on three to five tailored learning objectives intended for the training module content using a one-to-five Likert scale to measure their improvement on BRAIN seminar topics (1 = no improvement, 5 = exceptional improvement). Learning objectives included the ability of participants to understand key concepts of the brain and MRI, define function and terminology, reflect and discuss critical ideas presented throughout the module. There was above average progress on understanding the intended learning objectives (combined mean = 3.595, SD = 0.281). Moreover, participants evaluated not only intended learning objectives for the training modules, but also provided both written and numeric feedback rating and summarizing their feelings and attitudes on the general relevancy and content presentation. Training modules were felt to be relevant and readily applicable to the clinical setting (combined mean=3.71, SD = 0.306).

### ***2016 Internal Field Testing: Test Pre and Post Assessment Summary***

We performed several field tests with our online training modules across all evaluated courses with an average of 4.7 years of experience in neurology, radiology, computer science and neuroimaging. The average rating for how beneficial the web-based instructional content was to their learning showed a combined average of 3.6 on a scale of 5 (1=No improvement to 5=Exceptional improvement). Trainees' scores improved 54.6% from their pre to post assessment scores (combined pretest AVG =63.9% to combined post test AVG=98.8%). The prior year, 2015, the Pretest Mean result was 6.45 and Posttest mean result was 9.4 (64% and 94% respectively). This represents a 19.3% increase in evaluation improvement from year 2015 to 2016. The scores demonstrate that online multimedia learning provides a highly engaging educational method to teaching complicated topics about the developing pediatric brain and MRI techniques.

### Questionnaire Results

Similar to the prior year, participants felt they made above average progress on understanding the intended learning objectives (combined mean = 3.68, SD = 0.25). Moreover, participants evaluated not only intended learning objectives for the training modules, but also provided both written and numeric feedback rating and summarizing their feelings and attitudes on the general relevancy and content presentation. Participants indicated they felt strongly that the training modules presented relevant content that could be applied to real-world medical situations (combined mean=3.76, SD = 0.32), taught information about the pediatric brain and MRI that they previously didn't know (combined mean=3.46, SD=0.54), provided a better understanding about the topics or ideas discussed in the module (combined mean=3.7, SD=0.3), felt that they will apply the learned techniques at their institution (combined mean= 3.6, SD=0.23), and finally will participate in the future using other BRAIN training modules and the learning management platform (combined mean=3.63, SD=0.19).

### ***2017 Internal Field Testing: Test Pre and Post Assessment Summary***

There were 129 total field testers (29 trainees in this cycle) across all evaluated courses with an average of 3.81 years of experience in neurology, radiology, computer science and neuroimaging. The average rating for how beneficial the web-based instructional content was to their learning showed a combined average of 3.582 on a scale of 5 (1=No improvement to 5=Exceptional improvement). Trainees' scores improved 62.4% from their pre to post assessment scores (combined pretest AVG =59.58% to combined post test AVG=96.78%). In 2016, the Pretest Mean result was 6.3 and Posttest mean result was 9.8 (63% and 98% respectively) with an overall 12.31% increase in evaluation improvement results from year 2016 to 2017. The scores demonstrate that online multimedia learning provides a highly engaging educational method for teaching and learning complicated topics about pediatric brain injury and advanced brain MRI techniques.

### ***2018 Internal Field Testing: Test Pre and Post Assessment Summary***

There were a total of 145 total field testers (37 trainees in the final 12 months of the training program) across all evaluated courses with an average of 3.63 years of experience in neurology, radiology, computer science and neuroimaging. Trainees' scores improved 50.6% from their pre to post assessment scores (combined pretest AVG =62.48% to combined post test AVG=94.1%). In March 2016, the Baseline Pretest Mean result was 6.2 and Baseline

Posttest mean result was 9.3 (62% and 93% respectively). This represents a 4% increase in evaluation improvement from year 2015 to 2018. The scores demonstrate that online multimedia learning provides a highly engaging educational method to teaching complicated topics about the developing pediatric brain and MRI techniques. This field test(s) included a (pre/post: pre-test vs. post-test) mixed design, with training being a between-subjects factor. We randomly assigned participants to the training condition of different brain seminar topics:

| Group A  | Group B   |
|--|---|
| <ul style="list-style-type: none"> <li>• <b>Investigating Brain Plasticity and Connectivity with Structural MRI Techniques</b> Overall Average   Pre-Test 60.8 Post Test 96.7</li> </ul> | <ul style="list-style-type: none"> <li>• <b>Fundamentals of Digital Imaging</b> Overall Average   Pre-Test 72.9 Post Test 96.0</li> </ul>             |
| <ul style="list-style-type: none"> <li>• <b>Intro to MRI</b> Overall Average   Pre-Test 85.4 Post Test 97.1</li> </ul>   | <ul style="list-style-type: none"> <li>• <b>Pediatric MRI Without Sedation</b> Overall Average   Pre-Test 62.7 Post Test 85.9</li> </ul>              |
| <ul style="list-style-type: none"> <li>• <b>Normal/Abnormal Development of the Cerebellum</b> Overall Average   Pre-Test 41.2 Post Test 90.6</li> </ul>                                  | <ul style="list-style-type: none"> <li>• <b>Corpus Callosum and other Major Commissures</b> Overall Average   Pre-Test 51.9 Post Test 98.3</li> </ul> |

### Questionnaire Results

Participants indicated they felt strongly that the training modules presented clinically relevant information (combined mean=3.81, SD = 0.222), taught information about the pediatric brain and MRI that they previously didn't know (combined mean=3.6, SD=0.467), provided a better understanding about the topics or ideas discussed in the module (combined mean=3.8, SD=0.280), felt that they will apply the learned techniques at their institution (combined mean=3.68, SD=0.172), and finally will participate in the future using other BRAIN training modules and the learning management platform (combined mean=3.7, SD=0.167). For a breakdown of individual question results and open-ended responses, (see Appendix D).

### **BRAIN e-module Military Implementation**

In the final year, we disseminated the BRAIN courseware to Walter Reed Military Hospital Center. In the latter part of the final year of the grant, we incorporated the feedback we received from the 145 trainees to refine and optimize the existing 33 BRAIN modules and introduced our BRAIN courseware to key military educational stakeholders in order to demonstrate the value of this educational tool as a modality for saving time and training costs, improving clinical

performance, and providing quality training experiences. We built on our existing partnership with the National Capital Consortium Pediatrics and Walter Reed under the support of Shannon Brockman, MD, the Executive Coordinator of Governance, Section on Pediatric Trainees, to develop a unique eLearning curriculum for their pediatric trainees within the MilitaryMedEd Platform. The team at Walter Reed has identified a need to deliver their training online through simulation courses due to lack of patients within their NICU. After reviewing our eLearning platform and overall progress throughout the last few years, the various courses within, as well as our success rate with post assessment scores gathered from our many test cohorts, they believe that we will be the appropriate channel to develop and produce their eLearning material. We received a detailed outline for how the team intended to proceed and we developed the timeline and architecture that met those deliverables. We have completed five new applications for Walter Reed on Respiratory Distress within the Newborn and plan to hold courses that will guide their residents through the portal and applications within. The team at Walter Reed would like to branch out with further development that will help supplement and replace traditional training throughout their division.

## **Portal Updates | Main Highlights (Appendix E)**

### **Recent Updates | 2018**

- Analytics Graph Updates
  - Improved grades chart email
  - Improved block installation in a course
- Lightbox Updates
  - Improved create, edit and delete galleries
  - Created Filter by Application User
  - Improved image resize from the “add image” form
- Block Filtered Course Updates
  - Displays a configurable list of user’s courses
  - Replacement for the “My Courses” block
  - Parameters now allow padding layouts for better readability
  - Checkbox now suppresses “All courses” link that otherwise appears at the bottom of the block
  - Ability to hide block from guests and anonymous visitors
  - By default an "Other courses" rubric appears at the end of the list and displays any of the user's courses that have not already been mentioned under some other heading
  - Customize the separator between ancestor categories when using the ANCESTRY token above

- By default administrators and managers will see a list of categories rather than a list of their own courses. This setting allows you to change that, and it can be helpful to do so while configuring the block.
- Poodll Filter Update
  - Added a once audio recorder option to selectable html5 recorders in filter settings
  - Added a once audio recorder preset
  - Added a appid/subtitle job params
  - Updated native audio
  - Refactored AMD code for better organized skins
  - Added a more flexible cloud job register method
  - Added scaffolding for ReadAloud and CloudPoodll
- Attendance Update
  - Added option to prevent sharing ip for current session
  - Make events optional per-session
  - Added output buffering level for progress bar
  - add list of modules in course on index
  - Added cog menu on teacher page under Boost based themes
  - Prevent students from sharing device while self-marking
- Questionnaire Updates
  - Added enhanced notification feature for full submission data.
  - Added support for block\_myoverview.
  - Added error handling to search indexing.
  - Changed name of data column alias to a non-reserved Oracle word.
  - Adding feedback data duplication to survey copying.
  - Allowed filtering on the activity name for the view page.
  - Added 'sectionheading' and 'feedback' as pluginfile areas.
  - Adding XSS risk masks to appropriate capabilities.

### **Potential Impediments and Impacts**

Overall the lessons we have learned, from implementing the online training portals here at Children's National Medical Center and with partnering organizations, demonstrated an initial reluctance from users from distance learning tools. A strategy for successfully overcoming this reluctance was to provide real-time coaching and facilitation support via field tests and onsite demonstrations. Our experience has shown that teaching stakeholders and learners how to properly use the training provides the necessary guidance and experience needed for long-term effective use and promotion of the portal system. For this reason, we provided both short and long-term onsite and webinar facilitation support services to facilitate adoption and knowledge uptake.

Similarly, another common impediment to field testing distance learning systems is reluctance for people who are technologically-challenged and do not engage in dynamic web applications on a regular basis. Again, we have found that real-time facilitation and coaching encourages users to work in teams that can help remedy this issue and offer added benefits. For example, an inexperienced person who trains alongside an experienced person will learn how to best use

features and functionality in the portal interface while directly being mentored. Mentoring involves the passing of wisdom, knowledge, and experience from the mentor to the learner. A primary goal of MilitaryMedED.com has been to foster peer-to-peer and mentoring relationships over a period of time and usage of the tool to adjust learner's skill levels and needs. Mentoring teaches the learner *how* to think, rather than *what* to think, and mentors are usually people who have vast experience in a given domain. Mentoring can be an impactful teaching mechanism by providing one-on-one guidance, encouraging self-learning and reflection, and giving concise feedback after learners struggle through training and exercises.

### **Past Updates | Main Highlights | 2017**

- Filter by Learning Plan by Custom Template
  - By clicking on "show more...", you can have more options to filter learning plans by scales values.

There are two options for using scales values filter

- Filtering learning plans by scale values from competencies rated at course level
- Filtering learning plans by scales values from competencies rated in the plan (Final rating)
- Created Filter by Application User
  - When filtering by scales values, the number of rating in the student list will be displayed:
  - We can choose a particular student by typing their name in the user picker field in order to retrieve their learning plans
- Revamped Learning Plan Layout
  - The details of each learning plan is now divided into three intuitive sections
- Learning Plan Competency Information Dashboard
  - **This dashboard displays the following information**
    - The plan's status and the number of competencies that are rated proficient on the total number of competencies of the plan
    - The number competencies that are rated not proficient
    - The number of competencies that are not rated
- Developed Final Rating and Statistics Interface
  - **Total number of rating**
    - It displays the number of courses linked to the competency and wherein the user is enrolled, Clicking on the number will trigger a popup containing the list of courses linked to the competency and if the course was rated or not.
- New Learning Plan Monitoring System
  - This page gives the users the ability to keep track of their learning plans with all the details mentioned above. To access this page, instructors can visit the user profile page and click on "Monitoring of learning plans" in the reports block.

## **Past Updates | Main Highlights | 2016**

- Competencies support in MilitaryMedED.com Improvements to the Assignment grading user interface
- Global Search API allows to search forums, wikis and other content throughout the entire site.
- Significant performance improvements in gradebook calculations

## **Past Updates | Main Highlights | 2015**

- Web-Based eLearning Branding and Code Enhancements
- Portal Updates
- Modified Header and Navigation
- Simplified Top Hero Banner
- Unified Overall Branding
  - Border Radius Modification
  - Color Adjustments
  - Navigation Border Adjustments
  - Navigation Drop down Configuration

## **Past Updates | Main Highlights | 2014**

### **Updated Design and UI/UX Elements and Features**

- Contrast. Using a range of values, colors, textures, shapes, and other elements. Contrast creates visual excitement, increases interest, and places emphasis on content.
- Emphasis. The creation of a center of interest for the viewer. The center of interest attracts attention to emphasize its importance compared to the other elements in the composition.
- Balance. The appearance of visual equality in shape, form, value, and color. Balance can be symmetrical, asymmetrical, or radial.
- Unity. Enhance instruction by harmonizing sections and providing content cohesion.
- Patterns. Art elements that use planned or random repetition to enhance composition and increase users' visual experience.
- Movement. The visual flow of the content by object placement and position throughout composition.
- Rhythm. The repetition of visual movement in terms of color, shape, and lines.



#### ***Design Requirement #4: Instructional Content***

Due to the amount of information presented and the visual elements needed to expand upon points or teach an objective, most module instruction is designed on a generalized content screen template. The content screen template contained some of the following elements:

- A slide title shown at the beginning of the module
- Multiple levels of bulleted text.
- Still composite graphics
- Custom animations such as animated diagrams or illustrations with text or image fade-ins
- The training modules are BEST viewed using the latest Adobe Flash plugin, which provides a screen visibility of the animated content. For operational purposes, the screens were designed to have a resolution of 1280 x 1024 and 1024 x 768.

## **KEY RESEARCH ACCOMPLISHMENTS**

- Development and implementation of the web-based BRAIN curriculum
- Developed and optimized 33 SCORM-compliant online training modules as outlined and detailed in the body of this document
- Developed on line FACTS (Focus on Clinical and Translational Science) curriculum onto our portal site
- 145 civilian and military trainees completed the BRAIN curriculum
- Enhanced and maintained the web-based learning management system that houses the BRAIN online courseware at [www.MilitaryMedEd.com](http://www.MilitaryMedEd.com)
- The site is now accessible from any device, web browser and operating system
- Completed field-testing of the learning management system and online seminar courses which lead to further improvements on the BRAIN courseware modules
- Novel visual enhancements of [MilitaryMedED.com](http://MilitaryMedED.com) were performed with a vast array of UI/UX improvements (front end and back end)
- Developed a strong collaborative partnership with Walter Reed Military Medical Center and [Militarymeded.com](http://Militarymeded.com)

## REPORTABLE OUTCOMES

### Training Outcomes

Successful training of 145 military and civilian residents/fellows/faculty, of which 37% came from the National Capital Consortium.

### Funding

Since the DoD (W81XWH-11-2-0198) Advanced Pediatric Brain Imaging Research and Training Program ended, Period of Performance (PoP) 9/15/2011 9/14/2018, we recently applied for a T32 NIH Training Program (Overall PI: Catherine Limperopoulos).

### Scientific meetings and presentations

Limperopoulos, C, Sestokas, J.M. (2016) Introduction to military.medED.com. Walter Reed National Military Medical Center. Bethesda, MD.

Sestokas, J.M., (2015) Course 1276 - Upgrade Your Teaching: Developing and Improving an Online Learning System. (Presentation at 2015 Pediatric Academic Society Meeting). San Diego, CA.: Children's National Medical Center.

Sestokas, J.M., (2015) Course 3816 – Multimedia Learning: Selecting the Right Educational Technology for Your Learners. (Presentation at 2015 Pediatric Academic Society Meeting). San Diego, CA.: Children's National Medical Center.

Sestokas, J.M., (2016) Course 1551– e-Learning Support Technologies for Motivating, Incentivizing, Gamifying and the Enhancing the Situation Awareness of Online Learners. (Presentation at 2016 Pediatric Academic Society Meeting, Special Interest Group in Medical Education). Baltimore, MD: Children's National Medical Center.

Neha H. Shah, Priti Bhansali, Aisha Davis, Jeffrey Sestokas, Dewesh Agrawal. (2016) Course 1375– Care of the Child With Medical Complexity: A Multimedia Curriculum for Residents Across North America. (Presentation at 2016 Pediatric Academic Society Meeting). Baltimore, MD: Children's National Medical Center.

Sestokas, J.M., (2016) Course 1776– Assessing the E-learner: Combining Traditional Principles with New Technologies . (Presentation at 2016 Pediatric Academic Society Meeting). Baltimore, MD: Children's National Medical Center.

Sestokas, J.M., (2016) Course 3172– Upgrade Your Teaching: Developing and Improving an Online Learning System. (Presentation at 2016 Pediatric Academic Society Meeting). Baltimore, MD: Children's National Medical Center.

Goldberg, B and Sestokas, J.M. (2016) The Hot Zone: An Online Decision-centered Vignette Player for Teaching Clinical Diagnostic Reasoning Skills on the Management and Treatment of Patients with Malaria. (Presentation and Poster #2275 at 2016 Pediatric Infectious Disease Week). New Orleans, LA: Children's National Medical Center

### Manuscripts in preparation

Sestokas, J.M. *The Four Levels of Interactive Multimedia Instruction*. Manuscript in preparation for the British Journal of Educational Technology.

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2. Shah NH, Bhansali P, Barber A, Toner K, Kahn M, MacLean M, Kadden M, Sestokas J, Agrawal D. Children With Medical Complexity: A Web-Based Multimedia Curriculum Assessing Pediatric Residents Across North America. *Acad Pediatr.* 2018 Jan - Feb;18(1):79-85. doi: 10.1016/j.acap.2017.08.008. Epub 2017 Aug 24.
3. Ottolini M. Pediatric hospitalists and medical education. *Pediatric* 2014 Jul;43(7):e151-6. doi: 10.3928/00904481-20140619-08.

## **CONCLUSION**

Over the course of the DoD training program, we developed and enhanced 33 BRAIN eLearning modules and refined our online learning management system. The eLearning curriculum was completed by 145 trainees. Our internal field-testing results on 145 military and civilian trainees demonstrated the effectiveness and responsiveness of our novel eLearning instructional BRAIN courses. The success of this online training is further illustrated by a steady increase in evaluation improvement from year 2015 to 2018.

We continuously enhanced and maintained the web-based learning management system that houses the BRAIN online courseware at [www.MilitaryMedEd.com](http://www.MilitaryMedEd.com). The site can now be accessed from any device, web browser and operating system. We refined our online FACTS (Focus on Clinical and Translational Science) curriculum onto our portal site and held ongoing internal workshops to teach co-investigators and SMEs how to design, develop, and implement online BRAIN courseware training modules

Our field-testing of the learning management system and online seminar courses led to ongoing improvements and enhancements on the BRAIN courseware applications and in addition to the visual enhancements of [MilitaryMedED.com](http://MilitaryMedED.com), we have implemented a vast range of new UI/UX improvements (frontend and backend).

Finally, we successfully partnered with the National Capital Consortium Pediatrics and Walter Reed Medical Center in collaboration with Dr. Shannon Brockman, MD, the Executive Coordinator of Governance, Section on Pediatric Trainees, and have developed a unique eLearning curriculum for their pediatric trainees within the MilitaryMedEd Platform. They identified a need to deliver their training online through simulation courses due to lack of patients within the NICU at Walter Reed. After reviewing our eLearning platform and overall progress throughout the last few years, the various courses within, as well as our success rate with post assessment scores gathered from our many test cohorts, they believe that we will be the appropriate channel to develop and produce their eLearning material. We have worked with them on a rigorously detailed outline and have developed the architecture and eLearning Applications to meet those deliverables. We will continue to make the BRAIN e-learning courseware available to military medical bases to support ongoing remote educational initiatives.

Taken together, our DoD BRAIN curriculum significantly augmented the experience of the National Capital Consortium residents and fellows training experience at Children's National. Moreover, by exposing incoming military residents and fellows to our brain imaging research infrastructure and multidisciplinary investigators, we believe we can solicit future interest in multidisciplinary and multi-institutional imaging research with Children's National investigators.

The BRAIN program has also be available in an advisory capacity for military research projects involving pediatric brain imaging and serves as an effective forum for promoting data-sharing and problem solving and allow for a buildup of parallel collaborative network between Children's National and the military network of trainees in the future.

## **APPENDICES**

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

## APPENDIX A NEW E-LEARNING APP DEVELOPMENT

---

### Samples of newly developed eLearning applications



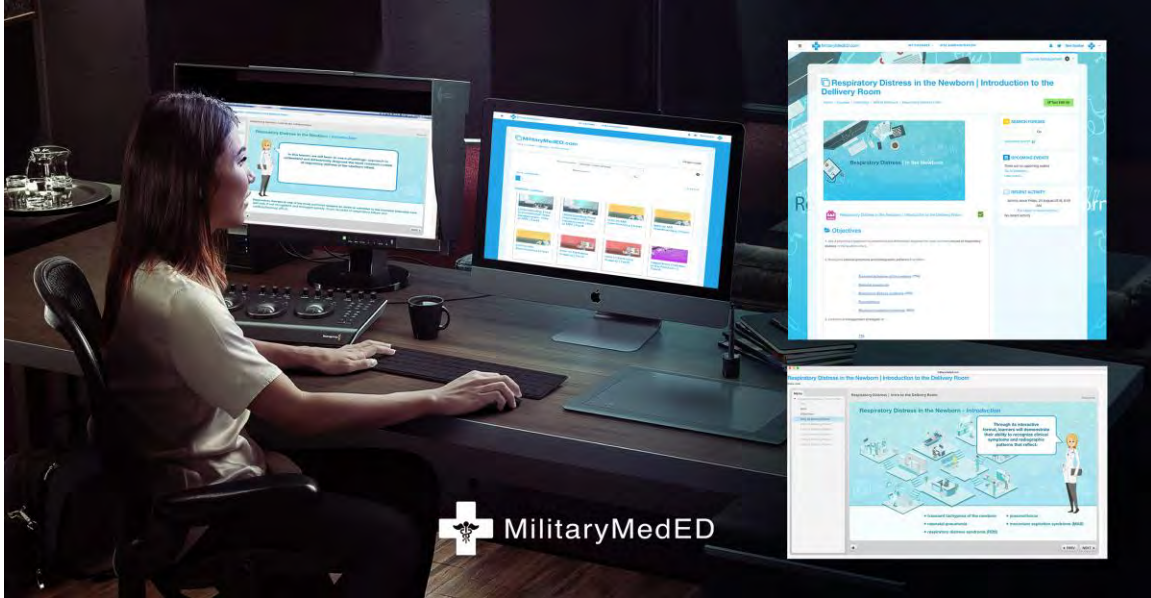
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MilitaryMedEd apps assist in training military medical providers in conducting clinical research using advanced brain imaging technologies to study the causes and consequences of pediatric brain injury.

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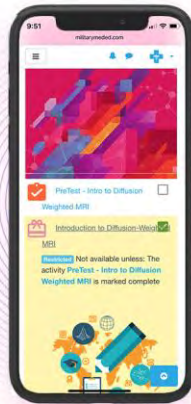
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- Understanding Fetal Supratentorial Brain Development: Role of MRI | Part1
- Intro to MR Spectroscopy | Part3
- Intro to MR Spectroscopy | Part2
- Intro to MR Spectroscopy | Part1
- Intro to Perfusion Imaging | Part2
- Intro to Perfusion Imaging | Part1
- Respiratory Distress in the Newborn | Case4
- Respiratory Distress in the Newborn | Case3
- Respiratory Distress in the Newborn | Case2
- Respiratory Distress in the Newborn | Case1
- Respiratory Distress in the Newborn | Introduction to the Delivery Room
- Advanced Magnetic Resonance Spectroscopy | Part2
- Advanced Magnetic Resonance Spectroscopy | Part1
- Resting State fMRI in Fetuses & Newborns | Part3
- Resting State fMRI in Fetuses & Newborns | Part2
- Resting State fMRI in Fetuses & Newborns | Part1
- Measuring the Cerebral Metabolic Rate of Oxygen using MRI | Part2
- Measuring the Cerebral Metabolic Rate of Oxygen using MRI | Part1
- Measuring the Cerebral Metabolic Rate of Oxygen using MRI | Part1
- Measuring the Cerebral Metabolic Rate of Oxygen using MRI | Part1
- Pediatric MRI Without Sedation: Is it Art or Science?
- Introduction to MRI
- Investigating Brain Plasticity and Connectivity with Structural MRI Techniques
- Normal and Abnormal Development of the Cerebellum
- Diffuse Axonal Injury and other "Major" Comminutions



developing  
brain  
research laboratory  
pediatrics • neurology • neuroscience

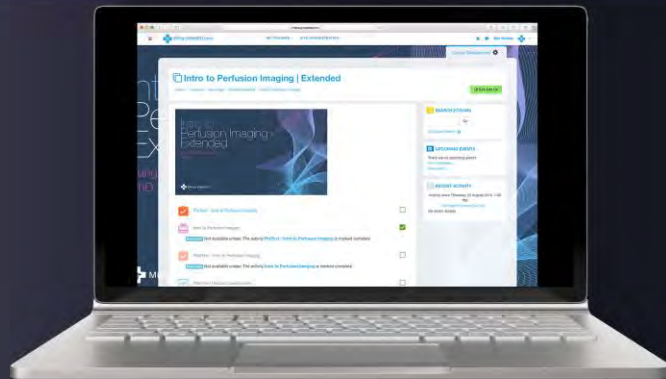
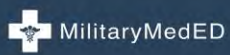
BRAIN (Brain Research Advanced Imaging with NMR) training. An online resource for medical providers and trainees to advance their understanding of pediatric brain injury.

MilitaryMedEd apps assist in training military medical providers in conducting clinical research using advanced brain imaging technologies to study the causes and consequences of pediatric brain injury.



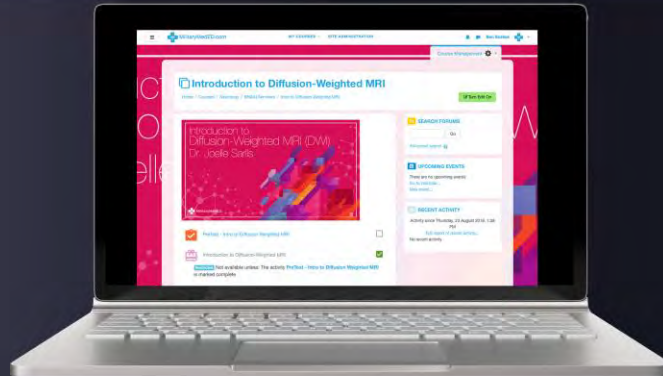
# Intro to Perfusion Imaging Extended

Zungho (Wesley) Zun  
PhD



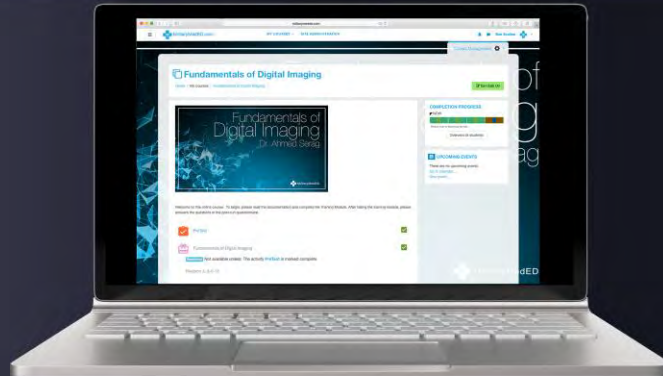
# Introduction to Diffusion-Weighted MRI (DWI)

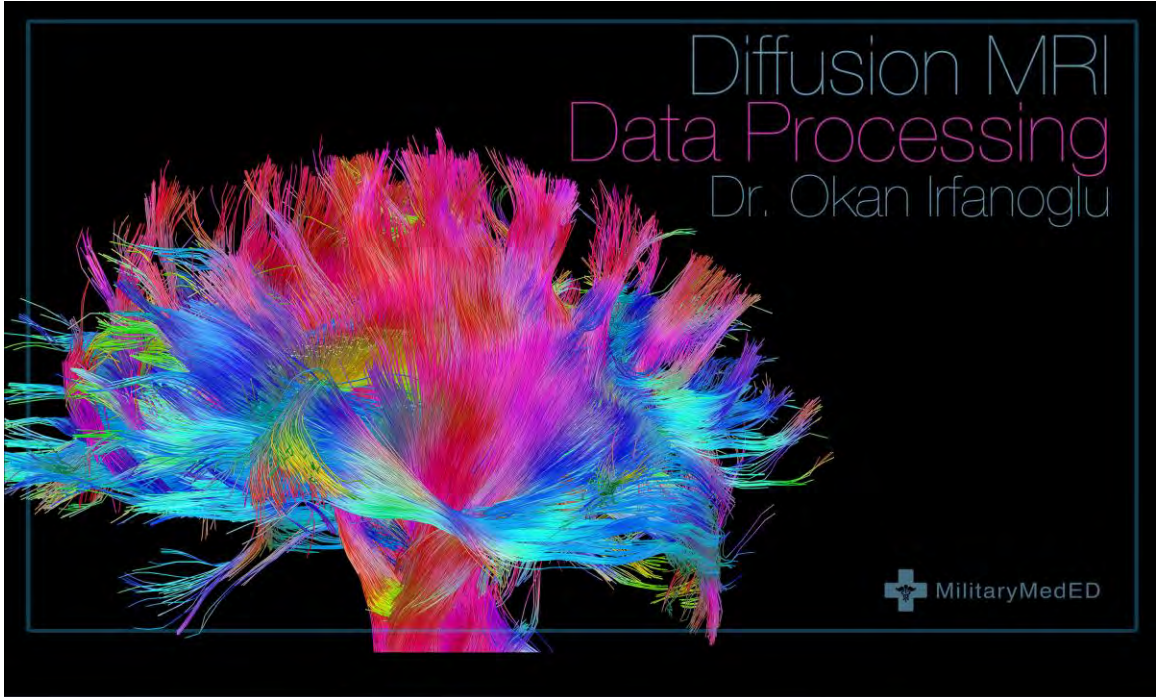
Dr. Joelle Sarlls



# Fundamentals of Digital Imaging

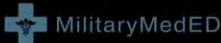
Dr. Ahmed Serag





# Diffusion MRI Data Processing

Dr. Okan Irfanoglu



Diffusion MRI Data Processing

Dr. Okan Irfanoglu

RECENT ACTIVITY

Activity from Training, 28 Jun 2015, 1:07





# Respiratory Distress in the Newborn | Introduction to the Delivery Room

Home / Courses / Neurology / BRAIN Seminars / Respiratory Distress | Intro

Turn Edit On



Respiratory Distress in the Newborn | Introduction to the Delivery Room



## Objectives

1. Use a physiologic approach to understand and differentially diagnose the most common *causes of respiratory distress* in the newborn infant.

2. Recognize *clinical symptoms and radiographic patterns* that reflect:

- [Transient tachypnea of the newborn \(TTN\)](#)
- [Neonatal pneumonia](#)
- [Respiratory distress syndrome \(RDS\)](#)
- [Pneumothorax](#)
- [Meconium aspiration syndrome \(MAS\)](#)

3. Understand *management strategies* for

- [TTN](#)

### SEARCH FORUMS

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## Respiratory Distress in the Newborn | Introduction to the Delivery Room

Review mode

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- Intro to Delivery Room
- Intro to Delivery Room2
- Intro to Delivery Room3
- Intro to Delivery Room4
- Intro to Delivery Room5
- Intro to Delivery Room6

Respiratory Distress | Intro to the Delivery Room

Resources

### Respiratory Distress in the Newborn - Introduction

Through its interactive format, learners will demonstrate their ability to recognize clinical symptoms and radiographic patterns that reflect:

- transient tachypnea of the newborn
- neonatal pneumonia
- respiratory distress syndrome (RDS)
- pneumothorax
- meconium aspiration syndrome (MAS)

< PREV NEXT >

## Respiratory Distress in the Newborn | Introduction to the Delivery Room

Review mode


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- Respiratory Distress | Intro to the Delivery Room
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- Intro to Delivery Room6

Respiratory Distress | Intro to the Delivery Room

Resources

### Respiratory Distress in the Newborn - Delivery Room



- Warmer for use during resuscitation
- Screen as an APGAR timer
- Suction and respiratory support
- Suction between 80 and 100mmHg
- Mask set to PIP of 20 and a PEEP of 5
- O2 set at 21% to start
- Pulse Oximetry sensor and an appropriately sized Endotracheal Tube, Stylet, & Laryngoscope nearby

< PREV    NEXT >

## Respiratory Distress in the Newborn | Introduction to the Delivery Room

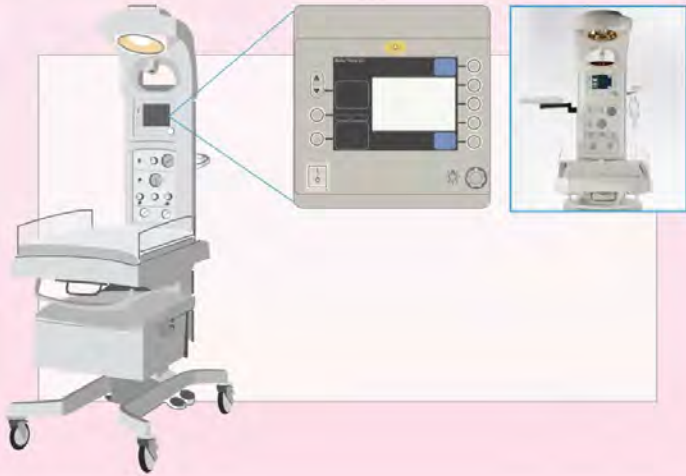
Review mode

Menu

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Respiratory Distress | Intro to the Delivery Room

Resources



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## Respiratory Distress in the Newborn | Case1

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  - 1.7. Case1 | Further Evaluation
  - 1.8. Case1 | Quiz II
  - 1.9. Case1 | Quiz II Results
  - 1.10. Case1 | Respiratory Distress Syndrome (RDS)
  - 1.11. Case1 | RDS II
  - 1.12. Case1 | CPAP
  - 1.13. Case1 | Quiz III
  - 1.14. Case1 | Quiz III Results
  - 1.15. Case1 | Conclusion

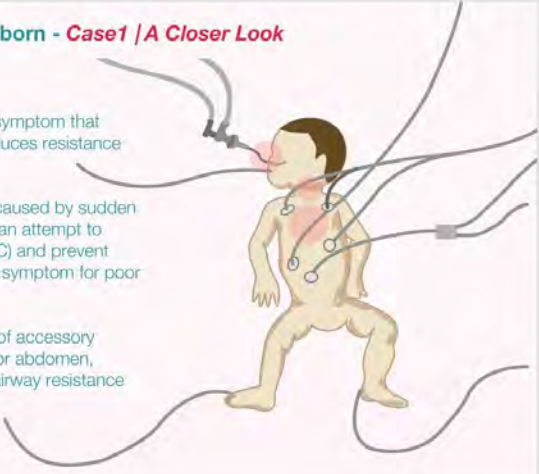
Respiratory Distress | Case1

### Respiratory Distress in the Newborn - Case1 | A Closer Look

**Nose** - Nasal flaring is a compensatory symptom that increases upper airway diameter and reduces resistance and work of breathing.

**Neck** - Grunting is an expiratory sound caused by sudden closure of the glottis during expiration in an attempt to maintain functional residual capacity (FRC) and prevent alveolar atelectasis. It is a compensatory symptom for poor pulmonary compliance.

**Chest** - Retractions, evident by the use of accessory muscles in the neck, rib cage, sternum, or abdomen, occur when lung compliance is poor or airway resistance is high.



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## Respiratory Distress in the Newborn | Case2

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 1.5. Case2 | Quiz II Results  
 1.6. Case2 | Transient Tachypnea of the Newborn (TTN)  
 1.7. Case2 | TTN II (Symptoms)  
 1.8. Case2 | TTN III (Amniotic Fluid)  
 1.9. Case2 | Conclusion


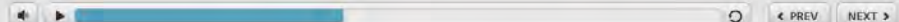
Respiratory Distress | Case2

### Respiratory Distress in the Newborn - Case2 | Intro / Quiz

 You place the pulse oximetry sensor on her right hand and it shows a heart rate of 165 and an oxygen saturation of 93%. You identify that your patient is in respiratory distress. What is your next step?

 **Great job!**

**Answer:** You apply CPAP 5cmH2O and your patient's work of breathing starts to improve. His FiO2 requirement is initially 30%, but you are able to wean quickly to 21% with appropriate oxygen saturations.

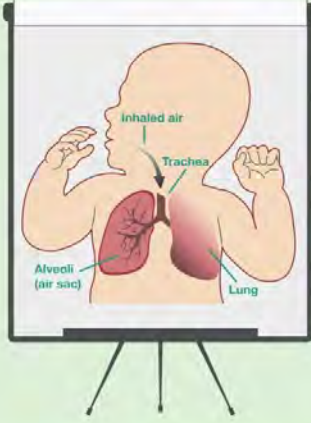
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## Respiratory Distress in the Newborn | Case2

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
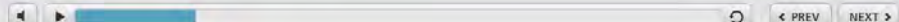
Respiratory Distress | Case2

### Respiratory Distress in the Newborn - Case2 | Transient Tachypnea of the Newborn (TTN)



Babies with TTN have fluid in their lungs that makes it hard to breathe.

- Rapid breathing
- Flaring of the nostrils when breathing in
- Grunting
- Sharp pulling in of the chest muscles during breathing (retraction)
- Bluish skin color (cyanosis) around the nose and mouth

Search...  



Respiratory Distress in the Newborn | Case3

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- 1.8. Chorioamnionitis II
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- 1.15. Case3 Quiz III
- 1.16. Case3 Quiz III Results
- 1.17. Case3 Quiz IV
- 1.18. Case3 Quiz IV Results
- 1.19. Neonatal Pneumonia II
- 1.20. Case3 Quiz V
- 1.21. Case3 Quiz V Results
- 1.22. Conclusion I
- 1.23. Conclusion II

Respiratory Distress | Case3

### Respiratory Distress in the Newborn - Case3 | [Back to Our Case](#)



You learn that your patient was born by vaginal delivery after rupture of membranes for 22 hours.

The obstetrics team in the delivery room informs you that mother had an intrapartum fever of 101.5F which was associated with maternal and fetal **tachycardia**.

The mother was diagnosed with **chorioamnionitis**.



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## Respiratory Distress in the Newborn | Case3

Respiratory Distress | Case3

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Respiratory Distress in the Newborn - Case3 | [Back to Our Case](#)

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## Respiratory Distress in the Newborn | Case3

Respiratory Distress | Case3

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  - 1.22. Conclusion I
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Respiratory Distress in the Newborn - Case3 | [Neonatal Pneumonia](#) | [Back to Our Case](#)

Upon further review of the hospital records, you learn that your patient's mother was late to prenatal care and had an unknown GBS status.

A GBS PCR was sent at time of admission, but she was not started on antibiotics due to a history of anaphylactic reaction to Penicillin.

**Group B Strep Infection (GBS) Infection of the Fetus**

1. Bacteria ascend from the vagina into the amniotic fluid
2. Baby inhales bacteria
3. Bacteria infects the bloodstream

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## Respiratory Distress in the Newborn | Case3

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- 1.21. Case3 Quiz V Results
- 1.22. Conclusion I
- 1.23. Conclusion II

### Respiratory Distress in the Newborn - Case3 | Neonatal Pneumonia

Infants may acquire **pneumonia transplacentally**, through infected amniotic fluid, via colonization at the time of birth, or nosocomially. Immaturity of the infant's immune system and the **pulmonary anatomical** and **physiologic features** make the newborn at higher risk of infection.

The underdeveloped respiratory cilia and the decreased number of pulmonary macrophages result in **decrease clearance of pathogens from the respiratory system.**

**Morphology**

- Lobar pneumonia
- Bronchopneumonia
- Interstitial pneumonia

**Onset**

- True congenital pneumonia
- Intrapartum pneumonia
- Postnatal pneumonia

**Etiology**

- Viral
- Bacterial
- Mycoplasma
- Aspiration

In addition, newborns have diminished cellular and humoral immune function. Risk factors for perinatal pneumonia include **prolonged rupture of membranes (PROM), maternal infection, and prematurity.**

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## Respiratory Distress in the Newborn | Case4

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  - 1.6. MAS II
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  - 1.9. Management of MAS I
  - 1.10. Management of MAS II
  - 1.11. Management of MAS III
  - 1.12. Management of MAS IV

Respiratory Distress (Case4)

### Respiratory Distress in the Newborn - Case4 | Quiz

**When she arrives on the warmer, you note a large infant with meconium-stained skin. She is limp and cyanotic with good respiratory effort.**

**You note nasal flaring and subcostal and suprasternal retractions and hear coarse rhonchi in bilateral lung fields. You apply CPAP and transfer the infant to the NICU. Once she is stabilized, you call for a chest x-ray.**



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## Respiratory Distress in the Newborn | Case4

Respiratory Distress (Case4)

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  - 1.7. Case4 Quiz2
  - 1.8. Case4 Quiz2 Results
  - 1.9. Management of MAS I
  - 1.10. Management of MAS II
  - 1.11. Management of MAS III
  - 1.12. Management of MAS IV

**Respiratory Distress in the Newborn - Case4 | Meconium Aspiration Syndrome**

Meconium in lungs

Trachea

Meconium in lungs

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## Respiratory Distress in the Newborn | Case4

Respiratory Distress (Case4)

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  - 1.5. Meconium Aspiration Syndrome (MAS)**
  - 1.6. MAS II
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  - 1.8. Case4 Quiz2 Results
  - 1.9. Management of MAS I
  - 1.10. Management of MAS II
  - 1.11. Management of MAS III
  - 1.12. Management of MAS IV

**Respiratory Distress in the Newborn - Case4 | Meconium Aspiration Syndrome**

**Quiz**

Meconium is composed of lanugo, bile, vernix, pancreatic enzymes, desquamated epithelia, amniotic fluid, and mucus. Meconium is present in the gastrointestinal tract as early as 16 weeks' gestation but is not present in the lower descending colon until 34 weeks' gestation; therefore, MSAF is seldom seen in infants younger than 37 weeks' gestation.

In the compromised fetus, hypoxia or acidosis may result in a peristaltic wave and relaxation of the anal sphincter, resulting in meconium passage in utero.

Oxygen is exchanged across the alveolar wall into the surrounding capillary network.

Meconium in alveolus  
 ● Inhibits the exchange of oxygen

Search...

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# Understanding Fetal Supratentorial Brain Development: Role of MRI | Part 1

Home / Courses / Neurology / BRAIN Seminars / Role of MRI | Part 1

Turn Edit On



Understanding Fetal Supratentorial Brain Development: Role of MRI | Part 1

## Objectives Outline | Topics Covered

1. Understand what fetal MRI can reveal about cerebral development
2. Become familiar with the appearance of the normally developing cerebrum
3. MR assessment of the normal fetal cerebrum
  - a. Growth of Cerebrum
  - b. Gyrfication
  - c. Germinal matrix / Cerebral layering
  - d. Lateral Ventricular Size / White matter

### SEARCH FORUMS

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### Understanding Fetal Supratentorial Brain Development: Role of MRI | Part2

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  - 1.1. Home
  - 1.2. Objectives**
  - 1.3. 28 wks
  - 1.4. 30wks/33wks
  - 1.5. Optimal Time for Precise Correlation Between MR Signal Pattern & Actual GA
  - 1.6. 23-24 wks
  - 1.7. 27 weeks
  - 1.8. 29 wks
  - 1.9. 32-33 wks
  - 1.10. 35 wks
  - 1.11. Sylvian Fissure - 18-29 wks

**Role of MRI | Pt2**

#### Objectives

1. Understand what fetal MRI can reveal about cerebral development
2. Become familiar with the appearance of the normally developing cerebrum

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[play icon] [progress bar] [refresh icon] [PREV] [NEXT]

## Understanding Fetal Supratentorial Brain Development: Role of MRI | Part2

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  - 1.4. 30wks/33wks**
  - 1.5. Optimal Time for Precise Correlation Between MR Sulcal Pattern & Actual GA
  - 1.6. 23-24 wks
  - 1.7. 27 weeks
  - 1.8. 29 wks
  - 1.9. 32-33 wks
  - 1.10. 35 wks
  - 1.11. Sylvian Fissure - 18-29 wks

**Role of MRI | Pt2**

30 weeks 33 weeks  
Replied Neuroimaging 2013

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## Understanding Fetal Supratentorial Brain Development: Role of MRI | Part2

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  - 1.3. 28 wks
  - 1.4. 30wks/33wks
  - 1.5. Optimal Time for Precise Correlation Between MR Sulcal Pattern & Actual GA
  - 1.6. 23-24 wks
  - 1.7. 27 weeks**
  - 1.8. 29 wks
  - 1.9. 32-33 wks
  - 1.10. 35 wks
  - 1.11. Sylvian Fissure - 18-29 wks

**Role of MRI | Pt2**

27 weeks

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## Understanding Fetal Supratentorial Brain Development: Role of MRI | Part2

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  - 1.8. 29 wks
  - 1.9. 32-33 wks
  - 1.10. 35 wks**
  - 1.11. Sylvian Fissure - 18-29 wks

**Role of MRI | Pt2**



35 weeks

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## Understanding Fetal Supratentorial Brain Development: Role of MRI | Part1

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  - 1.4. What Fetal MR can Document**
  - 1.5. MR Assessment of Normal Fetal Cerebrum
  - 1.6. 20 wks
  - 1.7. 20wks/30wks
  - 1.8. Cerebrum
  - 1.9. Emerging Connectivity
  - 1.10. 23wks/25wks

**Role of MRI | Pt1**



**What Fetal MR Can Document**

- Growth (cerebrum, corpus callosum)
- Neuronal migration
- Involution of germinal matrix
- Gyrfication
- Early myelination
- Structural maturation (DTI)
- Metabolic maturation (MRG)

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## Understanding Fetal Supratentorial Brain Development: Role of MRI | Part1

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  - 1.8. Cerebrum
  - 1.9. Emerging Connectivity
  - 1.10. 23wks/25wks

**Role of MRI | Pt1**



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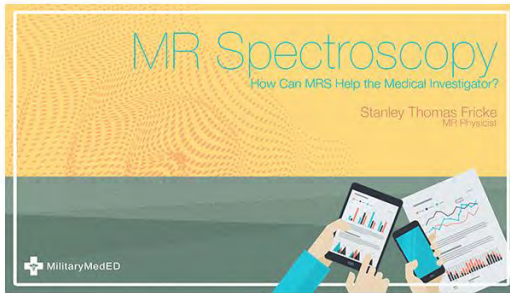




# Intro to MR Spectroscopy | Part1

Home / Courses / Neurology / BRAIN Seminars / Intro to MR Spectroscopy | Part1

Turn Edit On



Intro to MR Spectroscopy | Part1

## Objectives Outline | Topics Covered

- Magnetic Resonance Spectroscopy Theory
- Factors influencing Position and Intensity
- Line Shape
- The Lorentzian Equation
- Signal to Noise
- Brain Chemicals Visible via 1H NMR
- Brain Chemicals Visible via 31PNMR
- Variation of Chemical Shift
- Excess Glutamate
- Variation of Major 1H Brain Metabolites
- Spectra from Brain Regions
- Tissue Segmentation
- DTI Acquisition and Processing
- Diffusion

### SEARCH FORUMS

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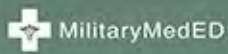
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# MR Spectroscopy

How Can MRS Help the Medical Investigator?

Stanley Thomas Fricke  
MR Physicist



## Intro to MR Spectroscopy | Part1

MR Spectroscopy | Pt 1

- 1. MR Spectroscopy
  - 1.1. Home
  - 1.2. Objectives
  - 1.3. The Signal
  - 1.4. Spin Energy
  - 1.5. Spin Energy Equation
  - 1.6. Frequency Equation
  - 1.7. Influencing Factors
  - 1.8. Influencing Factors
  - 1.9. Lorentzian
  - 1.10. Spectral Peak
  - 1.11. High Quality Spectra
  - 1.12. High Quality Spectra

$$\Delta E = \hbar\omega$$

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# Intro to MR Spectroscopy | Part1

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  - 1.10. Spectral Peak
  - 1.11. High Quality Spectra
  - 1.12. High Quality Spectra

MR Spectroscopy | Pt 1

$\omega = \gamma * \beta$

Angular Frequency    Gyro Magnetic Ratio    Magnetic Field

$\omega = \gamma * (\beta - \sigma)$

Shielding Constant

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# Intro to MR Spectroscopy | Part1

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MR Spectroscopy | Pt 1

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Intro to MR Spectroscopy | Part1

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MR Spectroscopy | Pt 1

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  - 1.13. Single Model Spectral Peaks
  - 1.14. Application

MR Spectroscopy | Pt 3

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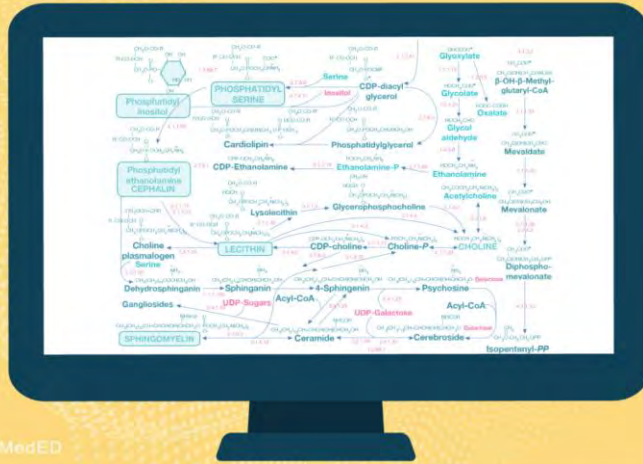
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### Intro to MR Spectroscopy | Part3

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#### MR Spectroscopy | Pt 3



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### Intro to MR Spectroscopy | Part3

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#### MR Spectroscopy | Pt 3



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# Intro to Perfusion Imaging | Part1

Home / Courses / Neurology / BRAIN Seminars / Perfusion Imaging | Part1

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## Intro to Perfusion Imaging | Part1

### Objectives

- Basics of Perfusion
- Non-MR Perfusion Imaging
- MR Perfusion Imaging with Contrast Agents
- MRI Perfusion Imaging without Contrast Agents – Arterial Spin Labeling (ASL)

### SEARCH FORUMS

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Intro to Perfusion Imaging | Part2

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Intro to Perfusion Imaging | Pt 2

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  - 1.6. Kety Model Failure
  - 1.7. Residue Function
  - 1.8. CBF Quantification Using Residue Function
  - 1.9. Residue Function in Practice
  - 1.10. MTT & Residue Function
  - 1.11. CBV Quantification
  - 1.12. Example Images
  - 1.13. Summary

**Why T2\*-w Imaging in the Brain?**

- Gd reduces T1, T2, T2\* (due to off-resonance)
- Blood brain barrier (BBB)
  - Barier in endothelial cells to stop foreign substances from crossing from intravascular space to extravascular space
  - Blood out Gd
- T2\*-w: high SNR than T1-w

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Search... [magnifying glass icon]

[play icon] [stop icon] [refresh icon] [PREV] [NEXT]

This screenshot shows a presentation slide titled 'Intro to Perfusion Imaging | Pt 2'. On the left is a 'Menu' with a list of topics, where '1.5. Why T2' is highlighted. The main content area features an illustration of a man in a white lab coat and glasses holding a tablet. The tablet displays the title 'Why T2\*-w Imaging in the Brain?' and a bulleted list of points. The first point is 'Gd reduces T1, T2, T2\* (due to off-resonance)'. The second point is 'Blood brain barrier (BBB)', which includes sub-points: 'Barier in endothelial cells to stop foreign substances from crossing from intravascular space to extravascular space' and 'Blood out Gd'. The third point is 'T2\*-w: high SNR than T1-w'. To the right of the text on the tablet is a small brain MRI image showing contrast enhancement. The MilitaryMedED logo is at the bottom left of the slide. At the bottom of the presentation window, there is a search bar, a play button, a stop button, a refresh button, and 'PREV' and 'NEXT' navigation buttons.

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### Intro to Perfusion Imaging | Pt 2

Kety Model Fails in Some Cases

- Ideal
- With a long MTT
- With a bolus of tracer injection

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### Intro to Perfusion Imaging | Pt 2

CBV Quantification

$$C_1(t) = F \cdot C_i(t) + R(t)$$

$$\int C_1(t) \cdot dt = F \cdot \int C_i(t) \cdot dt + \int R(t) \cdot dt \quad (\text{Take integral on both sides})$$

$$= F \cdot \int C_i(t) \cdot dt + \int R(t) \cdot dt$$

$$= F \cdot \int C_i(t) \cdot dt + MTT$$

$$= CBV \cdot \int C_i(t) \cdot dt \quad (\text{From CBF} = CBV/MTT)$$

$$CBV = \frac{\int C_1(t) \cdot dt}{\int C_i(t) \cdot dt}$$

- Only valid for intravascular contrast agent because  
 $CBF = CBV/MTT \rightarrow QIF = I/MTT$  in general

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### Intro to Perfusion Imaging | Part1

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  - 1.11. Quantify
  - 1.12. Nitrous Oxide Technique
  - 1.13. Kety-Schmidt
  - 1.14. Kety-Schmidt
  - 1.15. Measure Tissue Concentrations
  - 1.16. Applications of Kety Model

**Intro to Perfusion Imaging | Pt 1**

## Partition Coefficient ( $\lambda$ )

- Volume of distribution of the agent
- Specific to tracer agent
  - For intravascular agents,  $\lambda = \text{CBV}$
  - For extravascular agents (diffusible),  $\lambda = 1$ .

Intravascular agent      Extravascular agent

- MTT = 4 s for intravascular agents (or blood)
- MTT = 80 s for extravascular agents

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### Intro to Perfusion Imaging | Part1

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  - 1.15. Measure Tissue Concentrations
  - 1.16. Applications of Kety Model

**Intro to Perfusion Imaging | Pt 1**

## How to Quantify Perfusion Using Microspheres

$C_t(t)$  - concentration of tracer in tissue  
 $C_a(t)$  - concentration of tracer in artery  
 $F$  : CBF

$C_t(t)$        $C_a(t)$

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## Intro to Perfusion Imaging | Part1

Intro to Perfusion Imaging | Pt 1

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### Nitrous Oxide (N<sub>2</sub>O) Technique

- First technique to measure CBF in humans
- Subject breathes 15% N<sub>2</sub>O during sampling of [N<sub>2</sub>O] in artery/vein
- Global perfusion
  - C<sub>a</sub> from brachial/femoral arteries
  - C<sub>v</sub> from jugular vein
- Used Kety-Schmidt method for quantification



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# Advanced Magnetic Resonance Spectroscopy | Part1

Home / Courses / Neurology / BRAIN Seminars / Advanced MR Spectroscopy | Part1

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Advanced Magnetic Resonance Spectroscopy | Part1

## Objectives

- > Motivation
- > Spin
- > Chemical Shift
- > J-coupling
- > Localization
- > Point-Resolved Spectroscopy (PRESS)
- > Magnetic field strength
- > Pulse sequence and echo-time
- > Quantifying metabolites
- > Applications

### SEARCH FORUMS

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### UPCOMING EVENTS

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# Advanced MR Spectroscopy



Subechhya Pradhan  
Department of Diagnostic Imaging & Radiology  
Children's National Medical Center

## Advanced Magnetic Resonance Spectroscopy | Part 1

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  - 1.7. Basics: Scalar Coupling
  - 1.8. Localization
  - 1.9. Point-Resolved Spectroscopy
  - 1.10. Factors affecting the Signal

MR Spectroscopy Pt I

Cr ml Glx Cho Cr Glu Gln NAA CSO

Chemical Shift (ppm)

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## Advanced Magnetic Resonance Spectroscopy | Part1


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## Motivation

### Quantifying Metabolites



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## Advanced Magnetic Resonance Spectroscopy | Part1

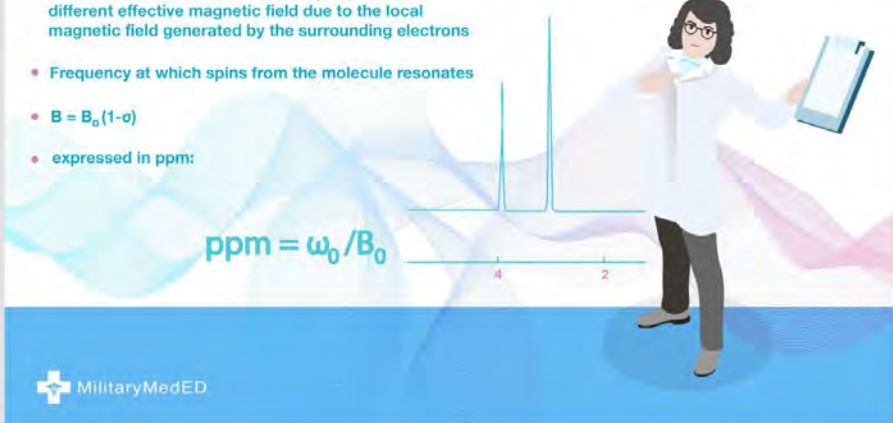
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MR Spectroscopy Pt I

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  - 1.7. Basics: Scalar Coupling
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  - 1.10. Factors affecting the Signal

## Basics: chemical shift

- Different nucleus in a molecule may experience different effective magnetic field due to the local magnetic field generated by the surrounding electrons
- Frequency at which spins from the molecule resonates
- $B = B_0(1-\sigma)$
- expressed in ppm:

$$\text{ppm} = \omega_0 / B_0$$


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## Advanced Magnetic Resonance Spectroscopy | Part2

MR Spectroscopy Pt II

## Use of prior knowledge

The image shows a woman in a white lab coat and glasses holding a tablet. The tablet displays two NMR spectra side-by-side. The left spectrum is labeled 'Basis set' and the right is labeled 'Spectrum'. Both spectra show peaks at approximately 3.6, 3.2, 2.0, and 1.2 ppm. The x-axis for both is labeled 'ppm' and ranges from 4.0 to 0.4.

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  - 1.5. How to Analyze Spectra
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  - 1.7. Use of Prior Knowledge**
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## Advanced Magnetic Resonance Spectroscopy | Part2

MR Spectroscopy Pt II

## Accuracy of the Basis set

The image shows two side-by-side NMR spectra plots. The left plot is labeled 'LCModel (Version 6.3-03) Copyright: S.W. Provencher' and the right is 'LCModel (Version 6.1-4) Copyright: S.W. Provencher'. Both plots show a noisy baseline with several sharp peaks at approximately 3.6, 3.2, 2.0, and 1.2 ppm. The x-axis is 'Chemical Shift (ppm)' from 4.0 to 0.4. The y-axis is labeled '2.0E+08'.

**Menu**

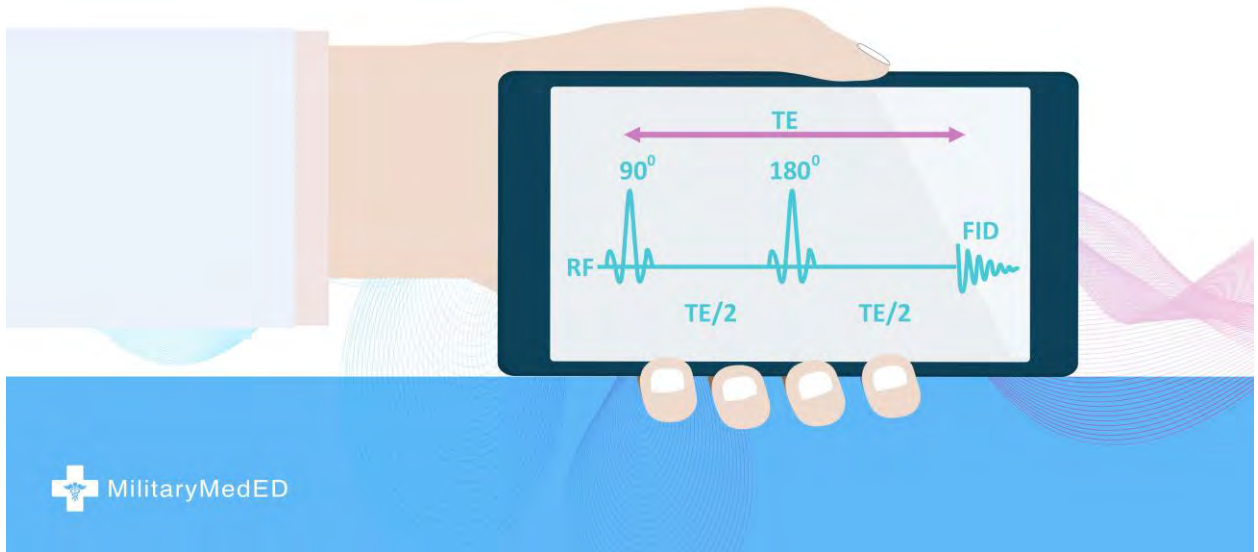
- 1. MR Spectroscopy II
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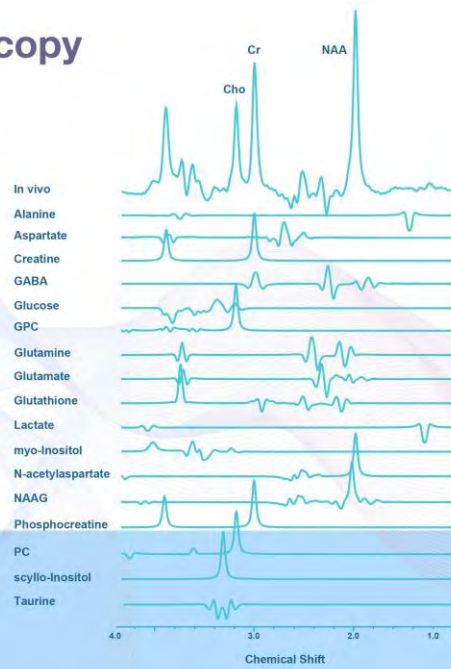
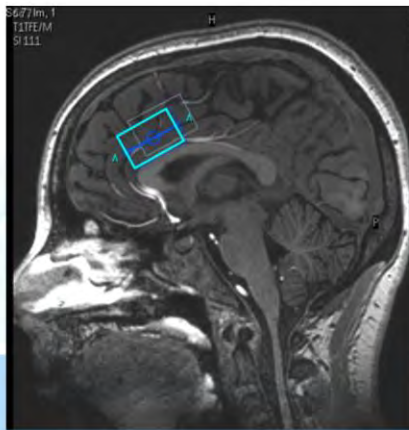
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# Localization

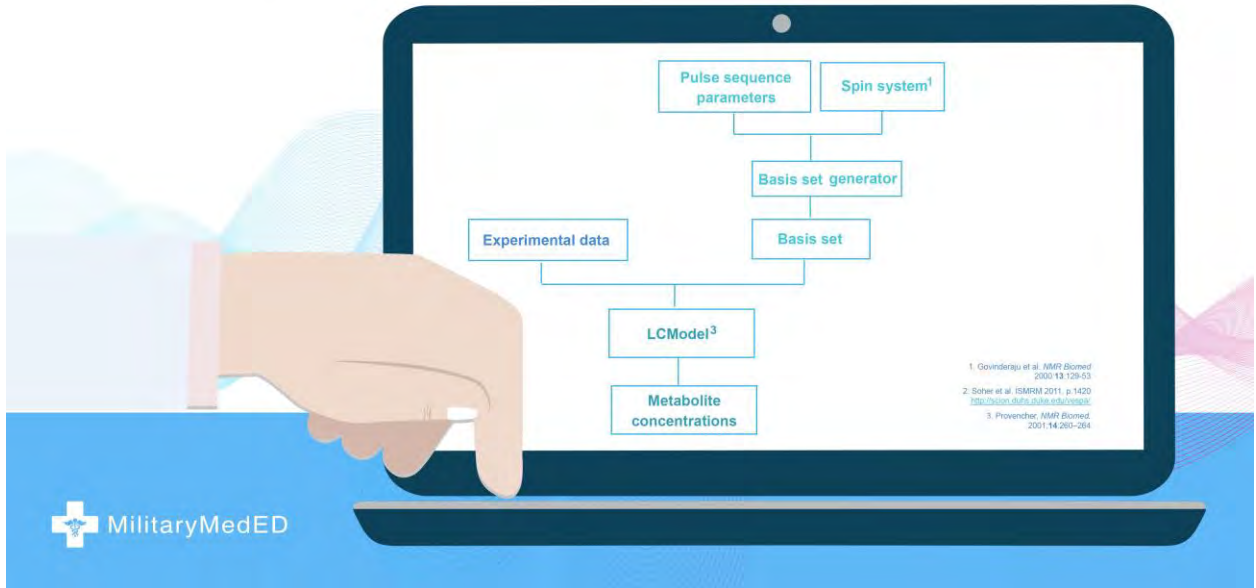
- Spin-echo



# Magnetic Resonance Spectroscopy



## How to analyze the spectra?

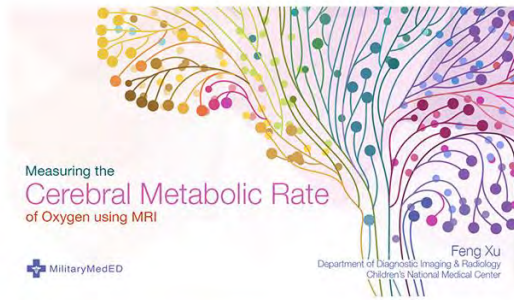




# Measuring the Cerebral Metabolic Rate of Oxygen using MRI | Part1

Home / Courses / Neurology / BRAIN Seminars / Measuring CMRO2 Part1

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Measuring CMRO2 Part1

## Objectives

- › CMRO2 is an important parameter for the brain function/activities.
- › Understand classic Fick principle for measuring CMRO2
- › Understand the mechanism of using magnetic resonance imaging to quantify blood oxygenation
- › Understand basic method of measuring T2 of blood
- › Understand basic method of measuring blood flow
- › Discussion for pros and cons of alternative methods for quantifying blood oxygenation and blood flow.
- › Discussion for pros and cons of alternative methods for CMRO2 measurement.

## SEARCH FORUMS

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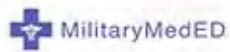
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# Measuring the Cerebral Metabolic Rate of Oxygen using MRI



Feng Xu  
Department of Diagnostic Imaging & Radiology  
Children's National Medical Center

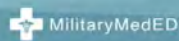
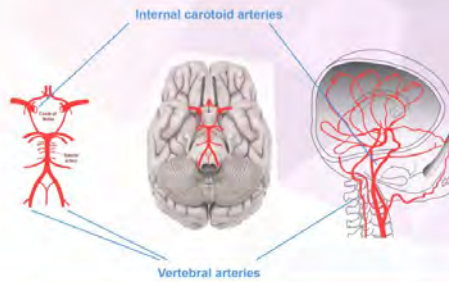
## Measuring CMRO2 Part1

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### Menu

- 1. Measuring CMRO2
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  - 1.2. Objectives
  - 1.3. Measure CMRO2 with Fick
  - 1.4. Oxygen Supply
  - 1.5. SS & IV
  - 1.6. CMRO2 Measurement
  - 1.7. Using Each Parameter

## Using the Fick principle to measure CMRO2



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## Measuring CMRO2 Part1

**Menu**

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  - 1.4. Oxygen Supply
  - 1.5. SS & IJV**
  - 1.6. CMRO2 Measurement
  - 1.7. Using Each Parameter

### Blood Drainage of the brain

Superior sagittal sinus (ss)

Internal jugular vein (IJV)

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## Measuring CMRO2 Part2

**Menu**

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  - 1.4. Measuring Blood T2
  - 1.5. TRUST Sequence
  - 1.6. CPMG
  - 1.7. TRUST on IJV & SS
  - 1.8. From T2v to Yv

### The blood $R_2(T_2)$ is directly related to oxygenation fraction

The blood  $R_2(T_2)$  is directly related to oxygenation fraction

Hypoxemia fraction

$$R_2 = 1/T_2 = \rho \cdot R_2 + (1 - \rho) \cdot R_2^0$$
$$A = \rho \cdot R_2 + (1 - \rho) \cdot R_2^0$$
$$B = \rho \cdot R_2 + (1 - \rho) \cdot R_2^0$$
$$C = \rho \cdot R_2 + (1 - \rho) \cdot R_2^0$$

Van Zijl et al. (1990)  
Oja et al. (1999)  
Cox et al. (2001)  
Thulborn et al. (1992)  
Simpson et al. (2003)  
Zhu et al. (2007)

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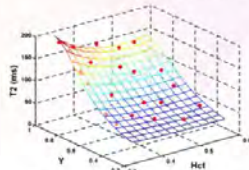
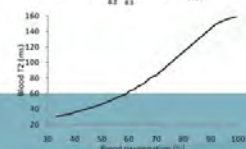
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## Measuring CMRO2 Part2

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- 1.6. CPMG
- 1.7. TRUST on IJV & SS
- 1.8. From T2v to Yv

### The blood $R_2$ ( $T_2$ ) is directly related to oxygenation fraction

$$R_2 = 1/T_2 = A + B \cdot (1-Y) + C \cdot (1-Y)^2$$



$$A = a_1 + a_2 \cdot Hct + a_3 \cdot Hct^2$$

$$B = b_1 \cdot Hct + b_2 \cdot Hct^2$$

$$C = c_1 \cdot Hct \cdot (1 - Hct)$$

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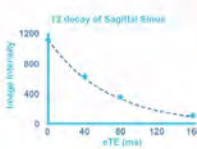
## Measuring CMRO2 Part2

**Menu**

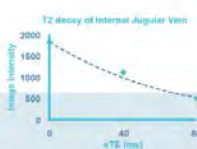
- 1. Measuring CMRO2
- 1.1. Title
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- 1.5. TRUST Sequence
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- 1.8. From T2v to Yv

$$S = S_0 \cdot e^{-\frac{eTE}{T_2}}$$

**T2 decay of Sagittal Sinus**



**T2 decay of Internal Jugular Vein**



**IJV**

|       |        |        |
|-------|--------|--------|
| eTE=0 | eTE=40 | eTE=80 |
|-------|--------|--------|

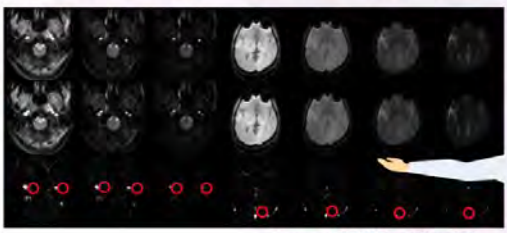
**SS**

|       |        |        |         |
|-------|--------|--------|---------|
| eTE=0 | eTE=40 | eTE=80 | eTE=160 |
|-------|--------|--------|---------|

Label

Control

Blood signal



**Images of TRUST on IJV and SS**

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### Measuring CMRO2 Part2


**Menu**


- 1. Measuring CMRO2
  - 1.1. Title
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  - 1.3.  $T_2$
  - 1.4. Measuring Blood  $T_2$**
  - 1.5. TRUST Sequence
  - 1.6. CPMG
  - 1.7. TRUST on IV & SS
  - 1.8. From  $T_2$  to  $Y_V$


## Measuring blood $T_2$

**T2-Relaxation-Under-Spin-Tagging (TRUST) MRI is recently developed to measure blood  $T_2$ . Mechanism of TRUST MRI is to separate blood  $T_2$  via spin tagging and imply a global  $T_2$  preparation module**

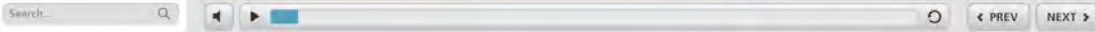
Control scan — Label scan = Difference

Tissue 

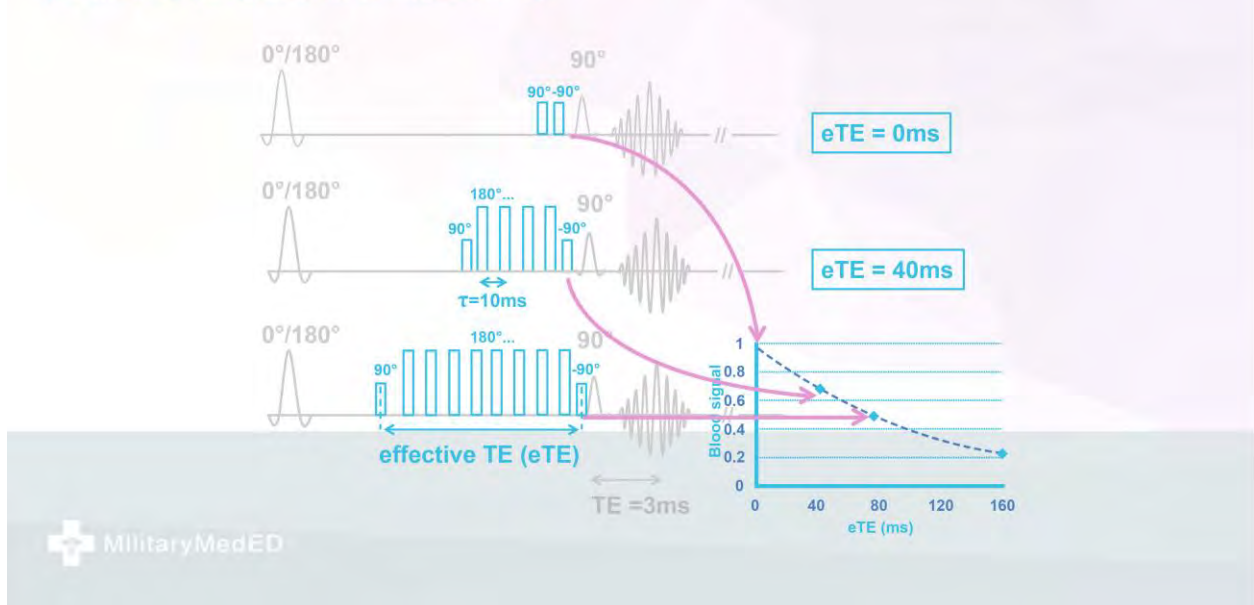
Blood 



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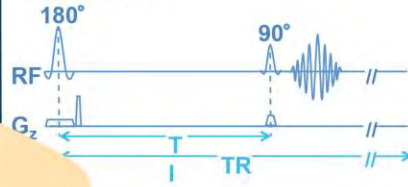
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### The TRUST MRI uses Carr-Purcell-Meiboom-Gill (CPMG) $T_2$ preparation to measure $T_2$

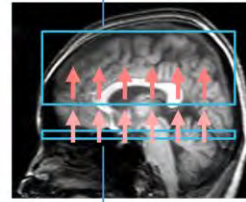


## TRUST sequence

Label scan:



Labeling box



Imaging slice

Blood signal

Tissue signal



# Resting State fMRI in Fetuses & Newborns | Part1

Home / Courses / Neurology / BRAIN Seminars / Resting State fMRI Part1

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## Resting State fMRI in Fetuses & Newborns



Resting State fMRI in Fetuses & Newborns | Part1

### Objectives

- Understand what resting state functional MRI is.
- Know the properties of resting state networks.
- Learn ways to analyze resting state data.
- Learn how resting state functional connectivity MRI (rs-fcMRI) is applied in fetal and neonatal imaging.

### SEARCH FORUMS

 Go

Advanced search

### UPCOMING EVENTS

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Josephheen De Asis-Cruz  
Department of Diagnostic Imaging & Radiology



# Resting State fMRI

in Fetuses & Newborns



## Resting State fMRI in Fetuses & Newborns | Part 1

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Resting State fMRI Pt 1

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- 1. Resting State fMRI Pt 1
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  - 1.3. What is Resting State?
  - 1.4. What is Measured with rs-fMRI?
  - 1.5. What is Measured with rs-fMRI II
  - 1.6. What is Measured with rs-fMRI III
  - 1.7. BOLD Signal I
  - 1.8. BOLD Signal II
  - 1.9. Properties of the BOLD Signal
  - 1.10. Low F Fluctuations at Rest I
  - 1.11. Low F Fluctuations at Rest II

What is measured with rs-fMRI?

- rs-fMRI reveals the brain's functional connectivity

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## Resting State fMRI in Fetuses & Newborns | Part1

Resting State fMRI Pt I

**Menu**

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  - 1.5. What is Measured with rs-fMRI II
  - 1.6. What is Measured with rs-fMRI III
  - 1.7. BOLD Signal I
  - 1.8. BOLD Signal II**
  - 1.9. Properties of the BOLD Signal
  - 1.10. Low f Fluctuations at Rest I
  - 1.11. Low f Fluctuations at Rest II

### What is the BOLD signal?

The diagram illustrates the BOLD signal mechanism. It shows a cross-section of a blood vessel with hemoglobin and oxygen. In the 'Resting' state, there is a balance of oxygenated (red) and deoxygenated (blue) hemoglobin. Upon 'Onset of neural activity', oxygen is consumed by neurons, leading to an increase in deoxygenated hemoglobin and a decrease in the BOLD signal. In the 'Activated State', local blood flow increases, which dilutes the deoxygenated hemoglobin, leading to a decrease in deoxygenated hemoglobin and an increase in the BOLD signal.

**Basic State**  
● Oxygenated Hb  
● Deoxygenated Hb

**Onset of neural activity**  
Oxygen consumption  
DeoxyHb increased  
BOLD signal decreased

**Activated State**  
Local blood flow increased  
DeoxyHb decreased  
BOLD signal increased

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## Resting State fMRI in Fetuses & Newborns | Part1

Resting State fMRI Pt I

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  - 1.9. Properties of the BOLD Signal
  - 1.10. Low f Fluctuations at Rest I**
  - 1.11. Low f Fluctuations at Rest II

### Low f fluctuations at rest

The slide displays two sets of brain scan images. The left set, labeled 'C Resting-state correlation', shows axial brain slices with a color scale from 0 to 0.15. The right set, labeled 'D Rest-state corr - after RVTCor', shows the same slices with a color scale from 0 to 0.10. A female scientist in a white lab coat is pointing at the images.

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# Resting State fMRI in Fetuses & Newborns | Part2

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  - 1.5. Networks are Reproducible
  - 1.6. Networks within Other Species
  - 1.7. Networks in Newborns

## Resting State fMRI Pt II

- Active/Task and rest networks are correlated
- Default mode network
- Precuneus
- posterior cingulate
- inferior-lateral-parietal cortex
- ventromedial prefrontal cortex

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# Resting State fMRI in Fetuses & Newborns | Part2

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## Resting State fMRI Pt II

- Resting state networks are consistent and reproducible

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## Resting State fMRI in Fetuses & Newborns | Part3

Resting State fMRI Pt III

**SBC and ICA findings converge**

|               | Seed | ICA |
|---------------|------|-----|
| visual        |      |     |
| somatosensory |      |     |
| DMN           |      |     |

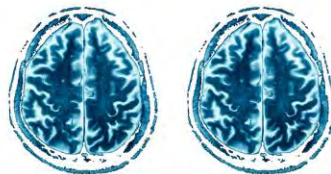
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## Low $f$ fluctuations at rest Functional Connectivity in the Motor Cortex of Resting Human Brain Using Echo-Planar MRI

"It is concluded that correlation of low frequency fluctuations, which may arise from fluctuations in blood oxygenation or flow, is a manifestation of functional connectivity of the brain."

et al., 1995



animation



● Resting state networks are present in newborns



Primary visual



Sensori-motor



Primary auditory



Parietal/cerebellum



Anterior/prefrontal (proto-DMN)



Fransson, 2007

## Assessing Neuropsychological Outcomes in TBI

Home / My courses / Assessing Neuropsychological Outcomes in TBI

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- PreTest - TBI Outcomes
- Assessing Neuropsychological Outcomes in TBI   
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- PostTest - TBI Outcomes   
**Restricted** Not available unless: The activity **Assessing Neuropsychological Outcomes in TBI** is marked complete
- Post-Run Module Questionnaire   
**Restricted** Not available unless: The activity **PostTest - TBI Outcomes** is marked complete

### SEARCH FORUMS

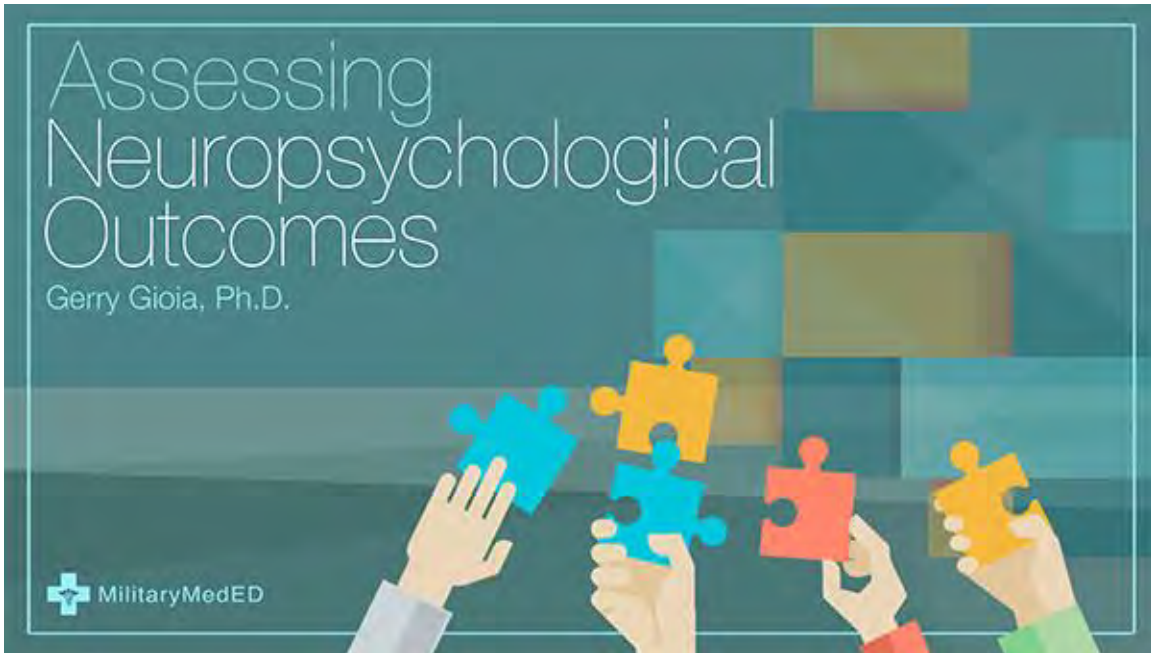
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## Assessing Neuropsychological Outcomes in TBI

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  - 1.14. Recovery
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  - 1.16. Evaluating Concussion
  - 1.17. Concussion Management
  - 1.18. Concussion Management
  - 1.19. Concussion Management
  - 1.20. Recognize & Manage
  - 1.21. Recognize & Manage
  - 1.22. Concussion

Assessing Neuropsychological TBI Outcomes

### Concussion as ADHD in 1980

| ADHD   | Concussion  |
|--|---|
| <p><b>1980:</b> Most kids were evaluated and treated by specialists</p> <p><b>2012:</b> Most kids are evaluated and treated by primary care physicians</p> <ul style="list-style-type: none"> <li>• Refer Complex Cases</li> </ul> | <p><b>2013:</b> Most kids are evaluated &amp; treated by specialties</p> <p><b>2007:</b> Most kids are evaluated &amp; treated by primary care physicians</p> <ul style="list-style-type: none"> <li>• Refer Complex Cases</li> </ul> |

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## Assessing Neuropsychological Outcomes in TBI

Assessing Neuropsychological TBI Outcomes

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  - 1.19. Concussion Management
  - 1.20. Recognize & Manage
  - 1.21. Recognize & Manage
  - 1.22. Concussion

**Ages 0-14**

| Category               | Value          | Rate per 100,000                       |
|------------------------|----------------|--|
| Deaths                 | 3,700          | 4.8                                    |
| Hospitalizations       | 3,170,000      | 63.0                                   |
| Pediatric Office (est) | 125,000 visits | (1996-1997, Schootman & Fuortes, 2000) |
| Emergency Department   | 435,000 visits | 731.2                                  |

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## Assessing Neuropsychological Outcomes in TBI

Assessing Neuropsychological TBI Outcomes

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  - 1.19. Concussion Management
  - 1.20. Recognize & Manage
  - 1.21. Recognize & Manage
  - 1.22. Concussion

**Neurometabolic Cascade Following Traumatic Brain Injury**

(Giza & Hovda, 2001)

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## Assessing Neuropsychological Outcomes in TBI

Assessing Neuropsychological TBI Outcomes

### Anatomical Timeline of a Concussion Defining the Key Factors

**C. Risk Factors**

Pre-Injury Risks

**A. Injury Characteristics**

**Concussion**

Retro-grade Amnesia 20-35% (Sec-Weeks+)

LOC ~10% (Sec-Weeks+)

Antero-grade Amnesia 25-40% (Sec-Weeks+)

**B. Symptom Assessments**

Neurocog & dysfx & Post-Concuss Symptoms (Hours-Days-Weeks+)

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## Assessing Neuropsychological Outcomes in TBI

Assessing Neuropsychological TBI Outcomes

### Recovery From Concussion: How Long Does it Take?

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# Assessing Neuropsychological Outcomes in TBI

Assessing Neuropsychological TBI Outcomes

**01** Head force or deceleration/ acceleration event

**02** Alteration of consciousness or mental status

**Blow/ Force to Head/ Body**

**Change in Function/ Behavior/ Performance**

- Physical - Fatigue - Balance - Decreased
- Cognitive - Attention - Memory - Speed of Processing
- Emotional - Irritability - Emotional Control - Sadness
- Sleep - More + Less + Cannot

Menu

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  - 1.19. Concussion Management
  - 1.20. Recognize & Manage
  - 1.21. Recognize & Manage
  - 1.22. Concussion

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# Introduction to Diffusion-Weighted MRI

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PreTest - Intro to Diffusion Weighted MRI

Introduction to Diffusion-Weighted MRI

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- (a) Understand the Process of Diffusion
- (b) Know the Basics of how Diffusion is Measured in MRI
- (c) How Directional Information of Water Movement can be Extracted

## SEARCH FORUMS

[Advanced search](#)

## UPCOMING EVENTS

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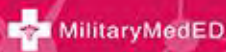
## RECENT ACTIVITY

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# Introduction to Diffusion-Weighted MRI (DWI)

Dr. Joelle Sarlis



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Review mode

## Resonance Frequency

Gradients make the resonance frequency a function of spatial position

Recall from Intro to MRI that when a gradient is applied, the resonance frequency of the proton is a function of its spatial position. **Figure 5** shows a plot of the resonance frequency as a function of Z-position when the Z-gradient is turned on.

The diagram shows a blue silhouette of a human figure lying horizontally. A vertical axis labeled "frequency" has a point  $\omega_0$  at the top. A horizontal axis labeled "Z" has a point "0" at the center, with "-Z" to the left and "+Z" to the right. A blue line representing the resonance frequency starts at  $\omega_0$  at Z=0 and slopes downwards as Z increases.

$\omega = \gamma B = \gamma B_0 + \gamma z G_z$

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**Menu**

- 1 Intro to Diffusion-Weighted MRI (DWI)
- 1.1 Home
- 1.2 Learning Objectives
- 1.3 Brownian Motion
- 1.4 Brownian Motion
- 1.5 Brownian Motion
- 1.6 T1 & T2-Weighted Images
- 1.7 Resonance Frequency
- 1.8 Phase Twist
- 1.9 Phase Twist
- 1.10 Pulse Sequence
- 1.11 Pulse Sequence
- 1.12 Spin Echo
- 1.13 Diffusion Coefficient
- 1.14 Diffusion Coefficient
- 1.15 Water Diffusion in Tissue
- 1.16 Water Diffusion in Tissue
- 1.17 Anisotropic Diffusion
- 1.18 The Diffusion Tensor
- 1.19 DTI
- 1.20 Calculate Diffusion Tensor
- 1.21 Diagonalize DT
- 1.22 Quantitative Parameters

## Phase Twist

When the diffusion gradient is applied, the protons start precessing at a different rate, depending on their position.

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**Menu**

- 1.6 T1 & T2-Weighted Images
- 1.7 Resonance Frequency
- 1.8 Phase Twist
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- 1.18 The Diffusion Tensor
- 1.19 DTI
- 1.20 Calculate Diffusion Tensor
- 1.21 Diagonalize DT
- 1.22 Quantitative Parameters
- 1.23 Quantitative Parameters
- 1.24 Directional Encoding for DTI
- 1.25 Directional Encoded Color Map
- 1.26 Directional Encoded Color Map
- 1.27 Sub-Millimeter DTI

## Anisotropic Diffusion

Now, what if we wanted to extract the directional information of diffusion in tissue? Recall that white matter has structured barriers, which lead to anisotropy. Our 2.5 mm voxel is over 300 times wider than the histology shown in figure 13.

Myelinated axons in our brain are 5-20  $\mu\text{m}$ , so 10s of 1000s of axons are running through the cross-section of our voxels! This large grouping of axons will all have anisotropic diffusion. The diffusion in a voxel can be represented as an ellipsoid, as seen in Figure 15.

This more complex model characterizes Gaussian diffusion that is not the same in all directions and is described by the diffusion tensor.

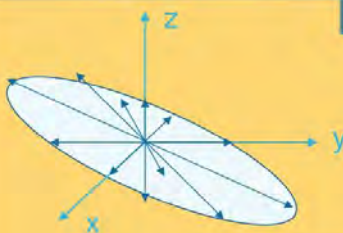
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- 1.6. 1.1 & 1.2-Weighted Images
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- 1.12. Spin Echo
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- 1.14. Diffusion Coefficient
- 1.15. Water Diffusion in Tissue
- 1.16. Water Diffusion in Tissue
- 1.17. Anisotropic Diffusion
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- 1.20. Calculate Diffusion Tensor
- 1.21. Diagonalize DT
- 1.22. Quantitative Parameters
- 1.23. Quantitative Parameters
- 1.24. Directional Encoding for DTI
- 1.25. Directional Encoded Color Map
- 1.26. Directional Encoded Color Map
- 1.27. Sub-Millimeter DTI

## The Diffusion Tensor



The diffusion tensor is a 3x3 matrix described by Bassler et. al. in 1994. The tensor has been shown to be symmetric. Thus measurements in 6 non-colinear diffusion directions must be collected to calculate the six unknowns. Then the full diffusion tensor can be filled.

$$D = \begin{bmatrix} D_{xx} & D_{xy} & D_{xz} \\ D_{yx} & D_{yy} & D_{yz} \\ D_{zx} & D_{zy} & D_{zz} \end{bmatrix}$$

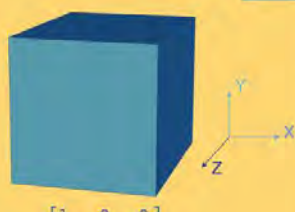
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Search... ◀ PREV

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- 1.6. 1.1 & 1.2-Weighted Images
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- 1.8. Phase Twist
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## Directional Encoding for DTI



The direction of the long axis of the ellipsoid can be color coded for visualization, as described by Pajevic and Pierpaoli in 1999. The orientation of the ellipsoid is taken to be the direction of the eigenvector corresponding to the highest diffusivity,  $\lambda_1$ . It can be designated a color for visual representation. In DTI the common representation is red for X-axis, green for Y-axis, and blue for Z-axis.

$$D = \begin{bmatrix} \lambda_1 & 0 & 0 \\ 0 & \lambda_2 & 0 \\ 0 & 0 & \lambda_3 \end{bmatrix}$$

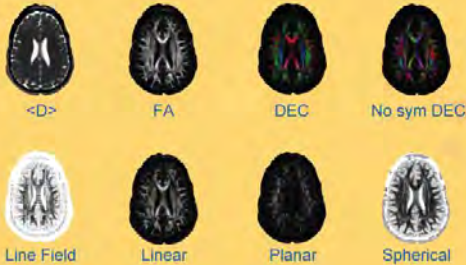
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- 1.6. 1.1 & 1.2-Weighted Images
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### Directional Encoded Color Map



There are more representations of the directional information of water diffusion in tissue obtained from DTI, shown in Figure 24.

Besides mean D, FA, and the DEC map, there are other color representations, like the no symmetry DEC map in which one can distinguish +XY from -XY, etc.

Search...



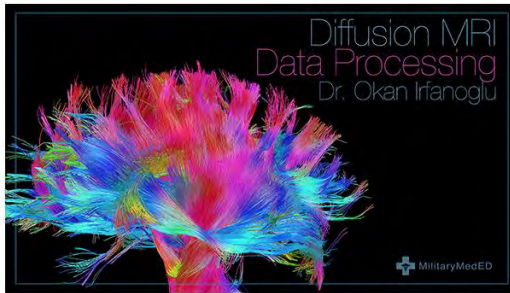
PREV



# Diffusion MRI Data Processing

Home / Courses / Neurology / BRAIN Seminars / Diffusion MRI Data Processing

Turn Edit On



## Overview of MRI Data Processing



- (a) Review the Processing Steps Necessary to Perform a Robust Diffusion MRI Data Based Analysis
- (b) Determine the Effects of Each Step of the Outcome
- (c) Determine if Processing Software Selection has Affected an Analysis
- (d) MRI Perfusion Imaging without Contrast Agents & Arterial Spin Labeling

### SEARCH FORUMS

Go

Advanced search

### UPCOMING EVENTS

There are no upcoming events

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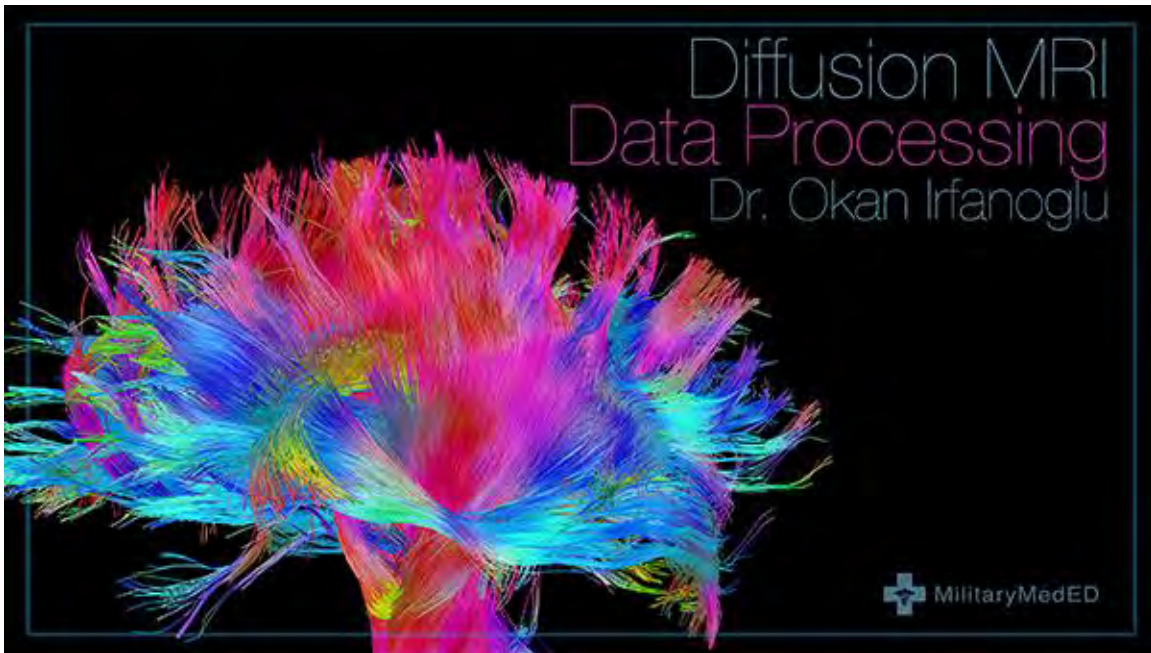
[New event...](#)

### RECENT ACTIVITY

Activity since Thursday, 23 August 2018, 1:37 PM

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## Analysis Pipeline

RawDWI → CorrectedDWI → DECmap

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Search

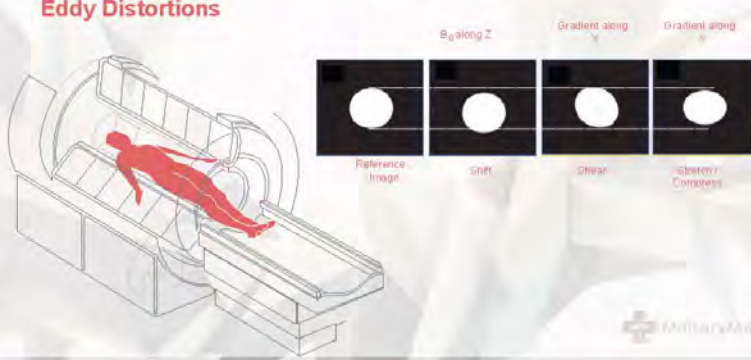
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**Image Registration**

**Eddy Distortions**



B<sub>0</sub> along Z    Gradient along X    Gradient along Y


Reference Image    Shift    Shear    Gradient Compress

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**(B-matrix) Reorientation**



No B-matrix rotation    With B-matrix rotation    Pajevic & Pierpaoli (MRM, 1999)

Search...    <    >    < PREV    NEXT >

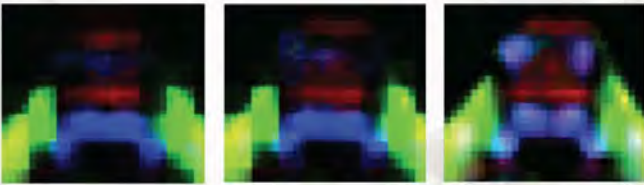


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## Correction Comparison



Correction 1      Correction 2      DR-BUDDI Correction

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## Tensor Visualization

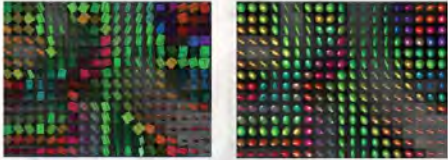
Scalar maps and glyph visualizations should be consistent across software packages.

However, even with the same dataset & same processing, **fiber tractography** results can significantly differ based on tracking algorithm and parameters.

This applies to both **deterministic tractography**, and **probabilistic tractography** which also includes uncertainty information.

### Glyph Types

Linefields, arrows, cubes, cylinders, ellipsoids, super-quadrics



Slicer4

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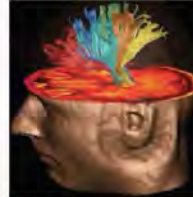
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Menu

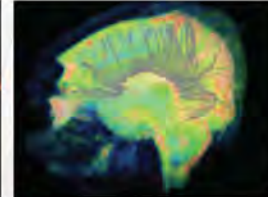
- 1. Diffusion MRI Data Processing
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    - 1.20. 19-Tensor Visualization

## Tensor Visualization

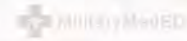
All the analysis methods commonly used for conventional MRI, such as **voxel-based morphometry, tensor-based morphometry, region of interest (ROI)** analysis can also be used for tensor-derived **scalar maps** such as **fractional anisotropy (FA)** or **mean diffusivity (MD)** maps. In addition, tensor based statistical analysis or tract based analysis can be performed with diffusion MRI.



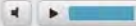
ExploreDTI



Slicer3



Search...



PREV

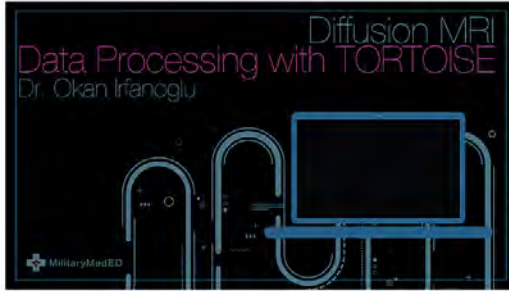




## Diffusion MRI Data Processing with TORTOISE

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Turn Edit On



### Learning Diffusion MRI Data Processing with TORTOISE



- Learn the basics of TORTOISE for dMRI data processing
- Learn how to navigate within the TORTOISE application
- Learn the unique parameters offered within the TORTOISE diffusion MRI processing package and how to effectively utilize them for your studies

### SEARCH FORUMS

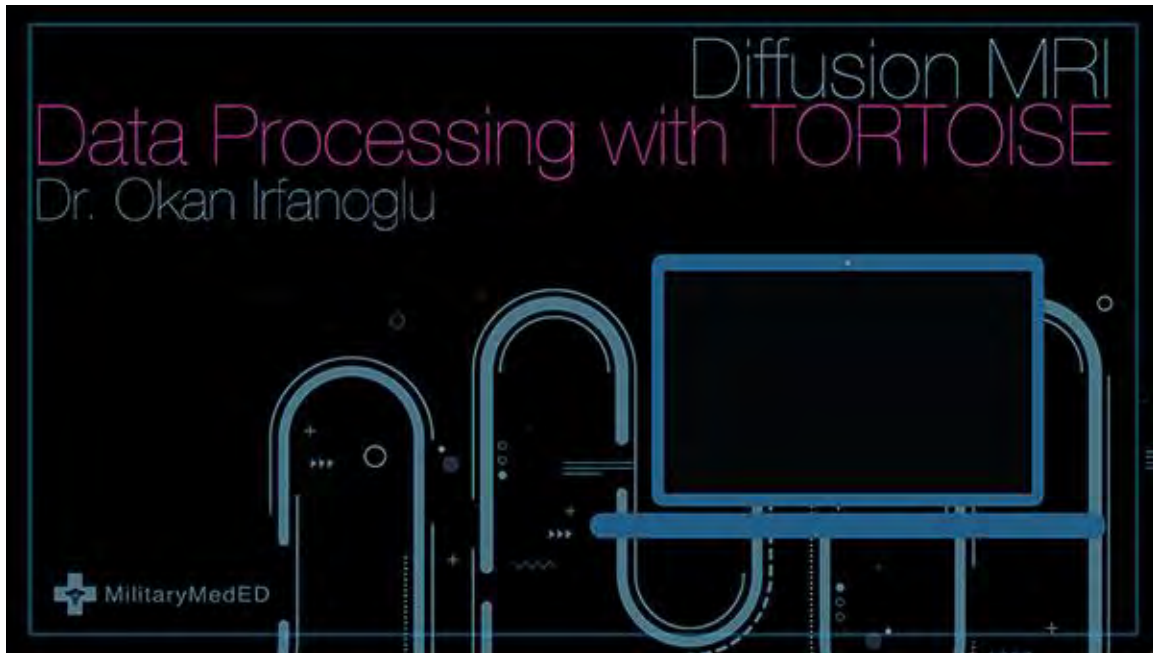
Advanced search

### UPCOMING EVENTS

There are no upcoming events.  
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### Learning Diffusion MRI Data Processing with TORTOISE

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Search...

The screenshot shows the TORTOISE software interface. It includes a file explorer on the left, a central workspace with multiple MRI slices, and a right-hand panel with various settings and options. The interface is designed for interactive data processing and visualization.

Navigation: < PREV NEXT >

## Learning Diffusion MRI Data Processing with TORTOISE

The screenshot shows the TORTOISE software interface. On the left is a 'Menu' sidebar with a list of 20 items. Item 1.4, '1 Run Diffprep', is highlighted in blue. The main window displays a file explorer for the path 'E:\Data\NeuroImageProcessing\TORTOISE\Diffprep\Diffprep\_data'. It shows a file tree with folders like 'software' and 'preproc'. A central window titled 'IDL' is open, showing a 'Virtual Machine' interface with a 'Get started' button. At the bottom, there is a search bar and navigation buttons for 'PREV' and 'NEXT'.

## Learning Diffusion MRI Data Processing with TORTOISE

This screenshot shows the TORTOISE software interface at a later stage. The 'Menu' sidebar on the left now has item 1.12, '9 Diffprep Outputs', highlighted in blue. The main window displays a file explorer for the path 'E:\Data\NeuroImageProcessing\TORTOISE\Diffprep\Diffprep\_data'. It shows a detailed list of files and folders, including 'sample\_C2\_diffprep\_data\_DICOM', 'sample\_C2\_diffprep\_data\_usp', and 'sample\_C2\_diffprep\_data\_usp\_psd'. The file list includes columns for name, size, type, and date. At the bottom, there is a search bar and navigation buttons for 'PREV' and 'NEXT'.

## Learning Diffusion MRI Data Processing with TORTOISE

The screenshot shows the TORTOISE software interface. On the left is a 'Menu' panel with a list of topics. The main window displays a brain MRI slice with a 'Tensor Fitting' progress window overlaid. The progress window shows a table of data for different tensor fitting steps.

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| Tensor Fitting Step | Progress (%) | Time (s) |
|---------------------|--------------|----------|
| 1                   | 100          | 0.00     |
| 2                   | 100          | 0.00     |
| 3                   | 100          | 0.00     |
| 4                   | 100          | 0.00     |
| 5                   | 100          | 0.00     |
| 6                   | 100          | 0.00     |
| 7                   | 100          | 0.00     |
| 8                   | 100          | 0.00     |
| 9                   | 100          | 0.00     |
| 10                  | 100          | 0.00     |
| 11                  | 100          | 0.00     |
| 12                  | 100          | 0.00     |
| 13                  | 100          | 0.00     |
| 14                  | 100          | 0.00     |
| 15                  | 100          | 0.00     |

## Learning Diffusion MRI Data Processing with TORTOISE

The screenshot shows the TORTOISE software interface. On the left is a 'Menu' panel with a list of topics. The main window displays a brain MRI slice with a tensor fitting mask overlaid. The mask is shown in blue and red, indicating the fitted tensor regions.

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# Learning Diffusion MRI Data Processing with TORTOISE

The screenshot displays the TORTOISE software interface. On the left is a 'Menu' panel with a list of topics. The current topic, '1.18. 14 Tensor Derived Quantity Visualization', is highlighted in blue. The main window shows a 3D visualization of brain white matter tracts, with different tracts colored in green, red, and blue. The interface includes a search bar at the bottom left, a progress bar, and navigation buttons labeled 'PREV' and 'NEXT'.

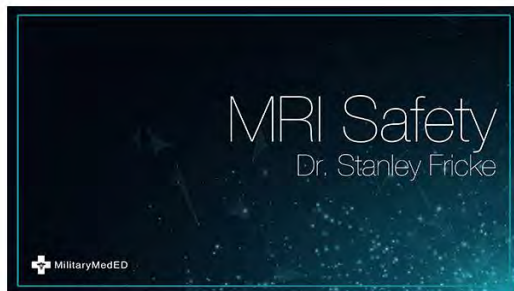
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## MRI Safety Training | Extended

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Turn Edit On



### MRI Safety Training

By the end of this lesson you will have learned how to treat medical devices, implanted or support devices and various types of metal in a safe manner in the MRI environment. You will also have learned how to act in a situation that may require shutting down the magnetic field in the case of fire or for emergency responders. Finally, you will have learned several other ancillary topics about acoustic hazards, cryogenic hazards, electrical hazards and how to avoid burning or harming the patient and other coworkers in the MRI environment.

#### SEARCH FORUMS

Advanced search

#### UPCOMING EVENTS

There are no upcoming events

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### MRI Safety Training

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### MRI Safety

Resources

## Hazards

Even **glasses** present, in many cases, as a loose metal object there have been several reports of glasses flying into the magnet breaking apart and therefore glasses should be considered a **loose metal object hazard**. The use of **MRI Safe Glasses** should be considered and encouraged. But in any case, if glasses pull strongly in a magnetic field they **Should Not be Worn in Zones III or Zones IV**.



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Navigation: < PREV NEXT >

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- Zones Signs 3.2.7
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**MRI Safety** Resources



Safety trained personnel **abandoned** the constant and direct **supervision** of **Zones III & IV** and further allowed the devastating event to happen.

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## MRI Safety Training

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- Zones Signs 3.2.6
- Zones Signs 3.2.7
- Zones Signs 3.2.8

**MRI Safety** Resources



In this figure we see a layout of an MRI Center. You will note Zones **I, II, III** and **IV**. In this MRI center induction-bays are located in **Zone II**.

Access to **Zone II** is given only to medical personnel of the center. Access to **Zones III** and **IV** is given only to MRI safety trained personnel. **Only persons that are safety level II trained are allowed to have a key access to Zone IV.**

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# MRI Safety Training

**Menu**

- Zones 2.3
- Zones Signs 3.1.0
- Zones Signs 3.1.1
- Zones Signs 3.1.2
- Zones Signs 3.1.3
- Zones Signs 3.1.4
- Zones Signs 3.1.5
- Zones Signs 3.1.6
- Zones Signs 3.1.7
- Zones Signs 3.1.8
- Zones Signs 3.1.9
- Zones Signs 3.2.0
- Zones Signs 3.2.1**
- Zones Signs 3.2.2
- Zones Signs 3.2.3
- Zones Signs 3.2.4
- Zones Signs 3.2.5
- Zones Signs 3.2.6
- Zones Signs 3.2.7
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- Zones Signs 3.3.5
- Zones Signs 3.3.6
- Zones Signs 3.3.7
- Zones Signs 3.3.8
- Zone Signs

**MRI Safety** Resources

In this particular design, the **sensitive region is on the tip** of the wand. Pointing the metal detector at the area of interest and **slowly moving** the metal detector is the correct usage of this particular model.

**Garrett**

**3-Way Switch:**  
ON  
OFF  
SILENT

**Green Ready Light**  
**Low Battery Light**  
**Red Alarm Light**

**360° Detection Area with tip pinpointing**

**Ergonomic Handle Grip**  
**Battery Cover**

**MilitaryMedED**

◀ PREV NEXT ▶

# MRI Safety Training

**Menu**

- Learning Objectives
- Hazards 1.0
- Hazards 1.1
- Hazards 1.2
- Hazards 1.3
- Hazards 1.4
- Zones 2.0
- Zones 2.1
- Zones 2.2
- Zones 2.3
- Zones Signs 3.1.0
- Zones Signs 3.1.1
- Zones Signs 3.1.2**
- Zones Signs 3.1.3
- Zones Signs 3.1.4
- Zones Signs 3.1.5
- Zones Signs 3.1.6
- Zones Signs 3.1.7
- Zones Signs 3.1.8
- Zones Signs 3.1.9
- Zones Signs 3.2.0
- Zones Signs 3.2.1
- Zones Signs 3.2.2
- Zones Signs 3.2.3
- Zones Signs 3.2.4
- Zones Signs 3.2.5
- Zones Signs 3.2.6
- Zones Signs 3.2.7
- Zones Signs 3.2.8
- Zones Signs 3.2.9
- Zones Signs 3.3.0

**MRI Safety** Resources

Also, it is imperative that you know the **color relationship** between the signs and the floor plan that is color-coded to **indicate which zone the signs apply to**. The floor plan in this slide is a floor plan of the interventional MRI environment. The special case of the interventional MRI environment presents a potential conflict of the rule that no loose metal objects should ever be in Zone III.

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**MRI ZONES**

- ZONE I
- ZONE II
- ZONE III
- ZONE IV

**MRI ZONE I**

**NOTICE**

**MRI ZONE II**

**CAUTION**

**MRI ZONE III**

**DANGER!**

**MRI ZONE IV**

◀ || ▶ PREV NEXT ▶




# MRI Safety Training

**Menu**

- Learning Objectives
- Hazards 1.0
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- Hazards 1.4
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- Zones 2.2
- Zones 2.3
- Zones Signs 3.1.0
- Zones Signs 3.1.1
- Zones Signs 3.1.2
- Zones Signs 3.1.3**
- Zones Signs 3.1.4
- Zones Signs 3.1.5
- Zones Signs 3.1.6
- Zones Signs 3.1.7
- Zones Signs 3.1.8
- Zones Signs 3.1.9
- Zones Signs 3.2.0
- Zones Signs 3.2.1
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- Zones Signs 3.2.3
- Zones Signs 3.2.4
- Zones Signs 3.2.5
- Zones Signs 3.2.6
- Zones Signs 3.2.7
- Zones Signs 3.2.8
- Zones Signs 3.2.9
- Zones Signs 3.3.0

**MRI Safety** Resources

Here we see a **Cardio Catheterization X-Ray Biplane Surgical Suite** that is connected to an MRI scan room in this particular implementation the surgical table is moved to connect to the door of the MRI scan room and the table top of the surgical table is allowed to transfer to the table of the MRI. Note that most of the equipment needed for the operation is connected to booms and other strongly affixed structures such that the **equipment is constrained to remain inside Zone III.**



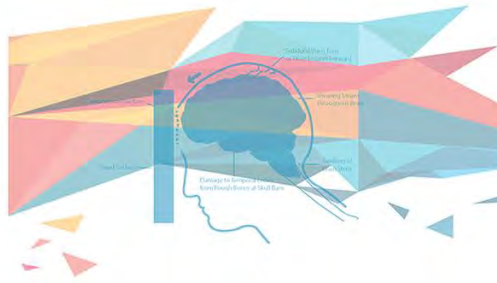
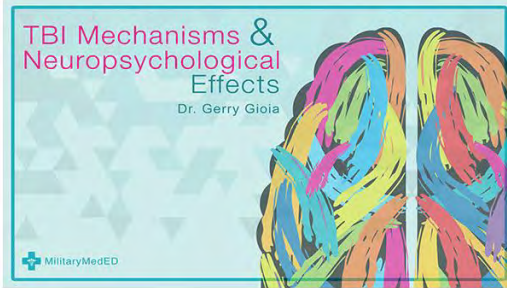
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## TBI Mechanisms & Neuropsychological Effects

Home / Courses / Neurology / BRAIN Seminars / TBI Mechanisms & Neuropsychological Effects

Turn Edit On



PreTest - TBI Mechanisms & Neuropsychological Effects

TBI Mechanisms & Neuropsychological Effects

Restricted Not available unless: The activity PreTest - TBI Mechanisms & Neuropsychological Effects is marked complete

Define Traumatic Brain Injury and its Mechanisms

### SEARCH FORUMS

 Go

Advanced search

### UPCOMING EVENTS

There are no upcoming events  
Go to calendar...  
New event...

### RECENT ACTIVITY

Activity since Thursday, 23 August 2018, 1:35 PM  
Full report of recent activity...  
No recent activity





# TBI Mechanisms & Neuropsychological Effects

Dr. Gerry Gioia



militarymed.com

## TBI Mechanisms & Neuropsychological Effects

Menu

- 1. Introduction to MRI
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  - 1.2. Learning Objectives
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  - 1.6. TBI Definition 1.3
  - 1.7. TBI Definition 1.8
  - 1.8. TBI Timeline**
    - 1.9. Signs of Mild TBI 1.0
    - 1.10. Signs of Mild TBI 1.1
    - 1.11. TBI Facts 1.0
    - 1.12. TBI Facts 1.1
    - 1.13. Mechanisms 1.0
    - 1.14. Mechanisms 1.1
    - 1.15. Mechanisms 1.2
    - 1.16. Mechanisms 1.3
    - 1.17. Mechanisms 1.4
    - 1.18. Development on Brain Injury 1.0
    - 1.19. Development on Brain Injury 1.1
    - 1.20. Concepts 1.0
    - 1.21. Concepts 1.1
    - 1.22. Connectivity 1.0

Search...

Mild TBI Timeline

The diagram illustrates the timeline of a mild TBI, centered on a 'Concussion' event. It is divided into three main sections: C. Risk Factors, A. Injury Characteristics, and B. Symptom Assessments. Section C includes 'Pre-Injury Risks'. Section A includes 'Retro-grade Amnesia 20-35%' (occurring 'Sec-Weeks+' before the event) and 'LOC <10%' (occurring 'Sec-Weeks+' after the event). Section B includes 'Antero-grade Amnesia 25-40%' (occurring 'Sec-Weeks+' after the event) and 'Neurocog & dysfx & Post-Concuss Symptoms' (occurring 'Hours-Days-Weeks+' after the event). An illustration of two soccer players is positioned between the amnesia statistics.

C. Risk Factors

Pre-Injury Risks

A. Injury Characteristics

Concussion

Retro-grade Amnesia 20-35%

LOC <10%

Antero-grade Amnesia 25-40%

Neurocog & dysfx & Post-Concuss Symptoms

Sec-Weeks+

Sec-Weeks+

Sec-Weeks+

Hours-Days-Weeks+

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PREV NEXT

### TBI Mechanisms & Neuropsychological Effects

**Menu**

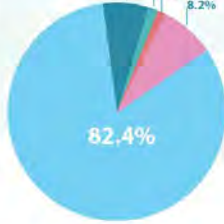
- 1. Introduction to MRI
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- 1.5. TBI Definition 1.2
- 1.6. TBI Definition 1.3
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- 1.9. Signs of Mild TBI 1.0
- 1.10. Signs of Mild TBI 1.1
- 1.11. TBI Facts 1.0
- 1.12. TBI Facts 1.1
- 1.13. Mechanisms 1.0
- 1.14. Mechanisms 1.1
- 1.15. Mechanisms 1.2
- 1.16. Mechanisms 1.3
- 1.17. Mechanisms 1.4
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- 1.19. Development on Brain Injury 1.1
- 1.20. Concepts 1.0
- 1.21. Concepts 1.1
- 1.22. Connectivity 1.0

Search...

## Brain Injury Facts

**Traumatic Brain Injury - Worldwide Totals**

| Category                      | Count          |
|-------------------------------|----------------|
| Penetrating                   | 4,477          |
| Severe                        | 3,041          |
| Moderate                      | 24,777         |
| Mild                          | 247,904        |
| Not Classifiable              | 20,508         |
| <b>Total - All Severities</b> | <b>300,707</b> |



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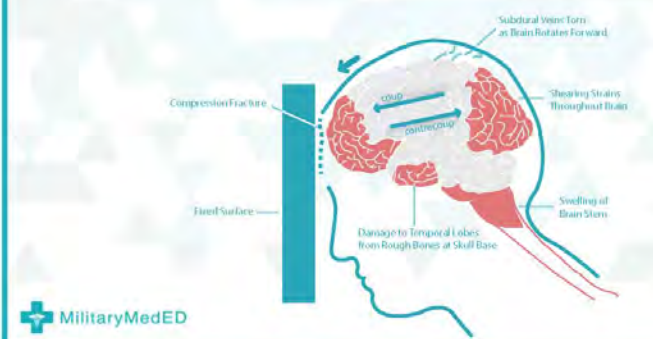
### TBI Mechanisms & Neuropsychological Effects

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Search...

## Mechanisms of TBI



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## TBI Mechanisms & Neuropsychological Effects

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Search...

### Mechanisms of TBI



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PREV NEXT

## TBI Mechanisms & Neuropsychological Effects

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  - 1.12. TBI Facts 1.1
  - 1.13. Mechanisms 1.0
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  - 1.15. Mechanisms 1.2
  - 1.16. Mechanisms 1.3
  - 1.17. Mechanisms 1.4
  - 1.18. Development on Brain Injury 1.0**
  - 1.19. Development on Brain Injury 1.1
  - 1.20. Concepts 1.0
  - 1.21. Concepts 1.1
  - 1.22. Connectivity 1.0

Search...

### Influence of Development on Brain Injury



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PREV NEXT



## TBI Mechanisms & Neuropsychological Effects

**Menu**

- 1.19. Development on Brain Injury 1.0
- 1.20. Concepts 1.0
- 1.21. Concepts 1.1
- 1.22. Connectivity 1.0**
- 1.23. Connectivity 1.1
- 1.24. Connectivity 1.3
- 1.25. Structural Changes 1.0
- 1.26. Injury 1.0
- 1.27. Injury 1.1
- 1.28. Injury 1.2
- 1.29. Current & Late Effects 1.0
- 1.30. Neuropsychological Outcomes
- 1.31. Neuropsychological Axes 1.0
- 1.32. Neuropsychological Axes 1.1
- 1.33. Neuropsychological Axes 1.2
- 1.34. Neuropsychological Axes 1.3
- 1.35. Components of the Executive System 1.0
- 1.36. Components of the Executive System 1.1

Search...

Building the Brain

Connectivity

FIGURE 4. Postnatal development of human cerebral cortex. Human brain's size is shown from various inside drawings of Golgi-Cox preparations (Cavalieri, 1979-1987). A: Newborn; (B) 3 months; (C) 6 months; (D) 9 months; (E) 18 months; (F) 24 months.

## TBI Mechanisms & Neuropsychological Effects

**Menu**

- 1.24. Connectivity 1.3
- 1.25. Structural Changes 1.0
- 1.26. Injury 1.0
- 1.27. Injury 1.1
- 1.28. Injury 1.2
- 1.29. Current & Late Effects 1.0
- 1.30. Neuropsychological Outcomes
- 1.31. Neuropsychological Axes 1.0
- 1.32. Neuropsychological Axes 1.1
- 1.33. Neuropsychological Axes 1.2
- 1.34. Neuropsychological Axes 1.3
- 1.35. Components of the Executive System 1.0
- 1.36. Components of the Executive System 1.1**
- 1.37. Cortical Systems 1.0
- 1.38. Neuropsychological Deficits 1.0
- 1.39. Neuropsychological Deficits 1.1
- 1.40. Executive Functions
- 1.41. Summary

Search...

Components

of the Executive System

- Inhibit** behavior incompatible with the goals
- Monitor** performance in relation to the goals
- Flexibly and strategically, shift** behavior in the event of obstacles to achieving goals
- Transfer** newly acquired skills from situation to situation

**Menu**

- 1.24. Connectivity 1.3
- 1.25. Structural Changes 1.0
- 1.26. Injury 1.0
- 1.27. Injury 1.1
- 1.28. Injury 1.2
- 1.29. Current & Late Effects 1.0
- 1.30. Neuropsychological Outcomes
- 1.31. Neuropsychological Axes 1.0**
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- 1.35. Components of the Executive System 1.0
- 1.36. Components of the Executive System 1.1
- 1.37. Cortical Systems 1.0
- 1.38. Neuropsychological Deficits 1.0
- 1.39. Neuropsychological Deficits 1.1
- 1.40. Executive Functions
- 1.41. Summary

Search...

### 3 Neuroanatomic Axes & Neuropsychological Function

1. Anterior-Posterior (Front-Back) Axis
2. Lateral (Left-Right) Axis
3. Cortical - Subcortical (Up - Down) Axis

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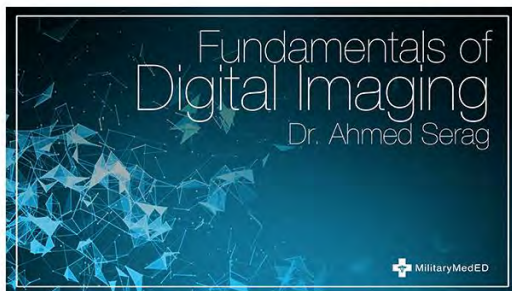
◀ PREV NEXT ▶



# Fundamentals of Digital Imaging

Home / My courses / Fundamentals of Digital Imaging

Turn Edit On



### COMPLETION PROGRESS

NOW



Mouse over or touch bar for info.

Overview of students

### UPCOMING EVENTS

There are no upcoming events

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[New event...](#)

Welcome to this online course. To begin, please read the documentation and complete the Training Module. After taking the training module, please answers the questions in the post-run questionnaire.

PreTest

Fundamentals of Digital Imaging

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Revision 3, 3-2-13

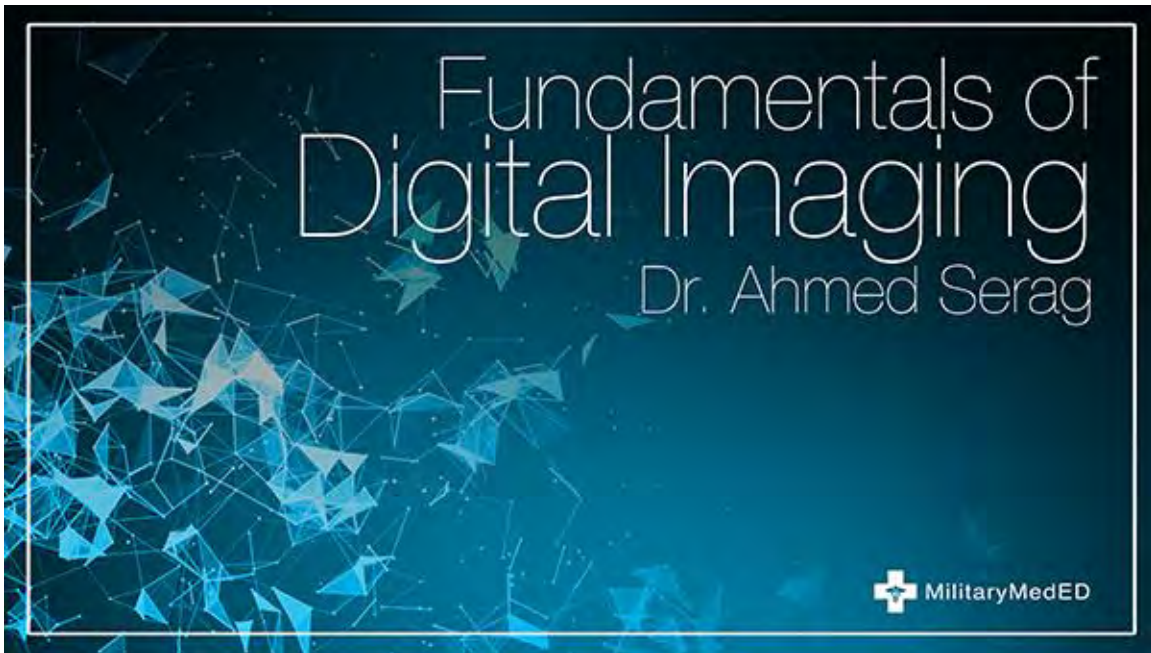
PostTest

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POST-RUN MODULE QUESTIONNAIRE

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## Fundamentals of Digital Imaging

Review mode

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  - 1.5. 4D Dataset
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  - 1.7. Medical Imaging Modalities
  - 1.8. Medical Imaging Modalities cont.
  - 1.9. Visualizing Medical Images
  - 1.10. Medical Image Analysis
  - 1.11. I have completed this training module

### 3D Dataset

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Search...

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## Fundamentals of Digital Imaging

Review mode


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  - 1.8. Medical Imaging Modalities cont.
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### Presentation and Efforts

Intense Presentations for Image Analysis

- full 3D volume representation



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00:03 / 00:08

Search...

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## Fundamentals of Digital Imaging


Review mode

**Menu**

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  - 1.9. Visualizing Medical Images
  - 1.10. Medical Image Analysis
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### Medical Imaging Modalities

In the case of projectional radiography, the probe uses X-ray radiation, which is absorbed at different rates by different tissue types such as bone, muscle and fat.



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Search...

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# Fundamentals of Digital Imaging

Review mode

**Menu**

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  - 1.7. Medical Imaging Modalities
  - 1.8. Medical Imaging Modalities cont.**
  - 1.9. Visualizing Medical Images
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  - 1.11. I have completed this training module

## Medical Imaging Modalities cont.

The diagram illustrates a 90-degree RF pulse being applied to a 3D coordinate system. The pulse is represented by a sine wave on the left, with an arrow pointing towards a circular plane. The coordinate system has a vertical Z-axis pointing up, a horizontal Y-axis pointing right, and a diagonal X-axis pointing towards the bottom-left. A dashed line indicates the plane of the pulse, which is perpendicular to the Z-axis.

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# Fundamentals of Digital Imaging

Review mode

**Menu**

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  - 1.6. Presentation and Efforts
  - 1.7. Medical Imaging Modalities
  - 1.8. Medical Imaging Modalities cont.
  - 1.9. Visualizing Medical Images**
  - 1.10. Medical Image Analysis
  - 1.11. I have completed this training module

## Visualizing Medical Images

**Options to Visualize Acquired Datasets**

- Slice Viewer
- Gallery View
- Section View
- Projections
- Full 3D Volume Representations

The slide shows four examples of medical image visualization: a top-down axial brain slice, a coronal brain slice, a sagittal brain slice, and a 3D volume rendering of a heart.

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# Fundamentals of Digital Imaging

Review mode

- Menu
  - 1. Fundamentals of Digital Imaging
    - 1.1. Title
    - 1.2. Learning Objectives
    - 1.3. Digital Revolution
    - 1.4. 3D Dataset
    - 1.5. 4D Dataset
    - 1.6. Presentation and Efforts
    - 1.7. Medical Imaging Modalities
    - 1.8. Medical Imaging Modalities (cont)
    - 1.9. Visualizing Medical Images
    - 1.10. Medical Image Analysis**
    - 1.11. I have completed this training module

## Medical Image Analysis

The visualization displays medical image analysis results. On the left, there are two sets of brain slices: the top set shows axial slices with labels like 'Pre', 'Mid', 'Post', 'Ant', 'Post', 'Ant', 'Post', 'Ant' and 'A', 'B', 'C', 'D'; the bottom set shows similar slices with labels 'Pre', 'Mid', 'Post', 'Ant', 'Post', 'Ant', 'Post', 'Ant' and 'A', 'B', 'C', 'D'. A color scale legend is positioned between the two sets. On the right, there are two line graphs showing 'Signal Int.' vs 'Region ID'. The top graph has a y-axis from 0 to 2 and an x-axis from 50 to 70. The bottom graph has a y-axis from 0 to 3 and an x-axis from 50 to 70. Both graphs show a fluctuating signal intensity across different regions.

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Search...

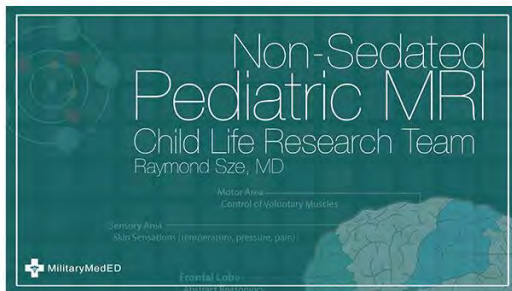
Navigation controls: back, forward, refresh, < PREV, NEXT >



# Pediatric MRI Without Sedation: Is it the Art or Science?

Home / My courses / Pediatric MRI Without Sedation: Is it the Art or Science?\_1

Turn Edit On



## COMPLETION PROGRESS

NOW



Mouse over or touch bar for info.

Overview of students

## UPCOMING EVENTS

There are no upcoming events  
Go to calendar...  
New event...

Welcome to this online course. To begin, please read the documentation and complete the Training Module. After taking the training module, please answers the questions in the post-run questionnaire.

## Content

- PreTest
- Sedation   
**Restricted** Not available unless: The activity **PreTest** is marked complete
- PostTest   
**Restricted** Not available unless: The activity **Sedation** is marked complete
- POST-RUN MODULE QUESTIONNAIRE   
**Restricted** Not available unless: The activity **PostTest** is marked complete

# Non-Sedated Pediatric MRI

Child Life Research Team  
Raymond Sze, MD

Motor Area  
Control of Voluntary Muscles

Sensory Area  
Skin Sensations (temperature, pressure, pain)

Frontal Lobe  
Abstract Reasoning

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## Sedation

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  - 1.3. Certified Child Life Specialist (CCLS)
  - 1.4. Family Referral Patterns
  - 1.5. Supporting Link
  - 1.6. Telephone Survey Results
  - 1.7. Summary
  - 1.8. Pediatric non-sedate MRI program
  - 1.9. CCLS
  - 1.10. Successful Pediatric
  - 1.11. Identifying Patients
  - 1.12. Special Needs Consideration
  - 1.13. Sedation Risks
  - 1.14. Extensive Search
  - 1.15. Study Review
  - 1.16. Long-term effects
  - 1.17. Preparatory Knowledge
  - 1.18. After Sedation Information
  - 1.19. Information & Medical Decisions
  - 1.20. I have completed this training module

Search:

### Family Referral Patterns

Reducing the need for sedation has multiple benefits for hospitals and healthcare institutions.

Cost  
Patient Safety     Patient Family Satisfaction

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## Sedation

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  - 1.17. Preparatory Knowledge
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Search...

### Telephone Survey Results



We asked the families about their decision to complete the study without sedation, as well as their experience at our facility with the Child Life Specialists and our non-sedate program.

We found that **more than two-thirds of the families** had told at someone else about the program. We learned many families even told 5 or more other people with children who would be eligible to participate in our non-sedate program if they ever needed a MRI scan in the future.

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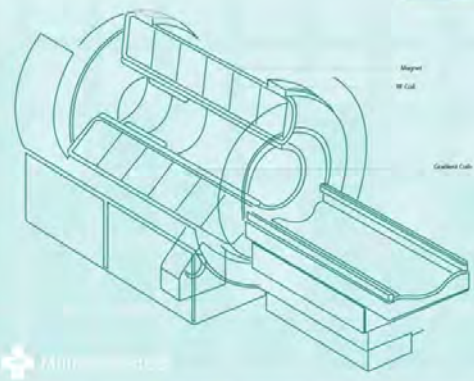
## Sedation

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  - 1.18. After Sedation Information
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  - 1.20. I have completed this training module

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### Pediatric non-sedate MRI program



In January 2012, the Certified Child Life Specialists in the radiology department at CNHS started a program to:

- reduce sedation rates to help patients 6 and up attempting a non-sedate scan for the first time
- prior, common practice to sedate most pediatric MR patients under the age of 12

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## Sedation

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### Long-term effects

Although the short-term (*minor*) effects of sedation are well known, the research behind potential long-term effects is limited.

Language  
Abstract reasoning  
Learning difficulties such as ADHD

Frontal Lobe  
Parietal Lobe  
Temporal Lobe  
Cerebellum  
Brain Stem

Miller + MedEd

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# Introduction to MRI

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## Introduction to MRI

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### The Molecular Level

- MR is based on proton (*Hydrogen-1*) imaging

70%

2 hydrogen atoms in each molecule

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# Introduction to MRI

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A Strong Magnetic Field



**In the presence of a strong magnetic field (1.5T, 3.0T or above)**

- protons spin to the direction of the magnetic field ( $B_0$ )
- parallel and some antiparallel

**The unit of measurement of the magnetic field strength is the Tesla (T).**

- For example, 1.5T magnetic field strength is about 30,000 times the strength (1.5T = 30,000) of the earth's magnetic field.

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# Introduction to MRI

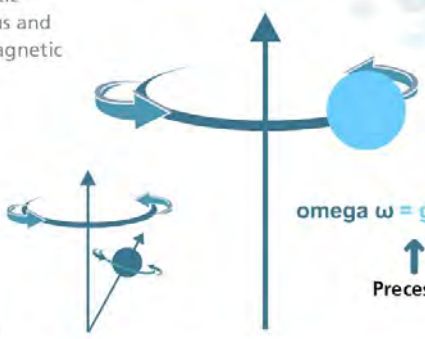
Review mode

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A Single Spin

- Gamma is the gyromagnetic ratio specific to each nucleus and  $B_0$  is the strength of the magnetic field strength in Tesla.



$\omega = \gamma \times B_0$

↑  
Precession

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# Introduction to MRI

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## 3D Space

Looking in a 3D (X,Y,Z) space, the external magnetic field ( $B_0$ ) is applied along the Z-axis

Protons align parallel (positive Z axis) to the external magnetic field ( $B_0$ ) and antiparallel (negative Z-axis).

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# Introduction to MRI

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## 3D Space

The sum of these forces forms a magnetic vector along the Z-axis called Longitudinal Magnetization ( $M_z$ )

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# Introduction to MRI

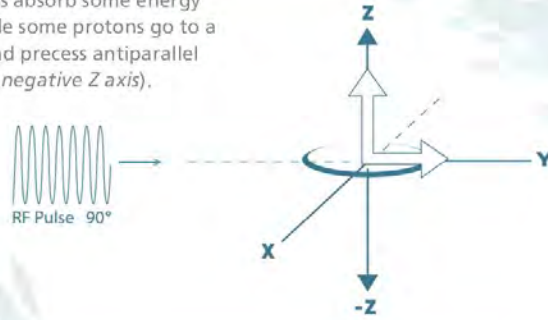
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## Longitudinal Magnetization

The precessing protons absorb some energy from the RF pulse while some protons go to a higher energy level and precess antiparallel to the magnetic field (*negative Z axis*).



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# Investigating Brain Plasticity and Connectivity with Structural MRI Techniques

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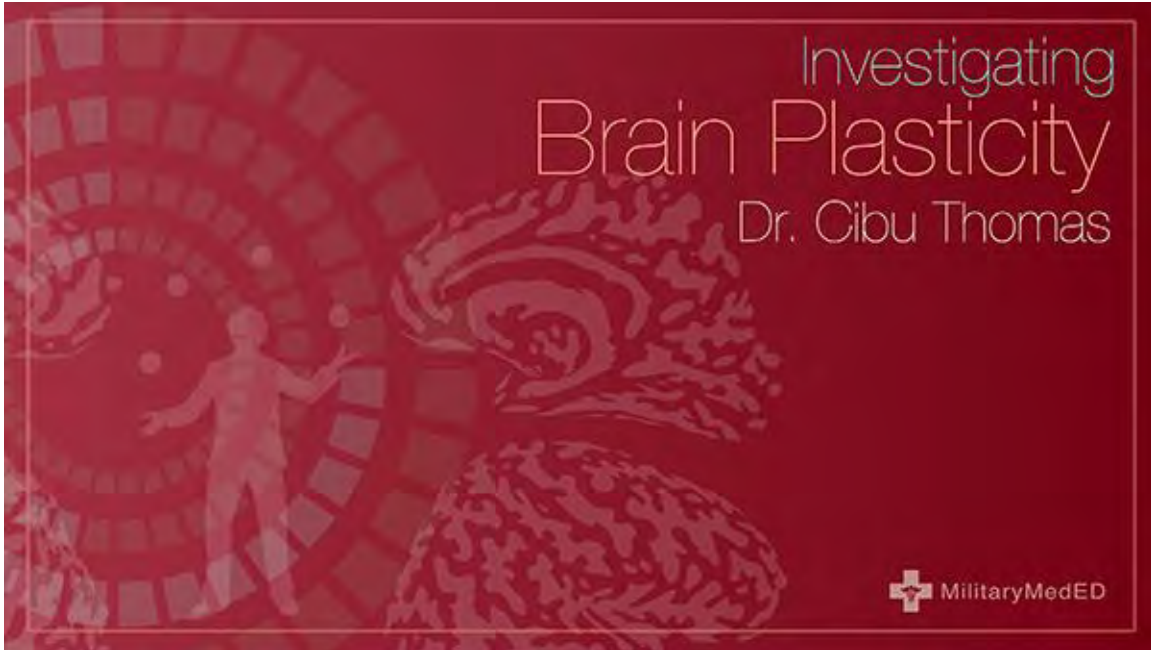
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## Neural plasticity

Adaptive ← Maladaptive

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## Brain Plasticity and Connectivity

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### Methods for Measuring Structural Plasticity

**Voxel-based Morphometry**

**Cortical Thickness Measurement & Diffusion tensor imaging**

Analysis based on VBM and cortical thickness is typically performed using T1-weighted images that show excellent contrast between gray matter, white matter and cerebrospinal fluid.

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### Cube of Cortex

- One gram of brain tissue typically contains ~  $10^{23}$  hydrogen nuclei
- When this tissue is in a strong magnetic field these nuclei settle into either a high energy or low energy state.
- Because of differences in molecular concentration and water content in white matter, and gray matter, the energy released (or the "signal") is different across the different tissue types.

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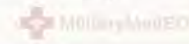
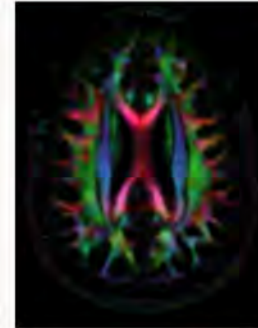
### Diffusion Tensor Imaging

- DTI is based on the phenomenon of diffusion (i.e. the random movement) of water molecules in tissue.

- In regions like CSF, diffusion is likely to be isotropic (i.e. water molecules are moving homogenously in all directions).

- In white matter tissue, diffusion has been found to be anisotropic (i.e. water molecules are moving predominantly in one direction and restricted in the orthogonal direction)

- DTI is based on collecting images that are sensitized to capture the diffusion of water molecules.

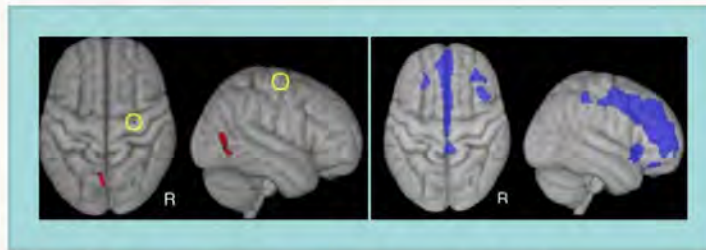


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### Imaging Brain Plasticity



No compelling evidence for training-related structural changes



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## Brain Plasticity and Connectivity

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### Inferring Specificity to the Brain Region

Spatial Profile of Changes not Replicated

Progress: 0%    Steps: 200 (20%)    Transcription: 0% (0%)    Labels: 200 (4%)

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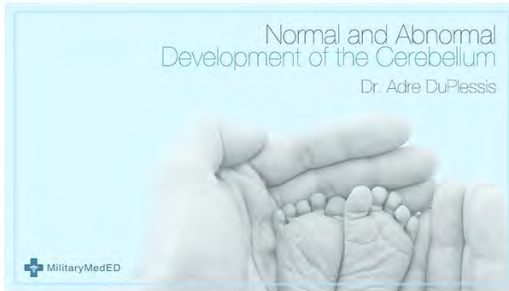
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# Normal and Abnormal Development of the Cerebellum

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# Normal and Abnormal Development of the Cerebellum

Dr. Adre DuPlessis



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## Normal and Abnormal Development of the Cerebellum

Normal and Abnormal - Development of the Cerebellum

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  - 1.18. Cerebellar and midbrain

**Introduction**

- Normal & abnormal cerebellum
- Occupies 10% of brain volume
- Has the same neurons in total for the entire cerebral hemisphere

The slide contains two anatomical diagrams. The top diagram shows a sagittal section of the brainstem and cerebellum, with the cerebellum highlighted in blue. The bottom diagram shows a superior view of the cerebellum, also highlighted in blue.

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## Normal and Abnormal Development of the Cerebellum

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Normal and Abnormal - Development of the Cerebellum

Development of Rostral Neural Tube

Week Three

- Between 5 - 7 wk gestation - mesencephalic, pontine, cervical flexures form
- By 18 wk gestation - gross cerebellar structural formation complete
- Mesencephalic Flexure at junction of future midbrain and cerebellum
- Pontine Flexure forms the cavity that is eventually filled by the 4<sup>th</sup> ventricle and the cerebellum

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Normal and Abnormal - Development of the Cerebellum

Folding of rostral neural tube

3 to 5 weeks post conception

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## Normal and Abnormal Development of the Cerebellum

Normal and Abnormal - Development of the Cerebellum

### Defining Fundamental Brain Territories

The diagram illustrates the four fundamental brain territories: Telencephalon, Diencephalon, Mesencephalon, and Rhombencephalon. The Cerebellum is shown as a distinct region within the Rhombencephalon. Gene expression patterns are indicated by colored boxes and arrows: Fgf8,17 (pink) in the Telencephalon; Pax6 (purple) in the Diencephalon; En1/Pax2 (green) in the Mesencephalon; and Otx2 (orange) and Gbx2 (red) in the Rhombencephalon. Fgf8,17 is also shown in the Cerebellum. The MilitaryMedED logo is visible in the bottom left corner of the slide.

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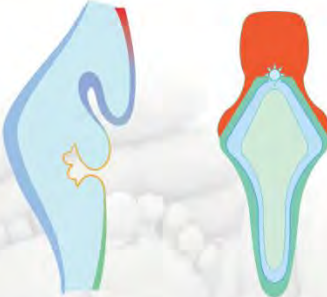
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## Normal and Abnormal Development of the Cerebellum

Normal and Abnormal - Development of the Cerebellum

**Characterization of cerebellar territory**

- The Isthmic Organizer is a patterning center at the midbrain-hindbrain (MHB) boundary
- Cells migrate rostrally from MHB to form the midbrain roof plate (tectum)
- Cells migrate caudally from MHB form cerebellar roof plate



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## Normal and Abnormal Development of the Cerebellum

Normal and Abnormal - Development of the Cerebellum

**Isthmic Organizer**

- Develops at the border of expression domains of two transcription factors, Gbx2 and Otx2
- Gbx2 permits development of cerebellum in the first rhombomere by suppressing Otx2
- Organizing activity of the isthmic organizer is mediated by Fgf 8 which is specific for organizing the mesencephalic tectum (Fgf 8a) and cerebellum (Fgf 8b)



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## Normal and Abnormal Development of the Cerebellum

Normal and Abnormal - Development of the Cerebellum

### Mesenchymal-Neuroepithelial Signaling

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1.24. Normal Development of 4th ventricular roof  
1.25. PHACES Syndrome  
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## Normal and Abnormal Development of the Cerebellum

Normal and Abnormal - Development of the Cerebellum

### Embryology of the Dura

Vascular mesenchyme  
Meninx primitiva  
Brain  
Arachnoid  
Pia  
SA S  
Falx cerebri and cerebelli, tentorium  
Dural sinuses (e.g., torcular)

With brain growth, there is eventual apposition and fusion of the dural layers  
Cavitation of the meninx primitiva leads to formation of the subarachnoid space

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# Corpus Callosum and other "Major" Commissures

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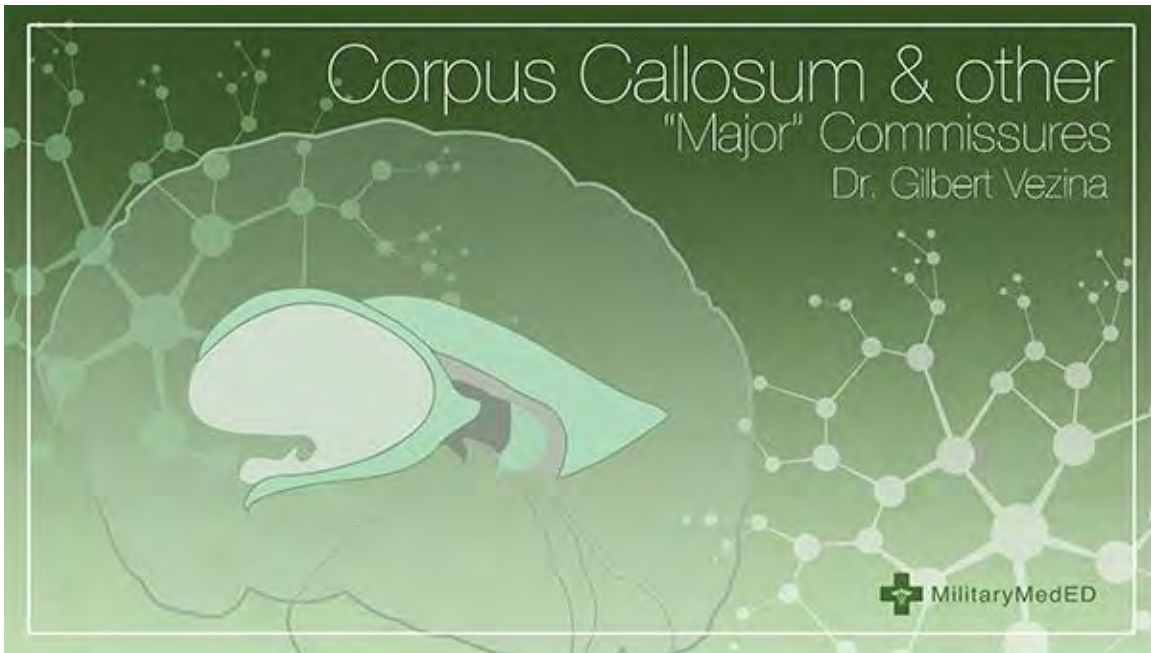
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Restricted Not available unless: The activity **PreTest** is marked complete  
 Version 3-3-15
- PostTest ✓  
Restricted Not available unless: The activity **Corpus Callosum and other "Major" Commissures** is marked complete
- POST-RUN MODULE QUESTIONNAIRE □  
Restricted Not available unless: The activity **PostTest** is marked complete



militarymed.com


## Corpus Callosum and other "Major" Commissures

**Menu**


- 1. Corpus Callosum
  - 1.1. Title
  - 1.2. Learning Objectives
  - 1.3. Case Presentation
  - 1.4. A Deeper Examination
  - 1.5. Different Views
  - 1.6. Aicardi Syndrome
  - 1.7. Great Forebrain Commissures
  - 1.8. Great Forebrain Commissures
  - 1.9. Corpus Callosum
  - 1.10. Isthmus of the Corpus Callosum
  - 1.11. Anterior & Posterior Corpus Callosum
  - 1.12. Embryology of the Corpus Callosum
  - 1.13. Agenesis w/ associated abnormalities
  - 1.14. Hypoplasia & Hypogenesis
  - 1.15. Hypogenesis
  - 1.16. Hypogenesis cont.
  - 1.17. Complete Commissural Agenesis
  - 1.18. Coronal imaging
  - 1.19. ACC: Prenatal Imaging

Search...

Case Presentation




Abnormal



Normal

?

**QUESTIONS FOR PROGNOSIS**



Search...

◀ ▶ 🔍

◀ PREV NEXT ▶

## Corpus Callosum and other "Major" Commissures

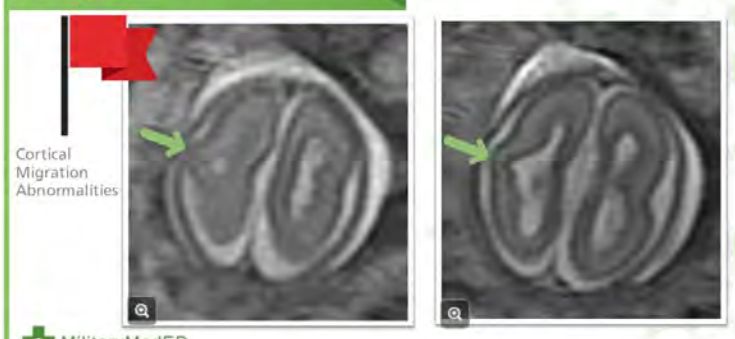
**Menu**

- 1. Corpus Callosum
  - 1.1. Title
  - 1.2. Learning Objectives
  - 1.3. Case Presentation
  - 1.4. A Deeper Examination
  - 1.5. Different Views
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  - 1.12. Embryology of the Corpus Callosum
  - 1.13. Agensis w/ associated abnormalities
  - 1.14. Hypoplasia & Hypogenesis
  - 1.15. Hypogenesis
  - 1.16. Hypogenesis cont.
  - 1.17. Complete Commissural Agensis
  - 1.18. Coronal Imaging
  - 1.19. ACC: Prenatal Imaging

Search:

### A Deeper Examination

Cortical Migration Abnormalities



MilitaryMedED

PREV NEXT

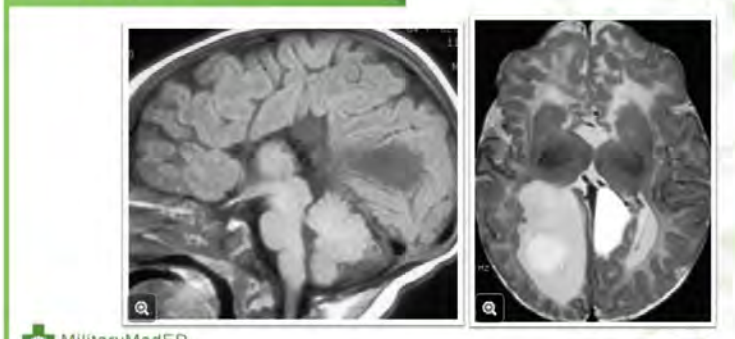
## Corpus Callosum and other "Major" Commissures

**Menu**

- 1. Corpus Callosum
  - 1.1. Title
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  - 1.15. Hypogenesis
  - 1.16. Hypogenesis cont.
  - 1.17. Complete Commissural Agensis
  - 1.18. Coronal Imaging
  - 1.19. ACC: Prenatal Imaging

Search:

### Aicardi Syndrome



MilitaryMedED

PREV NEXT



### Corpus Callosum and other "Major" Commissures

**Menu**

- 1. Corpus Callosum
- 1.1. Title
- 1.2. Learning Objectives
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- 1.15. Hypogenesis
- 1.16. Hypogenesis cont.
- 1.17. Complete Commissural Agensis
- 1.18. Coronal Imaging
- 1.19. ACC: Prenatal Imaging


Search:

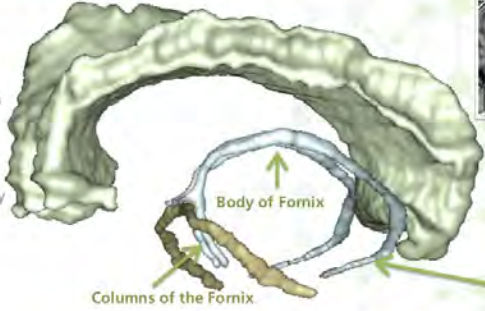
#### Great Forebrain Commissures

**Fornix**

- originates at the level of the alveus of hippocampus -> fimbria
- Upon reaching the undersurface of the splenium, the fimbriae merge to form the body of the fornix

#### Hippocampal Commissure






Body of Fornix

Columns of the Fornix

Fornix



Search:

< PREV

NEXT >


### Corpus Callosum and other "Major" Commissures

**Menu**

- 1. Corpus Callosum
- 1.1. Title
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- 1.19. ACC: Prenatal Imaging

Search:

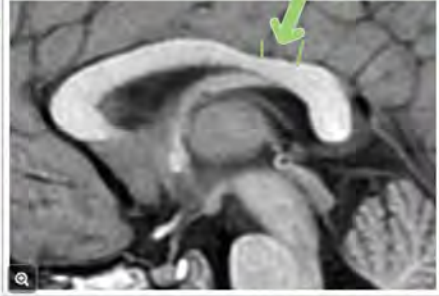
#### Isthmus of the




Motor Cortex

Somatic Sensory Cortex

#### Corpus Callosum



Isthmus



Search:

< PREV

NEXT >



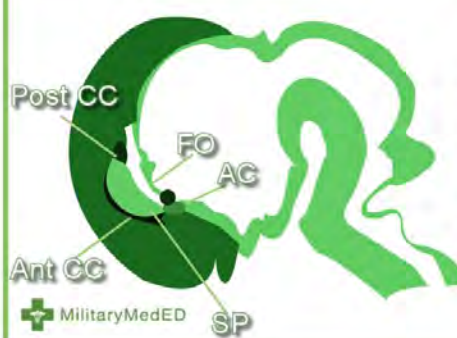
## Corpus Callosum and other "Major" Commissures

**Menu**

- Corpus Callosum
- 1.12. Embryology of the Corpus Callosum
- 1.13. Agenesis w/ associated abnormalities
- 1.14. Hypoplasia & Hypogenesis
- 1.15. Hypogenesis
- 1.16. Hypogenesis cont.
- 1.17. Complete Commissural Agenesis
- 1.18. Coronal Imaging
- 1.19. ACC: Prenatal Imaging Findings
- 1.20. Causes of Abnormal Development
- 1.21. Abnormal Neuronal & Glial Proliferation
- 1.22. Proliferation
- 1.23. Migration
- 1.24. Abnormal Neuronal &
- 1.25. Abnormal midline patterning
- 1.26. Abnormal midline patterning
- 1.27. Abnormal White Matter
- 1.28. Meningeal Anomalies
- 1.29. Meningeal Anomalies

Search...

### Embryology of the Corpus Callosum



### Growth of the Corpus Callosum

- CC forms from 2 separate growth centers (*posterior & anterior*)
- Posterior aspect develops from the formation of the hippocampal commissure. The first axons to cross the commissural plate in the hippocampal primordium and form the splenium (*appears 12-13 wks GA*)
- Around 14-15 wks GA, axons start to cross anteriorly near the anterior commissure form the genu.

## APPENDIX B STORYBOARD PROCEDURE & TEMPLATE

---

### I Objectives

- List 2-3 Objectives from presentation
- Remove any content from presentation not relevant to objectives
- View an example of a slide translated into a Storyboard [see page4]

### II Narrative

- Condense & Bullet Point Main Dialog from Objectives
- Provide Script for Voice Over [see page6]

### III Assessment Questions

- Create 3-5 assessment questions from Objectives [see page5]

Assessment Question Options:

- a. **Create Assessment Questions throughout the body (preferred with or without Post-Test)**
- b. Create Post-Test only
- c. Create Post-Test with Assessment Questions throughout the body

**\*\* This information can be delivered either via Storyboard Template as subsequently provided or in the Notes Section of your PowerPoint presentation slides.**

---

**This will assist in creating the 3 main sections of the Module.** See [link](http://www.childrensmedicaleducation.org/cbt/complex/mod1/story.html) for example. [http://www.childrensmedicaleducation.org/cbt/complex/mod1/story.html]

#### 1. Intro

- a. Home
- b. Welcome
- c. Learning Objectives Briefing

#### 2. **Body** (note that the Assessment Questions can be interspersed throughout the body as shown in this example and/or included as a Post Test at the end of the 2-3 Objectives)

- a. Objective1
  - i. Assessment Question
  - ii. Assessment Question
- b. Objective2
  - i. Assessment Question
- c. Objective3
  - i. Assessment Question
  - ii. Assessment Question

#### d. Post Test (Optional to include with or without interspersed Assessment Questions)

- i. Assessment Questions

#### 3. Summary

- Brief review of all content discussed

## Online Learning Module Storyboard

|   |       |  |  |
|---|-------|--|--|
| <b>Course:</b>  |       |  |  |
| <b>Module:</b>  |       |  |  |
| <b>Lesson:</b>  |       | 1                                      |  |
| <b>Segment:</b>   |       | 1                                      |  |
| <b>Page Title:</b>  |       | 1                                      |  |
| <b>Child Page:</b>  |       |  |  |
| <b>Objective:</b>   |       |  |  |
| <b>On-Screen Text:</b>  |       |  |  |
|   |       |  |  |
| <b>Narration / Closed Captioning: Narrator</b>  |       |  |  |
|   |       |  |  |
| <b>Graphics:</b> (P – photo; G – graphic; F – flash animation; T – table/chart/graph; V – video)  |       |  |  |
|   |       |  |  |
| <b>Audio:</b>   |       |  |  |
| <b>Knowledge Check:</b>   |       | <b>Remedial Screen: <i>Page ID</i></b> |  |
| Correct   |       |  |  |
| Feedback:   |       |  |  |
| 1 <sup>st</sup> try incorrect:  |       |  |  |
| 2 <sup>nd</sup> try incorrect:  |       |  |  |
| <b>Explanatory Information:</b>   |       |  |  |
|   |       |  |  |
| <p><i>Italics has no functional effect</i></p> <p><b>Bold</b> is a rollover</p> <p><u>Underscore</u> is a click to pop-up with click to close</p> |       |  |  |
| <b>Branching:</b>   | Back: | Next:                                  |  |

# APPENDIX C

## PRE AND POST KNOWLEDGE ASSESSMENT QUESTIONS

MilitaryMedED.com My courses Ben

HOME > MY COURSES > NEUROLOGY > BRAIN SEMINARS > NORMAL AND ABNORMAL DEVELOPMENT OF THE CEREBELLUM > PRETEST > PREVIEW

### QUIZ NAVIGATION

1 2 3 4 5  
Finish attempt ...  
Start a new preview

### ADMINISTRATION

- Quiz administration
  - Edit settings
  - Group overrides
  - User overrides
  - Edit quiz
  - Preview**
  - Results
  - Locally assigned roles
  - Permissions
  - Check permissions
  - Filters
  - Logs
  - Backup
  - Restore
  - Question bank
- Course administration
- Switch role to...
- My profile settings
- Site administration

### Normal and Abnormal Development of the Cerebellum

Back to course 'Normal and Abnormal Development of the Cerebellum'

**Question 4**  
Not yet answered  
Marked out of 1.00  
Flag question  
Edit question

In what is the Foxc1 gene expressed?

Select one:

- a. Mesenchyme
- b. Subarachnoid Space
- c. Neurocutaneous Melanosis

Next

MilitaryMedED.com My courses Ben

HOME > MY COURSES > NEUROLOGY > BRAIN SEMINARS > NORMAL AND ABNORMAL DEVELOPMENT OF THE CEREBELLUM > PRETEST > PREVIEW

### QUIZ NAVIGATION

1 2 3 4 5  
Finish attempt ...  
Start a new preview

### ADMINISTRATION

- Quiz administration
  - Edit settings
  - Group overrides
  - User overrides
  - Edit quiz
  - Preview**
  - Results
  - Locally assigned roles
  - Permissions
  - Check permissions
  - Filters
  - Logs
  - Backup
  - Restore
  - Question bank
- Course administration
- Switch role to...
- My profile settings
- Site administration

### Normal and Abnormal Development of the Cerebellum

Back to course 'Normal and Abnormal Development of the Cerebellum'

**Question 1**  
Not yet answered  
Marked out of 1.00  
Flag question  
Edit question

The widening of the neural tube and thinning of the 4<sup>th</sup> ventricular roof along with the GA formation of the Pontine Flexure occur when?

Select one:

- a. 5 weeks
- b. 62 days
- c. 2 months
- d. 12 weeks

Next

HOME > MY COURSES > NEUROLOGY > BRAIN SEMINARS > NORMAL AND ABNORMAL DEVELOPMENT OF THE CEREBELLUM > PRETEST

**ADMINISTRATION**

- Quiz administration
- Edit settings
- Group overrides
- User overrides
- Edit quiz
- Preview
- Results
- Locally assigned roles
- Permissions
- Check permissions
- Filters
- Logs
- Backup
- Restore
- Question bank
- Course administration
- Switch role to...
- My profile settings
- Site administration

## Normal and Abnormal Development of the Cerebellum

↑ Back to course 'Normal and Abnormal Development of the Cerebellum'

### PreTest

Grading method: Highest grade  
Attempts: 19

#### Summary of your previous attempts

| Attempt | State   | Marks / 5.00 | Grade / 10.00 |
|---------|---|--------------|---------------|
| Preview | Finished<br>Submitted Friday, 6 March 2015, 9:56 AM | 5.00         | 10.00         |

Highest grade: 10.00 / 10.00.

[Preview quiz now](#)

HOME > MY COURSES > NEUROLOGY > BRAIN SEMINARS > INVESTIGATING BRAIN PLASTICITY AND CONNECTIVITY WITH STRUCTURAL MRI TECHNIQUES Turn editing on

**PROGRESS BAR**

Progress: 75%

Mouse over block for info

[Overview of students](#)

## Investigating Brain Plasticity and Connectivity with Structural MRI Techniques

Welcome to this online course. To begin, please read the documentation and complete the Training Module. After taking the training module, please answers the questions in the post-run questionnaire.

- PreTest ☑  
Brain Plasticity and Connectivity  
Not available unless: The activity **PreTest** is marked complete
- PostTest ☑  
Not available unless: The activity **Brain Plasticity and Connectivity** is marked complete
- POST-RUN MODULE QUESTIONNAIRE ☑  
Not available unless: The activity **PostTest** is marked complete

**UPCOMING EVENTS**

There are no upcoming events

[Go to calendar...](#)

[New event...](#)

**ADMINISTRATION**

- Course administration
- Turn editing on
- Edit settings
- Course completion
- Users
- Filters
- Reports
- Grades
- Outcomes
- Badges
- Backup
- Restore
- Import
- Publish
- Reset
- Question bank
- Switch role to...
- My profile settings
- Site administration



QUIZ NAVIGATION

1 2 3 4 5

Finish attempt ...

Start a new preview

ADMINISTRATION

- Quiz administration
  - Edit settings
  - Group overrides
  - User overrides
  - Edit quiz
  - Preview
  - Results
  - Locally assigned roles
  - Permissions
  - Check permissions
  - Filters
  - Logs
  - Backup
  - Restore
  - Question bank
- Course administration
  - Switch role to...
  - My profile settings
  - Site administration

## Investigating Brain Plasticity and Connectivity with Structural MRI Techniques

Back to course 'Investigating Brain Plasticity and Connectivity with Structural MRI Techniques'

Question 4

Not yet answered

Marked out of 1.00

Flag question

Edit question

The hypothesis is that the trained volunteers' ability to juggle at the end of training is mediated by some structural change in brain tissue. This hypothesis can be tested using analysis pipelines like \_\_\_\_\_ that take as input the T1-weighted images collected before and after training and outputs statistical maps that show a significant change in brain structure in the training group compared to the control group.

Select one:

- a. Voxel-Based Morphometry (VBM)
- b. Magnetic Resonance Imaging (MRI)
- c. Diffusion Tensor Imaging (DTI)

Next

QUIZ NAVIGATION

1 2 3 4 5

Finish attempt ...

Start a new preview

ADMINISTRATION

- Quiz administration
  - Edit settings
  - Group overrides
  - User overrides
  - Edit quiz
  - Preview
  - Results
  - Locally assigned roles
  - Permissions
  - Check permissions
  - Filters
  - Logs
  - Backup
  - Restore
  - Question bank
- Course administration
  - Switch role to...
  - My profile settings
  - Site administration

## Investigating Brain Plasticity and Connectivity with Structural MRI Techniques

Back to course 'Investigating Brain Plasticity and Connectivity with Structural MRI Techniques'

Question 1

Not yet answered

Marked out of 1.00

Flag question

Edit question

The "change" from plasticity could be evoked by various factors, which include maturational changes due to \_\_\_\_\_

Select one:

- a. learning a novel skill
- b. development and aging
- c. injury to the central nervous system (CNS) or the peripheral nervous system (PNS)
- d. lifestyle factors (i.e. quality of sleep)

Next

---

[Course Management](#)

# Introduction to MRI

Home / My courses / Introduction to MRI / Curriculum  
 / POST-RUN MODULE QUESTIONNAIRE / View All Responses / Summary  
 / View Default order

[↑ Back to 'Curriculum'](#)
[Advanced settings](#)
[Questions](#)
[Preview](#)
[View All Responses](#)
[Non-respondents](#)
[Summary](#)
[List of responses](#)
[View Default order](#)
[Ascending order](#)
[Descending order](#)
[Delete ALL Responses](#)
[Download in text format](#)

View All Responses. **All participants.** View Default order  Responses: **43**

## POST-RUN MODULE QUESTIONNAIRE

**1** **Three learning objectives are listed below. Please rate the improvement in your ability to accomplish the module objectives. Use the following scale:**

- 1 - None = no apparent improvement in my ability to perform this objective
- 2 - Slight = slight improvement in my ability to perform this objective
- 3 - Moderate = moderate improvement in my ability to perform this objective
- 4 - Substantial = substantial improvement in my ability to perform this objective
- 5 - Exceptional = exceptional improvement in my ability to perform this objective

After completing the training module, the participant will be able to...

**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

|  |   |     |
|--|---|-----|
| 1.) Understand the concept of Protons, Spins, & Precession                               | ■ | 3.3 |
| 2.) Understand the Larmor Equation   | ■ | 3.3 |
| 3.) Understand how the MR signal is formed from Longitudinal to Transverse Magnetization | ■ | 3.3 |

| Responses  | 1          | 2          | 3           | 4                  | 5           | Total     |
|--|------------|------------|-------------|--------------------|-------------|-----------|
| 1.) Understand the concept of Protons, Spins, & Precession                               | 5<br>(12%) | 7<br>(16%) | 10<br>(23%) | <b>11</b><br>(26%) | 10<br>(23%) | <b>43</b> |
| 2.) Understand the Larmor Equation   | 6<br>(14%) | 6<br>(14%) | 9<br>(21%)  | <b>14</b><br>(33%) | 8<br>(19%)  | <b>43</b> |
| 3.) Understand how the MR signal is formed from Longitudinal to Transverse Magnetization | 7<br>(16%) | 4<br>(9%)  | 10<br>(23%) | <b>13</b><br>(30%) | 9<br>(21%)  | <b>43</b> |

## 2




Please rate the following comments about the training module using the following scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

|   |   |     |
|---|---|-----|
| 1.) The module presented content that can be applied in real-world medical situations.                  | ■ | 3.7 |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. | ■ | 2.8 |

|   |   |     |
|---|---|-----|
| 3.) I have a better understanding about the topics and concepts discussed in the module.  |  | 3.3 |
| 4.) I will apply these techniques while practicing at my institution.                     |  | 3.5 |
| 5.) I would participate in other BRAIN training modules using this program in the future. |  | 3.5 |

| Responses   | 1          | 2                  | 3                  | 4           | 5           | Total     |
|---|------------|--------------------|--------------------|-------------|-------------|-----------|
| 1.) The module presented content that can be applied in real-world medical situations.                  | 1<br>(2%)  | 3<br>(7%)          | <b>15</b><br>(35%) | 12<br>(28%) | 12<br>(28%) | <b>43</b> |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. | 9<br>(21%) | <b>11</b><br>(26%) | 10<br>(23%)        | 6<br>(14%)  | 7<br>(16%)  | <b>43</b> |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                | 3<br>(7%)  | 6<br>(14%)         | <b>18</b><br>(42%) | 9<br>(21%)  | 7<br>(16%)  | <b>43</b> |
| 4.) I will apply these techniques while practicing at my institution.                                   | 2<br>(5%)  | 4<br>(9%)          | <b>18</b><br>(42%) | 10<br>(23%) | 9<br>(21%)  | <b>43</b> |
| 5.) I would participate in other BRAIN training modules using this program in the future.               | 3<br>(7%)  | 3<br>(7%)          | <b>16</b><br>(37%) | 11<br>(26%) | 10<br>(23%) | <b>43</b> |

### 3

**Directions:** Please answer the following questions about using the training module.

**1. Was the module presentation organized, easy-to-use, and user-friendly? YN**

**Why or why not**



| Respondent                         | Response  |
|------------------------------------|---|
| 000000000002-a10<br>Analysis10     | Fairly user friendly. Occasionally the button to click to move to the next stage (pretest to module, module to post test, finish post test) isn't obvious in location or consistent in text/shape/color/etc.<br><br>A NEXT or CONTINUE TO MODULE button that is obvious and at the bottom of each section would be helpful. |
| 000000000001-a11<br>Analysis11     | yes   |
| 000000000001-a12<br>Analysis12     | Y<br><br>simple and animation provided  |
| 000000000003-a12<br>Analysis12     | Had a solid base in the identified objectives and presentation caused doubt. Aced pretest, lesson only contradicted my understanding.   |
| 000000000005-a12<br>Analysis12     | Y   |
| 000000000003-a13<br>Analysis13     | Yes. Easy to navigate.  |
| 000000000001-a15<br>Analysis15     | Yes.  |
| 0000000000000006-a16<br>Analysis16 | y   |
| 0000000000000002-a17<br>Analysis17 | Yes   |
| 0000000000000002-a19<br>Analysis19 | Well Organized.   |

|                                     |   |
|-------------------------------------|---|
| 00000000000000000005-a19 Analysis19 | Yes. Well ornaized, asy to use and user friendly.     |
| 0001baseline Analysis2              | yes<br>organized and easy to use                      |
| 0003baseline Analysis2              | The tone is very monotonous.                          |
| 0005baseline Analysis2              | Yes. Really like the graphics and organization.       |
| 0007baseline Analysis2              | No, I thought the module went WAY to fast.            |
| 000000004-a22 Analysis22            | Yes   |
| 000000005-a22 Analysis22            | y   |
| 000000002-a23 Analysis23            | Yes   |
| 000000001-a25 Analysis25            | yes. nicely done                                      |
| 000000001-a26 Analysis26            | Yes. Very organized.                                  |
| 000000002-a29 Analysis29            | trhrt   |
| 000000006-a29 Analysis29            | NA  |
| 01-a3 Analysis3                     | Nice animation  |
| 000000001-a30                       | Well designed except for when I tried to click on the |

|                             |  |
|-----------------------------|--|
| 000000001-a30<br>Analysis30 | well designed except for when I tried to click on the submit button at the end of presentation slides to finish it wouldn't let me click |
| 000000002-a34<br>Analysis34 | This module was a nice <a href="#">introduction to MRI</a> physics for beginners.  |
| 02-a35 Analysis35           | Yes, worked on internet explorer.  |
| 02-a36 Analysis36           | Yes, very concise.   |
| 02-a37 Analysis37           | The graphics would not load on Chrome  |
| 000005-a4 Analysis4         | yes  |
| 000007-a4 Analysis4         | Yes.   |
| 000009-a4 Analysis4         | Easy enough to use, but no added value to the traditional book learning I have already done.   |
| 000011-a4 Analysis4         | yes  |
| 00000001-a6 Analysis6       | Y  |
| 00000003-a6 Analysis6       | Extremely well done. Very intuitive.   |
| 0000000002-a8<br>Analysis8  | y  |
| 0000000004-a8<br>Analysis8  | Yes. Videos are a great learning tool.   |
| 00000000002-a9<br>Analysis9 | Easy to use.   |

|                            |   |
|----------------------------|---|
| 0000000004-a9<br>Analysis9 | it was ok   |
| participant baseline1      | Yes it was user friendly and easy to use  |
| participant baseline11     | Y   |
| participant baseline5      | Great quick overview of basic MRI physics, but not sure how clinically applicable it is to most clinicians. Well organized. Easy to navigate. |
| participant baseline7      | Yes - I appreciated the simplified organization of each topic without excessive information.  |
| participant baseline9      | yes   |

4

**SCALE**

|                            |   |   |   |   |   |                           |
|----------------------------|---|---|---|---|---|---------------------------|
| <i>Not at all engaging</i> | 1 | 2 | 3 | 4 | 5 | <i>Extremely engaging</i> |
|----------------------------|---|---|---|---|---|---------------------------|

**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

To what degree did the learning environment present information in a way that was engaging? 3.4

|                  |          |          |          |          |          |              |
|------------------|----------|----------|----------|----------|----------|--------------|
| <b>Responses</b> | <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b> | <b>Total</b> |
|------------------|----------|----------|----------|----------|----------|--------------|

To what degree did the learning environment present information in a way that was engaging?      1      5      **18**      13      6      **43**  
 (2%)    (12%)    (42%)    (30%)    (14%)

**5 Please provide an explanation of your above rating:**

| <b>Respondent</b>                  | <b>Response</b>  |
|------------------------------------|--|
| 000000000002-a10<br>Analysis10     | combination of text, images and voice is engaging.                                 |
| 000000000001-a11<br>Analysis11     | good   |
| 000000000001-a12<br>Analysis12     | it was really simple basic information i already know                              |
| 000000000003-a12<br>Analysis12     | Already had understanding of identified objectives, did not advance understanding. |
| 000000000005-a12<br>Analysis12     | Monotone   |
| 000000000003-a13<br>Analysis13     | Straightforward presentation   |
| 00000000000001-a15<br>Analysis15   | Very interactive   |
| 0000000000000006-a16<br>Analysis16 | x  |
| 0000000000000002-a17<br>Analysis17 | Engaging   |
| 0000000000000002-a19<br>Analysis19 | Well thought out.  |
| 0000000000000005-                  | - Good diagrams. clear information. IMO diagrams could                             |



.....  
a19 Analysis19

Good diagrams, clear information. The diagrams could be even better for a more clear explanation. I recommend the MRI physics course from imaos.com, which many radiologists use to learn MRI physics nowadays. Good ideas can be learned there.

- The explanations are clear and accurate, very good. I understand that this is a subject that is not easy to teach, but given this "limitation", I still believe that the voice of the speaker was a little monotonous. If you want to keep the attention from the audience for a longer course, the speaker should try to be more engaging. Just a suggestion.

0001baseline Analysis2

It is clearly relevant to our research.

0003baseline Analysis2

It is just a classic lecture.

0005baseline Analysis2

Video and graphics, along with pre- and post-testing are a great way to keep me engaged.

0007baseline Analysis2

The visual and auditory ques, although they moved fast, were very nice.

000000004-a22  
Analysis22

Animation useful

000000005-a22  
Analysis22

less text

000000002-a23  
Analysis23

Modestly engaging

000000001-a25  
Analysis25

mostly passive listening/watching

000000001-a26  
Analysis26

Yes.

---

|                            |   |
|----------------------------|---|
| 00000002-a29<br>Analysis29 | dgdf  |
| 00000006-a29<br>Analysis29 | nA  |
| 01-a3 Analysis3            | Lots of animation is hepful   |
| 00000001-a30<br>Analysis30 | Audio only no visual aides at least when I was reviewing the module                     |
| 00000002-a34<br>Analysis34 | The video, audio and text were well done.   |
| 02-a35 Analysis35          | Video cases   |
| 02-a36 Analysis36          | Good diagrams.  |
| 02-a37 Analysis37          | It is hard to have engaging activity regarding physics using online modules.            |
| 000005-a4 Analysis4        | yes   |
| 000007-a4 Analysis4        | Would like more interaction built with the presentation (felt like reading a textbook). |
| 000009-a4 Analysis4        | Pre and post test is OK, but the course itself was just reading a text book aloud.      |
| 000011-a4 Analysis4        | NA  |
| 00000001-a6 Analysis6      | video was boring at times   |

---

|                         |   |
|-------------------------|---|
| 00000003-a6 Analysis6   | Good combination of audio and visual cues.  |
| 0000000002-a8 Analysis8 | monotone  |
| 0000000004-a8 Analysis8 | Videos are a great learning tool.   |
| 0000000002-a9 Analysis9 | I feel comfortable with the material already.   |
| 0000000004-a9 Analysis9 | none  |
| participant baseline1   | For me it lacked colors to point out the different concepts and information, detailed animation or schemes to remember the main parts |
| participant baseline11  | simulates didactic classroom lecture - passive learning   |
| participant baseline5   | Nice graphics and very clear and clean presentation.  |
| participant baseline7   | Animations with voice over is very engaging.  |
| participant baseline9   | Short and concise   |

6

|                         |   |   |   |   |   |                         |
|-------------------------|---|---|---|---|---|-------------------------|
| <i>Do not recommend</i> | 1 | 2 | 3 | 4 | 5 | <i>Highly recommend</i> |
|-------------------------|---|---|---|---|---|-------------------------|

**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Would you recommend that this learning  3.5

environment be used for learning about the pediatric brain and MRI?

| Responses  | 1         | 2          | 3           | 4           | 5          | Total |
|--|-----------|------------|-------------|-------------|------------|-------|
| Would you recommend that this learning environment be used for learning about the pediatric brain and MRI? | 1<br>(2%) | 5<br>(12%) | 18<br>(42%) | 10<br>(23%) | 9<br>(21%) | 43    |

## 7

**Why or why not would you recommend that this learning environment be used for learning about the pediatric brain and MRI?**

| Respondent                        | Response   |
|-----------------------------------|--|
| 000000000002-a10<br>Analysis10    | mixed media can be useful for watching complex topics where animations can augment text. |
| 000000000001-a11<br>Analysis11    | basic training   |
| 000000000001-a12<br>Analysis12    | it really useful for people who do know the basics                                       |
| 000000000003-a12<br>Analysis12    | ONLY for junior residents  |
| 000000000005-a12<br>Analysis12    | It seems fine, but not necessarily my preferred learning method.                         |
| 000000000003-a13<br>Analysis13    | Useful for foundation in MRI   |
| 00000000000001-a15<br>Analysis15  | Very good content  |
| 000000000000006-a16<br>Analysis16 | x  |

|                                   |  |
|-----------------------------------|--|
| 000000000000000002-a17 Analysis17 | Yes  |
| 000000000000000002-a19 Analysis19 | Good basic training on physics.  |
| 000000000000000005-a19 Analysis19 | Please see my comments from the "plasticity" module.   |
| 0001baseline Analysis2            | Some topics need greater detail and information i.e. videos, podcasts, interactive tasks   |
| 0003baseline Analysis2            | Usefulness of online classes.  |
| 0005baseline Analysis2            | As above.  |
| 0007baseline Analysis2            | I believe the physics of this field require more time and a slower learning curve  |
| 000000004-a22 Analysis22          | Easy access. Can use at home.  |
| 000000005-a22 Analysis22          | need to be more basic  |
| 000000002-a23 Analysis23          | Not for fellow level, maybe for junior residents   |
| 000000001-a25 Analysis25          | It was redundant with other learning i've done...that radiology residents would be likely to do....however...is well targeted to non-radiology groups. |
| 000000001-a26 Analysis26          | Yes  |
| 000000002-a29                     | fgdg   |



## Analysis29

|                             |  |
|-----------------------------|--|
| 000000006-a29<br>Analysis29 | NA   |
| 01-a3 Analysis3             | Nice introduction  |
| 000000001-a30<br>Analysis30 | Implementation of visual aides would be helpful  |
| 000000002-a34<br>Analysis34 | The learning environment would be useful for online training of multiple subjects and applications.  |
| 02-a35 Analysis35           | good basic intro for MRI.  |
| 02-a36 Analysis36           | Very easy to use and follow.   |
| 02-a37 Analysis37           | Impartial  |
| 000005-a4 Analysis4         | yes  |
| 000007-a4 Analysis4         | Framework is there. Content could be improved. No easy to fully assess given basic intro module.   |
| 000009-a4 Analysis4         | It would be decent enough if you had no intro to MRI whatsoever, but I didn't find that the explanations were any better than other materials. Course itself was monotone and didn't present info in an innovative or interactive way. |
| 000011-a4 Analysis4         | Good resource and easy   |
| 00000001-a6 Analysis6       | decent intro video   |

|                         |  |
|-------------------------|--|
| 00000003-a6 Analysis6   | Would recommend. All the information is clearly presented.   |
| 0000000002-a8 Analysis8 | The explanation of how transverse magnetization is formed was not at all clear. It talked about a single proton being tipped down into the transverse plane, not a lot of protons being tipped and then made to precess in sync to form a net magnetization.   |
| 0000000004-a8 Analysis8 | No information on pediatric specific imaging.  |
| 0000000002-a9 Analysis9 | Yes  |
| 0000000004-a9 Analysis9 | ok   |
| participant baseline1   | I would recommend it to be used to learn about the pediatric brain but I would add information on how these concepts have an impact on the actual MRI images, try to link it more to actual practice   |
| participant baseline11  | do not feel much different from normal lecture classroom settings  |
| participant baseline5   | I would recommend this for a brief introduction/refresher topic for those somewhat familiar with MRI. It is a nice way to remind them about the basics as they go on to more complex modules. For more indepth understanding for radiologist, I would recommend the ACR physics modules. If this is a first introduction to the topic for someone who knows nothing about MRI, it may be too difficult. I'm not sure how an MRI novice (nonradiologist) would rate this topic. |
| participant baseline7   | This module seems like it could be a supplement to more in-depth reading material - a good introduction.   |

participant baseline9      Self-directed learning

## 8 Please comment on skills, concepts, and techniques you learned in this module:

| Respondent                          | Response                              |
|-------------------------------------|---------------------------------------|
| 000000000002-a10<br>Analysis10      | info in the module was review for me. |
| 000000000001-a11<br>Analysis11      | basic concepts                        |
| 0000000000001-a12<br>Analysis12     | i like the animations                 |
| 0000000000003-a12<br>Analysis12     | None                                  |
| 0000000000005-a12<br>Analysis12     | MRI physics                           |
| 0000000000003-a13<br>Analysis13     | Concise review of basic MRI physics   |
| 000000000000001-a15<br>Analysis15   | Great content about MRI basics        |
| 0000000000000006-a16<br>Analysis16  | x                                     |
| 0000000000000002-a17<br>Analysis17  | Good                                  |
| 00000000000000002-a19<br>Analysis19 | None.                                 |
| 00000000000000005-                  | n/a                                   |

## a19 Analysis19

---

|                             |  |
|-----------------------------|--|
| 0001baseline Analysis2      | To someone coming into this course that does not work directly with MRI, topics are very hard to grasp in general. |
| 0003baseline Analysis2      | No comments  |
| 0005baseline Analysis2      | MR concepts  |
| 0007baseline Analysis2      | I learned a little about how the hydrogen atoms spins are understood.  |
| 000000004-a22<br>Analysis22 | No significant new info as presented info was somewhat basic.  |
| 000000005-a22<br>Analysis22 | equation   |
| 000000002-a23<br>Analysis23 | N/A  |
| 000000001-a25<br>Analysis25 | none   |
| 000000001-a26<br>Analysis26 | MRI physics.   |
| 000000002-a29<br>Analysis29 | fgdg   |
| 000000006-a29<br>Analysis29 | nA   |
| 01-a3 Analysis3             | good introduction  |
| 000000001-a30               | Basics of MRI  |

---

## Analysis30

|                             |   |
|-----------------------------|---|
| 000000002-a34<br>Analysis34 | It was a nice review of introductory MRI concepts.                |
| 02-a35 Analysis35           | larmour equation and MRI basics.                                  |
| 02-a36 Analysis36           | Good understanding of basics.                                     |
| 02-a37 Analysis37           | None  |
| 000005-a4 Analysis4         | None  |
| 000007-a4 Analysis4         | Limited due to basic nature of the module.                        |
| 000009-a4 Analysis4         | I have already learned some MRI physics, so nothing here was new. |
| 000011-a4 Analysis4         | MRI Physics   |
| 00000001-a6 Analysis6       | learned very basic info on MRI physics                            |
| 00000003-a6 Analysis6       | Basic MRI theory.   |
| 0000000002-a8<br>Analysis8  |   |
| 0000000004-a8<br>Analysis8  | Physics   |
| 00000000002-a9<br>Analysis9 | None.   |
| 00000000004-a9<br>Analysis9 | ok  |



|                        |  |
|------------------------|--|
| participant baseline1  | nothing much to comment here, see the other comments                           |
| participant baseline11 | basic mr physics   |
| participant baseline5  | Good overview of topic on introductory level.                                  |
| participant baseline7  | I knew most of the basics already, but learned a little more about precession. |
| participant baseline9  | Very basic   |

## 9 What did you like best about this module?

| Respondent                  | Response   |
|-----------------------------|--|
| 000000000002-a10 Analysis10 | auto advancing between sections in the presentation. |
| 000000000001-a11 Analysis11 | pictures   |
| 000000000001-a12 Analysis12 | the animation  |
| 000000000003-a12 Analysis12 | N/A  |
| 000000000005-a12 Analysis12 | It had nice graphics.                                |
| 000000000003-a13 Analysis13 | Brevity  |
| 000000000001-a15 Analysis15 | Very easy to follow and understand                   |

## Analysis 16

|  |  |
|--|--|
| 00000000000000000006-a16<br>Analysis16 | x  |
| 00000000000000000002-a17<br>Analysis17 | Good   |
| 00000000000000000002-a19<br>Analysis19 | Its brevity.                                     |
| 00000000000000000005-a19<br>Analysis19 | concise and clear                                |
| 0001baseline Analysis2                 | Learning new facts about MRI                     |
| 0003baseline Analysis2                 | Animations                                       |
| 0005baseline Analysis2                 | Graphics   |
| 0007baseline Analysis2                 | The visuals that accompanied the lectures        |
| 000000004-a22 Analysis22               | Easy navigation.                                 |
| 000000005-a22 Analysis22               | models   |
| 000000002-a23 Analysis23               | Animations                                       |
| 000000001-a25 Analysis25               | concise  |
| 000000001-a26 Analysis26               | The <a href="#">introduction to MRI</a> physics. |
| 000000002-a29 Analysis29               | dgf  |

|                          |  |
|--------------------------|--|
| 000000006-a29 Analysis29 | nA   |
| 01-a3 Analysis3          | animation  |
| 000000001-a30 Analysis30 | Conciseness  |
| 000000002-a34 Analysis34 | The attention to detail in the video and audio portions. |
| 02-a35 Analysis35        | Quick pace.  |
| 02-a36 Analysis36        | Good diagram   |
| 02-a37 Analysis37        | Short  |
| 000005-a4 Analysis4      | No comment   |
| 000007-a4 Analysis4      | Ease of use.   |
| 000009-a4 Analysis4      | Pre and post test with explanations.                     |
| 000011-a4 Analysis4      | Everythings  |
| 00000001-a6 Analysis6    | Short- easy to stay focused                              |
| 00000003-a6 Analysis6    | It's very simple.  |
| 000000002-a8 Analysis8   | animations worked well                                   |
| 000000004-a8 Analysis8   | Videos are a great learning tool.                        |

|                          |  |
|--------------------------|--|
| 00000000002-a9 Analysis9 | It was short.  |
| 00000000004-a9 Analysis9 | ok   |
| participant baseline1    | nothing much to comment here: user friendly and not too long |
| participant baseline11   | short and concise  |
| participant baseline5    | Clear presentation.  |
| participant baseline7    | Animations   |
| participant baseline9    | Short and concise  |

## 10 What did you like least about this module?

| Respondent                      | Response       |
|---------------------------------|----------------|
| 00000000002-a10<br>Analysis10   | none           |
| 000000000001-a11<br>Analysis11  | no             |
| 0000000000001-a12<br>Analysis12 | the simplicity |
| 0000000000003-a12<br>Analysis12 | Not helpful    |
| 0000000000005-a12<br>Analysis12 | Monotone       |

|                                    |  |
|------------------------------------|--|
| 0000000000000003-a13<br>Analysis13 | N/A  |
| 0000000000000001-a15<br>Analysis15 | Nothing  |
| 0000000000000006-a16<br>Analysis16 | x  |
| 0000000000000002-a17<br>Analysis17 | Good   |
| 0000000000000002-a19<br>Analysis19 | Nothing.   |
| 0000000000000005-a19<br>Analysis19 | Please see my answer to item 5.  |
| 0001baseline Analysis2             | Left me wanting more information   |
| 0003baseline Analysis2             | Tone   |
| 0005baseline Analysis2             | The questionnaire is redundant   |
| 0007baseline Analysis2             | The visuals were not utilized very well within the lectures.   |
| 000000004-a22<br>Analysis22        | Too basic.   |
| 000000005-a22<br>Analysis22        | voice recording  |
| 000000002-a23<br>Analysis23        | Too basic  |
| 000000001-a25<br>Analysis25        | I don't normally like being forced to "listen" to these modules....recc presenting in visual manner making sure audio is there for aural learners but "skippable" for visual |



audio is there for aural learners but skipable for visual learners.

|                             |   |
|-----------------------------|---|
| 000000001-a26<br>Analysis26 | The quizzes.  |
| 000000002-a29<br>Analysis29 | fgdfg   |
| 000000006-a29<br>Analysis29 | nA  |
| 01-a3 Analysis3             | the guys voice is monotonous  |
| 000000001-a30<br>Analysis30 | No visual aides at least when I was reviewing the module                          |
| 000000002-a34<br>Analysis34 | The <b>pretest</b> questions were the same as the post test questions.            |
| 02-a35 Analysis35           | Some internet issues at first.  |
| 02-a36 Analysis36           | None.   |
| 02-a37 Analysis37           | None  |
| 000005-a4 Analysis4         | No comment  |
| 000007-a4 Analysis4         | Felt as if someone was reading a textbook.  |
| 000009-a4 Analysis4         | It was basically just a text book read aloud. I did not see anything interactive. |
| 000011-a4 Analysis4         | NA  |

|                         |  |
|-------------------------|--|
| 00000001-a6 Analysis6   | Not enough detail  |
| 00000003-a6 Analysis6   | The constant banner that would block the screen saying the internet is too slow. I would take that out completely and just have the audio and video not play until all the data has loaded. Otherwise, it blocks information on the screen.  |
| 0000000002-a8 Analysis8 | See above.   |
| 0000000004-a8 Analysis8 | Videos are a great learning tool.  |
| 0000000002-a9 Analysis9 | Nothing.   |
| 0000000004-a9 Analysis9 | ok   |
| participant baseline1   | It would be nice to have one normal learner mode and one advanced one where you can have additional information on concepts: for example be able to click on Larmor equation and then have an explanation on what it exactly entails, how and when it has been discovered etc. and eventually have examples like small exercises to be able to understand the concepts |
| participant baseline11  | having to wait for the speaker   |
| participant baseline5   | Not sure about the target audience.  |
| participant baseline7   | That there could probably be more animations.  |
| participant baseline9   | Too basic  |

## 11

If future training modules related to the topic just learned were to be developed, which ones would you recommend?

| Respondent                         | Response  |
|------------------------------------|---|
| 000000000002-a10<br>Analysis10     | more in depth physics of MRI and discussion of MRI imaging protocols (T1/T2/FLAIR/fat suppression/etc)                    |
| 000000000001-a11<br>Analysis11     | thinking  |
| 000000000001-a12<br>Analysis12     | use supporting animations as much as possible   |
| 000000000003-a12<br>Analysis12     | No  |
| 000000000005-a12<br>Analysis12     | Signal generation and showing how T1 and T2 weighting is performed.   |
| 000000000003-a13<br>Analysis13     | N/A   |
| 00000000000001-a15<br>Analysis15   | Body MRI  |
| 0000000000000006-a16<br>Analysis16 | x   |
| 0000000000000002-a17<br>Analysis17 | All   |
| 0000000000000002-a19<br>Analysis19 | More on pulse sequences.  |
| 0000000000000005-a19<br>Analysis19 | Any e-learning trainign module for MRI physics is always helpful, either to retain concepts, overview or learn new ideas. |

|                             |  |
|-----------------------------|--|
| 0001baseline Analysis2      | n/a  |
| 0003baseline Analysis2      | No recommendation at that time.            |
| 0005baseline Analysis2      | Other physics concepts                     |
| 0007baseline Analysis2      | introduction to nuclear magnetic resonance |
| 000000004-a22<br>Analysis22 | T1 T2 PD weighting. GRE and IR sequences.  |
| 000000005-a22<br>Analysis22 | more basic concepts                        |
| 000000002-a23<br>Analysis23 | Fellow level modules                       |
| 000000001-a25<br>Analysis25 | CT...<br>neuroantomy (brain MRI focus)     |
| 000000001-a26<br>Analysis26 | MRI physics                                |
| 000000002-a29<br>Analysis29 | gsfg                                       |
| 000000006-a29<br>Analysis29 | NA   |
| 01-a3 Analysis3             | review of vocabulary                       |
| 000000001-a30<br>Analysis30 | N/A  |
| 000000002-a34<br>Analysis34 | How frequency and phase encoding work.     |

|                            |   |
|----------------------------|---|
| 02-a35 Analysis35          | Explain different MRI sequences, ie FIESTA or SPGR.   |
| 02-a36 Analysis36          | More on case based radiology concepts   |
| 02-a37 Analysis37          | unknown   |
| 000005-a4 Analysis4        | None  |
| 000007-a4 Analysis4        | As far as online training goes, the more interactive, the better. This can, of course, be difficult with complex topics like MRI. Clinical overview is always important for clinicians (if they are the target audience). |
| 000009-a4 Analysis4        | More advanced topics that were relevant to radiology board preparation. The topics would need to be much more advanced. I would also like to see a more interactive format, less lecture.                                 |
| 000011-a4 Analysis4        | All   |
| 00000001-a6 Analysis6      | basic physics   |
| 00000003-a6 Analysis6      | MRI data acquisition. T1/2 weighting. Types of MRI sequences and how their TE/TR and RF maps differ.  |
| 0000000002-a8<br>Analysis8 | n/a   |
| 0000000004-a8<br>Analysis8 | MRI physics   |
| 0000000002-a9<br>Analysis9 | More in depth MRI physics.  |
| 0000000004-a9              | ok  |

## Analysis9

|                        |   |
|------------------------|---|
| participant baseline1  | An extended version of this one explaining more the physical concepts and linking the physical aspect to the final image in explaining how that could have an impact on the final image |
| participant baseline11 | similar presentation format, more animations  |
| participant baseline5  | MRI Sequences and key features, pitfalls of each sequence.  |
| participant baseline7  | Modules that have animations showing examples of different sequences  |
| participant baseline9  | Contrast weighting  |

## 12

### Additional comments?

| Respondent                           | Response  |
|--------------------------------------|---|
| 0000000000001-a11<br>Analysis11      | no  |
| 0000000000000001-a15<br>Analysis15   | No  |
| 000000000000000002-a19<br>Analysis19 | None  |
| 000000000000000005-a19<br>Analysis19 | n/a   |
| 0005baseline<br>Analysis2            |   |
| 0007baseline<br>Analysis2            | The sound volume decreases I believe in the 7th section |



|  |  |
|--|--|
| <a href="#">0000000004-a22</a><br>Analysis22 | Thank you.   |
| <a href="#">000000002-a23</a><br>Analysis23  |  |
| <a href="#">000000002-a29</a><br>Analysis29  | dgsgff   |
| <a href="#">000000006-a29</a><br>Analysis29  | NA   |
| <a href="#">02-a37</a> Analysis37            | Sorry I don't have a lot of feedback   |
| <a href="#">000005-a4</a> Analysis4          | N/A  |
| <a href="#">000009-a4</a> Analysis4          | Needs to be more than a text book read aloud on a computer.  |
| <a href="#">00000003-a6</a> Analysis6        | Overall well done.   |
| <a href="#">0000000002-a8</a><br>Analysis8   | Showing us the correct answers at the end of the <a href="#">pretest</a> makes the post test pretty useless as a measure of the module's effectiveness.                            |
| <a href="#">00000000002-a9</a><br>Analysis9  | None   |
| <a href="#">0000000004-a9</a><br>Analysis9   | NONE   |
| <a href="#">participant baseline1</a>        | Concerning the <a href="#">pretest</a> , I tried answering randomly to see what would happen when having right and wrong answers and I found that in both cases it was frustrating |

to just have right or wrong instead of an explanation of why the answer was right or wrong or a pointer to where we can find the information.

Also, why have a [pretest](#)?

At the end of a module, when you check the box saying you finished, nothing happens (you can also click on next at the same time) so it would be perhaps best to have the windows closed or something saying "you can now close the window and go back to the main menu" or something like that

You are logged in as [Ben Scalise](#) ([Log out](#))

[Introduction to MRI](#)

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# Fundamentals of Digital Imaging

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## POST-RUN MODULE QUESTIONNAIRE

**1** **Three learning objectives are listed below. Please rate the improvement in your ability to accomplish the module objectives. Use the following scale:**

- 1 - None = no apparent improvement in my ability to perform this objective
- 2 - Slight = slight improvement in my ability to perform this objective
- 3 - Moderate = moderate improvement in my ability to perform this objective
- 4 - Substantial = substantial improvement in my ability to perform this objective
- 5 - Exceptional = exceptional improvement in my ability to perform this objective

After completing the training module, the participant will be able to...

**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

1.) Learn about the nature of Digital Images  3.6

2.) Understand the presentation of Multi-Dimensional Data  3.6

| Responses   | 1         | 2         | 3           | 4          | 5          | Total |
|---|-----------|-----------|-------------|------------|------------|-------|
| 1.) Learn about the nature of Digital Images              | 2<br>(6%) | 2<br>(6%) | 12<br>(35%) | 9<br>(26%) | 9<br>(26%) | 34    |
| 2.) Understand the presentation of Multi-Dimensional Data | 2<br>(6%) | 3<br>(9%) | 11<br>(32%) | 9<br>(26%) | 9<br>(26%) | 34    |


## 2


**Please rate the following comments about the training module using the following scale:**


**1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree**


**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

1.) The module presented content that can be applied in real-world medical situations.  3.9

2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know.  3.4

3.) I have a better understanding about the topics and concepts discussed in the module.  3.6

4.) I will apply these techniques while practicing at my institution.  3.6

5.) I would participate in other BRAIN training  3.6

modules using this program in the future.

| Responses   | 1         | 2          | 3                  | 4                  | 5           | Total     |
|---|-----------|------------|--------------------|--------------------|-------------|-----------|
| 1.) The module presented content that can be applied in real-world medical situations.                  | 0         | 0          | <b>12</b><br>(35%) | <b>12</b><br>(35%) | 10<br>(29%) | <b>34</b> |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. | 3<br>(9%) | 5<br>(15%) | <b>10</b><br>(29%) | 9<br>(26%)         | 7<br>(21%)  | <b>34</b> |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                | 1<br>(3%) | 2<br>(6%)  | <b>14</b><br>(41%) | 9<br>(26%)         | 8<br>(24%)  | <b>34</b> |
| 4.) I will apply these techniques while practicing at my institution.                                   | 1<br>(3%) | 3<br>(9%)  | <b>14</b><br>(41%) | 8<br>(24%)         | 8<br>(24%)  | <b>34</b> |
| 5.) I would participate in other BRAIN training modules using this program in the future.               | 2<br>(6%) | 3<br>(9%)  | <b>11</b><br>(32%) | 9<br>(26%)         | 9<br>(26%)  | <b>34</b> |

### 3

**Directions:** Please answer the following questions about using the training module.

**1. Was the module presentation organized, easy-to-use, and user-friendly? YN**

**Why or why not**

| Respondent                     | Response           |
|--------------------------------|--------------------|
| 000000000003-a10<br>Analysis10 | Yes, well designed |
| 000000000005-a10<br>Analysis10 | Yes                |
| 000000000002-a11<br>Analysis11 | Yes                |

---

|                                     |  |
|-------------------------------------|--|
| 0000000000003-a11<br>Analysis11     | No. I did not understand the flow of information.  |
| 0000000000002-a12<br>Analysis12     | yes, concise and to the point  |
| 0000000000004-a12<br>Analysis12     | Yes  |
| 0000000000003-a14<br>Analysis14     | yes  |
| 000000000000002-a15<br>Analysis15   | Yes.   |
| 00000000000000001-a18<br>Analysis18 | Yes  |
| 00000000000000003-a18<br>Analysis18 | Y, very easy to follow.  |
| 00000000000000004-a18<br>Analysis18 | Y  |
| 0002baseline Analysis2              | I was not able to check the box at the end of test by using a mouse but I had to use 'tab' and 'space'. My browser is Safari (on Mac). |
| 0006baseline Analysis2              | yes  |
| 02-a20 Analysis20                   | I don't know I went through it too quickly   |
| 05-a20 Analysis20                   | Yes  |
| 000000003-a22<br>Analysis22         | Yes. Good content.   |

---



|                             |  |
|-----------------------------|--|
| 000000004-a23<br>Analysis23 | Yes- easy to follow.   |
| 000000003-a29<br>Analysis29 | Yes  |
| 01-a35 Analysis35           | It was well organized and presented in a logical fashion.    |
| 01-a36 Analysis36           | Easy to use.   |
| 000002-a4 Analysis4         | Y  |
| 000008-a4 Analysis4         | Yes.   |
| 000010-a4 Analysis4         | yes<br>simple lanuage  |
| 0000004-a5 Analysis5        | Yes, this module presentation is good for us to study.       |
| 00000002-a6 Analysis6       | Yes, easy to navigate and follow. Not too information dense. |
| 00000004-a6 Analysis6       | Yes  |
| 0000000001-a8<br>Analysis8  | yes  |
| 0000000003-a8<br>Analysis8  | Yes, all of the above.                                       |
| 00000000003-a9<br>Analysis9 | yes  |
| participant baseline10      | Yes. It was good to understand basic knowledge.              |

|                       |  |
|-----------------------|--|
| participant baseline2 | User-friendly, yes   |
| participant baseline4 | Y  |
| participant baseline6 | Easy to use and navigate   |
| participant baseline8 | For the most part, yes. Going from <b>pretest</b> to lesson to post test to evaluation could be made simpler with a link to the next part at the section. Also, possibly for compatibility reasons I was unable to check the "i completed this section" button at the end of the lesson. |

4

**SCALE**

|                            |   |   |   |   |   |                           |
|----------------------------|---|---|---|---|---|---------------------------|
| <i>Not at all engaging</i> | 1 | 2 | 3 | 4 | 5 | <i>Extremely engaging</i> |
|----------------------------|---|---|---|---|---|---------------------------|

Average rank ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

To what degree did the learning environment present information in a way that was engaging? 3.4

| Responses   | 1         | 2          | 3           | 4          | 5          | Total |
|---|-----------|------------|-------------|------------|------------|-------|
| To what degree did the learning environment present information in a way that was engaging? | 1<br>(3%) | 7<br>(21%) | 12<br>(35%) | 6<br>(18%) | 8<br>(24%) | 34    |

5

**Please provide an explanation of your above rating:**

| <b>Respondent</b>                  | <b>Response</b>  |
|------------------------------------|--|
| 000000000003-a10<br>Analysis10     | Animations, fast moving slides                                     |
| 000000000005-a10<br>Analysis10     | Presentation was average   |
| 000000000002-a11<br>Analysis11     | Yes  |
| 000000000003-a11<br>Analysis11     | I was not engaged to the content.                                  |
| 000000000002-a12<br>Analysis12     | passive listening  |
| 000000000004-a12<br>Analysis12     | Adequate   |
| 00000000000003-a14<br>Analysis14   | Good images and animations helped to engage me.                    |
| 000000000000002-a15<br>Analysis15  | I like the user interface.   |
| 0000000000000001-a18<br>Analysis18 | Good presentation  |
| 0000000000000003-a18<br>Analysis18 | In-test questions would be more helpful.                           |
| 0000000000000004-a18<br>Analysis18 | Audio visuals were engaging. Information presented understandably. |
| 0002baseline<br>Analysis2          | The environment was fairly engaging.                               |

|                             |  |
|-----------------------------|--|
| 0006baseline Analysis2      | straight forward   |
| 02-a20 Analysis20           | I went through the training too quickly  |
| 05-a20 Analysis20           | Excellent  |
| 000000003-a22<br>Analysis22 | Clear audio, demonstrations, pictures.   |
| 000000004-a23<br>Analysis23 | Topic is dry. Difficult to make engaging.  |
| 000000003-a29<br>Analysis29 | Very good  |
| 01-a35 Analysis35           | Concise review of the basics of medical imaging.   |
| 01-a36 Analysis36           | Would have been more engaging, but somewhat below my level.  |
| 000002-a4 Analysis4         | Y  |
| 000008-a4 Analysis4         | The video version is not very engaging. Low slower than I would prefer.  |
| 000010-a4 Analysis4         | monotonous voice   |
| 0000004-a5 Analysis5        | It is good.  |
| 00000002-a6 Analysis6       | Modules such as this are helpful for topics that are generally difficult to understand. It is best to keep the modules less information dense so that topics can be quickly understood. This module is a good example of this. |

|                          |  |
|--------------------------|--|
| 00000004-a6 Analysis6    | Animations were good.  |
| 0000000001-a8 Analysis8  |  |
| 0000000003-a8 Analysis8  | Engaging format  |
| 00000000003-a9 Analysis9 | The module was not engaging                                  |
| participant baseline10   | Good visualization to show information.                      |
| participant baseline2    | More pictures would make it more engaging                    |
| participant baseline4    | very easy to use and understand                              |
| participant baseline6    | Difficult to see the clinical relevance of this information. |
| participant baseline8    | Information level was too basic to be particularly engaging. |

6

|                         |   |   |   |   |   |                         |
|-------------------------|---|---|---|---|---|-------------------------|
| <i>Do not recommend</i> | 1 | 2 | 3 | 4 | 5 | <i>Highly recommend</i> |
|-------------------------|---|---|---|---|---|-------------------------|

Average rank ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Would you recommend that this learning environment be used for learning about the pediatric brain and MRI? 3.5

| Responses | 1 | 2 | 3 | 4 | 5 | Total |
|-----------|---|---|---|---|---|-------|
|-----------|---|---|---|---|---|-------|

|  |           |           |                    |            |            |           |
|--|-----------|-----------|--------------------|------------|------------|-----------|
| Would you recommend that this learning environment be used for learning about the pediatric brain and MRI? | 2<br>(6%) | 2<br>(6%) | <b>14</b><br>(41%) | 8<br>(24%) | 8<br>(24%) | <b>34</b> |
|--|-----------|-----------|--------------------|------------|------------|-----------|

## 7

### Why or why not would you recommend that this learning environment be used for learning about the pediatric brain and MRI?

| Respondent                       | Response  |
|----------------------------------|---|
| 000000000003-a10<br>Analysis10   | Go at your own speed learning is helpful  |
| 000000000005-a10<br>Analysis10   | I would recommend it. Presented simply/concisely  |
| 000000000002-a11<br>Analysis11   | Good training. Need harder quizzes that are different after the module. Alternatively, don't give the answers after the pre-test. |
| 000000000003-a11<br>Analysis11   | I'm not sure what the learning objectives are for this course.  |
| 000000000002-a12<br>Analysis12   | concise to the point  |
| 000000000004-a12<br>Analysis12   | Decent general overview   |
| 000000000003-a14<br>Analysis14   | Simple presentation and format.   |
| 00000000000002-a15<br>Analysis15 | It's easy to use and efficient in getting teaching points across.   |
| 0000000000000001-                | Good breakdown of basic material  |



## a18 Analysis18

00000000000000000003-  
a18 Analysis18

Too little detail.

00000000000000000004-  
a18 Analysis18

It is time-consuming but effective. If there is adequate time for this type of training, it can be beneficial.

0002baseline Analysis2

It was easy to watch the video and the quiz was fun.

0006baseline Analysis2

02-a20 Analysis20

Albeit, this took me little time, it still took me time.

05-a20 Analysis20

Good module

0000000003-a22  
Analysis22

I would recommend because it explains basic concepts well.

000000004-a23  
Analysis23

I prefer other resources to learning about the pediatric brain and MRI.

000000003-a29  
Analysis29

Very good

01-a35 Analysis35

The module is very limited in the explanation of MRI.

01-a36 Analysis36

Easy to use.

000002-a4 Analysis4

Y

000008-a4 Analysis4

I dont learn well with modules. Too much going on. I prefer a textbook.

|                            |   |
|----------------------------|---|
| 000010-a4 Analysis4        | not much details about the physics  |
| 0000004-a5 Analysis5       | It provide some basic and important information.  |
| 00000002-a6 Analysis6      | This is a good modality to cover topics that are difficult to understand such as this. It's is best to keep the information presented to a minimum with more modules rather than less modules with more information. If this is geared toward the military, I can speak from experience that if this becomes mandated that we use these, these need to be well worth our time because we will be required to so the modules on our own time on top of the many other "training" modules that we have to complete on a annual basis. |
| 00000004-a6 Analysis6      | Allows you to learn at your own pace  |
| 0000000001-a8<br>Analysis8 | .   |
| 0000000003-a8<br>Analysis8 |   |
| 0000000003-a9<br>Analysis9 | Has to be more clinically relevant  |
| participant baseline10     | Yes. It can be used to introduce basic knowledge on image processing to non-professionals.  |
| participant baseline2      | Interactive nature of videos allow users to appreciate both 2D and 3D nature of medical images  |
| participant baseline4      | user-friendly   |
| participant baseline6      | Possibly easier to learn about these topics with a more   |

interactive module.

participant baseline8

modules are one of many learning styles to learn. drawback of modules is that user cannot speed up or slow down during particular concepts based on their comprehension.

## 8

**Please comment on skills, concepts, and techniques you learned in this module:**

| Respondent                         | Response  |
|------------------------------------|---|
| 000000000003-a10<br>Analysis10     | I didn't learn much from this intro module                                    |
| 000000000005-a10<br>Analysis10     | Concepts of gray-scale were new to me   |
| 000000000002-a11<br>Analysis11     | None  |
| 000000000003-a11<br>Analysis11     | The course briefly reviewed concepts I was already familiar with.             |
| 000000000002-a12<br>Analysis12     | z axis allows 3 D reconstruction  |
| 000000000004-a12<br>Analysis12     | N/A   |
| 00000000000003-a14<br>Analysis14   | N/A   |
| 000000000000002-a15<br>Analysis15  | Overall a very basic overview, which is expected for a basic training module. |
| 0000000000000001-a18<br>Analysis18 | Image processing  |

---

|                                     |  |
|-------------------------------------|--|
| 00000000000000000003-a18 Analysis18 | Learned basics.  |
| 00000000000000000004-a18 Analysis18 | Better understanding of digital radiography.                                 |
| 0002baseline Analysis2              | I was already aware of most of the contents.                                 |
| 0006baseline Analysis2              | bits   |
| 02-a20 Analysis20                   | I got 80% on the <a href="#">pretest</a> but I still had to do the training. |
| 05-a20 Analysis20                   | Good skill learning  |
| 0000000003-a22 Analysis22           | Basic MRI concepts   |
| 000000004-a23 Analysis23            | Learned that the human eye can see 60 shades of grey.                        |
| 000000003-a29 Analysis29            | Basics of MRI  |
| 01-a35 Analysis35                   | none   |
| 01-a36 Analysis36                   | Always good to refresh the basics, I s'pose.                                 |
| 000002-a4 Analysis4                 | <b>Y</b>   |
| 000008-a4 Analysis4                 | Basics fundamentals.   |
| 000010-a4 Analysis4                 | none   |

---

|                          |   |
|--------------------------|---|
| 0000004-a5 Analysis5     | I learn a lot from it.  |
| 00000002-a6 Analysis6    | Very basic MRI and digital imaging concepts that really only Radiologists need to know, but good for explaining these basic concepts. |
| 00000004-a6 Analysis6    | I learn about digital image creation concepts   |
| 0000000001-a8 Analysis8  | .   |
| 0000000003-a8 Analysis8  |   |
| 00000000003-a9 Analysis9 | n/a   |
| participant baseline10   | Basic information on digital image processing   |
| participant baseline2    | Better understanding of different ways of viewing/visualizing digital images  |
| participant baseline4    | I learned that 256 grey level is coded by 8 bit, and human eye can only discriminate 60 grey levels (6 bit), which are new to me.     |
| participant baseline6    | Not sure  |
| participant baseline8    | na  |

## 9

### What did you like best about this module?

| Respondent       | Response                     |
|------------------|------------------------------|
| 000000000003-a10 | Good animations. fast slides |

|                                    |   |
|------------------------------------|---|
| Analysis10                         |   |
| 000000000005-a10<br>Analysis10     | pre and post test   |
| 000000000002-a11<br>Analysis11     | Good training. Need harder quizzes that are different after the module. Alternatively, don't give the answers after the pre-test. |
| 000000000003-a11<br>Analysis11     | It was short.   |
| 000000000002-a12<br>Analysis12     | consice   |
| 000000000004-a12<br>Analysis12     | Short   |
| 00000000000003-a14<br>Analysis14   | Brevity   |
| 000000000000002-a15<br>Analysis15  | Short and sweet. For more involved topics, having subtopics will be helpful so people don't get burned out.                       |
| 0000000000000001-a18<br>Analysis18 | Succinctness  |
| 0000000000000003-a18<br>Analysis18 | Great design.   |
| 0000000000000004-a18<br>Analysis18 | Nice info.  |
| 0002baseline<br>Analysis2          | Quiz.   |
| 0006baseline<br>Analysis2          | short   |



|                             |                                  |
|-----------------------------|----------------------------------|
| 02-a20 Analysis20           | Nothing                          |
| 05-a20 Analysis20           | Excellent skills                 |
| 000000003-a22<br>Analysis22 | Demonstrations.                  |
| 000000004-a23<br>Analysis23 | The module was short.            |
| 000000003-a29<br>Analysis29 | The videos                       |
| 01-a35 Analysis35           | none                             |
| 01-a36 Analysis36           | Ease of use                      |
| 000002-a4 Analysis4         | Y                                |
| 000008-a4 Analysis4         | Questions were reasonable.       |
| 000010-a4 Analysis4         | short                            |
| 000004-a5 Analysis5         | the content                      |
| 00000002-a6 Analysis6       | Short and not information dense. |
| 00000004-a6 Analysis6       | Animations                       |
| 000000001-a8<br>Analysis8   | not too long, short quiz         |
| 000000003-a8<br>Analvsis8   |                                  |

## Analysis9

|                              |                    |
|------------------------------|--------------------|
| 000000000003-a9<br>Analysis9 | n/a                |
| participant baseline10       | good animation.    |
| participant baseline2        | Its concise        |
| participant baseline4        | easy to follow     |
| participant baseline6        | The graphics       |
| participant baseline8        | pleasing interface |

## 10 What did you like least about this module?

| Respondent                     | Response  |
|--------------------------------|---|
| 000000000003-a10<br>Analysis10 | Nothing   |
| 000000000005-a10<br>Analysis10 | Somewhat dry  |
| 000000000002-a11<br>Analysis11 | Good training. Need harder quizzes that are different after the module. Alternatively, don't give the answers after the pre-test. |
| 000000000003-a11<br>Analysis11 | Lack of transitions between topics.   |
| 000000000002-a12<br>Analysis12 | not too much in depth   |
| 000000000004-a12               | Kind of boring.   |

## Analysis12

---

0000000000000003-a14    NA  
Analysis14

---

0000000000000002-a15 Analysis15    Takes a bit of time to load on a slow computer and hangs up on occasion, forcing me to reload the browser.

---

0000000000000001-a18 Analysis18    Nothing

---

0000000000000003-a18 Analysis18    Too little interaction.

---

0000000000000004-a18 Analysis18    Length of time required.

---

0002baseline Analysis2    The progress bar at the bottom of the screen did not represent each slide but each section. It may be good if it represent each slide in case you want to skip with the slide.

---

0006baseline Analysis2    -

---

02-a20 Analysis20    I got 80% on the [pretest](#) but I still had to do the training.

---

05-a20 Analysis20    Good images

---

000000003-a22 Analysis22    Good explanations. Easy to understand.

---

000000004-a23 Analysis23    Topic was not very interesting.

---

000000003-a29 Analysis29    Length

---

|                             |  |
|-----------------------------|--|
| 01-a35 Analysis35           | noen   |
| 01-a36 Analysis36           | Too basic for my level of training.  |
| 000002-a4 Analysis4         | Y  |
| 000008-a4 Analysis4         | Video format.  |
| 000010-a4 Analysis4         | voice over   |
| 0000004-a5 Analysis5        | The sound sometime can not catch up with the powerpoint  |
| 00000002-a6 Analysis6       | That is may become DoD mandated training. Active Duty Military personnel time is already inundated with numerous other online training modules that do very little for our personal or professional progression. |
| 00000004-a6 Analysis6       | Too brief  |
| 0000000001-a8<br>Analysis8  |  |
| 0000000003-a8<br>Analysis8  |  |
| 00000000003-a9<br>Analysis9 | n/a  |
| participant baseline10      | lack of information on MR physics.   |
| participant baseline2       | Some pictures are small (1.10)   |
| participant baseline4       | none   |

participant baseline7 none

participant baseline6 Not sure

participant baseline8 slow pace

## 11 If future training modules related to the topic just learned were to be developed, which ones would you recommend?

| Respondent                         | Response                               |
|------------------------------------|--|
| 000000000003-a10<br>Analysis10     | More in depth information              |
| 000000000005-a10<br>Analysis10     | MRI basics                             |
| 000000000002-a11<br>Analysis11     | Nuclear Medicine                       |
| 000000000003-a11<br>Analysis11     | Introduction to MRI                    |
| 000000000002-a12<br>Analysis12     | MRI contrast use                       |
| 000000000004-a12<br>Analysis12     | Image generation                       |
| 00000000000003-a14<br>Analysis14   | MRI Physics                            |
| 000000000000002-a15<br>Analysis15  | Image reconstruction and CT artifacts. |
| 0000000000000001-a18<br>Analysis18 | N/a                                    |

|   |   |
|---|---|
| 00000000000000000003-<br>a18 Analysis18 | All.  |
| 00000000000000000004-<br>a18 Analysis18 | unsure  |
| 0002baseline Analysis2                  | Introduction of filtering theory may be useful. |
| 0006baseline Analysis2                  |   |
| 02-a20 Analysis20                       | none  |
| 05-a20 Analysis20                       | MSK   |
| 000000003-a22<br>Analysis22             | Not sure.                                       |
| 000000004-a23<br>Analysis23             | Basic MRI and storing images.                   |
| 000000003-a29<br>Analysis29             | All topics                                      |
| 01-a35 Analysis35                       | none  |
| 01-a36 Analysis36                       | More detail about MR physics.                   |
| 000002-a4 Analysis4                     | Y   |
| 000008-a4 Analysis4                     | Not sure  |
| 000010-a4 Analysis4                     | MRi physics                                     |
| 000004-a5 Analysis5                     | Introduction of the MRI imaging system          |



|                         |   |
|-------------------------|---|
| 00000002-a6 Analysis6   | I would continue with producing short modules on difficult topics such as MRI and CT physics and then maybe one large end comprehensive module. |
| 00000004-a6 Analysis6   | MRI physics and image creation basics relevant to medical imaging   |
| 0000000001-a8 Analysis8 | .   |
| 0000000003-a8 Analysis8 |   |
| 0000000003-a9 Analysis9 | n/a   |
| participant baseline10  | Basic theories on MR physics need to be included.   |
| participant baseline2   | Mention different types of software that can be used to visualize images  |
| participant baseline4   | more detail   |
| participant baseline6   | Image processing and application to the clinical environment.   |
| participant baseline8   | more advanced MRI physics concepts  |

## 12

### Additional comments?

| Respondent                   | Response  |
|------------------------------|---|
| 0000000000002-a11 Analysis11 | Good training. Need harder quizzes that are different after the module. Alternatively, don't give the answers after the |

pre-test.

|                                    |   |
|------------------------------------|---|
| 00000000000002-a12<br>Analysis12   | N/A   |
| 00000000000004-a12<br>Analysis12   | None  |
| 00000000000003-a14<br>Analysis14   |   |
| 000000000000002-a15<br>Analysis15  | None.   |
| 0000000000000001-a18<br>Analysis18 | This survey is too long   |
| 05-a20<br>Analysis20               | Nothing   |
| 01-a35<br>Analysis35               | none  |
| 000002-a4<br>Analysis4             | Y   |
| 000008-a4<br>Analysis4             |   |
| 00000002-a6<br>Analysis6           | If this is geared toward the DoD and you stick to pediatric brain topics, the benefit will be of some but little value because we do not see that many pediatric brain cases. These types of cases are usually pretty well known clinically and sent to children's hospitals with specialists that deal with these cases which markedly limits our need for this depth of information on these topics as it is outside the scope of our typical practice. |
| 0000000003-a8<br>Analysis8         |   |

[participant baseline2](#)

1.11 would not allow me to check the box

You are logged in as [Ben Scalise \(Log out\)](#)  
[Fundamentals of Digital Imaging](#)

[Course Management](#)

# Pediatric MRI Without Sedation: Is it the Art or Science?

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## POST-RUN MODULE QUESTIONNAIRE

**1** **Three learning objectives are listed below. Please rate the improvement in your ability to accomplish the module objectives. Use the following scale:**

- 1 - None = no apparent improvement in my ability to perform this objective
- 2 - Slight = slight improvement in my ability to perform this objective
- 3 - Moderate = moderate improvement in my ability to perform this objective
- 4 - Substantial = substantial improvement in my ability to perform this objective
- 5 - Exceptional = exceptional improvement in my ability to perform this objective

After completing the training module, the participant will be able to...

Average rank



|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|






|  |  |     |
|--|--|-----|
| 1.) Understand the role of a Certified Child Life Specialist   |  | 3.9 |
| 2.) Summarize the key components of a successful Pediatric Non-Sedate MRI program                                |  | 3.9 |
| 3.) Identify ideal candidates for attempting a Non-Sedate scan   |  | 4.0 |
| 4.) Understand and describe three major benefits of creating and implementing a Pediatric Non-Sedate MRI Program |  | 3.9 |

| Responses  | 1         | 2         | 3           | 4           | 5           | Total |
|--|-----------|-----------|-------------|-------------|-------------|-------|
| 1.) Understand the role of a Certified Child Life Specialist   | 1<br>(3%) | 2<br>(6%) | 8<br>(23%)  | 11<br>(31%) | 13<br>(37%) | 35    |
| 2.) Summarize the key components of a successful Pediatric Non-Sedate MRI program                                | 1<br>(3%) | 3<br>(9%) | 8<br>(23%)  | 11<br>(31%) | 12<br>(34%) | 35    |
| 3.) Identify ideal candidates for attempting a Non-Sedate scan   | 0         | 3<br>(9%) | 10<br>(29%) | 7<br>(20%)  | 15<br>(43%) | 35    |
| 4.) Understand and describe three major benefits of creating and implementing a Pediatric Non-Sedate MRI Program | 1<br>(3%) | 2<br>(6%) | 8<br>(23%)  | 12<br>(34%) | 12<br>(34%) | 35    |

## 2

Please rate the following comments about the training module using the following scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

|   | Average rank |   |   |   |   | ↓   |
|---|--------------|---|---|---|---|-----|
|   | 1            | 2 | 3   | 4   | 5 |     |
| 1.) The module presented content that can be applied in real-world medical situations.                  |              |   |   |  |   | 4.0 |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. |              |   |  |   |   | 3.5 |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                |              |   |  |   |   | 3.9 |
| 4.) I will apply these techniques while practicing at my institution.                                   |              |   |  |   |   | 3.7 |
| 5.) I would participate in other BRAIN training modules using this program in the future.               |              |   |  |   |   | 3.7 |

| Responses   | 1         | 2          | 3           | 4           | 5           | Total |
|---|-----------|------------|-------------|-------------|-------------|-------|
| 1.) The module presented content that can be applied in real-world medical situations.                  | 0         | 1<br>(3%)  | 10<br>(29%) | 11<br>(31%) | 13<br>(37%) | 35    |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. | 0         | 7<br>(20%) | 13<br>(37%) | 7<br>(20%)  | 8<br>(23%)  | 35    |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                | 0         | 1<br>(3%)  | 13<br>(37%) | 8<br>(23%)  | 13<br>(37%) | 35    |
| 4.) I will apply these techniques while practicing at my institution.                                   | 1<br>(3%) | 1<br>(3%)  | 14<br>(40%) | 9<br>(26%)  | 10<br>(29%) | 35    |



|   |   |           |                    |            |             |           |
|---|---|-----------|--------------------|------------|-------------|-----------|
| 5.) I would participate in other BRAIN training modules using this program in the future. | 0 | 1<br>(3%) | <b>18</b><br>(51%) | 6<br>(17%) | 10<br>(29%) | <b>35</b> |
|---|---|-----------|--------------------|------------|-------------|-----------|

**3**

**Directions:** Please answer the following questions about using the training module.

**1. Was the module presentation organized, easy-to-use, and user-friendly? YN**

**Why or why not**

| Respondent                     | Response   |
|--------------------------------|--|
| 000000000002-a10<br>Analysis10 | It seems that only half the content deals with the title topic, "<br><br><b>Pediatric MRI Without Sedation: Is it the Art or Science?"</b> The Art or science question isn't addressed, and the second half of the lecture is about sedation expectations. |
| 000000000004-a10<br>Analysis10 | yes  |
| 000000000001-a11<br>Analysis11 | yes  |
| 000000000001-a12<br>Analysis12 | Y  |
| 000000000003-a12<br>Analysis12 | No, free response question asks for 1 of 5 reasons, will only accept single answer   |

|                                    |   |
|------------------------------------|---|
| Analysis12                         | only accept single answer.  |
| 00000000000005-a12<br>Analysis12   | Y   |
| 00000000000001-a13<br>Analysis13   | yes   |
| 00000000000003-a13<br>Analysis13   | Yes. Easy to use.   |
| 000000000000002-a15<br>Analysis15  | Yes.  |
| 0000000000000001-a18<br>Analysis18 | Yes   |
| 0000000000000003-a18<br>Analysis18 | Yes. Clear.   |
| 0001baseline Analysis2             | yes, easy to use. limited wording on each slide   |
| 0003baseline Analysis2             | The presentation was organized.   |
| 0005baseline Analysis2             | yes.  |
| 0007baseline Analysis2             | Yes, I found the module to present the issues and then answer the questions in a easy to follow way |
| 02-a20 Analysis20                  | yes, I was able to complete it quickly  |
| 000000003-a22<br>Analysis22        | No. Too time consuming.   |
| 000000004-a23<br>Analysis23        | yes   |

|                             |  |
|-----------------------------|--|
| 000000003-a29<br>Analysis29 | yes  |
| 01-a3 Analysis3             | Yes  |
| 01-a35 Analysis35           | yes it was well organized an logical.  |
| 01-a36 Analysis36           | Very organized.  |
| 000002-a4 Analysis4         | y  |
| 000008-a4 Analysis4         | Was ok.  |
| 000010-a4 Analysis4         | yes<br>clear descriptions  |
| 0000004-a5 Analysis5        | yes, it is good.   |
| 00000002-a6 Analysis6       | Same response as on prior survey.  |
| 00000004-a6 Analysis6       | Yes  |
| 0000000002-a8<br>Analysis8  | y  |
| 0000000004-a9<br>Analysis9  | ok   |
| participant baseline10      | Yes. It was easier to understand the information on CCLS program.  |
| participant baseline2       | Yes it was organize. I wish there was an option to speed up the audio or captioning that can be turned on and off. |

The voice over was slow. I felt some of the pictures were not matched to the content of the slide.

participant baseline4 y

participant baseline6 The module played well on the computer and ran in an efficient manner.

participant baseline8 clicking through modules could have been more linear. i.e. when finishing *pretest*, offer a button to go directly to next step, the lesson.

4

SCALE

|                            |   |   |   |   |   |                           |
|----------------------------|---|---|---|---|---|---------------------------|
| <i>Not at all engaging</i> | 1 | 2 | 3 | 4 | 5 | <i>Extremely engaging</i> |
|----------------------------|---|---|---|---|---|---------------------------|

Average rank ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

To what degree did the learning environment present information in a way that was engaging? 3.5

| Responses   | 1         | 2          | 3           | 4          | 5          | Total |
|---|-----------|------------|-------------|------------|------------|-------|
| To what degree did the learning environment present information in a way that was engaging? | 1<br>(3%) | 4<br>(11%) | 15<br>(43%) | 6<br>(17%) | 9<br>(26%) | 35    |

5

Please provide an explanation of your above rating:

| Respondent                          | Response   |
|-------------------------------------|--|
| 000000000002-a10<br>Analysis10      | material becomes boring  |
| 000000000004-a10<br>Analysis10      | material dry   |
| 000000000001-a11<br>Analysis11      | good   |
| 0000000000001-a12<br>Analysis12     | The way it was presented was simple and interesting  |
| 0000000000003-a12<br>Analysis12     | Don't find interesting.  |
| 0000000000005-a12<br>Analysis12     | Learning environment was ok.   |
| 0000000000001-a13<br>Analysis13     | computer module  |
| 0000000000003-a13<br>Analysis13     | Concise  |
| 000000000000002-a15<br>Analysis15   | Good balance between pictures and words on screen.   |
| 0000000000000001-a18<br>Analysis18  | Good graphics  |
| 00000000000000003-a18<br>Analysis18 | Interactive graphic design.  |
| 0001baseline Analysis2              | I could relate   |
| 0003baseline Analysis2              | Module is a little bit long. More interactions (with questions inside the module?) will be great |

inside the module :) will be great.

|                          |  |
|--------------------------|--|
| 0005baseline Analysis2   | video  |
| 0007baseline Analysis2   | If there had been more discussion about the benefits or why this is required in the medical field, it would have been more engaging to me. |
| 02-a20 Analysis20        | The material was quickly covered.  |
| 000000003-a22 Analysis22 | Video learning in personal time is too time consuming.   |
| 000000004-a23 Analysis23 | More interesting than prior models   |
| 000000003-a29 Analysis29 | vERY GOOD  |
| 01-a3 Analysis3          | It's as engaging as it can be for a video.   |
| 01-a35 Analysis35        | It was very useful as our institution does not have a similar program in place.  |
| 01-a36 Analysis36        | Reasonably engaging. Slides weren't too wordy. Plenty of visuals.  |
| 000002-a4 Analysis4      | y  |
| 000008-a4 Analysis4      | Dont learn by videos.  |
| 000010-a4 Analysis4      | testing  |
| 0000004-a5 Analysis5     | It gives us much information about the pediatric MRI.  |



|                         |  |
|-------------------------|--|
| 00000002-a6 Analysis6   | Same response as on prior survey.  |
| 00000004-a6 Analysis6   | Well organized   |
| 0000000002-a8 Analysis8 | n/a  |
| 0000000004-a9 Analysis9 | k  |
| participant baseline10  | It was good to summarize and introduce the CCLS program.   |
| participant baseline2   | I think this particular module can be made shorter. For instance, there was a lot of information about how the studies were collated. I don't think that's needed. Also, I think the <a href="#">sedation</a> portion at the end (second half of the module) can be shortened. |
| participant baseline4   | very easy to understand  |
| participant baseline6   | The activity was largely passive when learning.  |
| participant baseline8   | It wasn't interesting enough to keep my attention.   |

6

|                         |   |   |   |   |   |                         |
|-------------------------|---|---|---|---|---|-------------------------|
| <i>Do not recommend</i> | 1 | 2 | 3 | 4 | 5 | <i>Highly recommend</i> |
|-------------------------|---|---|---|---|---|-------------------------|

**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Would you recommend that this learning  3.7

environment be used for learning about the pediatric brain and MRI?

| Responses  | 1         | 2         | 3           | 4          | 5           | Total |
|--|-----------|-----------|-------------|------------|-------------|-------|
| Would you recommend that this learning environment be used for learning about the pediatric brain and MRI? | 1<br>(3%) | 3<br>(9%) | 12<br>(34%) | 9<br>(26%) | 10<br>(29%) | 35    |

## 7 Why or why not would you recommend that this learning environment be used for learning about the pediatric brain and MRI?

| Respondent                     | Response   |
|--------------------------------|--|
| 000000000002-a10<br>Analysis10 | modules can have animations which can help learn MRI   |
| 000000000004-a10<br>Analysis10 | good explanation   |
| 000000000001-a11<br>Analysis11 | good   |
| 000000000001-a12<br>Analysis12 | i RECOMMEDED AND SPECIACALLY FOR THE TECH OR NURSED TAKING CARE OF THE RUNNIG THE MRI ITSELD |
| 000000000003-a12<br>Analysis12 | Easy to follow   |
| 000000000005-a12<br>Analysis12 | A little slow for my taste.  |
| 000000000001-a13<br>Analysis13 | important topic  |
| 000000000003-a13               | Not really applicable to either  |

## Analysis13

|                                   |  |
|-----------------------------------|--|
| 000000000000000002-a15 Analysis15 | It's engaging.   |
| 000000000000000001-a18 Analysis18 | Good images  |
| 000000000000000003-a18 Analysis18 | I would. It's a little basic but good.   |
| 0001baseline Analysis2            | I would recommend this because I was otherwise not aware of the tools the CCLS offers. |
| 0003baseline Analysis2            | Online classes provide scheduling freedom.   |
| 0005baseline Analysis2            | video and presentation are top notch   |
| 0007baseline Analysis2            | I would recommend this because of the ability to learn from a professional             |
| 02-a20 Analysis20                 | I'm not engaged in online training   |
| 000000003-a22 Analysis22          | Easier to learn when you have the ability to ask questions.                            |
| 000000004-a23 Analysis23          | I prefer other resources   |
| 000000003-a29 Analysis29          | Very good  |
| 01-a3 Analysis3                   | Only if their child wants an MRI or they work at a pediatric hospital.                 |
| 01-a35 Analysis35                 | Radiologists often don't think about the patient, and this                             |

module forces us to concentrate on the patient.

|                          |   |
|--------------------------|---|
| 01-a36 Analysis36        | Organized, reasonably engaging. Accomplished the learning objectives efficiently.   |
| 000002-a4 Analysis4      | y   |
| 000008-a4 Analysis4      | I learn better from textbooks.  |
| 000010-a4 Analysis4      | easy to remember  |
| 0000004-a5 Analysis5     | It is good to learn it.   |
| 00000002-a6 Analysis6    | Same response as on prior survey.   |
| 00000004-a6 Analysis6    | Interactive   |
| 0000000002-a8 Analysis8  | n/a   |
| 00000000004-a9 Analysis9 | k   |
| participant baseline10   | It shows how the MRI can be practically important and carefully used for pediatric imaging.   |
| participant baseline2    | It depends. I think a brochure/pamphlet would be more appropriate. I think a more interactive approach (video, audio, etc) is needed for topics where 2D cannot fully translate the message, but for this particular module, I feel its better (and shorter) to just read about it. |
| participant baseline4    | easy to understand  |

participant baseline6 The module could benefit from more interactive steps.

participant baseline8 environment is fine.

## 8 Please comment on skills, concepts, and techniques you learned in this module:

| Respondent                          | Response   |
|-------------------------------------|--|
| 000000000002-a10<br>Analysis10      | info about expectations for <a href="#">sedation</a> exams                           |
| 000000000004-a10<br>Analysis10      | understand role of child life specialist   |
| 000000000001-a11<br>Analysis11      | good   |
| 0000000000001-a12<br>Analysis12     | IT WAS ATTRACTIVE, SIMPLIFIED AND COMPREHENSIVE                                      |
| 0000000000003-a12<br>Analysis12     | Pre-nonsedate MRI reccomendations  |
| 0000000000005-a12<br>Analysis12     | The process of <a href="#">sedation</a> patient selection was good as well as risks. |
| 0000000000001-a13<br>Analysis13     | no comment   |
| 0000000000003-a13<br>Analysis13     | Role of CCLS   |
| 000000000000002-a15<br>Analysis15   | As above.  |
| 00000000000000001-a18<br>Analysis18 | Good understanding of CLS  |

## a18 Analysis18

00000000000000000003-  
a18 Analysis18

Sedation info.

0001baseline Analysis2

I am interested in the MRI scanner simulation and other techniques in accommodating families of children with special needs.

0003baseline Analysis2

I have already listen to this module before so it is hard to comment.

0005baseline Analysis2

well organized

0007baseline Analysis2

I learned how a child life specialist can help promote family education in regards to MRI and [sedation](#)

02-a20 Analysis20

None

0000000003-a22  
Analysis22

Active listening.

000000004-a23  
Analysis23

Learned about move towards non [sedation](#).

000000003-a29  
Analysis29

[Sedation](#)

01-a3 Analysis3

Guiding parents through the process. The CCLS seems to do most of the work.

01-a35 Analysis35

none

01-a36 Analysis36

We don't have CCLS at my institution, but it is good to know that there is an effective risk-minimizing alternative to [sedation](#) in appropriate pediatric candidates. Hopefully,



similar programs will become more commonplace as their efficacy is demonstrated.

|                         |   |
|-------------------------|---|
| 000002-a4 Analysis4     | y   |
| 000008-a4 Analysis4     | Not sure  |
| 000010-a4 Analysis4     | i like how they explain child life roles in decreasing sedation rates   |
| 0000004-a5 Analysis5    | Improved  |
| 00000002-a6 Analysis6   | Same response as on prior survey.   |
| 00000004-a6 Analysis6   | Role of child life specialists  |
| 0000000002-a8 Analysis8 | n/a   |
| 0000000004-a9 Analysis9 | k   |
| participant baseline10  | the importance of reducing sedation in pediatric MRI  |
| participant baseline2   | Learned about who is the ideal candidate for a non-sedate MRI.  |
| participant baseline4   | how to apply non-sedated MRI in patients aged 6 or older, including pre-assessment, mock scan, and post-scan family education |
| participant baseline6   | Using acronyms can be distracting to the overall message.   |
| participant baseline8   | get a child life specialist involved in MRI cases   |

participant baseline

get a child life specialist involved in mini cases

## 9 What did you like best about this module?

| Respondent                          | Response   |
|-------------------------------------|--|
| 000000000002-a10 Analysis10         | learning age range for possible non sedation exams |
| 000000000004-a10 Analysis10         | organization                                       |
| 000000000001-a11 Analysis11         | clear  |
| 0000000000001-a12 Analysis12        | SIMPLIFIED   |
| 0000000000003-a12 Analysis12        | Easy flow.   |
| 0000000000005-a12 Analysis12        | Learning about the concepts in 8.                  |
| 0000000000001-a13 Analysis13        | easy to understand                                 |
| 0000000000003-a13 Analysis13        | Concise  |
| 000000000000002-a15<br>Analysis15   | "Cleanliness" of the user interface.               |
| 0000000000000001-a18<br>Analysis18  | Images   |
| 00000000000000003-a18<br>Analysis18 | Clarity.   |
| 0001baseline Analysis2              | wording was easy                                   |

---

|                          |   |
|--------------------------|---|
| 0003baseline Analysis2   | The animation: text-image.                          |
| 0005baseline Analysis2   | well organized                                      |
| 0007baseline Analysis2   | the pace of the presentation was really comfortable |
| 02-a20 Analysis20        | Not much  |
| 000000003-a22 Analysis22 | Good pictures.                                      |
| 000000004-a23 Analysis23 | short   |
| 000000003-a29 Analysis29 | Videos  |
| 01-a3 Analysis3          | Clear.  |
| 01-a35 Analysis35        | none  |
| 01-a36 Analysis36        | User friendly.                                      |
| 000002-a4 Analysis4      | y   |
| 000008-a4 Analysis4      | Not sure  |
| 000010-a4 Analysis4      | easy yo follow                                      |
| 000004-a5 Analysis5      | all   |
| 0000002-a6 Analysis6     | Same response as on prior survev.                   |

---

|                          |  |
|--------------------------|--|
| 00000004-a6 Analysis6    | Organization                                       |
| 0000000002-a8 Analysis8  | n/a  |
| 00000000004-a9 Analysis9 | k  |
| participant baseline10   | the narration with clear pronunciation             |
| participant baseline2    | The segment about patient selection was well done. |
| participant baseline4    | simple and to the point                            |
| participant baseline6    | The model MRI for the children.                    |
| participant baseline8    | color scheme                                       |

## 10 What did you like least about this module?

| Respondent                      | Response         |
|---------------------------------|------------------|
| 00000000002-a10<br>Analysis10   | dry material     |
| 00000000004-a10<br>Analysis10   | material was dry |
| 00000000001-a11<br>Analysis11   | too long         |
| 0000000000001-a12<br>Analysis12 | ATTARCTIVE       |

|                                    |   |
|------------------------------------|---|
| 00000000000003-a12<br>Analysis12   | Not interesting to me   |
| 00000000000005-a12<br>Analysis12   | Extraneous information not relevant to our practice including details about library searches.   |
| 00000000000001-a13<br>Analysis13   | there was a bug with the <a href="#">sedation</a> rate question on pre and post test.   |
| 00000000000003-a13<br>Analysis13   | N/A   |
| 000000000000002-a15<br>Analysis15  | The popup stating that my internet connection was too slow. The presentation never stuttered at any point. Perhaps there is a better way to gauge buffer speed? |
| 0000000000000001-a18<br>Analysis18 | Nothing   |
| 0000000000000003-a18<br>Analysis18 | Lack of interactive questions.  |
| 0001baseline<br>Analysis2          | nothing   |
| 0003baseline<br>Analysis2          | The lenght  |
| 0005baseline<br>Analysis2          | nothing   |
| 0007baseline<br>Analysis2          | The info graphics werent fully utilized   |
| 02-a20<br>Analysis20               | Not much  |
| 000000003-a22<br>Analysis22        | Too time consuming.   |

|                             |   |
|-----------------------------|---|
| 000000004-a23<br>Analysis23 | It was required for me to do  |
| 000000003-a29<br>Analysis29 | Length  |
| 01-a3 Analysis3             | Fill in the blank question is impossible to answer unless you know the exact phrase verbatim. |
| 01-a35 Analysis35           | none  |
| 01-a36 Analysis36           | n/a   |
| 000002-a4 Analysis4         | y   |
| 000008-a4 Analysis4         | Video format  |
| 000010-a4 Analysis4         | long  |
| 0000004-a5 Analysis5        | none  |
| 00000002-a6 Analysis6       | Same response as on prior survey.   |
| 00000004-a6 Analysis6       | Too narrow of a focus since only CNMC non sedate program was discussed                        |
| 0000000002-a8<br>Analysis8  | n/a   |
| 00000000004-a9<br>Analysis9 | k   |
| participant baseline10      | less animation which helps understanding.   |



participant baseline2      The length, the speed.

participant baseline4      non

participant baseline6      The acronyms.

participant baseline8      bandwidth requirement

## 11 If future training modules related to the topic just learned were to be developed, which ones would you recommend?

| Respondent                     | Response   |
|--------------------------------|--|
| 000000000002-a10<br>Analysis10 | more about complex MRI physics and brain pathology |
| 000000000004-a10<br>Analysis10 | not sure   |
| 000000000001-a11<br>Analysis11 | short topic  |
| 000000000001-a12<br>Analysis12 | CONTRAST USED IN MRI                               |
| 000000000003-a12<br>Analysis12 | Unsure   |
| 000000000005-a12<br>Analysis12 | none   |
| 000000000001-a13<br>Analysis13 | none   |
| 000000000003-a13<br>Analysis13 | N/A  |

|                                       |  |
|---------------------------------------|--|
| 000000000000000002-<br>a15 Analysis15 | Nothing comes to mind.   |
| 000000000000000001-<br>a18 Analysis18 | N/a  |
| 000000000000000003-<br>a18 Analysis18 | All of them.   |
| 0001baseline Analysis2                | n/a  |
| 0003baseline Analysis2                | No idea.   |
| 0005baseline Analysis2                | more on child life techniques  |
| 0007baseline Analysis2                | More about negative impacts of anesthesia on health, and why we should avoid this. |
| 02-a20 Analysis20                     | Person to person training.   |
| 000000003-a22<br>Analysis22           | None.  |
| 000000004-a23<br>Analysis23           | I prefer other resources   |
| 000000003-a29<br>Analysis29           | Sedation module  |
| 01-a3 Analysis3                       | More about how to council parents on the risks of sedation.                        |
| 01-a35 Analysis35                     | none   |
| 01-a36 Analvsis36                     | Unsure   |

|                             |   |
|-----------------------------|---|
| 000002-a4 Analysis4         | y   |
| 000008-a4 Analysis4         | Not sure  |
| 000010-a4 Analysis4         | how they calm the kids  |
| 0000004-a5 Analysis5        | introduce more about the food selection for children.   |
| 00000002-a6 Analysis6       | Same response as on prior survey.   |
| 00000004-a6 Analysis6       | Not sure  |
| 0000000002-a8<br>Analysis8  | n/a   |
| 00000000004-a9<br>Analysis9 | k   |
| participant baseline10      | The function of downloading information as PDF files for the future review needs to be included.  |
| participant baseline2       | Length of time it takes to train<br><br>Maybe a list of other institutions that successfully ran the program (if any)<br><br>Video of child/family who did non-sedate taking about non-sedate MRI |
| participant baseline4       | successful rate   |
| participant baseline6       | No comment  |
| participant baseline8       | none  |

participant baseline none

## 12 Additional comments?

| Respondent                         | Response  |
|------------------------------------|---|
| 00000000000001-a11<br>Analysis11   | none  |
| 00000000000003-a13<br>Analysis13   | free text question in pre/post test not functioning. Also, one of the question has a link for "sedation" in the answer choices. |
| 000000000000002-a15<br>Analysis15  | Overall well done. Short and sweet and keeps you engaged for the basics.  |
| 0000000000000001-a18<br>Analysis18 | N/a   |
| 000000004-a23<br>Analysis23        | n/a   |
| 01-a35<br>Analysis35               | none  |
| 000002-a4<br>Analysis4             | y   |
| 000008-a4<br>Analysis4             |   |
| 000000002-a8<br>Analysis8          | n/a   |
| 0000000004-a9<br>Analysis9         | k   |

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[Pediatric MRI Without Sedation: Is it the Art or Science?\\_1](#)

[Course Management](#)

# Normal and Abnormal Development of the Cerebellum

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View All Responses. **All participants.** View Default order [?](#) Responses: **39**

## POST-RUN MODULE QUESTIONNAIRE

**1** **Three learning objectives are listed below. Please rate the improvement in your ability to accomplish the module objectives. Use the following scale:**

- 1 - None = no apparent improvement in my ability to perform this objective
- 2 - Slight = slight improvement in my ability to perform this objective
- 3 - Moderate = moderate improvement in my ability to perform this objective
- 4 - Substantial = substantial improvement in my ability to perform this objective
- 5 - Exceptional = exceptional improvement in my ability to perform this objective

After completing the training module, the participant will be able to...

Average rank



|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

|   |  |     |
|---|--|-----|
| 1.) Discuss Normal and Abnormal Development of the Cerebellum |  | 3.6 |
| 2.) Understand the Flexing of the Rostral Neural Tube         |  | 3.6 |
| 3.) Discuss Defining Fundamental Territories                  |  | 3.7 |
| 4.) Understand Mesenchymal-Neuroepithelial Signaling          |  | 3.7 |

| Responses   | 1         | 2         | 3           | 4           | 5          | Total |
|---|-----------|-----------|-------------|-------------|------------|-------|
| 1.) Discuss Normal and Abnormal Development of the Cerebellum | 1<br>(3%) | 3<br>(8%) | 14<br>(36%) | 12<br>(31%) | 9<br>(23%) | 39    |
| 2.) Understand the Flexing of the Rostral Neural Tube         | 1<br>(3%) | 3<br>(8%) | 14<br>(36%) | 14<br>(36%) | 7<br>(18%) | 39    |
| 3.) Discuss Defining Fundamental Territories                  | 1<br>(3%) | 2<br>(5%) | 14<br>(36%) | 14<br>(36%) | 8<br>(21%) | 39    |
| 4.) Understand Mesenchymal-Neuroepithelial Signaling          | 1<br>(3%) | 3<br>(8%) | 13<br>(33%) | 13<br>(33%) | 9<br>(23%) | 39    |

2

Please rate the following comments about the training module using the following scale:






1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

Average rank



|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|



|   |   |     |
|---|---|-----|
| 1.) The module presented content that can be applied in real-world medical situations.                  |  | 3.5 |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. |  | 3.8 |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                |  | 3.8 |
| 4.) I will apply these techniques while practicing at my institution.                                   |  | 3.6 |
| 5.) I would participate in other BRAIN training modules using this program in the future.               |  | 3.6 |

| Responses   | 1          | 2         | 3                  | 4                  | 5           | Total     |
|---|------------|-----------|--------------------|--------------------|-------------|-----------|
| 1.) The module presented content that can be applied in real-world medical situations.                  | 2<br>(5%)  | 3<br>(8%) | <b>15</b><br>(38%) | 12<br>(31%)        | 7<br>(18%)  | <b>39</b> |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. | 0          | 2<br>(5%) | <b>14</b><br>(36%) | 11<br>(28%)        | 12<br>(31%) | <b>39</b> |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                | 0          | 3<br>(8%) | 12<br>(31%)        | <b>14</b><br>(36%) | 10<br>(26%) | <b>39</b> |
| 4.) I will apply these techniques while practicing at my institution.                                   | 4<br>(10%) | 2<br>(5%) | <b>12</b><br>(31%) | 10<br>(26%)        | 11<br>(28%) | <b>39</b> |
| 5.) I would participate in other BRAIN training modules using this program in the future.               | 4<br>(10%) | 1<br>(3%) | <b>13</b><br>(33%) | 10<br>(26%)        | 11<br>(28%) | <b>39</b> |

### 3

**Directions:** Please answer the following questions about using the training module.

**1. Was the module presentation organized, easy-to-use, and user-friendly? YN****Why or why not**

| <b>Respondent</b>              | <b>Response</b>   |
|--------------------------------|---|
| 000000000002-a10<br>Analysis10 | Sometimes it was hard to understand what part of the diagram the instructor was discussing  |
| 000000000004-a10<br>Analysis10 | y   |
| 000000000001-a11<br>Analysis11 | y   |
| 000000000001-a12<br>Analysis12 | N<br><br>i feel it was not enough simplified  |
| 000000000003-a12<br>Analysis12 | Yes and no. While the flow was easy to follow, believe that the material could have been presented as easily in article format with less wasted time. |
| 000000000005-a12<br>Analysis12 | y   |
| 000000000003-a13<br>Analysis13 | Yes, but very dense   |
| 000000000001-a15<br>Analysis15 | Yes   |
| 000000000006-a16<br>Analysis16 | N. Choppy language pattern; obviously not continuously recorded   |
| 000000000002-a17<br>Analysis17 | Yes, but a bit confusing at times.  |

|                                     |  |
|-------------------------------------|--|
| 00000000000000000002-a19 Analysis19 | More challenging than prior modules.   |
| 00000000000000000005-a19 Analysis19 | Yes, well organized and easy to use.   |
| 0001baseline Analysis2              | yes  |
| 0003baseline Analysis2              | The module was well organized but too long. Submodule will be better.                                  |
| 0005baseline Analysis2              | No too indepth. Need animation with discussion   |
| 0007baseline Analysis2              | Yes, the topics were presented in an easy to follow manner   |
| 0000000004-a22 Analysis22           | Yes. Easy navigation and progression.  |
| 0000000005-a22 Analysis22           | y  |
| 000000002-a23 Analysis23            | Yes  |
| 000000001-a25 Analysis25            | yes  |
| 000000001-a26 Analysis26            | No. There were no images or text. Perhaps my internet browser (Chrome) doesn't work with the software. |
| 000000002-a29 Analysis29            | gppf   |
| 000000006-a29 Analysis29            | na   |
| 01-a3 Analvsis3                     | ves  |

|                             |  |
|-----------------------------|--|
| 000000001-a30<br>Analysis30 | Lengthy  |
| 02-a35 Analysis35           | Yes  |
| 000005-a4 Analysis4         | yes  |
| 000007-a4 Analysis4         | Yes.   |
| 000009-a4 Analysis4         | Well organized.  |
| 000011-a4 Analysis4         | yes  |
| 00000001-a6 Analysis6       | yes  |
| 00000003-a6 Analysis6       | Yes. Laid out the basic concepts and then applied it to a real-life syndrome (Dandy-Walker).   |
| 0000000002-a8<br>Analysis8  | y  |
| 00000000004-a9<br>Analysis9 | k  |
| participant baseline1       | <p>This comment goes for all the modules: the tone is too monotonous and so after a time not engaging to follow</p> <p>Why do all the courses are just in one color? This one was blue all over and it enhance the monotonous impression</p> <p>The important information should be highlighted, different colors should be used</p> |

participant baseline3 The module was easy to use and well organized. There were some alerts regarding the internet connection being poor which kept obstructing the presentation. However, the presentation kept running fine.

participant baseline5 Yes, very clear graphics on complex topic

participant baseline7 All of the modules are well organized and easy to use.

participant baseline9 yes

4

**SCALE**

|                            |   |   |   |   |   |                           |
|----------------------------|---|---|---|---|---|---------------------------|
| <i>Not at all engaging</i> | 1 | 2 | 3 | 4 | 5 | <i>Extremely engaging</i> |
|----------------------------|---|---|---|---|---|---------------------------|

**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

To what degree did the learning environment present information in a way that was engaging? 3.0

| Responses   | 1         | 2           | 3           | 4          | 5          | Total |
|---|-----------|-------------|-------------|------------|------------|-------|
| To what degree did the learning environment present information in a way that was engaging? | 3<br>(8%) | 10<br>(26%) | 13<br>(33%) | 9<br>(23%) | 4<br>(10%) | 39    |

5

**Please provide an explanation of your above rating:**

| Respondent | Response |
|------------|----------|
|------------|----------|

|                                    |  |
|------------------------------------|--|
| 000000000002-a10<br>Analysis10     | topic is tough to get excited about  |
| 000000000004-a10<br>Analysis10     | genetics seemed remote from clinical application   |
| 000000000001-a11<br>Analysis11     | good   |
| 000000000001-a12<br>Analysis12     | not simplified<br>no well supporting pictures  |
| 000000000003-a12<br>Analysis12     | Outside of my interests with the depth of discussion of topic well beyond my interests.  |
| 000000000005-a12<br>Analysis12     | Interactive  |
| 000000000003-a13<br>Analysis13     | Very dense presentation  |
| 00000000000001-a15<br>Analysis15   | Great teaching   |
| 0000000000000006-a16<br>Analysis16 | slow pace. boring  |
| 0000000000000002-a17<br>Analysis17 | The narration sounds stitched together at times.   |
| 0000000000000002-a19<br>Analysis19 | More complicated topic.  |
| 0000000000000005-a19<br>Analysis19 | The topic is fascinating but challenging to study, understand and memorize. I would consider dividing it in two parts, otherwise is hard -at least, for me- to keep full attention during the entire module. |

---

|                             |  |
|-----------------------------|--|
| 0001baseline Analysis2      | was not super engaging. real-life photos were most helpful   |
| 0003baseline Analysis2      | It was okay, not bad, could be better.   |
| 0005baseline Analysis2      | Too in-depth, not on a radiology resident level  |
| 0007baseline Analysis2      | This may have been more difficult for me to be engaged in due to a lack of knowledge in the field on my part, but the case studies definitely helped me to be involved in the concepts |
| 000000004-a22<br>Analysis22 | Graphics helped  |
| 000000005-a22<br>Analysis22 | great  |
| 000000002-a23<br>Analysis23 | N/A  |
| 000000001-a25<br>Analysis25 | passive  |
| 000000001-a26<br>Analysis26 | Again, there was no text or images. It was not very engaging.  |
| 000000002-a29<br>Analysis29 | good   |
| 000000006-a29<br>Analysis29 | na   |
| 01-a3 Analysis3             | needs more MRI correlation   |

---



|                             |  |
|-----------------------------|--|
| 000000001-a30<br>Analysis30 | Audio only. No visual aides at least when I was reviewing the module   |
| 02-a35 Analysis35           | Videos   |
| 000005-a4 Analysis4         | no comment   |
| 000007-a4 Analysis4         | Not very engaging.   |
| 000009-a4 Analysis4         | Just a regular lecture. Not interactive or engaging.   |
| 000011-a4 Analysis4         | Its hard topic about cerebellar embryology   |
| 00000001-a6 Analysis6       | Speaker was not engaging, needs to be more entertaining  |
| 00000003-a6 Analysis6       | Overall a great background on brain development. You lost me for a bit when all the genes were being displayed in certain parts of the brain.                                |
| 0000000002-a8<br>Analysis8  | monotonous delivery.   |
| 0000000004-a9<br>Analysis9  | k  |
| participant baseline1       | See the comments above.<br><br>Same comments as for the other courses on the need of a way to obtain details in switching between an advanced learner and basic learner mode |
| participant baseline3       | Easy to follow lecture with nice diagrams  |

participant baseline5 Examples of clinical applications tied it all together in the end, made the topic less dry

participant baseline7 Images and narrative were fairly engaging - animations as well.

participant baseline9 A bit slow and dry

6

|                  |   |   |   |   |   |                  |
|------------------|---|---|---|---|---|------------------|
| Do not recommend | 1 | 2 | 3 | 4 | 5 | Highly recommend |
|------------------|---|---|---|---|---|------------------|

Average rank ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Would you recommend that this learning environment be used for learning about the pediatric brain and MRI? 3.3

| Responses  | 1          | 2          | 3           | 4           | 5          | Total |
|--|------------|------------|-------------|-------------|------------|-------|
| Would you recommend that this learning environment be used for learning about the pediatric brain and MRI? | 5<br>(13%) | 4<br>(10%) | 11<br>(28%) | 11<br>(28%) | 8<br>(21%) | 39    |

7

Why or why not would you recommend that this learning environment be used for learning about the pediatric brain and MRI?

| Respondent                     | Response                          |
|--------------------------------|-----------------------------------|
| 000000000002-a10<br>Analysis10 | animations can be helpful for MRI |
| 000000000004-a10               | too much detail into genetics     |

## Analysis10

0000000000001-a11  
Analysis11

it is helpful

0000000000001-a12  
Analysis12

not simplified  
no well supporting pictures

0000000000003-a12  
Analysis12

Did present new knowledge.

0000000000005-a12  
Analysis12

Difficult topic, needs some kind of interaction

0000000000003-a13  
Analysis13

Would recommend, useful for peds neuro

000000000000001-a15  
Analysis15

Would recommend. Great teaching

0000000000000006-  
a16 Analysis16

x

0000000000000002-  
a17 Analysis17

Good overview, but focus should be more on pathology.

00000000000000002-  
a19 Analysis19

Very good basic science review.

00000000000000005-  
a19 Analysis19

Useful, relevant.

0001baseline Analysis2

yes, with previous background knowledge

0003baseline Analysis2

Online accessibility.

0005baseline Analysis2

not enough animation

|                             |   |
|-----------------------------|---|
| 0007baseline Analysis2      | A question answer system may have been more beneficial for this format because it was hard to identify a lot of the areas of focus on the images. |
| 000000004-a22<br>Analysis22 | Graphical integration and easy Internet access anytime/anywhere   |
| 000000005-a22<br>Analysis22 | very good   |
| 000000002-a23<br>Analysis23 | N/A   |
| 000000001-a25<br>Analysis25 | This is way too technical to be practical. also..with highly technical material such as this...a passive online module is NOT effective.          |
| 000000001-a26<br>Analysis26 | I didn't find this to be a very good use of time-I would rather look at cases or read a textbook.   |
| 000000002-a29<br>Analysis29 | good  |
| 000000006-a29<br>Analysis29 | na  |
| 01-a3 Analysis3             | too much focus on embryology  |
| 000000001-a30<br>Analysis30 | Audio only. No visual aides at least when I was reviewing the module<br><br>Lengthy module compared to the other modules                          |
| 02-a35 Analysis35           | Detailed cases of cerebellar development.   |

|                         |   |
|-------------------------|---|
| 000005-a4 Analysis4     | yes   |
| 000007-a4 Analysis4     | Standard module.  |
| 000009-a4 Analysis4     | Was too slow. Given the textbook like presentation style, I would prefer a textbook.  |
| 000011-a4 Analysis4     | Good and easy way of learning   |
| 00000001-a6 Analysis6   | Hard to focus on, boring  |
| 00000003-a6 Analysis6   | This gives a better understanding of the mechanism for the Dandy-Walker malformation, which by itself is difficult to understand. Prior to this I just memorized the imaging criteria for diagnosis.        |
| 0000000002-a8 Analysis8 | see above   |
| 0000000004-a9 Analysis9 | k   |
| participant baseline1   | <p>The content is interesting but the presentation is a bit monotonous and seems long (this comment goes for all the 3 courses I've taken)</p> <p>The monochromatic presentation is not really engaging</p> |
| participant baseline3   | I would recommend the module because it helps the radiologist understand the embryology behind hindbrain malformations and makes clinicians more comfortable describing the findings                        |
| participant baseline5   | Good cross -disciplinary overview of complex anatomy and fetal development  |

|                       |  |
|-----------------------|--|
| participant baseline7 | This learning environment is better than a live lecture as the user can replay complicated material. |
| participant baseline9 | Interactive, work at own pace  |

## 8 Please comment on skills, concepts, and techniques you learned in this module:

| Respondent                         | Response  |
|------------------------------------|---|
| 000000000002-a10<br>Analysis10     | learned some about gene expression and timelines in brain development |
| 000000000004-a10<br>Analysis10     | development of posterior fossa  |
| 000000000001-a11<br>Analysis11     | FOXC gene   |
| 00000000000001-a12<br>Analysis12   | not simplified<br>no well supporting pictures                         |
| 00000000000003-a12<br>Analysis12   | learn more about cerebellar development.                              |
| 00000000000005-a12<br>Analysis12   | Interesting topic of embryology                                       |
| 00000000000003-a13<br>Analysis13   | Normal and abnl cerebellum  |
| 0000000000000001-a15<br>Analysis15 | More knowledge of cerebellum  |
| 0000000000000006-a16<br>Analysis16 | some embryology   |
| 0000000000000002-                  | Development of the cerebellum   |

## a17 Analysis17

|   |  |
|---|--|
| 00000000000000000002-<br>a19 Analysis19 | Better understanding of dandy walker malformation.                                 |
| 00000000000000000005-<br>a19 Analysis19 | -  |
| 0001baseline Analysis2                  | dandy walker syndrome  |
| 0003baseline Analysis2                  | No comment.  |
| 0005baseline Analysis2                  | too confusing  |
| 0007baseline Analysis2                  | I learned about malformations in the cerebellum, and what how they appear in MRI's |
| 000000004-a22<br>Analysis22             | Learned much about cerebellar development which I had no idea about before.        |
| 000000005-a22<br>Analysis22             | embryology   |
| 000000002-a23<br>Analysis23             | Posterior fossa formation  |
| 000000001-a25<br>Analysis25             | this is a horrible question. what is the nature of the comments you want?          |
| 000000001-a26<br>Analysis26             | Learned a bit more about the embryology of the posterior fossa                     |
| 000000002-a29<br>Analysis29             | good   |
| 000000000                               |  |



|                             |   |
|-----------------------------|---|
| UUUUUUUU6-a29<br>Analysis29 | na  |
| 01-a3 Analysis3             | embryology  |
| 00000001-a30<br>Analysis30  | basics of developmental neurology   |
| 02-a35 Analysis35           | Detailed development of the cerebellum.                                   |
| 000005-a4 Analysis4         | no comment  |
| 000007-a4 Analysis4         | ?   |
| 000009-a4 Analysis4         |   |
| 000011-a4 Analysis4         | N/A   |
| 00000001-a6 Analysis6       | embryology of 4th ventricle   |
| 00000003-a6 Analysis6       | As above.   |
| 0000000002-a8 Analysis8     | Irrelevant to clinical practice.  |
| 0000000004-a9<br>Analysis9  | k   |
| participant baseline1       | nothing much to say here  |
| participant baseline3       | The fetal development of the cerebellum and hindbrain were well explained |
| participant baseline5       | Good overview of mesencephalon  |

---

participant baseline7      Formation and abnormalities of the posterior fossa

---

participant baseline9      Embryologic development

---

## 9      What did you like best about this module?

| Respondent                        | Response                                  |
|-----------------------------------|---|
| 000000000002-a10<br>Analysis10    | description of dandy walker               |
| 000000000004-a10<br>Analysis10    | diagrams                                  |
| 000000000001-a11<br>Analysis11    | easy to memorize                          |
| 000000000001-a12<br>Analysis12    | correlation between anatomy and pathology |
| 000000000003-a12<br>Analysis12    | New information.                          |
| 000000000005-a12<br>Analysis12    | Interaction                               |
| 000000000003-a13<br>Analysis13    | Extensive overview                        |
| 00000000000001-a15<br>Analysis15  | Content                                   |
| 000000000000006-a16<br>Analysis16 | x   |
| 000000000000002-a17<br>Analysis17 | Nice graphics                             |

|                                     |   |
|-------------------------------------|---|
| 00000000000000000002-a19 Analysis19 | More in depth than other modules.                             |
| 00000000000000000005-a19 Analysis19 | Organization, examples with real cases.                       |
| 0001baseline Analysis2              | pictures of babies  |
| 0003baseline Analysis2              | Images.   |
| 0005baseline Analysis2              | its attempt to teach the cerebellum it is a difficult subject |
| 0007baseline Analysis2              | The case studies  |
| 000000004-a22 Analysis22            | Graphics and easy Internet access.                            |
| 000000005-a22 Analysis22            | graphics  |
| 000000002-a23 Analysis23            | N/A   |
| 000000001-a25 Analysis25            | clean   |
| 000000001-a26 Analysis26            | The topic.  |
| 000000002-a29 Analysis29            | good  |
| 000000006-a29 Analysis29            | na  |
| 01-a3 Analysis3                     | The cases which were provided were interesting                |

|                             |  |
|-----------------------------|--|
| 000000001-a30<br>Analysis30 | n/a  |
| 02-a35 Analysis35           | Very detailed anatomy and embryology.  |
| 000005-a4 Analysis4         | simple interface   |
| 000007-a4 Analysis4         | Ease of use.   |
| 000009-a4 Analysis4         |  |
| 000011-a4 Analysis4         | Everythings  |
| 00000001-a6 Analysis6       | content  |
| 00000003-a6 Analysis6       | Gave a good explanation for a relatively common disease that people known relatively little about. |
| 0000000002-a8<br>Analysis8  | n/a  |
| 00000000004-a9<br>Analysis9 | k  |
| participant baseline1       | Content that I did not know  |
| participant baseline3       | The anatomy  |
| participant baseline5       | graphics   |
| participant baseline7       | The in depth discussion.   |
| participant baseline9       | Very thorough  |

## 10 What did you like least about this module?

| Respondent                         | Response                                      |
|------------------------------------|---|
| 000000000002-a10<br>Analysis10     | none  |
| 000000000004-a10<br>Analysis10     | genetics and molecular biology                |
| 000000000001-a11<br>Analysis11     | too long                                      |
| 000000000001-a12<br>Analysis12     | not simplified<br>no well supporting pictures |
| 000000000003-a12<br>Analysis12     | Depth of discussion;                          |
| 000000000005-a12<br>Analysis12     | A little long                                 |
| 000000000003-a13<br>Analysis13     | Molecular aspects                             |
| 00000000000001-a15<br>Analysis15   | Nothing                                       |
| 0000000000000006-a16<br>Analysis16 | slow pace and interrupted speech pattern      |
| 0000000000000002-a17<br>Analysis17 | Complexity                                    |
| 0000000000000002-a19<br>Analysis19 | A little longer than the other modules.       |

|                                     |  |
|-------------------------------------|--|
| 00000000000000000005-a19 Analysis19 | Please see my answer to question 5   |
| 0001baseline Analysis2              | vocabulary   |
| 0003baseline Analysis2              | Lenght   |
| 0005baseline Analysis2              | raspy voice and lack of active animation   |
| 0007baseline Analysis2              | The audio was not the best quality   |
| 0000000004-a22 Analysis22           | Speaker pointing to things verbally did not correspond to visual graphics.   |
| 0000000005-a22 Analysis22           | time   |
| 0000000002-a23 Analysis23           | N/A  |
| 000000001-a25 Analysis25            | way too technical  |
| 000000001-a26 Analysis26            | Software didn't seem to work (no images or text). Too long.  |
| 000000002-a29 Analysis29            | good   |
| 000000006-a29 Analysis29            | na   |
| 01-a3 Analysis3                     | The SCORM player has determined that your Internet connection is unreliable or has been interrupted. If you continue in this SCORM activity, your progress may not be saved.<br>You should exit the activity now. and return when you have a |

dependable Internet connection.

|                             |  |
|-----------------------------|--|
| 000000001-a30<br>Analysis30 | n/a  |
| 02-a35 Analysis35           | Too detailed for my level.   |
| 000005-a4 Analysis4         | NA   |
| 000007-a4 Analysis4         | Dry content. Inject some interaction/interest.   |
| 000009-a4 Analysis4         |  |
| 000011-a4 Analysis4         | Nothing  |
| 00000001-a6 Analysis6       | length of time and how content was presented   |
| 00000003-a6 Analysis6       | GENETICS.  |
| 0000000002-a8<br>Analysis8  | Irrelevant, too detailed, language too technical, monotone delivery  |
| 00000000004-a9<br>Analysis9 | k  |
| participant baseline1       | (Again this comment goes for all 3 courses): Lack of examples in term of exercises, of medical images illustrations.<br><br>Why do not propose a 3 model showing the formation of the brain to make it more interactive? |
| participant baseline3       | Technical problems with the internet blocking the presentation constantly. May be have the error message   |



to the side after the first 2 alerts.

participant baseline5 a little too dry with the signaling markers

participant baseline7 ?

participant baseline9 A bit slow and drawn-out

## 11 If future training modules related to the topic just learned were to be developed, which ones would you recommend?

| Respondent                      | Response  |
|---------------------------------|---|
| 000000000002-a10<br>Analysis10  | none  |
| 000000000004-a10<br>Analysis10  | more clinical application                               |
| 000000000001-a11<br>Analysis11  | shorter   |
| 0000000000001-a12<br>Analysis12 | cerebrum malformation as well                           |
| 0000000000003-a12<br>Analysis12 | Unsure.   |
| 0000000000005-a12<br>Analysis12 | More development leading to clinical problems.          |
| 0000000000003-a13<br>Analysis13 | Split presentation into normal and abnormal development |
| 000000000000001-a15             | Cerebrum  |

## Analysis15

|                                       |   |
|---------------------------------------|---|
| 000000000000000006-<br>a16 Analysis16 | x   |
| 000000000000000002-<br>a17 Analysis17 | more focus on MRI physics would be great for radiology residents  |
| 000000000000000002-<br>a19 Analysis19 | Cerebral cortex.  |
| 000000000000000005-<br>a19 Analysis19 | - Division of this lecture in two parts<br>- Development of spine   |
| 0001baseline Analysis2                | n/a   |
| 0003baseline Analysis2                | I do not know   |
| 0005baseline Analysis2                | dont know   |
| 0007baseline Analysis2                | More case studies in regards to observing the mri's of abnormal brain formation   |
| 000000004-a22<br>Analysis22           | Cerebral development.   |
| 000000005-a22<br>Analysis22           | this one  |
| 000000002-a23<br>Analysis23           | N/A   |
| 000000001-a25<br>Analysis25           | if you want to do neuro-embryology...you have to go back to the beginning...basics....and there has to be some tie in to relevancy. |

---

|                            |   |
|----------------------------|---|
| 00000001-a26<br>Analysis26 | MRI physics. Common pediatric brain lesions.  |
| 00000002-a29<br>Analysis29 | good  |
| 00000006-a29<br>Analysis29 | na  |
| 01-a3 Analysis3            | <p>The SCORM player has determined that your Internet connection is unreliable or has been interrupted. If you continue in this SCORM activity, your progress may not be saved.</p> <p>You should exit the activity now, and return when you have a dependable Internet connection.</p> |
| 00000001-a30<br>Analysis30 | n/a   |
| 02-a35 Analysis35          | Different brain structures.   |
| 000005-a4 Analysis4        | No comment  |
| 000007-a4 Analysis4        | Depends on target audience. Maybe over most medical students.   |
| 000009-a4 Analysis4        |   |
| 000011-a4 Analysis4        | all   |
| 00000001-a6 Analysis6      | embryology  |
| 00000003-a6 Analysis6      | The mechanism of other malformations, such as corpus callosum agenesis.   |

---

|                            |   |
|----------------------------|---|
| 0000000002-a8<br>Analysis8 | none  |
| 0000000004-a9<br>Analysis9 | k   |
| participant baseline1      | nothing to say here   |
| participant baseline3      | N/A   |
| participant baseline5      | more clinical diseases and how they relate to fetal development   |
| participant baseline7      | Similar modules with any aspect of neuroradiology as the focus. Specific modules focused on certain sequences could be helpful - ie how spectroscopy is performed and instances where it is useful with examples. |
| participant baseline9      | Fetal pathology of the posterior fossa  |

## 12

### Additional comments?

| Respondent                     | Response   |
|--------------------------------|--|
| 000000000001-a11<br>Analysis11 | none   |
| 000000000003-a12<br>Analysis12 | <p>Test question about Foxc1 vague (In what is the Foxc1 gene expressed?), answer was mesenchyme, but no point in question or answer choice specific to cerebellum.</p> <p>Question 1 above on questionnaire references 3 objectives, but four listed.</p> |

|   |  |
|---|--|
| 00000000000000000002-<br>a19 Analysis19 |  |
| 00000000000000000005-<br>a19 Analysis19 | Very helpful, great work. Thanks.  |
| 0000000004-a22<br>Analysis22            | Thank you.   |
| 000000001-a25<br>Analysis25             | didn't like this one at all.   |
| 000000006-a29<br>Analysis29             | na   |
| 01-a3 Analysis3                         | The SCORM player has determined that your Internet connection is unreliable or has been interrupted. If you continue in this SCORM activity, your progress may not be saved.<br><br>You should exit the activity now, and return when you have a dependable Internet connection. |
| 02-a35 Analysis35                       | None.  |
| 000009-a4 Analysis4                     |  |
| 00000003-a6 Analysis6                   | None.  |
| 000000002-a8<br>Analysis8               | n/a  |
| 0000000004-a9<br>Analysis9              | k  |
| participant baseline1                   | I tried here to do the post test without finishing the course or even checking the "I finished the course" box on the presentation and it worked with no problem.  |

---

participant baseline3

The module was fine

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[Normal and Abnormal Development of the Cerebellum](#)

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# Investigating Brain Plasticity and Connectivity with Structural MRI Techniques

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## POST-RUN MODULE QUESTIONNAIRE

**1** **Three learning objectives are listed below. Please rate the improvement in your ability to accomplish the module objectives. Use the following scale:**

**1** - None = no apparent improvement in my ability to perform this objective

**2** - Slight = slight improvement in my ability to perform this objective

**3** - Moderate = moderate improvement in my ability to perform this objective

**4** - Substantial = substantial improvement in my ability to perform this objective



## 5 - Exceptional = exceptional improvement in my ability to perform this objective

After completing the training module, the participant will be able to...

|   | Average rank |           |             |             |             | ⇓     |
|---|--------------|-----------|-------------|-------------|-------------|-------|
|   | 1            | 2         | 3           | 4           | 5           |       |
| 1.) Understand the concept of Neural Plasticity   |              |           |             | █           |             | 3.7   |
| 2.) Understand how MRI can be used to measure changes in Brain Structure due to Plasticity                                |              |           |             | █           |             | 3.7   |
| 3.) Discuss the limitations of prevailing MRI studies on Structural Plasticity and how one can Circumvent the Limitations |              |           |             | █           |             | 3.8   |
| 4.) Understand how to use Structural MRI Technique to measure Brain Plasticity  |              |           |             | █           |             | 3.7   |
| Responses   | 1            | 2         | 3           | 4           | 5           | Total |
| 1.) Understand the concept of Neural Plasticity   | 1<br>(2%)    | 3<br>(7%) | 12<br>(29%) | 15<br>(37%) | 10<br>(24%) | 41    |
| 2.) Understand how MRI can be used to measure changes in Brain Structure due to Plasticity                                | 1<br>(2%)    | 2<br>(5%) | 13<br>(32%) | 16<br>(39%) | 9<br>(22%)  | 41    |
| 3.) Discuss the limitations of prevailing MRI studies on Structural Plasticity and how one can Circumvent the Limitations | 0            | 2<br>(5%) | 14<br>(34%) | 16<br>(39%) | 9<br>(22%)  | 41    |
| 4.) Understand how to use Structural MRI Technique to measure Brain Plasticity  | 1<br>(2%)    | 3<br>(7%) | 11<br>(27%) | 17<br>(41%) | 9<br>(22%)  | 41    |

## 2

Please rate the following comments about the training module using the following scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

|   | Average rank |   |   |   |   | ↓   |
|---|--------------|---|---|---|---|-----|
|   | 1            | 2 | 3 | 4 | 5 |     |
| 1.) The module presented content that can be applied in real-world medical situations.                  |              |   |   | ■ |   | 3.7 |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. |              |   |   | ■ |   | 3.7 |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                |              |   |   | ■ |   | 3.9 |
| 4.) I will apply these techniques while practicing at my institution.                                   |              |   |   | ■ |   | 3.7 |
| 5.) I would participate in other BRAIN training modules using this program in the future.               |              |   |   | ■ |   | 3.9 |

| Responses   | 1         | 2          | 3           | 4           | 5          | Total |
|---|-----------|------------|-------------|-------------|------------|-------|
| 1.) The module presented content that can be applied in real-world medical situations.                  | 1<br>(2%) | 4<br>(10%) | 11<br>(27%) | 16<br>(39%) | 9<br>(22%) | 41    |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. | 0         | 4<br>(10%) | 12<br>(29%) | 16<br>(39%) | 9<br>(22%) | 41    |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                | 0         | 1<br>(2%)  | 12<br>(29%) | 20<br>(49%) | 8<br>(20%) | 41    |

|   |           |            |             |                    |             |           |
|---|-----------|------------|-------------|--------------------|-------------|-----------|
| 4.) I will apply these techniques while practicing at my institution.                     | 0         | 4<br>(10%) | 12<br>(29%) | <b>17</b><br>(41%) | 8<br>(20%)  | <b>41</b> |
| 5.) I would participate in other BRAIN training modules using this program in the future. | 1<br>(2%) | 1<br>(2%)  | 11<br>(27%) | <b>18</b><br>(44%) | 10<br>(24%) | <b>41</b> |

### 3

**Directions:** Please answer the following questions about using the training module.

**1. Was the module presentation organized, easy-to-use, and user-friendly? YN**

**Why or why not**

| Respondent                         | Response                   |
|------------------------------------|----------------------------|
| 000000000003-a10<br>Analysis10     | Yes                        |
| 000000000005-a10<br>Analysis10     | Yes, easy to understand.   |
| 000000000005-a10<br>Analysis10     | Yes, easy to understand.   |
| 000000000002-a11<br>Analysis11     | Yes.                       |
| 000000000002-a12<br>Analysis12     | yes, concise and organized |
| 000000000004-a12<br>Analysis12     | Yes. Short.                |
| 000000000003-a14<br>Analysis14     | yes                        |
| 00000000000001-a15<br>Analysis15   | Yes                        |
| 0000000000000006-a16<br>Analysis16 | Y                          |

|                                   |   |
|-----------------------------------|---|
| 000000000000000002-a17 Analysis17 | Yes, it was well organized.   |
| 000000000000000002-a19 Analysis19 | Well Organized.   |
| 000000000000000005-a19 Analysis19 | Well organized, clean, nice interface.  |
| 0002baseline Analysis2            | Yes.  |
| 0006baseline Analysis2            | internet would not allow loading of module  |
| 0000000004-a22 Analysis22         | Yes   |
| 0000000005-a22 Analysis22         | y   |
| 0000000002-a23 Analysis23         | Yes   |
| 0000000001-a25 Analysis25         | yes   |
| 0000000001-a26 Analysis26         | Yes. I liked the format.  |
| 0000000002-a29 Analysis29         | good  |
| 0000000006-a29 Analysis29         | na  |
| 0000000001-a30 Analysis30         | Well designed and concise<br><br>Audio only. No visual aides at least when I was reviewing the module |

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|                             |   |
|-----------------------------|---|
| 02-a35 Analysis35           | Yes   |
| 02-a36 Analysis36           | Yes. Very concise and good lecturer.  |
| 02-a37 Analysis37           | Interface was good  |
| 000005-a4 Analysis4         | yes   |
| 000007-a4 Analysis4         | Yes.  |
| 000009-a4 Analysis4         | Well organized.   |
| 000011-a4 Analysis4         | yes   |
| 00000001-a6 Analysis6       | yes   |
| 00000003-a6 Analysis6       | Yes.  |
| 000000001-a7 Analysis7      | yes.  |
| 0000000001-a8<br>Analysis8  | yes   |
| 0000000003-a8<br>Analysis8  | Yes. Easy to use and user friendly.   |
| 00000000003-a9<br>Analysis9 | It was organized. There was an error in the cube of cortex portion where it talks about the brain but there is no correlating image |
| participant baseline1       | The module seems to have several connectivity problems.   |

---

Sometimes the sound stops and you have to go back several slides to be able to get the sound back again.

Sometimes (Often) you cannot go from one slice to another and there seems to be a loading issue.

I tried with wireless and wired internet access and both problems remained so it does not seem to be an issue with internet speed for example.

|                        |                           |
|------------------------|---------------------------|
| participant baseline11 | y                         |
| participant baseline3  | y                         |
| participant baseline5  | yes, well organized topic |
| participant baseline7  | Yes - well organized      |
| participant baseline9  | yes                       |

4

**SCALE**

|                            |   |   |   |   |   |                           |
|----------------------------|---|---|---|---|---|---------------------------|
| <i>Not at all engaging</i> | 1 | 2 | 3 | 4 | 5 | <i>Extremely engaging</i> |
|----------------------------|---|---|---|---|---|---------------------------|

**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

To what degree did the learning environment present information in a way that was engaging? █ 3.6

| Responses   | 1 | 2          | 3           | 4           | 5          | Total |
|---|---|------------|-------------|-------------|------------|-------|
| To what degree did the learning environment present information in a way that was engaging? | 0 | 7<br>(17%) | 13<br>(32%) | 12<br>(29%) | 9<br>(22%) | 41    |

## 5

Please provide an explanation of your above rating:

| Respondent                         | Response   |
|------------------------------------|--|
| 000000000003-a10<br>Analysis10     | Good use of animation                                  |
| 000000000005-a10<br>Analysis10     | Not terribly engaging                                  |
| 000000000005-a10<br>Analysis10     | Not terribly engaging                                  |
| 000000000002-a11<br>Analysis11     | Good educator.   |
| 000000000002-a12<br>Analysis12     | passive listening                                      |
| 000000000004-a12<br>Analysis12     | A little boring, but pretty good info. Fairly concise. |
| 00000000000003-a14<br>Analysis14   | NA   |
| 000000000000001-a15<br>Analysis15  | Very engaging.   |
| 0000000000000006-a16<br>Analysis16 | x  |



|                                   |  |
|-----------------------------------|--|
| 000000000000000002-a17 Analysis17 | It's as engaging as it can be when the topic is neural plasticity.               |
| 000000000000000002-a19 Analysis19 | Interesting topic.   |
| 000000000000000005-a19 Analysis19 | Interesting material, well organized, good speaker, good diagrams.               |
| 0002baseline Analysis2            | The information provided by the learning environment was relevant and practical. |
| 0006baseline Analysis2            | internet would not allow loading of module                                       |
| 0000000004-a22 Analysis22         | Useful graphics  |
| 0000000005-a22 Analysis22         | interesting  |
| 0000000002-a23 Analysis23         | N/A  |
| 0000000001-a25 Analysis25         | passive  |
| 0000000001-a26 Analysis26         | Yes it was engaging.   |
| 0000000002-a29 Analysis29         | good   |
| 0000000006-a29 Analysis29         | na   |
| 0000000001-a30 Analysis30         | Audio only. No visual aides at least when I was reviewing the module             |

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|                             |   |
|-----------------------------|---|
| 02-a35 Analysis35           | Video cases   |
| 02-a36 Analysis36           | Very engaging presenter.  |
| 02-a37 Analysis37           | I find it challenging to use modules for learning.  |
| 000005-a4 Analysis4         | none  |
| 000007-a4 Analysis4         | More interaction.   |
| 000009-a4 Analysis4         | Very boring.  |
| 000011-a4 Analysis4         | Good illustrations with clear sound   |
| 00000001-a6 Analysis6       | Difficult to pay attention to, boring   |
| 00000003-a6 Analysis6       | Unfortunately this is a very complex topic and a cursory overview is always limited.                                  |
| 000000001-a7 Analysis7      | organized, though less engaging.  |
| 0000000001-a8<br>Analysis8  | some pictures and diagrams facilitated  |
| 0000000003-a8<br>Analysis8  | Engaging presentation, but slightly basic for upper level radiology residents.  |
| 00000000003-a9<br>Analysis9 | Images were good. Audio was not engaging  |
| participant baseline1       | I would have liked to have more schemes and illustrations and to have import notions pointed out in a different color |

---

or font for example


|                        |   |
|------------------------|---|
| participant baseline11 | informative   |
| participant baseline3  | useful  |
| participant baseline5  | Enagaging because of novel topic.                                   |
| participant baseline7  | Text, voice over and images all combined to an engaging experience. |
| participant baseline9  | A bit dry   |

6

|                         |   |   |   |   |   |                         |
|-------------------------|---|---|---|---|---|-------------------------|
| <i>Do not recommend</i> | 1 | 2 | 3 | 4 | 5 | <i>Highly recommend</i> |
|-------------------------|---|---|---|---|---|-------------------------|

Average rank 

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

Would you recommend that this learning environment be used for learning about the pediatric brain and MRI?  3.7

| Responses  | 1         | 2         | 3           | 4           | 5           | Total |
|--|-----------|-----------|-------------|-------------|-------------|-------|
| Would you recommend that this learning environment be used for learning about the pediatric brain and MRI? | 1<br>(2%) | 2<br>(5%) | 16<br>(39%) | 11<br>(27%) | 11<br>(27%) | 41    |

7

**Why or why not would you recommend that this learning environment be used for learning about the pediatric brain and MRI?**

| <b>Respondent</b>              | <b>Response</b>  |
|--------------------------------|--|
| 000000000003-a10<br>Analysis10 | Yes, learn at own speed  |
| 000000000005-a10<br>Analysis10 | It may be helpful  |
| 000000000005-a10<br>Analysis10 | It may be helpful  |
| 000000000002-a11<br>Analysis11 | Need to not give answers to pre-quiz immediately after the pre-quiz. With-hold them until after the post-quiz.   |
| 000000000002-a12<br>Analysis12 | informative  |
| 000000000004-a12<br>Analysis12 | Easy to use.   |
| 000000000003-a14<br>Analysis14 | Simple interface.  |
| 000000000001-a15<br>Analysis15 | Great tool   |
| 000000000006-a16<br>Analysis16 | well broken-down   |
| 000000000002-a17<br>Analysis17 | Good overview  |
| 000000000002-a19<br>Analysis19 | Focused presentation.  |
| 000000000005-a19<br>Analysis19 | Very helpful. However, it would be good to know in advance the "target population" you want to teach or share your lectures with. Neuroscience field is very wide. |

and includes (among others) engineers, neurologists, radiologists, post-docs, med students... For instance, the lecture about "basics of MRI" may not be helpful for a radiologist or a biomedical engineer, but on the other hand might be extremely helpful for a med student or a post doc. An so on.

|                             |  |
|-----------------------------|--|
| 0002baseline Analysis2      | It discuss morphologic changes due to neurodevelopment and this is related to pediatric brain study. |
| 0006baseline Analysis2      | internet would not allow loading of module   |
| 000000004-a22<br>Analysis22 | Easy to use and accessible at home.  |
| 000000005-a22<br>Analysis22 | good explananations  |
| 000000002-a23<br>Analysis23 | To better understand plasticity.   |
| 000000001-a25<br>Analysis25 | i wish i understood better the purpose of doing these modules  |
| 000000001-a26<br>Analysis26 | I would recommend this be used as an introduction during a pediatric neuroradiology rotation.        |
| 000000002-a29<br>Analysis29 | good   |
| 000000006-a29<br>Analysis29 | na   |
| 000000001-a30<br>Analysis30 | Audio only. No visual aides at least when I was reviewing the module                                 |

|                             |   |
|-----------------------------|---|
| 02-a35 Analysis35           | Online case review and quiz is helpful.   |
| 02-a36 Analysis36           | Very concise and good explanation.  |
| 02-a37 Analysis37           | I don't learn well from modules   |
| 000005-a4 Analysis4         | simple  |
| 000007-a4 Analysis4         | Pretty standard online learning module.   |
| 000009-a4 Analysis4         | Basically a slower version of a book.   |
| 000011-a4 Analysis4         | N/A   |
| 00000001-a6 Analysis6       | Doesn't stand alone well. Needs more information.   |
| 00000003-a6 Analysis6       | It's a great learning environment. All this is missing is more detailed information, which isn't an obstacle. |
| 000000001-a7 Analysis7      | it is helpful   |
| 0000000001-a8<br>Analysis8  | .   |
| 0000000003-a8<br>Analysis8  |   |
| 00000000003-a9<br>Analysis9 | n/a   |
| participant baseline1       | yes   |
| participant baseline11      | informative, same as other learning tools   |

|                       |   |
|-----------------------|---|
| participant baseline3 | Easy interface  |
| participant baseline5 | Nice intro on novel MRI research technique.   |
| participant baseline7 | I would recommend this environment - it provides an easy to understand basic introduction to the topic. |
| participant baseline9 | Concise. Work at own pace   |

## 8 Please comment on skills, concepts, and techniques you learned in this module:

| Respondent                       | Response   |
|----------------------------------|--|
| 000000000003-a10<br>Analysis10   | Spasticity   |
| 000000000005-a10<br>Analysis10   | Learned some concepts that may be sueful in the future.  |
| 000000000005-a10<br>Analysis10   | Learned some concepts that may be sueful in the future.  |
| 000000000002-a11<br>Analysis11   | Need to not give answers to pre-quiz immediately after the pre-quiz. With-hold them until after the post-quiz. |
| 000000000002-a12<br>Analysis12   | use of plasticity to understand changes in the brain   |
| 000000000004-a12<br>Analysis12   | Differences between some MR sequences.   |
| 00000000000003-a14<br>Analysis14 | NA   |



## Analysis14

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000000000000000001-a15      Good tool

## Analysis15

---

000000000000000006-a16      VBM

## Analysis16

---

000000000000000002-a17      Good module

## Analysis17

---

000000000000000002-a19      I liked the experimental design discussion.

## Analysis19

---

000000000000000005-a19      Limitations of VBM.

## Analysis19

---

0002baseline Analysis2      I learned elasticity and morphometry which may be useful in my research in the future.

---

0006baseline Analysis2

internet would not allow loading of module

---

000000004-a22

Use of MRI in studying neural plasticity.

## Analysis22

---

000000005-a22

basic skills

## Analysis22

---

000000002-a23

Limitations of MRI in the setting of brain plasticity.

## Analysis23

---

000000001-a25

new concept for me

## Analysis25

---

000000001-a26

I learned about MRI physics.

## Analysis26

---

000000002-a29

good

## Analysis29

|                             |   |
|-----------------------------|---|
| 00000006-a29<br>Analysis29  | na  |
| 00000001-a30<br>Analysis30  | introduction of DTI                             |
| 02-a35 Analysis35           | How brain plasticity is imaged with MRI.        |
| 02-a36 Analysis36           | Learned the basics of plasticity.               |
| 02-a37 Analysis37           | Concepts are interesting.                       |
| 000005-a4 Analysis4         | NA  |
| 000007-a4 Analysis4         | Like reading a textbook.                        |
| 000009-a4 Analysis4         |   |
| 000011-a4 Analysis4         | N/A   |
| 00000001-a6 Analysis6       | Function of MRI other than standard techniques. |
| 00000003-a6 Analysis6       | Very basic, but good ground knowledge.          |
| 000000001-a7 Analysis7      | MRI methods for plasticity and its limitations  |
| 0000000001-a8<br>Analysis8  | .   |
| 0000000003-a8<br>Analysis8  |   |
| 00000000003-a9<br>Analysis9 | n/a   |

|                        |  |
|------------------------|--|
| participant baseline1  | nothing much to say here   |
| participant baseline11 | principles of mri plastics   |
| participant baseline3  | plasticity   |
| participant baseline5  | Nice overview, but I wish the topic went more indepth on the technical side and showed more actual MRI images. |
| participant baseline7  | I learned about neuroplasticity and basic methods of measuring changes in the brain with MRI                   |
| participant baseline9  | Mainly experimental concepts. No real clinical application that I could see                                    |

## 9 What did you like best about this module?

| Respondent                      | Response   |
|---------------------------------|--|
| 000000000003-a10<br>Analysis10  | Good explanations about spasticity imaging   |
| 000000000005-a10<br>Analysis10  | Pre and post test  |
| 000000000005-a10<br>Analysis10  | Pre and post test  |
| 000000000002-a11<br>Analysis11  | Need to not give answers to pre-quiz immediately after the pre-quiz. With-hold them until after the post-quiz. |
| 0000000000002-a12<br>Analysis12 | content  |

|                                   |  |
|-----------------------------------|--|
| 00000000000004-a12<br>Analysis12  | Good general overview.                               |
| 000000000000003-a14<br>Analysis14 | NA   |
| 000000000000001-a15<br>Analysis15 | Great teaching                                       |
| 000000000000006-a16<br>Analysis16 | x  |
| 000000000000002-a17<br>Analysis17 | Easy to understand                                   |
| 000000000000002-a19<br>Analysis19 | I liked the experimental design discussion.          |
| 000000000000005-a19<br>Analysis19 | N/A  |
| 0002baseline<br>Analysis2         | None.  |
| 0006baseline<br>Analysis2         | internet would not allow loading of module           |
| 000000004-a22<br>Analysis22       | Easy to follow.                                      |
| 000000005-a22<br>Analysis22       | graphics   |
| 000000002-a23<br>Analysis23       | Learning the MRI technique that measures plasticity. |
| 000000001-a25<br>Analysis25       | concise  |
| 000000001-a26<br>Analysis26       | The online format with quizzes.                      |

|                             |  |
|-----------------------------|--|
| 000000002-a29<br>Analysis29 | good   |
| 000000006-a29<br>Analysis29 | na   |
| 000000001-a30<br>Analysis30 | Conciseness and ease of completion   |
| 02-a35 Analysis35           | Research based evidence.   |
| 02-a36 Analysis36           | Good graphics and presentation.  |
| 02-a37 Analysis37           | Interface  |
| 000005-a4 Analysis4         | simple to use  |
| 000007-a4 Analysis4         | Ease of use.   |
| 000009-a4 Analysis4         |  |
| 000011-a4 Analysis4         | N/A  |
| 00000001-a6 Analysis6       | Not too long.  |
| 00000003-a6 Analysis6       | Simple interface and brief. Just about the right amount of information before becoming too much. |
| 000000001-a7 Analysis7      | organization and content   |
| 0000000001-a8<br>Analysis8  | short quiz   |
| 0000000003-a8               |  |

## Analysis8

|                             |                                     |
|-----------------------------|-------------------------------------|
| 00000000003-a9<br>Analysis9 | n/a                                 |
| participant baseline1       | nothing much to say here            |
| participant baseline11      | it was short                        |
| participant baseline3       | Easy to follow                      |
| participant baseline5       | Nice use of an example on juggling. |
| participant baseline7       | Pictures/animations.                |
| participant baseline9       | Concise, easy level                 |

## 10 What did you like least about this module?

| Respondent                    | Response   |
|-------------------------------|--|
| 00000000003-a10<br>Analysis10 | Too much discussion about limitations/ways bias is introduced  |
| 00000000005-a10<br>Analysis10 | Narration  |
| 00000000005-a10<br>Analysis10 | Narration  |
| 00000000002-a11<br>Analysis11 | Need to not give answers to pre-quiz immediately after the pre-quiz. With-hold them until after the post-quiz. |
| 00000000002-a12<br>Analysis12 | not too much in depth  |

## Analysis 12

|                                   |   |
|-----------------------------------|---|
| 000000000000004-a12<br>Analysis12 | A little boring.  |
| 000000000000003-a14<br>Analysis14 | NA  |
| 000000000000001-a15<br>Analysis15 | Nothing   |
| 000000000000006-a16<br>Analysis16 | x   |
| 000000000000002-a17<br>Analysis17 | A lot of advanced techniques for the lay person   |
| 000000000000002-a19<br>Analysis19 | Nothing.  |
| 000000000000005-a19<br>Analysis19 | N/A   |
| 0002baseline<br>Analysis2         | One quiz had choices of DTI and MRI. The right choice was MRI. But MRI includes DTI. That choice of MRI may be replaced by a more narrow sense of term, for example, MR elastography. |
| 0006baseline<br>Analysis2         | internet would not allow loading of module  |
| 000000004-a22<br>Analysis22       | Too general.  |
| 000000005-a22<br>Analysis22       | nothign   |
| 000000002-a23<br>Analysis23       | N/A   |
| 000000001-a25                     | none  |



## Analysis25

---

|                            |  |
|----------------------------|--|
| 00000001-a26<br>Analysis26 | The length.  |
| 00000002-a29<br>Analysis29 | good   |
| 00000006-a29<br>Analysis29 | na   |
| 00000001-a30<br>Analysis30 | Audio only. No visual aides at least when I was reviewing the module                               |
| 02-a35 Analysis35          | Got a little repetitive in the middle.   |
| 02-a36 Analysis36          | None.  |
| 02-a37 Analysis37          | Content  |
| 000005-a4 Analysis4        | Too long   |
| 000007-a4 Analysis4        | Lack of interaction.   |
| 000009-a4 Analysis4        |  |
| 000011-a4 Analysis4        | Nothing  |
| 00000001-a6 Analysis6      | Boring   |
| 00000003-a6 Analysis6      | Very basic. Sometimes even involved modules can be helpful because you can do them multiple times. |
| 00000001-a7 Analysis7      | not too much interaction   |

---

|                            |  |
|----------------------------|--|
| 0000000001-a8<br>Analysis8 | .  |
| 0000000003-a8<br>Analysis8 |  |
| 0000000003-a9<br>Analysis9 | n/a  |
| participant baseline1      | the comment here is the same as the one on MRI introduction, I would have liked to have the possibility to have more details on selected notions, to be able to go to an "advanced learner" mode |
| participant baseline11     | information a bit dry  |
| participant baseline3      | a little too long  |
| participant baseline5      | needed more MRI images, more examples, less abstract concepts.   |
| participant baseline7      | Some slides had a lot of text, although not too much   |
| participant baseline9      | A bit dry. Did not really keep my interest   |

## 11

**If future training modules related to the topic just learned were to be developed, which ones would you recommend?**

| Respondent                    | Response                                      |
|-------------------------------|---|
| 00000000003-a10<br>Analysis10 | More in depth about protocoling these studies |
| 00000000005-a10               | Not sure                                      |

## Analysis10

|                                    |  |
|------------------------------------|--|
| 000000000005-a10<br>Analysis10     | Not sure   |
| 000000000002-a11<br>Analysis11     | Need to not give answers to pre-quiz immediately after the pre-quiz. With-hold them until after the post-quiz. |
| 000000000002-a12<br>Analysis12     | more outcome data  |
| 000000000004-a12<br>Analysis12     | A little more board relevant physics stuff.  |
| 00000000000003-a14<br>Analysis14   | NA   |
| 000000000000001-a15<br>Analysis15  | N/A  |
| 0000000000000006-a16<br>Analysis16 | x  |
| 0000000000000002-a17<br>Analysis17 | More MRI   |
| 0000000000000002-a19<br>Analysis19 | More on the physics of MRI.  |
| 0000000000000005-a19<br>Analysis19 | - Image processing softwares for DTI<br>- Artifacts on DTI   |
| 0002baseline<br>Analysis2          | Morphometry.   |
| 0006baseline<br>Analysis2          | internet would not allow loading of module   |
| 000000004-a22                      | More details about DTI and VBM   |

|                             |  |
|-----------------------------|--|
| Analysis22                  |  |
| 000000005-a22<br>Analysis22 | yes  |
| 000000002-a23<br>Analysis23 | More in-depth module on imaging brain plasticity.  |
| 000000001-a25<br>Analysis25 | none   |
| 000000001-a26<br>Analysis26 | Diffusion tensor imaging.  |
| 000000002-a29<br>Analysis29 | good   |
| 000000006-a29<br>Analysis29 | na   |
| 000000001-a30<br>Analysis30 | n/a  |
| 02-a35 Analysis35           | More research examples of plasticity imaging.  |
| 02-a36 Analysis36           | Would recommend more case based lectures.  |
| 02-a37 Analysis37           | None, seems good for people who learn this way.  |
| 000005-a4 Analysis4         | none   |
| 000007-a4 Analysis4         | The key to good online training is connecting with the user. More interaction, better visuals. |
| 000009-a4 Analysis4         |  |
| 000011-a4 Analysis4         | all  |

|                          |  |
|--------------------------|--|
| 00000001-a6 Analysis6    | structural MRI techniques  |
| 00000003-a6 Analysis6    | That's a little beyond me. Perhaps a brief summary about what studies have already been done on plasticity mechanisms and how neurons actually remodel real time? (If that's known...) |
| 000000001-a7 Analysis7   | n/a  |
| 0000000001-a8 Analysis8  | .  |
| 0000000003-a8 Analysis8  |  |
| 00000000003-a9 Analysis9 | n/a  |
| participant baseline1    | A training module on how to conduct experimental studies, how to design them and how to interpret them so that the statistics would be correct   |
| participant baseline11   | clinical applications  |
| participant baseline3    | N/A  |
| participant baseline5    | Plasticity related to TBI.   |
| participant baseline7    | More specific modules as to how to use VBM, DTI  |
| participant baseline9    | More on physics of DTI and VBM   |

## 12 Additional comments?

| Respondent                          | Response   |
|-------------------------------------|--|
| 0000000000002-a11<br>Analysis11     | Need to not give answers to pre-quiz immediately after the pre-quiz. With-hold them until after the post-quiz.   |
| 0000000000002-a12<br>Analysis12     | N/A  |
| 0000000000004-a12<br>Analysis12     | None   |
| 000000000000001-a15<br>Analysis15   | No   |
| 00000000000000002-a19<br>Analysis19 | None   |
| 00000000000000005-a19<br>Analysis19 | n/a  |
| 000000004-a22<br>Analysis22         | Thank you  |
| 00000001-a25<br>Analysis25          | <p>this post survey is ENTIRELY TOO LONG! its longer than the quizzes. c ompletely out of proportion. try creating your own...rather than using a boiler plate... 2 questions would be good.</p> <p>1) what did you like?</p> <p>2) what would you change?</p> |
| 00000006-a29<br>Analysis29          | na   |
| 02-a35 Analysis35                   | None.  |

---

|                           |   |
|---------------------------|---|
| 02-a37 Analysis37         | None  |
| 000005-a4 Analysis4       | NA  |
| 000009-a4 Analysis4       |   |
| 00000003-a6 Analysis6     | None.   |
| 000000003-a8<br>Analysis8 |   |
| participant baseline1     | Same comments here regarding the pre and post test on the addition of detailed explanations for each question |
| participant baseline3     | nothing   |

---

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[Investigating Brain Plasticity and Connectivity with Structural MRI Techniques](#)



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# Corpus Callosum and other “Major” Commissures

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View All Responses. **All participants.** View Default order [?](#) Responses: **26**

## POST-RUN MODULE QUESTIONNAIRE




**1** **Three learning objectives are listed below. Please rate the improvement in your ability to accomplish the module objectives. Use the following scale:**

- 1 - None = no apparent improvement in my ability to perform this objective
- 2 - Slight = slight improvement in my ability to perform this objective
- 3 - Moderate = moderate improvement in my ability to perform this objective
- 4 - Substantial = substantial improvement in my ability to perform this objective
- 5 - Exceptional = exceptional improvement in my ability to perform this objective

After completing the training module, the participant will be able to...

Average rank ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|






|  |   |     |
|--|---|-----|
| 1.) Discuss the Corpus Callosum and other Major Cerebral Commissures looking at their anatomy through the lens of Normal and Abnormal Development. |  | 3.8 |
| 2.) Understand why a full Radiologic Assessment is necessary to properly categorize a case of Abnormal Corpus Callosum.                            |  | 3.9 |
| 3.) Understand the basis of the Abnormal Corpus Callosum Development and its Genetic and Clinical Implications.                                    |  | 3.8 |

| Responses  | 1         | 2          | 3          | 4          | 5           | Total |
|--|-----------|------------|------------|------------|-------------|-------|
| 1.) Discuss the Corpus Callosum and other Major Cerebral Commissures looking at their anatomy through the lens of Normal and Abnormal Development. | 1<br>(4%) | 3<br>(12%) | 6<br>(23%) | 7<br>(27%) | 9<br>(35%)  | 26    |
| 2.) Understand why a full Radiologic Assessment is necessary to properly categorize a case of Abnormal Corpus Callosum.                            | 1<br>(4%) | 2<br>(8%)  | 6<br>(23%) | 7<br>(27%) | 10<br>(38%) | 26    |
| 3.) Understand the basis of the Abnormal Corpus Callosum Development and its Genetic and Clinical Implications.                                    | 1<br>(4%) | 2<br>(8%)  | 7<br>(27%) | 7<br>(27%) | 9<br>(35%)  | 26    |

## 2

Please rate the following comments about the training module using the following scale:

1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

|   | Average rank |   |   |   |   | ↓   |
|---|--------------|---|---|---|---|-----|
|   | 1            | 2 | 3 | 4 | 5   |     |
| 1.) The module presented content that can be applied in real-world medical situations.                  |              |   |   |   |    | 4.1 |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. |              |   |   |   |    | 4.2 |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                |              |   |   |   |    | 4.1 |
| 4.) I will apply these techniques while practicing at my institution.                                   |              |   |   |   |    | 4.0 |
| 5.) I would participate in other BRAIN training modules using this program in the future.               |              |   |   |   |  | 3.9 |

| Responses   | 1         | 2         | 3          | 4          | 5           | Total |
|---|-----------|-----------|------------|------------|-------------|-------|
| 1.) The module presented content that can be applied in real-world medical situations.                  | 0         | 2<br>(8%) | 4<br>(15%) | 9<br>(35%) | 11<br>(42%) | 26    |
| 2.) This lesson taught me information about the pediatric brain and MRI that I previously did not know. | 0         | 1<br>(4%) | 4<br>(15%) | 9<br>(35%) | 12<br>(46%) | 26    |
| 3.) I have a better understanding about the topics and concepts discussed in the module.                | 1<br>(4%) | 0         | 6<br>(23%) | 8<br>(31%) | 11<br>(42%) | 26    |
| 4.) I will apply these techniques   | 1         | 0         | 8          | 7          | 10          | 26    |

while practicing at my institution. (4%) (31%) (27%) (38%)

5.) I would participate in other BRAIN training modules using this program in the future. 1 (4%) 1 (4%) 7 (27%) 7 (27%) 10 (38%) 26

**3 Directions:** Please answer the following questions about using the training module.

**1. Was the module presentation organized, easy-to-use, and user-friendly? YN**

**Why or why not**

| Respondent                         | Response  |
|------------------------------------|---|
| 000000000005-a10<br>Analysis10     | yes, engaging narration   |
| 000000000002-a11<br>Analysis11     | Yes   |
| 000000000002-a12<br>Analysis12     | yes, concise and to the point   |
| 000000000004-a12<br>Analysis12     | Yest. Very informative with clinically relevant info. Unfortunately, I had to rush through so didn't absorb everything. |
| 00000000000003-a14<br>Analysis14   | yes   |
| 00000000000002-a15<br>Analysis15   | Yes.  |
| 0000000000000001-a18<br>Analysis18 | Yes well organized.   |
| 0000000000000003-a18<br>Analysis18 | Yes. Very clear overall.  |
| 0002baseline<br>Analysis2          | Not really easy to follow. I wish there were more and clearer depiction of brain regions on the MR images using         |

arrows or lines. Also, it would have been great if this module had started with more basic concepts of corpus callosum.

|                            |   |
|----------------------------|---|
| 0006baseline Analysis2     | module does not load fast enough to do anything   |
| 02-a20 Analysis20          | yes, it had great picture.  |
| 00000004-a23<br>Analysis23 | Yes   |
| 00000003-a29<br>Analysis29 | y   |
| 01-a35 Analysis35          | The only thing I would change is introducing the embryology earlier in the module as it is a basis for understanding the material. There was discussion of a few abnormalities prior to the embryology. |
| 01-a36 Analysis36          | Very easy to use. No problems.  |
| 000002-a4 Analysis4        | y   |
| 000008-a4 Analysis4        | Yes   |
| 000010-a4 Analysis4        | no<br><br>the discussion can be better prganized<br><br>embryology->anatomy->pathology  |
| 000004-a5 Analysis5        | yes, it is organized good.  |
| 0000004-a6 Analysis6       | Yes. It was well organized  |

|                             |  |
|-----------------------------|--|
| 000000001-a7<br>Analysis7   | Organized, yes. easy to use, yes. user friendly, yes         |
| 0000000001-a8<br>Analysis8  | yes  |
| 00000000003-a9<br>Analysis9 | Yes  |
| participant baseline10      | Yes. I could understand difficult terminologies with images. |
| participant baseline2       | Yes. I think it was very well organized.                     |
| participant baseline8       | yes  |

4

**SCALE**

|                            |   |   |   |   |   |                           |
|----------------------------|---|---|---|---|---|---------------------------|
| <i>Not at all engaging</i> | 1 | 2 | 3 | 4 | 5 | <i>Extremely engaging</i> |
|----------------------------|---|---|---|---|---|---------------------------|

**Average rank** ↓↓

|   |   |   |   |   |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|

To what degree did the learning environment present information in a way that was engaging? 3.8

| Responses   | 1         | 2         | 3          | 4          | 5          | Total |
|---|-----------|-----------|------------|------------|------------|-------|
| To what degree did the learning environment present information | 1<br>(4%) | 2<br>(8%) | 7<br>(27%) | 8<br>(31%) | 8<br>(31%) | 26    |

in a way that was engaging?'

## 5

Please provide an explanation of your above rating:

| Respondent                         | Response   |
|------------------------------------|--|
| 000000000005-a10<br>Analysis10     | interesting subject matter   |
| 000000000002-a11<br>Analysis11     | Good training.   |
| 000000000002-a12<br>Analysis12     | passive learning   |
| 000000000004-a12<br>Analysis12     | Very clinically relevant; familiar voice.  |
| 00000000000003-a14<br>Analysis14   | Good discussion and examples   |
| 000000000000002-a15<br>Analysis15  | Clicking on images to make them larger and the popups are a nice touch, albeit heavy on the CPU. |
| 0000000000000001-a18<br>Analysis18 | Interactive portions that allowed for clicking and expanding explanations.                       |
| 0000000000000003-a18<br>Analysis18 | No in-module questions.  |
| 0002baseline<br>Analysis2          | Although the topics are useful, it was still not straight forward to understand.                 |
| 0006baseline<br>Analysis2          | module does not load fast enough to do anything  |

|                             |  |
|-----------------------------|--|
| 02-a20 Analysis20           | I looked at a few of the slides in full.   |
| 000000004-a23<br>Analysis23 | Complicated topic and very lengthy   |
| 000000003-a29<br>Analysis29 | Very good  |
| 01-a35 Analysis35           | The material was fast paced enough to be engaging.   |
| 01-a36 Analysis36           | Good depth of material taught at the optimal rate. Helpful visual aids.                            |
| 000002-a4 Analysis4         | y  |
| 000008-a4 Analysis4         | Good presentation  |
| 000010-a4 Analysis4         | very disorganized  |
| 0000004-a5 Analysis5        | I understand a lot from it.  |
| 00000004-a6 Analysis6       | Cases were engaging and relevant   |
| 000000001-a7<br>Analysis7   | a couple slides were interactive. Needs more though.   |
| 0000000001-a8<br>Analysis8  | had a slide to interact with each part of the corpus callosum - maybe include more of those slides |
| 00000000003-a9<br>Analysis9 | Good diagrams and choice of images   |
| participant baseline10      | I could learn clinical information on brain injuries.  |



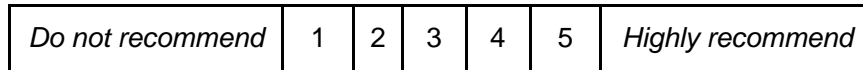
participant baseline2

The topic was engaging and information was presented in a systematic fashion. Moreover, I think the essential findings for each type of corpus callosal abnormality was described very well. However, I feel that module is too long. I think it can be broken down into 10 minutes segments. Towards the end, its hard to remember the additional information. Hopefully, this module is something that can be repeatedly accessed by users.

participant baseline8

material was interesting, presented in a somewhat engaging fashion

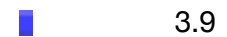
6



Average rank ↓↓



Would you recommend that this learning environment be used for learning about the pediatric brain and MRI?



| Responses  | 1         | 2         | 3          | 4           | 5          | Total |
|--|-----------|-----------|------------|-------------|------------|-------|
| Would you recommend that this learning environment be used for learning about the pediatric brain and MRI? | 2<br>(8%) | 1<br>(4%) | 3<br>(12%) | 12<br>(46%) | 8<br>(31%) | 26    |

7

Why or why not would you recommend that this learning environment be used for learning about the pediatric brain and MRI?

Respondent                      Response

|                                    |   |
|------------------------------------|---|
| 000000000005-a10<br>Analysis10     | useful, engaging, can be done at home   |
| 000000000002-a11<br>Analysis11     | Good training.  |
| 000000000002-a12<br>Analysis12     | content is very informative   |
| 000000000004-a12<br>Analysis12     | Clinically relevant, to the point information.  |
| 00000000000003-a14<br>Analysis14   | na  |
| 000000000000002-a15<br>Analysis15  | Yes, for review or basic overview. I would still recommend a dedicated textbook for details and board studying. |
| 0000000000000001-a18<br>Analysis18 | Great info and presentation   |
| 0000000000000003-a18<br>Analysis18 | This one was much better than the others - much more relevant information.                                      |
| 0002baseline<br>Analysis2          | Development of corpus callosum is definitely related to pediatric MR.   |
| 0006baseline<br>Analysis2          | module does not load fast enough to do anything   |
| 02-a20<br>Analysis20               | I can't say that this format engages me.  |
| 00000004-a23<br>Analysis23         | I prefer other resources  |
| 00000003-a29<br>Analvsis29         | Yes, good pictures  |

|                             |  |
|-----------------------------|--|
| 01-a35 Analysis35           | Concise module that is packed with high yield information.   |
| 01-a36 Analysis36           | Good content, good pace. Good visual aids.   |
| 000002-a4 Analysis4         | y  |
| 000008-a4 Analysis4         | Would need too many modules to go through the amount of info needed to learn peds brain mri  |
| 000010-a4 Analysis4         | not well organized   |
| 0000004-a5 Analysis5        | it is really useful.   |
| 00000004-a6 Analysis6       | Allows for self paced learning   |
| 000000001-a7<br>Analysis7   | Yes. However, more diagrams are needed to illustrated the step-by-step development of thi complex anatomy to really hit home.  |
| 0000000001-a8<br>Analysis8  | lots of material, organized  |
| 00000000003-a9<br>Analysis9 | It is applicable information   |
| participant baseline10      | It is helpful for non-clinicians.  |
| participant baseline2       | It's very informative. I think the banner on top (title of each slide) is distracting and occupies too much space. If this were smaller, the images can be bigger. Sometimes, there are too many words and bullets on the slide. |

participant baseline8 learning about MRI requires images and text, this format works well to combine

## 8 Please comment on skills, concepts, and techniques you learned in this module:

| Respondent                         | Response  |
|------------------------------------|---|
| 000000000005-a10<br>Analysis10     | useful skills   |
| 000000000002-a11<br>Analysis11     | Basic science review  |
| 000000000002-a12<br>Analysis12     | brain development   |
| 000000000004-a12<br>Analysis12     | Embryology related to disease process.  |
| 000000000003-a14<br>Analysis14     | na  |
| 00000000000002-a15<br>Analysis15   | A lot of new and good stuff.  |
| 0000000000000001-a18<br>Analysis18 | Extensive and useful in practice and review                                   |
| 0000000000000003-a18<br>Analysis18 | CC development.   |
| 0002baseline Analysis2             | I got to know a little more about development and importance of white matter. |
| 0006baseline Analysis2             | module does not load fast enough to do anything                               |

|                             |   |
|-----------------------------|---|
| 02-a20 Analysis20           | None  |
| 000000004-a23<br>Analysis23 | Corpus collosum development   |
| 000000003-a29<br>Analysis29 | Agenesis of CC  |
| 01-a35 Analysis35           | The concept of evaluating for migrational anomalies in utero was very helpful.  |
| 01-a36 Analysis36           | Whole new way to think about the various commissural anomalies, what co-existing abnormalities may be associated and why. |
| 000002-a4 Analysis4         | y   |
| 000008-a4 Analysis4         | corpus callosum   |
| 000010-a4 Analysis4         | very disorganized   |
| 000004-a5 Analysis5         | The concepts improved a lot.  |
| 00000004-a6 Analysis6       | Development of corpus callosum  |
| 000000001-a7<br>Analysis7   | CC development  |
| 0000000001-a8<br>Analysis8  | lots of detail about corpus callosum  |
| 00000000003-a9<br>Analysis9 | n/a   |

|                        |   |
|------------------------|---|
| participant baseline1U | I learned brain injuries of the tetus.                    |
| participant baseline2  | Describe different types of corpus callosum abnormalities |
| participant baseline8  | recognize and understand path for abnormal commissures    |

## 9

**What did you like best about this module?**

| <b>Respondent</b>                   | <b>Response</b>   |
|-------------------------------------|---|
| 0000000000005-a10<br>Analysis10     | subject matter  |
| 0000000000002-a11<br>Analysis11     | Good Instructor   |
| 0000000000002-a12<br>Analysis12     | content and organization  |
| 0000000000004-a12<br>Analysis12     | Clinically relevant.  |
| 000000000000003-a14<br>Analysis14   | na  |
| 000000000000002-a15<br>Analysis15   | A lot of info was presented in a pretty manner. The topic is dense, so it was nice having the ability to click when you wanted to move on to the next slide, instead of having the program do it automatically. |
| 00000000000000001-a18<br>Analysis18 | Amount of content   |
| 00000000000000003-a18<br>Analysis18 | Clarity.  |

|                            |  |
|----------------------------|--|
| 0002baseline Analysis2     | None.  |
| 0006baseline Analysis2     | module does not load fast enough to do anything  |
| 02-a20 Analysis20          | The images   |
| 00000004-a23<br>Analysis23 | I knew very little about the topic before the module                                   |
| 00000003-a29<br>Analysis29 | Images   |
| 01-a35 Analysis35          | The nature of the material is very useful to a developing radiologist.                 |
| 01-a36 Analysis36          | Just a very interesting topic and one of the few that can make embryology interesting. |
| 000002-a4 Analysis4        | y  |
| 000008-a4 Analysis4        | Clear info   |
| 000010-a4 Analysis4        | clear images   |
| 000004-a5 Analysis5        | Discussions about the Corpus Callosum.   |
| 0000004-a6 Analysis6       | Organization   |
| 00000001-a7<br>Analysis7   | organization and content   |
| 000000001-a8<br>Analysis8  | topic  |

|                             |                                 |
|-----------------------------|---------------------------------|
| 00000000003-a9<br>Analysis9 | n/a                             |
| participant baseline10      | good example images.            |
| participant baseline2       | The organization of the lecture |
| participant baseline8       | information within module.      |

## 10 What did you like least about this module?

| Respondent                    | Response  |
|-------------------------------|---|
| 00000000005-a10<br>Analysis10 | length  |
| 00000000002-a11<br>Analysis11 | Quiz answers should not be given after the prequiz. |
| 00000000002-a12<br>Analysis12 | not too much in depth                               |
| 00000000004-a12<br>Analysis12 | N/A   |
| 00000000003-a14<br>Analysis14 | na  |
| 00000000002-a15<br>Analysis15 | The constant slow network popups.                   |
| 00000000001-a18<br>Analysis18 | N/a   |
| 00000000003-a18<br>Analysis18 | Not enough interaction.                             |



|                            |   |
|----------------------------|---|
| 0002baseline Analysis2     | See my answer in #3.  |
| 0006baseline Analysis2     | module does not load fast enough to do anything   |
| 02-a20 Analysis20          | Not sure  |
| 00000004-a23<br>Analysis23 | More information than I need to know at this stage of my career.  |
| 00000003-a29<br>Analysis29 | Length  |
| 01-a35 Analysis35          | none  |
| 01-a36 Analysis36          | What's not to like? I won't like how many more times I'm likely to hear during my residency that the corpus callosum forms in an anterior to posterior manner (apparently erroneous, but I've heard it many times already)! |
| 000002-a4 Analysis4        | y   |
| 000008-a4 Analysis4        | I dont learn well from a video type format  |
| 000010-a4 Analysis4        | the back noise  |
| 000004-a5 Analysis5        | like all  |
| 0000004-a6 Analysis6       | Not applicable  |
| 00000001-a7<br>Analysis7   | lack of illustrations and diagrams for the embryological development  |
| 00000004-a8                | too much detail   |

|                             |  |
|-----------------------------|--|
| 0000000001-a8<br>Analysis8  | maybe too much detail  |
| 00000000003-a9<br>Analysis9 | n/a  |
| participant baseline10      | lack of animation.   |
| participant baseline2       | Length   |
| participant baseline8       | inability to slow down/speed up areas based on needs for comprehension |

## 11 If future training modules related to the topic just learned were to be developed, which ones would you recommend?

| Respondent                        | Response   |
|-----------------------------------|--|
| 00000000005-a10<br>Analysis10     | yes  |
| 000000000002-a11<br>Analysis11    | Heterotopias.  |
| 0000000000002-a12<br>Analysis12   | more in depth information  |
| 0000000000004-a12<br>Analysis12   | This was the right level. Could broaden I guess.   |
| 00000000000003-a14<br>Analysis14  | na   |
| 000000000000002-a15<br>Analysis15 | Absence of the corpus callosum differential. That is, an overview of commons conditions (particularly those name after certain people) that can cause corpus callosum abnormalities. |

---

|                                     |  |
|-------------------------------------|--|
| 00000000000000000001-a18 Analysis18 | N/a  |
| 00000000000000000003-a18 Analysis18 | This one for sure.   |
| 0002baseline Analysis2              | Not sure.  |
| 0006baseline Analysis2              | module does not load fast enough to do anything                            |
| 02-a20 Analysis20                   | Not sure   |
| 000000004-a23 Analysis23            | More basic developmental concepts  |
| 000000003-a29 Analysis29            | All  |
| 01-a35 Analysis35                   | none   |
| 01-a36 Analysis36                   | This is a good format for embryology in general.                           |
| 000002-a4 Analysis4                 | y  |
| 000008-a4 Analysis4                 | None   |
| 000010-a4 Analysis4                 | embrology  |
| 0000004-a5 Analysis5                | introduce more about how to find the abnormal Corpus Callosum development. |
| 0000004-a6 Analysis6                | More topics on brain development and its clinical relevance                |

---

|                             |  |
|-----------------------------|--|
| 000000001-a7<br>Analysis7   | CC development                                       |
| 0000000001-a8<br>Analysis8  | .  |
| 00000000003-a9<br>Analysis9 | n/a  |
| participant baseline10      | Animated 3D visualization may be helpful.            |
| participant baseline2       | I cannot think of a topic right now - will follow up |
| participant baseline8       | --   |

## 12 Additional comments?

| Respondent                         | Response   |
|------------------------------------|------------|
| 0000000000002-a11<br>Analysis11    | None       |
| 0000000000002-a12<br>Analysis12    | N/A        |
| 0000000000004-a12<br>Analysis12    | NOne       |
| 000000000000002-a15<br>Analysis15  | Well done. |
| 0000000000000001-a18<br>Analysis18 | N/a        |
| 000000004-a23<br>Analysis23        | n/a        |

## Analysis

---

|                   |      |
|-------------------|------|
| 01-a35 Analysis35 | none |
|-------------------|------|

---

|                     |   |
|---------------------|---|
| 000002-a4 Analysis4 | y |
|---------------------|---|

---

|                     |  |
|---------------------|--|
| 000008-a4 Analysis4 |  |
|---------------------|--|

---

|                       |   |
|-----------------------|---|
| participant baseline2 | Shorter modules with the same set of information (i.e. divide this one into three), I think, will be more effective |
|-----------------------|---|

---

|                       |   |
|-----------------------|---|
| participant baseline8 | liked that pictures could be enlarged, but it would be nice if instead of arrows, the areas being identified (e.g. rostrum) could be highlighted. |
|-----------------------|---|

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[Corpus Callosum and other "Major" Commissures](#)

# APPENDIX E

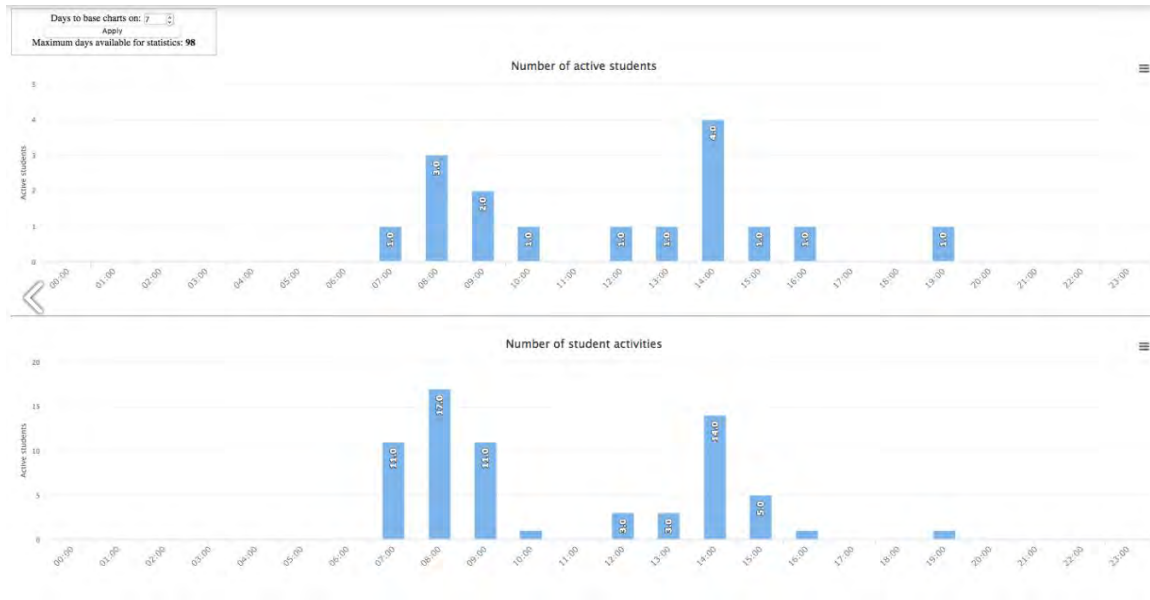
## MilitaryMedEd | Portal Updates

### 1. Analytics Graphs Update

Update: block\_analytics\_graphs\_v4.1.1\_2018072501

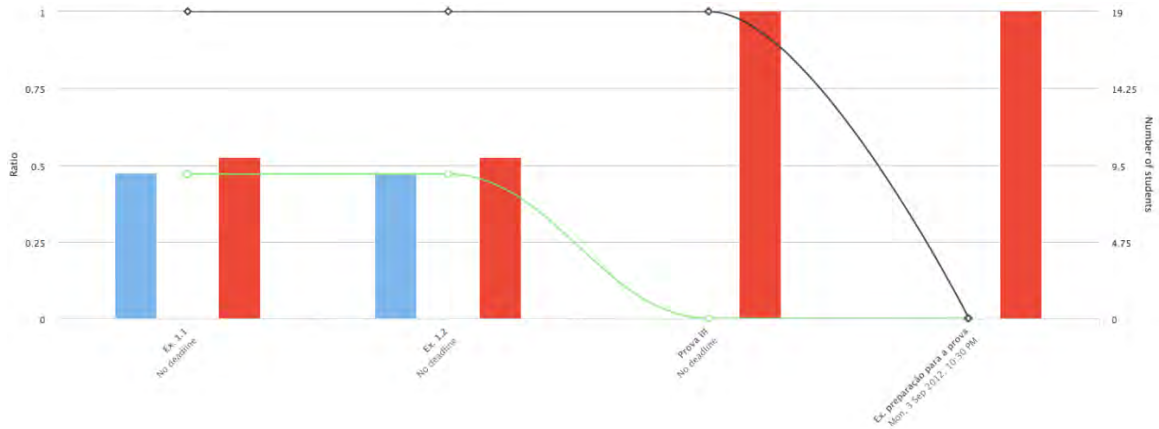
- Improved grades chart email
- Improved block installation in a course

This is a block that generates graphs intended to facilitate pedagogical decisions. The graphs have zoom capabilities and allow fast communication with students through email.



This plugin provides five graphs that may facilitate the identification of student profiles. Those graphs allow the teacher to send messages to users according to their behavior inside a course. The graphs show:

- 1 Grades Chart - The grades distribution in a box graph to identify the differences among evaluations and students with problems.
- 2 Content Accesses Chart - Which users accessed many different resources.
- 3 Number of Active Users Chart - How many users are active in a certain time of day.
- 4 Assignment Submissions Chart - Which users have submitted assignments on time or late (tasks, quizzes and hotpotatoes).
- 5 Hits distribution Chart - How each user is accessing the course and its resources in each course week.



It is possible to click over graph elements in order to send email to a group of students (first two graphs) or to a particular student (last graph).

## 2. LightBox Update

Update: mod\_lightboxgallery\_3.3.0.6\_2018062700



- Improved create, edit and delete galleries
- Created Filter by Application User
- Improved image resize from the “add image” form

The Lightbox Gallery allows you to create image galleries within your Moodle course. The Lightbox system is a set of scripts that can be used to apply various effects to image galleries.

As a course teacher, you are able to create, edit and delete galleries. The main configuration option involves telling Moodle which directory contains the images you want to include in the gallery. Small thumbnails will then be generated, which are used for the thumbnail view of the gallery.

## Lightbox Gallery

**Disabled plugins**  
lightboxgallery | disabledplugins

Caption  
 Crop  
 Delete  
 Flip  
 Resize  
 Rotate  
 Tag  
 Thumbnail  
Default: None

Select the image editing plugins you want to disable.

**Enable RSS feeds**  
lightboxgallery | enablerrssfeeds

Default: No

Allow RSS feeds to be generated from galleries.

[Save changes](#)

Clicking on any of the thumbnails brings that image into focus, and allows you to scroll through the gallery at your leisure. Using the Lightbox scripts creates nice transition effects when loading and scrolling through the images.

It is also of note that you can modify permissions on a site- or course-wide level to allow students to directly contribute to the gallery. If a site administrator first modifies the role to enable students to contribute, instructors may then "switch" this capability on or off in their courses.

### 3. Filtered Course List Update

Update: block\_filtered\_course\_list\_v3.3.6\_2018060600

- Displays a configurable list of user's courses
- Replacement for the "My Courses" block
- Parameters now allow padding layouts for better readability
- Checkbox now suppresses "All courses" link that otherwise appears at the bottom of the block
- Ability to hide block from guests and anonymous visitors
- By default an "Other courses" rubric appears at the end of the list and displays any of the user's courses that have not already been mentioned under some other heading



- Customize the separator between ancestor categories when using the ANCESTRY token above
- By default administrators and managers will see a list of categories rather than a list of their own courses. This setting allows you to change that, and it can be helpful to do so while configuring the block.

The Filtered Course List block displays a configurable list of courses. It is intended as a replacement for the My Courses block, although both may be used. It is maintained by the Collaborative Liberal Arts Moodle Project (CLAMP).

An administrator can apply various filters by which to organize a user's course listing in the block. Courses can be sorted by category, shortname matches or completion status. If all of the courses in a given semester have a shortname ending in a semester code, for instance, then the administrator can designate those courses to appear under "Current courses," "Future courses" or any other heading. Regex matching is supported.

Administrators can designate multiple collapsible headings and choose which of those headings, if any, should be expanded by default.

Other options include the ability to hide the block from guests or anonymous visitors, to choose whether an admin sees all courses or her own, and to hide or reveal a link to a more comprehensive course search.

#### 4. Poodll Filter Update

Update: filter\_poodll\_3.1.06\_2018070501



- Added a once audio recorder option to selectable html5 recorders in filter settings
- Added a once audio recorder preset
- Added a appid/subtitle job params
- Updated native audio
- Refactored AMD code for better organized skins
- Added a more flexible cloud job register method
- Added scaffolding for ReadAloud and CloudPoodll

Poodll is a toolbox of features for Moodle, including audio and video recording, media players for the classroom and widgets such as tabs and stopwatches. The Poodll filter is a pre-requisite plugin for the Poodll Assignment plugins, Poodll Recording Question type, Poodll Atto/TinyMCE plugins. Poodll Repository and Poodll Database Activity Field.

### HTML5 Recorder Settings

**HTML5 Recorder Skin(Audio)**  
filter\_poodll | html5recorder\_skin\_audio  
 Plain  Default: Plain

**HTML5 Recorder Skin(Video)**  
filter\_poodll | html5recorder\_skin\_video  
 Plain  Default: Plain

**Skin style(audio)**  
filter\_poodll | skinstyleaudio  
 Default: Empty  
 A CSS class name that will be added to the audio recorder to assist in customizing recorder appearance.

**Skin style(video)**  
filter\_poodll | skinstylevideo  
 Default: Empty  
 A CSS class name that will be added to the video recorder to assist in customizing recorder appearance.

**Use on desktop Safari**  
filter\_poodll | html5ondesktop  
 Default: No  
 Desktop Safari may not select the correct audio device and there is no option to select a different one. In most cases its ok, but on Mac Mini it may not detect a working audio device at all.

### Whiteboard Settings

**Default whiteboard**  
filter\_poodll | defaultwhiteboard  
 Literally Canvas(s)  Default: Literally Canvas(s)

**Whiteboard Default Width**  
filter\_poodll | whiteboardwidth  
 600  Default: 600

**Whiteboard Default Height**  
filter\_poodll | whiteboardheight  
 350  Default: 350

**Autosave(millisecond)**  
filter\_poodll | autosavewhiteboard  
 2000  Default: 2000  
 Saves the drawing when the user has paused drawing after X milliseconds. 0 = no autosave

**Disable Zoom**  
filter\_poodll | whiteboarddisablezoom  
 Default: No  
 Only applies to LiterallyCanvas. If checked sets the max and min zoom to 1.0, effectively disabling the zoom feature.

### Custom Audio and Video Placeholder File Settings

Audio and video placeholder files are used in Poodll while files are converted to MP3 or MP4. If the default ones don't appeal you can upload custom ones here. See [here](#) for more details on how to do this.

**Audio placeholder file (.mp3)**  
filter\_poodll | placeholderaudiofile  
 Maximum size for new files: Unlimited, maximum attachments: 1

Files

  
 You can drag and drop files here to add them.

Default: Empty  
 Upload an MP3 file here and Poodll will use it as a placeholder.

**Audio Duration(secs)**  
filter\_poodll | placeholderaudiolength  
 0  Default: 0  
 Duration in seconds to at least one decimal place of placeholder audio.

**Video placeholder file (.mp4)**  
filter\_poodll | placeholdervideofile  
 Maximum size for new files: Unlimited, maximum attachments: 1

Files

  
 You can drag and drop files here to add them.

Default: Empty  
 Upload an MP4 file here and Poodll will use it as a placeholder.

**Video Duration(secs)**  
filter\_poodll | placeholdervideolength  
 0  Default: 0  
 Duration in seconds to at least one decimal place of placeholder video.

## Preferred Recorder Order

Poodll will choose the best recorder it can if the user browser and platform support it. You set the order here.

|  |  |  |
|--|--|--|
| Audio Recorder Order<br><small>filter: poodll_recorderorder_audio</small>  | <input type="text" value="media,mobile,flashaudio,red5,uplo"/> | Default: media,mobile,flashaudio,red5,upload |
| Video Recorder Order<br><small>filter: poodll_recorderorder_video</small>  | <input type="text" value="media,mobile,red5,upload"/>          | Default: media,mobile,red5,upload            |
| Whiteboard Recorder Order<br><small>filter: poodll_recorderorder_whiteboard</small>  | <input type="text" value="upload"/>                            | Default: upload                              |
| (This setting is currently not used and may be removed from Poodll soon)   |  |  |
| Snapshot Recorder Order<br><small>filter: poodll_recorderorder_snapshot</small>  | <input type="text" value="snapshot,upload"/>                   | Default: snapshot,upload                     |
| Use Flash on Android<br><small>filter: poodll_learn_on_android</small>   | <input type="checkbox"/> Default: No                           |  |
| It is possible to use Flash on Android, though in many cases its not available and difficult to communicate to students what to do. So by default this is off. |  |  |
| Show download button under players<br><small>filter: poodll_download_media_ok</small>  | <input type="checkbox"/> Default: No                           |  |
| This is implemented in some players. native players, mediaelement players, audiojs_shim, flowplayer first frame and Video JS                                   |  |  |

## Category: Administration / Plugins / Filters / PoodLL

### General Settings

#### Register your Poodll

Poodll 3 requires a registration key. If you do not have one visit [Poodll.com](https://poodll.com) to get one.

|  |   |
|--|---|
| Registration Key<br><small>filter: poodll_registration_key</small>   | <input type="text"/>  |
| Default: Empty   |   |
| Enter your Poodll registration key here. You can obtain a key from <a href="https://poodll.com/pricing">https://poodll.com/pricing</a>   |   |
| Cloud recording<br><small>filter: poodll_cloudrecording</small>  | <input checked="" type="checkbox"/> Default: Yes                            |
| Poodll cloud recording. This enables transcoding and other services in the cloud. The Poodll iOS app requires this, and so too do the html5 audio and video recorders. Recorded files are not hosted in the cloud.   |   |
| Cloud notifications<br><small>filter: poodll_notificationapache</small>  | <input checked="" type="checkbox"/> Default: Yes                            |
| Poodll cloud notifications. This enables instant notification that cloud transcoding is complete   |   |
| AWS SDK<br><small>filter: poodll_aws_sdk</small>   | Version 3.x <input type="checkbox"/> Default: Version 2.x                   |
| Poodll cloud recording uses Amazon Web Services (AWS). Version 3.x is supported but not shipped with Poodll. Version 2.x of the AWS SDK will work on PHP 5.3 or greater. If you need to use AWS SDK 3.x then place it in a folder called aws-v3 in filter/poodll/3rdparty. |   |
| Cloud Region (AWS)<br><small>filter: poodll_aws_region</small>   | Asia Pacific (Tokyo) <input type="checkbox"/> Default: Asia Pacific (Tokyo) |
| Choose the closest region to your Moodle server for best performance and to satisfy any data protection policies or regulations that apply to you.   |   |

## 5. Attendance Update

Update: mod\_attendance\_3.3.15\_2017050226



- Added option to prevent sharing ip for current session
- Make events optional per-session
- Added output buffering level for progress bar
- add list of modules in course on index
- Added cog menu on teacher page under Boost based themes
- Prevent students from sharing device while self-marking

The Attendance activity allows teachers to maintain a record of attendance, replacing or supplementing a paper-based attendance register. It is primarily used in blended-learning environments where students are required to attend classes, lectures and tutorials and allows the teacher to track and optionally provide a grade for the students attendance. The instructor can set the frequency of their classes (# of days per week & length of course) or create specific sessions.

To take attendance, the instructor clicks on the "Update Attendance" button and is presented with a list of all the students in that course, along with configurable options and comments. The default options provided are: Present, Absent, Late & Excused. Instructors can download the attendance for their course in Excel format or text format.

Sessions can also be configured to allow students to record their own attendance and a range of different reports are available.

# Attendance

Settings

Default status set

Course summary report

Reset calendar

Import Sessions

**Results per page**  
attendance | resultsperpage

25  Default: 25

Number of students displayed on a page

**Allow students to record own attendance**  
attendance | studentscanmark

Default: Yes

If checked, teachers will be able to allow students to mark their own attendance.

**Students record attendance during session time**  
attendance | studentscanmarksessiontime

Default: Yes

If checked students can only record their attendance during the session.

**Session end (minutes)**  
attendance | studentscanmarksessiontimeend

60  Default: 60

If the session does not have an end time, how many minutes should the session be available for students to record their attendance.

## Default status set











Settings

Default status set

Course summary report

Reset calendar

Import Sessions

| # | Acronym                        | Description                          | Points                           | Available for students (minutes)  | Automatically set when not marked  | Action   |
|---|--------------------------------|--------------------------------------|----------------------------------|--|---|--|
| 1 | <input type="text" value="P"/> | <input type="text" value="Present"/> | <input type="text" value="2.0"/> | <input type="text"/>   | <input type="radio"/>   | <br> |
| 2 | <input type="text" value="L"/> | <input type="text" value="Late"/>    | <input type="text" value="1.0"/> | <input type="text"/>   | <input type="radio"/>   | <br> |
| 3 | <input type="text" value="E"/> | <input type="text" value="Excused"/> | <input type="text" value="1.0"/> | <input type="text"/>   | <input type="radio"/>   | <br> |
| 4 | <input type="text" value="A"/> | <input type="text" value="Absent"/>  | <input type="text" value="0.0"/> | <input type="text"/>   | <input type="radio"/>   | <br> |
| * | <input type="text"/>           | <input type="text"/>                 | <input type="text"/>             | <input type="text"/>   | <input type="button" value="Add"/>  |  |

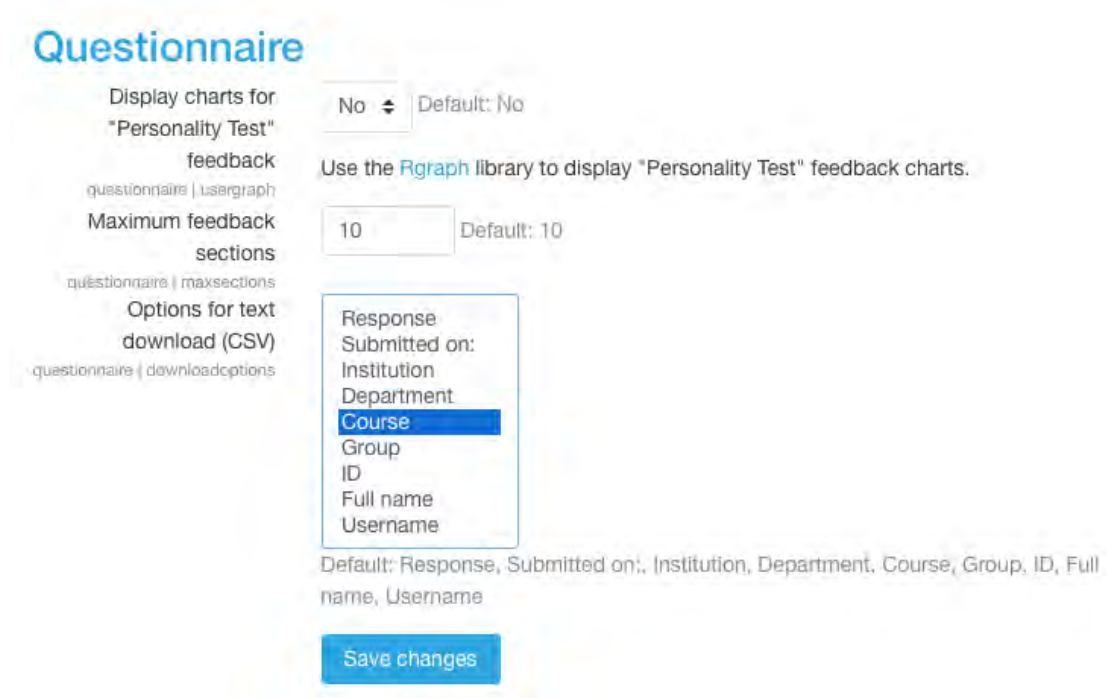
## 6. Questionnaire Update

Update: mod\_questionnaire\_ 3.3.3 (Build - 2018013100)



- Added enhanced notification feature for full submission data.
- Added support for block\_myoverview.
- Added error handling to search indexing.
- Changed name of data column alias to a non-reserved Oracle word.
- Adding feedback data duplication to survey copying.
- Allowed filtering on the activity name for the view page.
- Added 'sectionheading' and 'feedback' as pluginfile areas.
- Adding XSS risk masks to appropriate capabilities.

The Moodle Questionnaire module is a survey-like type of activity. It allows teachers to create a wide range of questions to get student feedback e.g. on a course or activities.



**Questionnaire**

Display charts for "Personality Test"  Default: No

feedback questionnaire | usargraph

Use the [Rgraph](#) library to display "Personality Test" feedback charts.

Maximum feedback sections  Default: 10

questionnaire | maxsections

Options for text download (CSV) questionnaire | downloadoptions

Response Submitted on:  
Institution  
Department  
**Course**  
Group  
ID  
Full name  
Username

Default: Response, Submitted on:, Institution, Department, Course, Group, ID, Full name, Username

The goals of the Questionnaire module are quite different from those of the Moodle Lesson or Quiz modules. With Questionnaire you do not test or assess the student, you gather data.

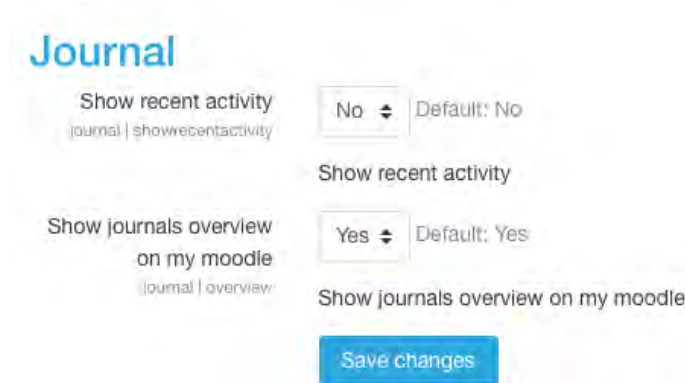
## 7. Journal Update

Update: mod\_journal\_ 33.0 (Build: 2017121101)



The journal module allows teachers to collect online text from students, review it and provide feedback including grades. The work students submit is visible only to the teacher and not to the other students.

A journal entry is one in which students type directly into a text field in Moodle. A Journal does not allow students to submit any digital content (files), including, for example, word-processed documents, spreadsheets, images, audio and video clips. Journals do not consist of file uploads. A journal has a 'Days available' setting that controls the number of days the journal is open for changes.



**Journal**

Show recent activity  Default: No

Show recent activity

Show journals overview on my moodle  Default: Yes

Show journals overview on my moodle

[Save changes](#)

Markers are not notified every time a student submits an assignment, or for late submissions. The entries for a whole class or group is shown to a marker, at the same time. Markers can choose to give students feedback in the form of text and grade.

The Journal is suitable for simple, short, online writing assignments in which students will refine their entries over time based on feedback from the marker. Journal assignments should be simple because it allows online text only and it does not allow for file uploads or use of the rubric or marking guide. Journal assignments should be short to prevent the 'scroll of death' for markers, because entries for all participants or groups are shown to the marker at the same time on one page.