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14. ABSTRACT
With this project, we have created the largest and most detailed database of vascular anatomy ever done and linked this vascular anatomy data in 3D space to anatomic landmarks throughout the torso. This database was created with the substantial use of software algorithms that substantially increased the precision of the measures taken. Using the morphomic and vascular anatomy data obtained from a young adult civilian population, we were able to objectively determine the location and size of the aortic zones needed for effective placement of REBOA in the field. The precise characterization of vascular lengths and dimensions will guide the future development of vascular intervention devices including next generation REBOA catheters.

15. SUBJECT TERMS
Trauma, Endovascular, Thoracic, Abdominal, Aorta, Morphometry, Morphomic

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1. **INTRODUCTION:**

Our research group has developed advanced technical capabilities to quantitatively measure anatomic characteristics in traumatically injured patients. In a previous DOD study, we noted clear differences between men (n=400) and women (n=170). We also noted significant racial differences in the correlation between body habitus and aortic dimensions as well as differences with age and body habitus. We hypothesized that aortic and venous dimensions differ with the hemodynamic status of the injured person as well as their gender, race, body habitus and age. Better characterization of *these differences* is necessary to guide optimal field inflation of occlusive balloon catheters or other hemorrhage control devices for the treatment of battlefield casualties; and better characterization of *the corresponding dimensions* will support the development of occlusion devices that optimally limit hemorrhage while minimizing complications. Specifically, we aim to develop accurate measurements for aortic and vena caval dimensions based on hemodynamic status, body habitus, gender and age in the civilian population; and subsequently we will translate these findings to the military population and create accurate nomograms for catheter design, catheter insertion and balloon inflation based on hemodynamic status, body habitus, gender and age.

2. **KEYWORDS:**

- Trauma
- Endovascular
- Thoracic
- Abdominal
- Aorta
- Morphometry
- Vena Cava
- Machine Learning
- Hemorrhage
- Catheter
- Hypotension
- Balloon Occlusion

3. **ACCOMPLISHMENTS:**

1.1.1: Identify 2000 Civilian CTs (06/30/14-01/02/2015)

- Current Objectives:
  The goal for this task was to identify CT scans from 2000 civilians between the ages of 18 and 50 from which we will extract aorta and vena cava measurements of length and dimension, as well as muscle, fat, bone, and organ morphomic measures and hemodynamic status (blood pressure and heart rate).

- Results, Progress and Accomplishments (with Discussion):
  This task is complete. This study evaluated 2,247 patients who underwent CT imaging following traumatic injury between 2000-06-11 and 2015- 03-30. There were 478 exclusions (21.2%) due to incomplete chest, abdomen, pelvis, and femoral imaging. The final cohort was composed of 1769 patients with a mean (SD) age of 32.7 (10.2) and a median (IQR) torso extent of 557.4 mm (537-579 mm). There were 1270 (71.8%) male patients and 75 (4.2%) patients identified as hypotensive. For the purposes of the study, hypotensive was defined as blood pressure less than 100 and pulse over 100 at the time of emergency department trauma admission.
- Key Methodology:
  Using the PGAdmin query tool, we married the data from the University of Michigan trauma registry with the University of Michigan radiology database to identify patients who were transported to the Emergency Department for a traumatic injury or admitted the University of Michigan Hospital System (UMHS) and who received a CT scan for clinical purposes.
- Opportunities for Training and Professional Development: Nothing to Report
- Dissemination of Results to Communities of Interest: Nothing to Report
- Data: Appendix A: Civilian Patient List

1.3 Develop Aorta Algorithm (06/30/14-10/30/14)

- Current Objectives:
  Segment the full aorta from the arch to the bifurcation points, and then post-process with MATLAB® to identify the multiple critical vessel branch-points for diameter and length measurements.
- Results, Progress and Accomplishments (with Discussion):
  The algorithms for the automatic segmentation of the aorta have been developed and meet our target accuracy measures (currently we are achieving an average 90% accuracy rate with our fully-automated machine learning approach). This method has greatly improved the throughput and provided a level of consistency that overcomes any inter- and intra-user variability.
- Key Methodology:
  Using a novel approach for identifying and capturing morphomic data from CT scans, we have developed a machine learning technique for extracting the aortic structures in a more automated fashion. This entails creating algorithms that search for circular structures in a region of interest and then reference the slices above and below to validate the selection. Once the main aortic structure is identified, we lay in a centerline and use a post-processing, user-guided algorithm developed in MATLAB® to mark femoral head cut point (left and right), iliac (left and right), bifurcation point, renal arteries (left and right), superior mesenteric, celiac (inferior and superior), and left subclavian artery. Following this identification step, measurements of diameter and lengths (total and between the branch points) are stored in the database.
- Opportunities for Training and Professional Development: Nothing to Report
- Dissemination of Results to Communities of Interest: Nothing to Report

- Data:
  Appendix B: Vascular Processing
  Appendix C: Machine Learning

1.1.2: Identify 50 EKG-gated CTs (11/03/14-12/12/14)

- Current Objectives:
  To determine the normal change in aortic/vena caval geometry and dimensions at different locations during the cardiac cycle, we also analyzed a cohort (n=50) of subjects who had undergone EKG-gated CT scans to determine the change in aortic geometry and dimensions at different aortic locations during the cardiac cycle. Hemodynamic data was available for these patients from the time of CT scanning. This information will be essential for optimal design of catheter balloons that have the appropriate mechanical properties to occlude flow without causing aortic rupture or dissection at different stages of the cardiac cycle.

- Results, Progress and Accomplishments (with Discussion):
  We have successfully identified this subset of patients. This task is complete.

- Key Methodology:
  To identify these patients we used the PGAdmin query tool find patients in the trauma population who underwent an ECG-gated CT scan. Once selected, downloaded, and de-identified, these scans are then separated into the multiple cardiac phases to enable our algorithms to process each stage individually. Once this is complete, we run each phase through our automated and post-processing steps.

- Opportunities for Training and Professional Development: Nothing to Report

- Dissemination of Results to Communities of Interest: Nothing to Report

- Data:
  Appendix A: Civilian Patient List
  Appendix D: Phase Overlay & Gated Radius Graph

1.1.3: Identify 75 Internal Injury & Hypotensive CTs (11/03/14-01/02/15)

- Current Objectives:
  To determine the effect of internal hemorrhage and hypovolemia on aortic/vena caval dimensions and geometry, we analyzed an additional cohort of civilian trauma patients with significant internal hemorrhage and with hemodynamic instability (n=75). Comparing patients with arterial versus venous bleeding (as determined by active contrast extravasation) as well as differing locations of hemorrhage (chest, abdomen, pelvis). In the past, it was extremely rare to scan a hypotensive trauma patient as they were rushed to the OR. However, with the recent widespread adoption of ultrasound to rule out pericardial, pleural, and abdominal fluid in combination with continued use of chest and pelvis radiographs to rule out significant thoracic and pelvic hemorrhage, more and more hypotensive blunt trauma patients (primarily from high energy motor vehicle crashes) are undergoing CT scanning with continued resuscitation to define their internal injuries rather than proceeding to the OR for blind surgical exploration. It is this population that provided the 75 scans needed for this task.

- Results, Progress and Accomplishments (with Discussion):
  We successfully identified this subset of patients. This task is complete.
- Key Methodology:
  To identify these patients we used the PGAdmin query tool find patients in the trauma population with internal hemorrhage and hypovolemia. Once selected, downloaded, and de-identified, we will determine whether the patient had arterial versus venous bleeding (as determined by active contrast extravasation) as well as the differing locations of hemorrhage (chest, abdomen, pelvis).
- Opportunities for Training and Professional Development: Nothing to Report
- Dissemination of Results to Communities of Interest: Nothing to Report
- Data:
  Appendix A: Civilian Patient List

1.4: Develop Vena Cava Algorithm (09/01/14-02/13/15)

- Current Objectives:
  Better characterization of the differences in vena caval dimensions and lengths is necessary to guide optimal field inflation of occlusive balloon catheters or other hemorrhage control devices for the treatment of battlefield casualties. Better characterization of these dimensions will support the development of occlusion devices that optimally limit hemorrhage while minimizing complications.
- Results, Progress and Accomplishments (with Discussion):
  We have developed a user-guided algorithm to process the vena cava. This task is complete.
- Key Methodology:
  We manually segmentation of Vena Cava of civilian patients. This process involves placing points on the interior of the vena cava and then using a "growing" algorithm to find the edges. We attempted development of a more automated process but the variation of the vena cava dimension and shape resulted an algorithm that was not accurate enough to make the process useful. We then developed a tool to measure the maximum and minimum diameter of a cross-section of the vena cava, from which we will derive are and volume variability across the population.
- Opportunities for Training and Professional Development: Nothing to Report
- Dissemination of Results to Communities of Interest: Nothing to Report
- Data:
  Appendix B: Vascular Processing

1.2: Capture Civilian Demographics (11/03/14-03/06/15)

- Current Objectives:
  To identify the variability in aortic and vena caval dimensions without the need for 3-D imaging in the field. Our objective is to develop nomograms that take into account age, sex, race, weight, and height, as well as external measurements that we can extrapolate for our base morphomics measurements.

- Results, Progress and Accomplishments (with Discussion):

  We identified all demographics of our civilian population that are possible. This task is complete.

- Key Methodology:
  We leveraged the University of Michigan trauma registry and the electronic medical records system at University of Michigan Health System (UMHS) to extract the demographics data on our selected civilian patient population. Using the PGAdmin query tool, we extracted age, sex, race (when available), blood pressure, and heart rate for each patient from our identified group (transported to the Emergency Department for a traumatic injury or admitted the UMHS and who received a CT scan for clinical purposes.

- Opportunities for Training and Professional Development: Nothing to Report

- Dissemination of Results to Communities of Interest: Nothing to Report

- Data:
  Appendix A: Civilian Patient List

1.5: Process Base Morphomics for Civilian Population (09/01/14-03/27/15)

- Current Objectives:
  We used our base morphomic measurements in body circumference, fat, muscle, bone, organs, etc. to record measurement of body habitus for the civilian trauma population. These data were then connected with demographics and vasculature measures to feed our development of nomograms for vasculature.

- Results, Progress and Accomplishments (with Discussion):
  All base morphomics have been processed for the civilian scans we have identified. This task is complete.

- Key Methodology:
  Morphomics is based on highly automated, high-throughput image processing to quantify anatomically indexed measures from a single patient's scan, offering remarkable opportunities for personalized treatment. Each patient's individual morphometric qualities are then assessed against population-based standards to identify patient-specific risk factors. Morphomic assessment of trunk musculature (density and mass), spine, psoas (area and quality), fascia, skin, fat, body circumference and eccentricity, dorsal muscle group, bone mineral density, and solid organ morphomic measures have demonstrated that these patient-specific variables dominate risk prediction models using proven techniques for the University of Michigan Morphomic Analysis Group.

- Opportunities for Training and Professional Development: Nothing to Report

- Dissemination of Results to Communities of Interest: Nothing to Report

- Data:
  Appendix E: Morphomics Overview

1.6: Process Aorta for Civilian Population (09/22/14-10/02/15)

- Current Objectives:
  To determine a baseline for our nomogram development, we leveraged our custom

algorithm to extract length and diameter measurements as well as branch point locations for the civilian CT cohort.

- Results, Progress and Accomplishments (with Discussion):
  We processed 1716 aortas from normotensive civilian CTs. We have developed and tested a reliable machine-learning based automatic processing method. This task is complete.

- Key Methodology:
  Using a novel approach for identifying and capturing morphomic data from CT scans, we developed a machine learning technique for extracting the aortic structures in a more automated fashion. This entails creating algorithms that search for circular structures in a region of interest and then reference the slices above and below to validate the selection. Once the main aortic structure is identified, we lay in a centerline and measure the radius. Then, using a post-processing, user-guided algorithm developed in MATLAB®, we mark the femoral head cut point (left and right), iliac (left and right), bifurcation point, renal arteries (left and right), superior mesenteric, celiac (inferior and superior), and left subclavian artery. Following this identification step, measurements of diameter and lengths (total and between the branch points) are stored in the database.

- Opportunities for Training and Professional Development: Nothing to Report

- Dissemination of Results to Communities of Interest: Nothing to Report

- Data:

AORTA	*Centerline*	*Radii*	*Landmarks*	*Full Volumes*
Normotensive	1716	1716	1716	563
Hypotensive	78	78	78	14

1.7: Process Vena Cava for Civilian Population (01/05/15-01/15/16)

- Current Objectives:
  To determine a baseline for our nomogram development, we leveraged our custom algorithm to extract length as well as minor and major diameter measurements, branch point locations, and volume for a 5 cm section of the vena cava.

- Results, Progress and Accomplishments (with Discussion):
  This task is complete.

- Key Methodology:
  Points within the vena cava are placed manually, and then a line is derived. Landmarks (right and left iliac, inferior and superior bifurcation, left and right renal, supra hepatic, and IVC heart junction) are identified on the scans and recorded in the database. A custom algorithm is then run to determine the major and minor axis of the vena cava, providing insight into its eccentricity and level of collapse. Finally a 5cm segment is identified on a representative sample, and volume is derived to provide further data on the condition of the vena cava.

- Opportunities for Training and Professional Development: Nothing to Report

- Dissemination of Results to Communities of Interest: Nothing to Report
- Data:

VENA CAVA	*Landmarks*
Normotensive	1707
Hypotensive	78

1.8: Civilian Analysis (12/07/15-05/29/17)

- Current Objectives:
  Hemodynamic data, in conjunction with age, gender, height, weight, and Body Mass Index (BMI) data as well as analytic morphomic data (distances between bony landmarks, body composition, and cross sectional area and circumference, etc.) were analyzed with the aortic/vena caval data to determine nomograms for optimal balloon insertion and inflation targets.
- Results, Progress and Accomplishments (with Discussion):

  For the civilian population, we computed descriptive statistics of means, standard deviations, and percentiles for (1) arterial distances (lengths) and (2) arterial diameters by gender and age. We fit linear regression models employing gender, age, and torso extent as covariates to predict the distance to arterial zones of interest. Aortic Zone I extended from the origin of the left subclavian artery to the celiac trunk, and Aortic Zone III is composed of the infrarenal aorta (lowest renal to the aortic bifurcation). Analysis of arterial tortuosity and descriptive statistics of venous dimensions were completed.
- Key Methodology:
  We used the tool, Tableau, to analyze the data acquired.
- Opportunities for Training and Professional Development: Nothing to Report
- Dissemination of Results to Communities of Interest: Nothing to Report
- Data:
  Appendix F: Data Analysis and Results

2.1: Arrange Access to Military CTs in San Antonio (01/02/15-06/19/15)

- Current Objectives:
  Arrange for access to 500 warfighter CTs for the third aim of this grant.
- Results, Progress and Accomplishments (with Discussion):
  We successfully completed a CRADA to enable access to warfighter scans. However, the technical staff at AISR struggled to access the scans. To assist military personnel at the Army Institute for Surgical Research (AISR), we developed a system to load, select, and de-identify scans and visited AISR at Fort Sam Houston to advance this effort. Yet, the technical team at AISR continued to encounter issues when applying these approaches to the production environment. In April 2016, we again sent one of our staff to liaise with the technical staff at AISR at Fort Sam Houston to help resolve some of these new technical problems, and we identified an AISR medical staff member, Dr. Sahar Leazer, to help with

identification of appropriate scans at AISR and to ensure IRB compliance. Nevertheless, AISR staff was unable to overcome this obstacle. This result was shared with Wilbur Malloy, our Health Science Program Manager at CDMRP.

- Opportunities for Training and Professional Development: Nothing to Report
- Dissemination of Results to Communities of Interest: Nothing to Report
- Key Methodology:
  Following DOD protocol.
- Data:
  Appendix G: CRADA

2.2: Identify 500 CTs from Military Population (06/19/15-10/23/15)

- This task was not completed due to the issues outlined in SOW 2.1 (above).

2.3: Capture Demographics for Military Population (11/01/16-02/15/17)

- This task was not completed due to the issues outlined in SOW 2.1 (above).

2.4: Process Base Morphomics for Military Population (12/01/16-03/15/17)

- This task was not completed due to the issues outlined in SOW 2.1 (above).

2.5: Process Aorta for Military Population (01/16/17-03/15/17)

- This task was not completed due to the issues outlined in SOW 2.1 (above).

2.6: Process Vena Cava for Military Population (03/16/17-05/15/17)

- This task was not completed due to the issues outlined in SOW 2.1 (above).

4. **IMPACT**:

Non-compressible torso hemorrhage remains the leading cause of preventable death on the battlefield and a leading cause of death in civilian centers. Investigators are researching the use of various aortic occlusion catheters that can control non-compressible torso injuries in the field. Basic morphometric understanding is prerequisite for such procedures to be done safely and effectively. Better characterization of vascular dimensions and lengths are also need to support the development of occlusion devices that optimally limit hemorrhage while minimizing complications.

With this project, we have created the largest and most detailed database of vascular anatomy ever done and linked this vascular anatomy data in 3D space to anatomic landmarks throughout the torso. This database was created with the substantial use of software algorithms that substantially increased the precision of the measures taken. Using the morphomic and vascular anatomy data obtained from a young adult civilian population, we were able to objectively determine the location and size of the aortic zones needed for effective placement of REBOA in the field. The precise characterization of vascular lengths and dimensions will guide the future development of vascular intervention devices including next generation REBOA catheters.

We used the collected data to define the best algorithms for accurate placement of first generation REBOA catheters in the field. Analysis of our data showed that accurate placement into the long Zone 1 is easily achieved using a simple nomogram based on torso extent alone. Indeed, no other body dimensional data added significant value for estimating optimal insertion distance.

However, analysis of our database shows that accurate placement of a first generation REBOA catheter into Zone III is challenging, with an error rate of approximately 40%. This is clearly the result of the long (4cm) balloon on the current REBOA catheters and a short (8.7 cm) Zone III. Recently, new clinical indications for placement of REBOA into Zone III have been identified, making the development of next generation REBOA catheters with shorter balloons a major priority identified by this project.

Our findings have impact on several major disciplines. For device development teams, they now have granular dimensional and geometric measures to target. For clinicians, REBOA insertion protocols should emphasize the reliability of torso extent measures for accurate placement into Zone I while also emphasizing the unreliability of proper placement into Zone III. For clinical researchers, epidemiologists, and anatomists, we have defined the age and gender-related population corridors for torso vascular anatomy in a large adult population. This data will serve as a foundation to characterize the vascular changes that occur with disease burden over time.

Our database will be foundational for commercial technology development related to vascular-based medical interventions. The population norms for location, length, curvature, tortuosity, dimensions, etc. of arterial as well as vena caval segments are now available for use to guide the development, use and evaluation of new medical devices.

The data collected by this project adds substantially to a better understanding of the human body, its change over time and its variability between individuals in a population. The body is the biological medical record of an individual over their lifetime, integrating the cumulative effect of that individual's genes, behaviors, diseases, nutrition, activity and environment. Vascular diseases are a major source of morbidity and mortality; the data collected and analyzed in this project will serve as a strong foundation for future studies into human health and disease.

5. CHANGES/PROBLEMS:

Access to the military CT scans remains a roadblock. We provided the IT team in San Antonio with a custom software solution that should have allowed this task to be completed, but a new technical difficulty once again left us behind on processing. Without the military scans to begin processing, we have finished the processing of the civilian scans and demographics as well as the analysis design. The analysis of the civilian data is complete.

This continuing difficulty with access to military scans has had a negative impact on the timeline. Thus, we filed for a no cost extension to be able to fulfill the terms of the grant.

As we have reported in the past, obtaining racial/ethnic demographic information is a difficult task. Reports of these data in patient records are self-reported and therefore unreliable and sometimes omitted. In response, we performed a manual search of medical records and reduced the null values in the race field to 28 of 1796 CTs reviewed. This small number will not impact the study statistically.

6. PRODUCTS:

Publications, conference papers, and presentations "Nothing to report."

Journal publications: multiple journal publications in preparation.

Books or other non-periodical, one-time publications "Nothing to report."

Other publications, conference papers, and presentations: May 2, 2017 "Characterization of Human Torso Vascular Morphometry in Normotensive and Hypotensive Trauma Patients Update" Ft. Detrick, Maryland.
See Appendix I: Interim Progress Review Presentation.

Website(s) or other Internet site(s) "Nothing to report."

Technologies or techniques "Nothing to report."

Inventions, patent applications, and/or licenses "Nothing to report."

Other Products "Nothing to report."

7. PARTICIPANTS & OTHER COLLABORATING ORGANZATIONS:

Name:	*Stewart C. Wang, MD PhD*
Project Role:	*PI*
Nearest person month worked:	9 (3 per year)
Contribution to Project:	*Dr. Wang was the Principal Investigator on this grant, with expertise in morphomics.*
Funding Support:	

Name:	*Jonathan Eliason, MD*
Project Role:	*Co-Investigator*
Nearest person month worked:	3 (1 per year)
Contribution to Project:	*Dr. Eliason was the Co-Investigator on this grant with expertise in vascular surgery.*
Funding Support:	

Name:	*Nicholas Wang*
Project Role:	*Research Associate*
Nearest person month worked:	27 (9 per year)
Contribution to Project:	*Nick Wang developed algorithms for image extraction and processing.*
Funding Support:	

Name:	*Binu Enchakalody*
Project Role:	*Research Associate*

Nearest person month worked:	27 (9 per year)
Contribution to Project:	*Binu Enchakalody developed algorithms for image extraction and processing.*
Funding Support:	

Name:	*June Sullivan*
Project Role:	*Project Manager*
Nearest person month worked:	9 (3 per year)
Contribution to Project:	*June Sullivan was responsible for defining the tasks and verifying quality and completion.*
Funding Support:	

Name:	*Peng Zhang, PhD*
Project Role:	*Biostatistician*
Nearest person month worked:	6 (2 per year)
Contribution to Project:	*Peng Zhang was responsible for development of the statistical models for this grant.*
Funding Support:	

Name:	*Brian Derstine*
Project Role:	*Data Analyst*
Nearest person month worked:	24 (12 per year for two years)
Contribution to Project:	*Brian Derstine ensured validity of all imaging and medical data and will manage the execution of analyses as well as preparation and dissemination of reports.*
Funding Support:	

Name:	*Pat Rabban*
Project Role:	*Research Associate*
Nearest person month worked:	20 (10 per year for two years)
Contribution to Project:	*Pat Rabban was responsible for processing the morphomics using existing algorithms.*
Funding Support:	

Name:	*Honglak Lee, PhD*
Project Role:	*Engineering Faculty Lead*
Nearest person month worked:	2 (1 per year for two years)

Contribution to Project:	*Dr. Lee was responsible for overseeing machine learning development on this grant.*
Funding Support:	

Name:	*Xinchen Yan*
Project Role:	*EECS Graduate Student Research Assistant*
Nearest person month worked:	12 (12 for 1 year)
Contribution to Project:	*Xinchen Yan was responsible for implementation of machine learning on this grant.*
Funding Support:	

- Change in Active Support of PIs: "Nothing to Report."

Other Partner Organizations

Organization Name:	*Army Institute of Surgical Research (AISR)*
Location of Organization	*Ft. Sam Houston, San Antonio, TX*
Partner's Contribution to Project:	*Collaboration: Sahar Leazer, MD at AISR assisted with the AISR IRB. She also attempted to identify and provide the required military CTs, but the IT infrastructure prohibited the completion of this task.*

8. SPECIAL REPORTING REQUIREMENTS:
Quad Chart is included in Appendix H.

9. APPENDICES:
Appendix A: Civilian Patient List
Appendix B: Vascular Processing
Appendix C: Machine Learning
Appendix D: Phase Overlay & Gated Radius Graph
Appendix E: Morphomics Overview
Appendix F: Data Analysis and Results
Appendix G: CRADA
Appendix H: Quad Chart
Appendix I: Interim Progress Review Presentation
Appendix J: References

Appendix A: Civilian Patient List

studyid	studydescription	studydttm	age	race	gender	ed_bp	ed_pulse	tag_contents
554	CT THORAX W IV CONTRAS	8/9/08 12:59	21	White	M	129	78	DOD ECG
3125	CT ANGIO CHEST WO AND W CONTR.	6/5/09 7:31	47	White	M	16	97	DOD ECG
3195	CT THORAX W IV CONTRAST	3/3/10 19:30	45	Black	M	103	95	DOD ECG
3286	CHEST ABDOMEN PELVIS	2/1/09 18:03	21	White	F	147	105	DOD ECG
3322	CHEST ABDOMEN PELVIS	12/7/08 8:55	29	White	M	147	86	DOD ECG
3512	CT THORAX W IV CONTRAS	10/11/08 19:40	48	White	M	140	76	DOD ECG
3514	CHEST ABDOMEN PELVIS	10/9/08 10:36	47	White	M	149	62	DOD ECG
6997	CT THORAX W IV CONTRAS	8/9/08 12:01	38	White	M	145	68	DOD ECG
7822	CHEST ABDOMEN PELVIS	6/16/08 5:23	28	White	F	132	74	DOD ECG
7828	CT THORAX W IV CONTRAS	6/10/08 7:28	38	White	M	156	87	DOD ECG
7838	CT THORAX W IV CONTRAS	6/9/08 5:03	21	White	M	105	67	DOD ECG
7885	CHEST ABDOMEN PELVIS	4/28/08 4:44	23	White	F	110	87	DOD ECG
7909	CHEST ABDOMEN PELVIS	4/3/08 14:37	30	White	M	118	74	DOD ECG
7933	CHEST ABDOMEN PELVIS	2/26/08 10:51	43	White	M	156	87	DOD ECG
7974	CHEST ABDOMEN PELVIS	1/6/08 13:39	35	White	F	120	109	DOD ECG
7990	CHEST ABDOMEN PELVIS	12/20/07 2:19	44	White	M	166	100	DOD ECG
9200	CHEST ABDOMEN PELVIS	7/12/07 13:33	19	White	M	159	74	DOD ECG
9246	CHEST ABDOMEN PELVIS	6/19/07 1:53	26	White	M	121	115	DOD ECG
9264	CHEST ABDOMEN PELVIS	6/3/07 17:14	37	White	F	114	122	DOD ECG
10551	CT THORAX W IV CONTRAST	8/23/09 8:10	44	White	M	118	81	DOD ECG
10815	CT THORAX W IV CONTRAST	9/9/09 10:36	35	White	M	123	88	DOD ECG
10924	CT THORAX W IV CONTRAST	7/16/09 15:25	33	White	M	152	111	DOD ECG
11631	CT ABDOMEN W IV CONTRAST	8/9/09 3:23	21	White	M	71	103	DOD ECG
13399	CT THORAX W IV CONTRAST	8/19/09 7:04	21	White	M	151	113	DOD ECG
16034	CT ABDOMEN W IV CONTRAST	6/2/10 16:39	19	White	M	160	55	DOD ECG
16069	CT ABDOMEN W IV CONTRAST	2/20/10 13:02	20	Hispanic	M	134	78	DOD ECG
21970	CT THORAX W IV CONTRAST	8/20/10 1:15	41	White	M	163	109	DOD ECG
23575	CT THORAX W IV CONTRAST	6/22/09 20:00	42	White	F	142	68	DOD ECG
23705	CT THORAX W IV CONTRAST	9/1/11 14:29	22	White	F	130	129	DOD ECG

23726	CT THORAX W IV CONTRAST	8/1/11 17:07	20	White	M	139	122	DOD ECG
23881	CT THORAX W IV CONTRAST	7/2/11 6:21	49	White	M	123	95	DOD ECG
23883	CT THORAX W IV CONTRAST	7/2/11 7:29	47	White	M	141	96	DOD ECG
23924	CT ABDOMEN PELVIS W IV CONTRAS	6/7/11 14:37	18	White	F	141	66	DOD ECG
23925	CT ABDOMEN PELVIS W IV CONTRAS	6/5/11 23:27	47	White	M	180	81	DOD ECG
23930	CT ABDOMEN PELVIS W IV CONTRAS	5/26/11 13:56	22	White	M	160	90	DOD ECG
24439	CT THORAX W IV CONTRAST	6/19/05 6:12	20	White	M	140	98	DOD ECG
49464	CT THORAX W IV CONTRAST	8/27/10 0:29	35	White	M	140	82	DOD ECG
52937	CT THORAX W IV CONTRAST	10/23/11 15:29	48	White	M	177	91	DOD ECG
52945	CT THORAX W IV CONTRAST	12/2/11 20:34	50	White	F	195	76	DOD ECG
52949	CT THORAX W IV CONTRAST	3/5/12 15:51	49	White	M	165	100	DOD ECG
52974	CT THORAX W IV CONTRAST	1/22/12 5:18	31	White	F	90	69	DOD ECG
53834	CT THORAX W IV CONTRAST	10/11/11 6:16	34	Black	M	152	75	DOD ECG
53966	CT ABDOMEN PELVIS W IV CONTRAS	2/4/12 5:45	25	Black	F	129	94	DOD ECG
54436	CT THORAX W IV CONTRAST	12/1/12 14:58	42	White	M	118	81	DOD ECG
68795	CT THORAX W IV CONTRAST	9/9/09 2:54	35	White	M	181	66	DOD ECG
68796	CT THORAX W IV CONTRAST	3/20/08 15:26	31	White	M	133	84	DOD ECG
68797	CT THORAX W IV CONTRAST	9/22/08 9:26	36	White	M	149	100	DOD ECG
68798	CT THORAX W IV CONTRAST	11/8/08 8:23	33	White	M	98	80	DOD ECG
68799	CT THORAX W IV CONTRAST	12/31/07 14:32	36	White	M	186	68	DOD ECG
68800	CT THORAX W IV CONTRAST	6/6/10 22:24	45	White	F	145	80	DOD ECG
68801	CT THORAX W IV CONTRAST	11/5/09 10:26	25	White	F	140	115	DOD ECG
68802	CT THORAX W IV CONTRAST	12/14/10 11:21	41	White	M	159	95	DOD ECG
68803	CT THORAX W IV CONTRAST	11/1/10 2:06	19	White	M	143	96	DOD ECG
68804	CT THORAX W IV CONTRAST	10/2/10 14:11	19	White	M	144	84	DOD ECG
68805	CT THORAX W IV CONTRAST	11/25/11 6:04	31	Black	F	125	115	DOD ECG
68806	CT THORAX W IV CONTRAST	4/15/12 18:16	18	White	M	159	86	DOD ECG
68807	CT THORAX W IV CONTRAST	2/4/12 5:45	25	Black	F	129	94	DOD ECG
68808	CT THORAX W IV CONTRAST	12/5/11 3:06	37	White	M	135	98	DOD ECG
68809	CT THORAX W IV CONTRAST	1/28/12 18:43	19	White	M	146	142	DOD ECG

68810	CT THORAX W IV CONTRAST	1/13/12 14:16	20	White	F	116	79	DOD ECG
68811	CT THORAX W IV CONTRAST	2/18/12 15:36	26	White	M	199	103	DOD ECG
68812	CT ANGIO CHEST WO AND W CONTR.	8/1/12 8:03	23	White	F	134	76	DOD ECG
68813	CT THORAX W IV CONTRAST	4/29/12 4:11	24	White	F	135	120	DOD ECG
68815	CT THORAX W IV CONTRAST	10/13/12 9:35	37	White	F	129	102	DOD ECG
68816	CT THORAX W IV CONTRAST	11/16/12 14:29	33	White	F	132	84	DOD ECG
68817	CT THORAX W IV CONTRAST	1/17/13 9:48	39	White	M	203	82	DOD ECG
68818	CT THORAX W IV CONTRAST	2/20/13 14:26	20	White	F	149	122	DOD ECG
68819	CT THORAX W IV CONTRAST	3/13/13 11:52	22	White	F	110	78	DOD ECG
68820	CT ANGIO CHEST WO AND W CONTR.	11/11/07 2:37	19	White	M	132	105	DOD ECG
160	CHEST ABDOMEN PELVIS	3/24/04 2:27	21	White	M	87	130	DOD hypotensive
559	CT THORAX W IV CONTRAS	2/20/06 8:57	25	White	M	82	145	DOD hypotensive
646	CHEST ABDOMEN PELVIS	7/8/04 23:36	39	White	M	78	102	DOD hypotensive
673	CHEST ABDOMEN PELVIS	8/24/02 8:30	35	White	M	82	105	DOD hypotensive
1788	CHEST ABDOMEN PELVIS	11/24/04 6:56	19	White	M	77	156	DOD hypotensive
2163	CT THORAX W IV CONTRAS	6/18/09 4:51	31	White	F	79	117	DOD hypotensive
3089	CHEST ABDOMEN PELVIS	6/27/09 4:17	35	White	M	66	118	DOD hypotensive
3090	CHEST ABDOMEN PELVIS	6/27/09 21:45	18	White	M	67	106	DOD hypotensive
3225	CHEST ABDOMEN PELVIS	4/16/09 17:38	49	White	M	75	121	DOD hypotensive
3463	CHEST ABDOMEN PELVIS	10/14/08 4:09	34	Black	M	75	102	DOD hypotensive
4348	CHEST ABDOMEN PELVIS	9/26/08 17:50	42	White	M	87	120	DOD hypotensive
4374	CT THORAX W IV CONTRAST	8/30/08 10:19	19	White	M	95	122	DOD hypotensive
7812	CHEST ABDOMEN PELVIS	6/23/08 2:13	22	White	M	73	122	DOD hypotensive
7849	CHEST ABDOMEN PELVIS	5/24/08 16:04	45	White	F	69	113	DOD hypotensive
7871	CHEST ABDOMEN PELVIS	5/5/08 10:56	23	White	F	52	105	DOD hypotensive
7876	CHEST ABDOMEN PELVIS	5/4/08 18:50	48	White	M	67	157	DOD hypotensive
7915	CT ABDOMEN W IV CONTRA	3/21/08 2:34	18	White	M	78	122	DOD hypotensive
7963	CHEST ABDOMEN PELVIS	3/13/08 18:30	45	White	M	68	140	DOD hypotensive
7981	CHEST ABDOMEN PELVIS	1/1/08 14:07	19	White	M	86	132	DOD hypotensive
8920	CT THORAX W IV CONTRAS	10/7/07 1:44	28	White	M	67	119	DOD hypotensive

9314	CT ABDOMEN W IV CONTRA	4/23/07 4:06	20	White	M	75	104	DOD hypotensive
9338	CHEST ABDOMEN PELVIS	3/26/07 12:20	38	White	M	75	140	DOD hypotensive
9496	CHEST ABDOMEN PELVIS	12/5/06 14:41	24	White	M	90	118	DOD hypotensive
10585	ABDOMEN	8/16/01 14:30	50	White	F	88	106	DOD hypotensive
10938	CT ABDOMEN W IV CONTRAST	2/5/10 0:44	39	White	F	66	114	DOD hypotensive
11392	CT THORAX W IV CONTRAST	4/23/10 4:40	24	White	F	96	130	DOD hypotensive
11616	CT ABDOMEN W IV CONTRAST	11/13/09 20:44	30	Other	F	80	102	DOD hypotensive
11631	CT ABDOMEN W IV CONTRAST	8/9/09 3:23	21	White	M	71	103	DOD hypotensive
12417	CHEST ABDOMEN PELVIS	2/11/06 8:25	32	White	F	96	113	DOD hypotensive
13043	CHEST ABDOMEN PELVIS	1/24/06 12:44	24	White	M	92	133	DOD hypotensive
14340	CT THORAX W IV CONTRAST	12/6/10 20:45	21	White	M	78	157	DOD hypotensive
16057	CT ABDOMEN W IV CONTRAST	5/24/10 16:38	27	White	M	83	109	DOD hypotensive
16867	CT THORAX W IV CONTRAST	7/3/07 8:47	32	White	F	93	113	DOD hypotensive
19466	CT THORAX W IV CONTRAST	11/17/07 2:32	19	White	F	72	102	DOD hypotensive
21890	CT ABDOMEN W IV CONTRAST	8/24/09 23:28	24	White	M	88	118	DOD hypotensive
21946	CT THORAX W IV CONTRAST	9/25/11 22:07	20	White	M	78	115	DOD hypotensive
21953	CT ABDOMEN PELVIS W IV CONTRAS	9/25/11 2:46	20	White	M	78	115	DOD hypotensive
22752	CT THORAX W IV CONTRAST	6/7/04 1:39	19	White	F	98	110	DOD hypotensive
23561	CT THORAX W IV CONTRAST	12/12/09 15:33	36	White	F	85	111	DOD hypotensive
24379	CT THORAX W IV CONTRAST	10/23/04 18:47	19	White	F	55	138	DOD hypotensive
24436	CT THORAX W IV CONTRAST	6/17/05 13:04	41	White	F	44	116	DOD hypotensive
24482	CT ABDOMEN W IV CONTRAST	7/19/05 12:22	41	White	M	93	135	DOD hypotensive
24656	CT THORAX W IV CONTRAST	2/24/07 3:52	47	White	M	79	122	DOD hypotensive
35635	CT ABDOMEN W IV CONTRAST	1/19/10 22:59	48	White	M	75	128	DOD hypotensive
49484	CT THORAX W IV CONTRAST	8/6/05 23:10	45	White	M	68	118	DOD hypotensive
53899	CT THORAX W IV CONTRAST	11/10/11 17:22	42	White	F	80	116	DOD hypotensive
54158	CT OUTSIDE FILM CONSULT ABDOME	8/2/12 1:24	40	Black	M	69	126	DOD hypotensive
54319	CT THORAX W IV CONTRAST	9/9/12 18:03	45	White	F	78	111	DOD hypotensive
54340	CT THORAX W IV CONTRAST	8/31/12 22:08	44	White	F	87	130	DOD hypotensive
54342	CT ABDOMEN PELVIS W IV CONTRAS	8/12/12 19:36	50	White	F	90	128	DOD hypotensive

54372	CT POST PROCESSED L SPINE	9/21/12 7:32	24	White	F	78	120	DOD hypotensive
55782	CT THORAX W IV CONTRAST	8/6/05 15:01	42	White	F	97	105	DOD hypotensive
59391	CT ABDOMEN PELVIS W IV CONTRAS	2/21/13 18:45	44	White	F	98	126	DOD hypotensive
60918	CT ABDOMEN W IV CONTRAST	6/9/03 23:49	18	White	M	63	155	DOD hypotensive
66225	CT THORAX W IV CONTRAST	7/4/07 16:21	32	White	M	84	131	DOD hypotensive
66278	CT THORAX W IV CONTRAST	4/29/02 15:53	47		M	60	145	DOD hypotensive
66279	CT THORAX W IV CONTRAST	8/7/04 16:30	49	Other	F	74	106	DOD hypotensive
66280	CT ABDOMEN W IV CONTRAST	7/25/03 10:04	30		M	86	133	DOD hypotensive
66281	CT THORAX W IV CONTRAST	6/10/05 8:34	40	White	M	41	188	DOD hypotensive
66282	CT THORAX W IV CONTRAST	8/11/07 11:02	34	White	M	53	130	DOD hypotensive
66283	CT ABDOMEN W IV CONTRAST	12/20/03 18:57	50	White	M	85	120	DOD hypotensive
66284	CT THORAX W IV CONTRAST	11/5/06 16:05	32	White	M	83	142	DOD hypotensive
66285	CT THORAX W IV CONTRAST	10/15/04 6:10	21	White	F	80	121	DOD hypotensive
66286	CT OUTSIDE FILM CONSULT CHEST	11/14/09 16:31	49	White	F	83	117	DOD hypotensive
66288	CT THORAX W IV CONTRAST	9/10/05 13:26	47	White	F	86	114	DOD hypotensive
66297	CT THORAX W IV CONTRAST	5/5/08 18:15	39	White	M	86	119	DOD hypotensive
66298	CT THORAX W IV CONTRAST	4/29/09 0:00	37	Black	M	83	135	DOD hypotensive
66299	CT OUTSIDE FILM CONSULT ABDOME	8/28/10 10:18	44	White	F	76	130	DOD hypotensive
66300	CT OUTSIDE FILM CONSULT CHEST	9/23/12 18:14	44	White	M	45	130	DOD hypotensive
66302	CT ABDOMEN W IV CONTRAST	6/11/00 7:12	42	White	M	77	106	DOD hypotensive
67032	CT THORAX W IV CONTRAST	1/30/02 11:37	46	White	M	94	105	DOD hypotensive
67033	CT THORAX W IV CONTRAST	4/8/03 19:28	36	White	M	92	131	DOD hypotensive
67035	CT ABDOMEN W IV CONTRAST	6/28/09 22:44	39	White	F	99	112	DOD hypotensive
67036	CT THORAX W IV CONTRAST	1/23/09 21:57	21	White	M	98	112	DOD hypotensive
67037	CT THORAX W IV CONTRAST	8/3/08 20:15	20	White	M	94	105	DOD hypotensive
67039	CT ABDOMEN W IV CONTRAST	12/5/06 14:41	24	White	M	90	118	DOD hypotensive
67042	CT THORAX W IV CONTRAST	2/11/06 8:25	32	White	F	96	113	DOD hypotensive
67045	CT ABDOMEN PELVIS W IV CONTRAS	3/23/11 23:29	28	White	F	91	101	DOD hypotensive
67050	CT ANGIO CHEST WO AND W CONTR	8/21/11 6:23	24	White	M	91	118	DOD hypotensive
67053	CT ABDOMEN W IV CONTRAST	7/29/06 5:10	24	White	M	98	151	DOD hypotensive

0	CHEST ABDOMEN PELVIS	10/20/01 20:03	47	White	M	151	79	DOD	normotensive
6	CHEST ABDOMEN PELVIS	4/24/04 7:07	31	White	M	144	100	DOD	normotensive
10	CHEST ABDOMEN PELVIS	10/31/01 18:11	21	White	M	136	97	DOD	normotensive
29	CHEST ABDOMEN PELVIS	1/5/04 9:50	36	White	M	134	69	DOD	normotensive
47	CHEST ABDOMEN PELVIS	1/21/02 8:36	27	White	M	120	66	DOD	normotensive
56	CT THORAX W IV CONTRAS	6/6/05 2:29	48		F	135	82	DOD	normotensive
83	CHEST ABDOMEN PELVIS	7/17/02 2:43	31	White	M	162	99	DOD	normotensive
88	CHEST ABDOMEN PELVIS	1/23/04 10:02	50	White	M	145	93	DOD	normotensive
89	CHEST ABD PELVIS	2/4/04 18:28	46	White	M	143	90	DOD	normotensive
114	CHEST ABDOMEN PELVIS	5/28/08 9:33	37	White	M	127	90	DOD	normotensive
118	CT ABDOMEN W IV CONTRA	9/24/05 21:46	31	White	F	133	81	DOD	normotensive
121	CHEST ABDOMEN PELVIS	6/13/05 12:40	43	White	F	155	86	DOD	normotensive
131	CHEST ABDOMEN PELVIS	7/26/06 9:24	23	White	M	142	82	DOD	normotensive
133	CT THORAX W IV CONTRAS	4/1/06 2:19	24	White	M	139	77	DOD	normotensive
146	CT THORAX W IV CONTRAS	11/18/06 22:55	46	White	M	138	95	DOD	normotensive
147	CHEST ABDOMEN PELVIS	10/29/06 5:14	19	White	F	144	92	DOD	normotensive
151	CHEST ABDOMEN PELVIS	10/5/04 15:32	48	White	M	140	76	DOD	normotensive
158	CHEST ABDOMEN PELVIS	9/28/04 17:48	29	White	F	130	72	DOD	normotensive
176	CHEST ABDOMEN PELVIS	7/22/03 15:58	32	White	M	134	92	DOD	normotensive
177	ABDOMEN	4/2/03 18:14	44	White	F	138	90	DOD	normotensive
194	ABDOMEN	1/28/03 22:28	49	White	F	125	85	DOD	normotensive
196	ABDOMEN	2/9/03 3:33	46	White	F	128	77	DOD	normotensive
207	CHEST ABDOMEN PELVIS	10/23/06 4:00	29	White	F	151	96	DOD	normotensive
218	CHEST ABDOMEN PELVIS	6/14/02 1:44	38	White	F	144	100	DOD	normotensive
223	CHEST ABDOMEN PELVIS	8/29/02 22:08	48	White	F	151	47	DOD	normotensive
225	ABDOMEN	11/11/02 17:00	20	Black	M	150	68	DOD	normotensive
228	CHEST ABDOMEN PELVIS	8/20/02 15:22	23	White	F	129	89	DOD	normotensive
232	ABDOMEN	7/7/02 17:52	31	White	F	125	97	DOD	normotensive
236	ABDOMEN PELVIS	3/9/02 3:49	24	White	M	139	78	DOD	normotensive
237	ABDOMEN	3/13/02 8:17	35	White	F	121	96	DOD	normotensive

242	ABDOMEN	7/15/02 17:24	45	White	M	144	72	DOD normotensive
243	ABDOMEN	8/3/02 22:25	39	White	F	126	74	DOD normotensive
244	ABDOMEN	10/16/02 21:17	48	Black	M	157	89	DOD normotensive
253	CHEST ABDOMEN PELVIS	4/24/07 3:13	33	White	M	133	81	DOD normotensive
258	CT ABDOMEN W IV CONTRA	4/26/07 12:29	24	White	F	121	96	DOD normotensive
262	CHEST ABDOMEN PELVIS	8/19/07 5:09	29	White	M	154	90	DOD normotensive
425	CHEST ABDOMEN PELVIS	8/9/02 17:18	19	White	M	125	98	DOD normotensive
427	CHEST ABDOMEN PELVIS	8/4/02 15:37	42	White	F	157	96	DOD normotensive
432	ABDOMEN	9/15/02 20:37	36	White	M	176	92	DOD normotensive
438	CHEST ABDOMEN PELVIS	3/17/03 20:31	40	White	M	142	85	DOD normotensive
440	ABDOMEN	4/27/03 20:08	26	White	M	140	71	DOD normotensive
441	CHEST ABDOMEN PELVIS	5/18/03 18:01	26	White	M	152	63	DOD normotensive
444	ABDOMEN	5/17/03 14:08	42	White	F	133	80	DOD normotensive
445	CHEST ABDOMEN PELVIS	6/24/03 12:56	24	White	M	144	61	DOD normotensive
481	ABDOMEN	6/26/03 16:09	20	White	M	143	80	DOD normotensive
485	ABDOMEN	11/27/04 18:52	40	White	M	126	74	DOD normotensive
492	ABDOMEN	12/8/02 1:08	45	White	M	133	72	DOD normotensive
493	ABDOMEN PELVIS	12/10/02 12:03	45	White	M	159	78	DOD normotensive
495	ABDOMEN	5/7/04 6:23	43	White	M	165	86	DOD normotensive
508	ABDOMEN	11/24/04 17:51	40	White	M	140	88	DOD normotensive
511	ABDOMEN	11/28/04 18:56	22	White	M	158	96	DOD normotensive
513	ABDOMEN PELVIS	12/2/04 12:33	34	White	M	137	79	DOD normotensive
514	ABDOMEN PELVIS	12/3/04 14:08	35	White	F	129	93	DOD normotensive
515	ABDOMEN	12/2/04 3:01	42	White	M	146	93	DOD normotensive
516	ABDOMEN	12/4/04 5:02	44	White	M	174	97	DOD normotensive
530	CT ABDOMEN W CONTRAST=AB	6/28/08 7:18	49	White	F	138	88	DOD normotensive
533	ABDOMEN	9/23/04 13:37	42	White	F	194	95	DOD normotensive
534	ABDOMEN	10/10/04 15:52	40	Black	M	134	80	DOD normotensive
535	CHEST ABDOMEN PELVIS	10/14/04 6:21	20	Black	F	114	93	DOD normotensive
538	ABDOMEN	10/8/04 22:29	49	White	F	147	85	DOD normotensive

539	CHEST ABDOMEN PELVIS	10/13/04 12:23	32	Other	M	147	84	DOD normotensive
540	ABDOMEN PELVIS	10/12/04 14:11	44	Black	M	146	76	DOD normotensive
554	CT THORAX W IV CONTRAS	8/9/08 12:59	21	White	M	129	78	DOD normotensive
573	CHEST ABDOMEN PELVIS	9/13/04 2:11	25	White	F	100	122	DOD normotensive
574	ABDOMEN	9/15/04 8:27	21	White	F	131	58	DOD normotensive
577	CHEST ABDOMEN PELVIS	9/22/04 10:20	48		F	139	73	DOD normotensive
584	CHEST ABDOMEN PELVIS	8/9/04 8:52	40	White	M	162	85	DOD normotensive
593	CHEST ABDOMEN PELVIS	7/24/04 17:38	39	White	M	146	75	DOD normotensive
599	CHEST ABDOMEN PELVIS	6/20/04 1:32	45	White	M	144	94	DOD normotensive
601	CHEST ABDOMEN PELVIS	6/29/04 23:47	19	White	M	142	69	DOD normotensive
602	CHEST ABDOMEN PELVIS	7/4/04 14:52	40	Black	M	165	81	DOD normotensive
606	CHEST ABDOMEN PELVIS	7/19/04 18:58	38	White	M	160	78	DOD normotensive
607	CHEST ABDOMEN PELVIS	7/21/04 3:07	19	White	M	156	95	DOD normotensive
610	CHEST ABDOMEN PELVIS	6/24/04 9:44	34	White	F	127	96	DOD normotensive
614	CHEST ABDOMEN PELVIS	6/15/03 23:30	40	White	M	151	77	DOD normotensive
618	CHEST ABDOMEN PELVIS	7/2/03 20:22	40	White	M	147	98	DOD normotensive
626	CHEST ABDOMEN PELVIS	9/14/03 15:31	40	White	M	126	85	DOD normotensive
636	CHEST ABDOMEN PELVIS	5/13/04 5:44	45	White	M	140	80	DOD normotensive
639	CHEST ABDOMEN PELVIS	5/31/04 17:29	33	Black	M	171	93	DOD normotensive
640	CHEST ABDOMEN PELVIS	5/29/04 19:34	39	White	M	133	64	DOD normotensive
641	ABDOMEN	8/31/04 22:46	31	White	M	155	87	DOD normotensive
650	CHEST ABDOMEN PELVIS	8/8/04 21:12	49	White	M	131	86	DOD normotensive
653	ABDOMEN	8/6/04 23:30	47		M	138	80	DOD normotensive
654	ABDOMEN	8/21/04 18:03	24	White	M	155	82	DOD normotensive
655	ABDOMEN	9/3/04 2:18	40	Black	M	161	91	DOD normotensive
656	ABDOMEN	9/2/04 16:42	44	White	M	152	72	DOD normotensive
657	ABDOMEN	8/27/04 23:26	42	White	M	138	98	DOD normotensive
658	ABDOMEN	8/29/04 9:16	26	White	M	134	77	DOD normotensive
660	ABDOMEN	8/28/04 19:00	30	White	F	140	93	DOD normotensive
661	CHEST ABDOMEN PELVIS	8/19/04 22:25	28	White	M	169	76	DOD normotensive

662	ABDOMEN	9/6/04 12:44	24	White	M	137	79	DOD normotensive
664	ABDOMEN	9/25/04 17:52	43	White	M	154	66	DOD normotensive
668	CHEST ABDOMEN PELVIS	10/30/04 16:44	31	Hispanic	M	129	91	DOD normotensive
678	CHEST ABDOMEN PELVIS	12/8/02 22:15	47	White	M	143	90	DOD normotensive
698	CHEST ABDOMEN PELVIS	8/19/04 20:55	37	White	M	130	72	DOD normotensive
708	CHEST ABDOMEN PELVIS	2/8/02 10:02	43	White	M	135	96	DOD normotensive
710	ABDOMEN PELVIS	3/25/02 15:08	33	White	F	128	68	DOD normotensive
712	ABDOMEN PELVIS	2/21/02 22:14	40	White	F	126	100	DOD normotensive
723	CHEST ABDOMEN PELVIS	7/5/02 3:20	42	White	M	124	71	DOD normotensive
730	ABDOMEN	5/25/02 4:50	20	White	M	135	90	DOD normotensive
741	CHEST ABDOMEN PELVIS	6/21/02 17:08	44	White	F	136	74	DOD normotensive
742	CHEST ABDOMEN PELVIS	6/22/02 0:42	47	White	M	136	64	DOD normotensive
743	CHEST ABDOMEN PELVIS	6/27/02 1:28	50	White	F	148	81	DOD normotensive
747	ABDOMEN	7/6/02 21:56	36	White	F	142	92	DOD normotensive
759	CHEST ABDOMEN PELVIS	10/17/02 17:30	36	White	F	121	80	DOD normotensive
760	ABDOMEN PELVIS	10/23/02 14:58	45	White	F	162	83	DOD normotensive
771	ABDOMEN PELVIS	12/17/02 4:21	19	Asian	M	128	90	DOD normotensive
775	ABDOMEN PELVIS	2/5/03 0:44	33	White	F	125	96	DOD normotensive
776	ABDOMEN PELVIS	1/31/03 12:05	44	White	M	120	82	DOD normotensive
777	ABDOMEN PELVIS	2/10/03 22:06	26	Black	M	120	62	DOD normotensive
782	ABDOMEN PELVIS	2/27/03 19:53	33	White	F	151	75	DOD normotensive
794	ABDOMEN PELVIS	3/21/03 5:20	21	White	F	134	88	DOD normotensive
798	CHEST ABDOMEN PELVIS	3/27/03 10:35	31	White	F	135	92	DOD normotensive
799	CHEST ABDOMEN PELVIS	4/5/03 1:11	45	White	F	140	76	DOD normotensive
800	CHEST ABDOMEN PELVIS	4/12/03 22:25	40	White	M	146	93	DOD normotensive
801	CHEST ABDOMEN PELVIS	4/16/03 4:02	48	Black	M	157	88	DOD normotensive
805	CHEST ABDOMEN PELVIS	4/29/03 2:01	21	White	F	137	82	DOD normotensive
813	CHEST ABDOMEN PELVIS	6/17/03 21:16	36	White	F	168	70	DOD normotensive
816	ABDOMEN PELVIS	7/23/03 19:35	24	White	M	151	88	DOD normotensive
819	CHEST ABDOMEN PELVIS	7/14/03 21:58	21	White	F	175	80	DOD normotensive

820	CHEST ABDOMEN PELVIS	7/10/03 23:19	24	White	M	163	76	DOD normotensive
823	ABDOMEN PELVIS	7/29/03 12:48	31	White	M	150	68	DOD normotensive
826	ABDOMEN	8/17/03 3:19	20	White	M	131	97	DOD normotensive
828	ABDOMEN	8/17/03 18:24	27	White	M	142	78	DOD normotensive
833	CHEST ABDOMEN PELVIS	9/9/03 13:54	31	White	F	142	74	DOD normotensive
837	CHEST ABDOMEN PELVIS	9/2/03 20:57	25	White	M	150	79	DOD normotensive
838	CHEST ABDOMEN PELVIS	12/7/03 2:02	35	White	M	123	92	DOD normotensive
847	CHEST ABDOMEN PELVIS	11/17/03 16:14	43	White	M	140	90	DOD normotensive
861	CHEST ABDOMEN PELVIS	10/27/02 17:08	30	Asian	M	133	63	DOD normotensive
864	CHEST ABDOMEN PELVIS	11/18/08 11:15	45	White	F	212	89	DOD normotensive
865	CHEST ABDOMEN PELVIS	11/8/08 14:52	50	White	M	151	80	DOD normotensive
867	CHEST ABDOMEN PELVIS	5/9/03 20:07	25	White	M	142	100	DOD normotensive
878	ABDOMEN PELVIS	6/30/04 22:25	23	White	F	137	99	DOD normotensive
883	CHEST ABDOMEN PELVIS	9/11/04 18:29	42	White	M	146	81	DOD normotensive
886	CHEST ABDOMEN PELVIS	4/5/04 8:17	42	White	F	137	84	DOD normotensive
887	CHEST ABDOMEN PELVIS	4/26/04 10:47	27	White	M	141	95	DOD normotensive
898	ABDOMEN	5/21/04 2:43	22	Black	F	123	48	DOD normotensive
903	ABDOMEN	5/21/04 17:59	34	White	M	132	83	DOD normotensive
918	CHEST ABDOMEN PELVIS	3/14/04 2:30	30	White	M	138	74	DOD normotensive
979	CHEST ABDOMEN PELVIS	1/4/09 11:35	40	White	F	134	90	DOD normotensive
987	ABDOMEN	5/3/03 23:23	45	White	M	165	79	DOD normotensive
990	ABDOMEN PELVIS	7/16/02 10:32	19	White	F	137	73	DOD normotensive
991	CHEST ABDOMEN PELVIS	7/27/02 2:54	40	White	M	154	86	DOD normotensive
993	ABDOMEN PELVIS	7/29/02 21:05	24	White	F	120	94	DOD normotensive
994	CHEST ABDOMEN PELVIS	8/20/02 17:57	38	White	M	163	95	DOD normotensive
996	ABDOMEN PELVIS	9/6/02 10:03	23	White	M	151	97	DOD normotensive
998	CHEST ABDOMEN PELVIS	8/25/02 17:57	37	White	M	135	87	DOD normotensive
1006	ABDOMEN	8/16/03 5:19	23	White	F	125	88	DOD normotensive
1007	ABDOMEN	8/15/03 4:57	39	Black	F	161	91	DOD normotensive
1008	ABDOMEN	9/12/03 20:06	45	White	F	172	100	DOD normotensive

1059	CHEST ABDOMEN PELVIS	1/6/09 22:21	19	Black	M	149	90	DOD normotensive
1509	CHEST ABDOMEN PELVIS	5/2/07 14:18	47	White	F	125	100	DOD normotensive
1606	CHEST ABDOMEN PELVIS	3/5/09 2:52	27	White	F	131	90	DOD normotensive
1608	CHEST ABDOMEN PELVIS	5/11/09 8:33	50	White	M	177	60	DOD normotensive
1612	CHEST ABDOMEN PELVIS	6/1/09 19:26	23	White	F	129	91	DOD normotensive
1635	CHEST ABDOMEN PELVIS	4/5/09 4:49	24	White	M	138	63	DOD normotensive
1736	CHEST ABDOMEN PELVIS	12/30/04 3:48	29	White	F	77	88	DOD normotensive
1739	CHEST ABDOMEN PELVIS	6/10/07 2:00	20	White	F	135	101	DOD normotensive
1744	CHEST ABDOMEN PELVIS	4/30/07 10:37	41	White	F	123	78	DOD normotensive
1778	CHEST ABDOMEN PELVIS	7/30/03 10:59	45	White	M	167	84	DOD normotensive
1787	CHEST ABDOMEN PELVIS	2/6/03 10:44	26	White	F	129	86	DOD normotensive
2420	CHEST ABDOMEN PELVIS	9/9/09 2:54	35	White	M	181	66	DOD normotensive
3044	CHEST/ABD/PELVIS	7/3/00 14:20	38	White	M	126	78	DOD normotensive
3055	ABDOMEN PELVIS	12/7/01 0:27	34	White	M	121	77	DOD normotensive
3058	CHEST ABDOMEN PELVIS	5/22/01 15:29	37	White	F	133	94	DOD normotensive
3064	ABDOMEN	5/23/01 11:39	39	White	M	153	71	DOD normotensive
3065	ABDOMEN	8/25/01 7:14	21	White	M	134	72	DOD normotensive
3069	CT THORAX W IV CONTRAS	10/21/09 2:03	28	White	M	159	100	DOD normotensive
3083	CHEST ABDOMEN PELVIS	6/28/09 4:13	31	White	M	147	100	DOD normotensive
3087	CHEST ABDOMEN PELVIS	6/28/09 22:44	39	White	F	99	112	DOD normotensive
3091	CHEST ABDOMEN PELVIS	6/27/09 22:35	19	White	M	140	90	DOD normotensive
3092	CHEST ABDOMEN PELVIS	6/27/09 23:28	19	White	F	105	112	DOD normotensive
3094	CHEST ABDOMEN PELVIS	6/26/09 17:39	41	White	M	138	100	DOD normotensive
3098	CHEST ABDOMEN PLEVIS	6/21/09 1:57	26	Black	M	130	96	DOD normotensive
3100	CHEST ABDOMEN PELVIS	6/20/09 9:15	24	Black	M	154	84	DOD normotensive
3115	CHEST ABDOMEN PELVIS	6/7/09 19:14	19	White	F	118	76	DOD normotensive
3120	CT THORAX W IV CONTRAST	6/6/09 22:08	22	White	M	154	90	DOD normotensive
3138	CT THORAX W IV CONTRAST	5/24/09 22:02	42	White	M	123	79	DOD normotensive
3143	CT THORAX W IV CONTRAST	5/21/09 22:33	31	White	M	139	97	DOD normotensive
3146	CT THORAX W IV CONTRAST	5/17/09 21:28	47	White	M	167	77	DOD normotensive

3152	CHEST ABDOMEN PELVIS	1/3/10 16:49	40	White	M	149	80	DOD normotensive
3157	CHEST ABDOMEN PELVIS	4/11/02 10:37	49	White	M	194	88	DOD normotensive
3166	CHEST ABDOMEN PELVIS	8/26/06 2:24	23	White	M	123	94	DOD normotensive
3186	CT THORAX W IV CONTRAST	11/11/09 16:40	43	White	M	149	51	DOD normotensive
3192	CHEST ABDOMEN PELVIS	1/19/10 9:11	48	White	M	123	71	DOD normotensive
3196	CT THORAX W IV CONTRAST	3/18/10 23:13	38	White	M	136	92	DOD normotensive
3203	CHEST ABDOMEN PELVIS	5/8/09 4:04	19	White	F	125	79	DOD normotensive
3211	CHEST ABDOMEN PELVIS	4/24/09 13:33	18	White	F	110	96	DOD normotensive
3226	CT ABDOMEN W IV CONTRA	4/16/09 1:13	21	White	F	126	78	DOD normotensive
3227	CHEST ABDOMEN PELVIS	4/14/09 2:10	21	White	M	140	90	DOD normotensive
3237	CHEST ABDOMEN PELVIS	4/4/09 20:36	50	Black	F	204	68	DOD normotensive
3238	CHEST ABDOMEN PELVIS	4/2/09 13:10	37	White	F	120	87	DOD normotensive
3240	CT ABDOMEN W IV CONTRA	3/27/09 12:57	46	White	M	144	80	DOD normotensive
3244	CHEST ABDOMEN PELVIS	3/22/09 12:09	35	White	F	135	100	DOD normotensive
3247	CHEST ABDOMEN PELVIS	3/23/09 1:13	36	White	F	110	124	DOD normotensive
3258	CT THORAX W IV CONTRAS	3/10/09 12:44	50	Black	M	229	83	DOD normotensive
3261	chest abdomen pelvis	3/8/09 3:13	21	Black	M	137	84	DOD normotensive
3264	CHEST ABDOMEN PELVIS	3/5/09 22:33	19	White	M	135	87	DOD normotensive
3265	CT ABDOMEN W IV CONTRA	3/5/09 15:41	40	Black	M	162	70	DOD normotensive
3270	CT ABDOMEN W IV CONTRA	2/26/09 11:32	45	White	F	124	84	DOD normotensive
3271	CHEST ABDOMEN PELVIS	2/24/09 17:29	28	White	F	132	94	DOD normotensive
3282	CHEST ABDOMEN PELVIS	2/7/09 12:35	20	White	M	145	67	DOD normotensive
3284	CHEST ABDOMEN PELVIS	2/7/09 0:25	39	Black	M	149	100	DOD normotensive
3285	CHEST ABDOMEN PELVIS	2/6/09 12:15	35	White	F	152	67	DOD normotensive
3286	CHEST ABDOMEN PELVIS	2/1/09 18:03	21	White	F	147	105	DOD normotensive
3287	CT THORAX W IV CONTRAS	1/29/09 18:35	27	White	M	139	77	DOD normotensive
3297	CHEST ABDOMEN PELVIS	1/19/09 9:26	37	Black	M	145	62	DOD normotensive
3303	CHEST ABDOMEN PELVIS	1/11/09 14:41	31	Asian	M	148	70	DOD normotensive
3304	CHEST ABDOMEN PELVIS	1/8/09 17:31	49	White	M	128	75	DOD normotensive
3307	CT ABDOMEN W IV CONTRA	1/7/09 0:58	18	Black	M	195	97	DOD normotensive

3313	CHEST ABDOMEN PELVIS	12/15/08 11:36	48	White	M	123	74	DOD normotensive
3316	CHEST ABDOMEN PELVIS	12/14/08 18:16	40	White	M	169	69	DOD normotensive
3322	CHEST ABDOMEN PELVIS	12/7/08 8:55	29	White	M	147	86	DOD normotensive
3372	CHEST ABDOMEN PELVIS	1/23/04 10:02	50	White	M	145	93	DOD normotensive
3379	CT THORAX W IV CONTRAST	12/6/08 2:47	36	White	F	128	65	DOD normotensive
3392	CHEST ABDOMEN PELVIS	12/4/08 21:17	23	White	M	149	99	DOD normotensive
3394	CHEST ABDOMEN PELVIS	12/1/08 21:47	19	White	F	126	83	DOD normotensive
3405	CHEST ABDOMEN PELVIS	11/24/08 23:05	29	White	M	149	89	DOD normotensive
3424	CHEST ABDOMEN PELVIS	11/22/08 3:42	44	Black	M	137	83	DOD normotensive
3425	CHEST ABDOMEN PELVIS	11/22/08 5:57	43	White	F	141	64	DOD normotensive
3426	CT THORAX W IV CONTRAST	11/22/08 6:33	40	Black	M	131	93	DOD normotensive
3427	CHEST ABDOMEN PELVIS	11/22/08 21:01	47	White	M	125	90	DOD normotensive
3428	CHEST ABDOMEN PELVIS	11/18/08 22:18	28	White	F	140	72	DOD normotensive
3431	CHEST ABDOMEN PELVIS	11/17/08 9:11	32	White	M	139	79	DOD normotensive
3433	CT THORAX W IV CONTRAST	11/16/08 2:56	23	Black	M	152	64	DOD normotensive
3434	CT THORAX W IV CONTRAST	11/16/08 4:52	22	Black	M	156	90	DOD normotensive
3439	CHEST ABDOMEN PELVIS	11/10/08 9:32	49	White	F	127	53	DOD normotensive
3446	CHEST ABDOMEN PELVIS	11/6/08 18:41	44	White	M	159	89	DOD normotensive
3455	CHEST ABDOMEN PELVIS	10/26/08 1:46	38	White	M	130	36	DOD normotensive
3505	CHEST ABDOMEN PELVIS	10/12/08 9:30	21	White	M	134	66	DOD normotensive
3508	CHEST ABDOMEN PELVIS	10/12/08 1:10	32	White	M	129	94	DOD normotensive
3512	CT THORAX W IV CONTRAS	10/11/08 19:40	48	White	M	140	76	DOD normotensive
3513	CT THORAX W IV CONTRAS	10/9/08 13:42	47	White	M	153	82	DOD normotensive
3514	CHEST ABDOMEN PELVIS	10/9/08 10:36	47	White	M	149	62	DOD normotensive
3983	CHEST ABDOMEN PELVIS	10/9/08 18:42	29	White	F	118	90	DOD normotensive
3985	CHEST ABDOMEN PELVIS	10/5/08 2:19	31	White	M	135	88	DOD normotensive
3987	CHEST ABDOMEN PELVIS	10/3/08 17:36	40	White	M	132	77	DOD normotensive
4346	CHEST ABDOMEN PELVIS	9/29/08 3:03	25	White	M	150	90	DOD normotensive
4355	CHEST ABDOMEN PELVIS	9/27/08 3:09	48	White	M	148	86	DOD normotensive
4371	CHEST ABDOMEN PELVIS	9/2/08 17:25	33	White	M	135	78	DOD normotensive

4375	CT THORAX W IV CONTRAS	8/30/08 1:19	49	White	F	140	90	DOD	normotensive
4376	CHEST ABDOMEN PELVIS	8/28/08 19:57	46	White	M	168	86	DOD	normotensive
4380	CHEST ABDOMEN PELVIS	8/29/08 12:13	24	White	M	136	90	DOD	normotensive
4383	CHEST ABDOMEN PELVIS	8/23/08 12:29	48	White	F	148	63	DOD	normotensive
4385	CHEST ABDOMEN PELVIS	8/21/08 19:59	47	White	M	150	92	DOD	normotensive
6957	CHEST ABDOMEN PELVIS	8/16/08 4:48	24	White	M	136	93	DOD	normotensive
6959	CHEST ABDOMEN PELVIS	8/15/08 17:44	46	White	M	164	95	DOD	normotensive
6966	CHEST ABDOMEN PELVIS	8/10/08 11:03	25	White	M	146	78	DOD	normotensive
6997	CT THORAX W IV CONTRAS	8/9/08 12:01	38	White	M	145	68	DOD	normotensive
6998	CT ABDOMEN W IV CONTRAST	8/9/08 5:22	25	Hispanic	M	175	98	DOD	normotensive
7000	CHEST ABDOMEN PELVIS	8/8/08 3:33	37	Black	M	138	93	DOD	normotensive
7002	CHEST ABDOMEN PELVIS	8/4/08 16:31	38	White	M	152	91	DOD	normotensive
7009	CT THORAX W IV CONTRAS	7/30/08 16:42	22	White	M	135	81	DOD	normotensive
7010	CHEST ABDOMEN PELVIS	7/30/08 4:42	47	Black	M	157	98	DOD	normotensive
7013	CHEST ABDOMEN PELVIS	7/27/08 3:31	32	White	F	113	74	DOD	normotensive
7016	CT THORAX W IV CONTRAS	7/26/08 11:37	21	White	M	133	91	DOD	normotensive
7020	CHEST ABDOMEN PELVIS	7/30/08 23:42	45	White	F	128	86	DOD	normotensive
7034	CHEST ABDOMEN PELVIS	7/4/08 21:56	46	White	M	128	57	DOD	normotensive
7036	CHEST ABDOMEN PELVIS	7/1/08 18:37	19	White	M	113	83	DOD	normotensive
7037	CHEST ABDOMEN PELVIS	7/1/08 14:02	50	White	M	129	61	DOD	normotensive
7048	CHEST ABDOMEN PELVIS	6/25/08 23:47	43	White	M	127	89	DOD	normotensive
7050	CHEST ABDOMEN PELVIS	6/22/08 20:22	29	White	F	142	90	DOD	normotensive
7809	CHEST ABDOMEN PELVIS	6/22/08 22:17	45	White	M	138	73	DOD	normotensive
7810	CHEST ABDOMEN PELVIS	6/21/08 1:05	24	White	M	137	93	DOD	normotensive
7818	CHEST ABDOMEN PELVIS	6/19/08 15:03	20	White	M	133	66	DOD	normotensive
7822	CHEST ABDOMEN PELVIS	6/16/08 5:23	28	White	F	132	74	DOD	normotensive
7826	CHEST ABDOMEN PELVIS	6/11/08 12:41	25	White	M	177	79	DOD	normotensive
7828	CT THORAX W IV CONTRAS	6/10/08 7:28	38	White	M	156	87	DOD	normotensive
7830	CHEST ABDOMEN PELVIS	4/6/08 23:18	22	Black	M	151	73	DOD	normotensive
7832	CHEST ABDOMEN PELVIS	6/1/08 13:06	28	White	M	156	85	DOD	normotensive

7837	CHEST ABDOMEN PELVIS	6/9/08 18:21	37	White	M	140	71	DOD normotensive
7840	CT THORAX W IV CONTRAS	6/8/08 10:35	50	Black	M	142	76	DOD normotensive
7845	CHEST ABDOMEN PELVIS	5/25/08 21:17	49	Black	F	148	115	DOD normotensive
7846	CHEST ABDOMEN PELVIS	5/25/08 5:21	24	White	M	132	87	DOD normotensive
7850	CHEST ABDOMEN PELVIS	5/23/08 2:05	32	White	F	129	110	DOD normotensive
7865	CHEST ABDOMEN PELVIS	5/10/08 7:49	36	White	M	138	98	DOD normotensive
7867	CHEST ABDOMEN PELVIS	5/10/08 22:53	23	White	M	139	90	DOD normotensive
7872	CHEST ABDOMEN PELVIS	5/5/08 22:49	19	White	M	135	77	DOD normotensive
7875	CT THORAX W IV CONTRAS	5/4/08 4:03	27	White	M	127	91	DOD normotensive
7884	CHEST ABDOMEN PELVIS	4/30/08 17:58	49	White	M	162	78	DOD normotensive
7887	CHEST ABDOMEN PELVIS	4/25/08 3:52	43	White	M	125	83	DOD normotensive
7888	CT THORAX W IV CONTRAS	4/25/08 0:33	50	White	M	157	83	DOD normotensive
7889	CHEST ABDOMEN PELVIS	4/27/08 20:49	21	White	M	158	73	DOD normotensive
7890	CHEST ABDOMEN PELVIS	4/28/08 15:14	19	White	M	134	83	DOD normotensive
7891	CHEST ABDOMEN PELVIS	4/22/08 9:58	46	White	M	198	92	DOD normotensive
7892	CT THORAX W IV CONTRAS	4/22/08 22:07	25	White	M	139	91	DOD normotensive
7894	CHEST ABDOMEN PELVIS	4/21/08 9:19	20	White	M	177	99	DOD normotensive
7897	CHEST ABDOMEN PELVIS	4/19/08 12:29	26	White	F	146	93	DOD normotensive
7902	CHEST ABDOMEN PELVIS	4/12/08 14:57	21	White	M	161	75	DOD normotensive
7905	CHEST ABDOMEN PELVIS	4/6/08 2:21	38	Hispanic	M	150	71	DOD normotensive
7914	CHEST ABDOMEN PELVIS	3/23/08 0:30	47	White	M	136	98	DOD normotensive
7917	CHEST ABDOMEN PELVIS	3/20/08 16:31	31	White	M	136	85	DOD normotensive
7919	CHEST ABDOMEN PELVIS	3/19/08 3:16	43	White	M	138	96	DOD normotensive
7920	CHEST ABDOMEN PELVIS	3/15/08 12:42	20	White	M	149	100	DOD normotensive
7922	CHEST ABDOMEN PELVIS	3/14/08 10:45	38	Hispanic	M	127	97	DOD normotensive
7923	CHEST ABDOMEN PELVIS	3/5/08 1:26	31	White	M	134	98	DOD normotensive
7925	CHEST ABDOMEN PELVIS	3/10/08 15:04	31	White	M	140	88	DOD normotensive
7927	CHEST ABDOMEN PELVIS	3/16/08 18:52	19	Hispanic	M	144	98	DOD normotensive
7929	CHEST ABDOMEN PELVIS	2/29/08 20:13	41	White	M	132	83	DOD normotensive
7930	CT THORAX W IV CONTRAS	2/26/08 22:00	34	White	F	151	84	DOD normotensive

7931	CHEST ABDOMEN PELVIS	2/25/08 13:40	43	Hispanic	M	154	78	DOD normotensive
7933	CHEST ABDOMEN PELVIS	2/26/08 10:51	43	White	M	156	87	DOD normotensive
7940	CHEST ABDOMEN PELVIS	2/19/08 23:30	30	White	M	158	119	DOD normotensive
7942	CHEST ABDOMEN PELVIS	2/10/08 2:24	25	White	M	150	93	DOD normotensive
7949	CT THORAX W IV CONTRAS	2/5/08 23:40	22	Black	M	145	85	DOD normotensive
7952	CHEST ABDOMEN PELVIS	2/2/08 9:16	39	White	F	117	117	DOD normotensive
7954	CHEST ABDOMEN PELVIS	2/1/08 23:26	45	White	M	152	87	DOD normotensive
7955	CHEST ABDOMEN PELVIS	2/1/08 12:32	21	Black	M	134	86	DOD normotensive
7960	CT THORAX W IV CONTRAS	3/12/08 20:06	19	White	M	154	80	DOD normotensive
7965	CHEST ABDOMEN PELVIS	1/20/08 8:27	21	White	M	115	82	DOD normotensive
7969	CHEST ABDOMEN PELVIS	1/18/08 0:17	36	White	M	132	96	DOD normotensive
7980	CHEST ABDOMEN PELVIS	1/1/08 17:48	41	Black	F	221	72	DOD normotensive
7990	CHEST ABDOMEN PELVIS	12/20/07 2:19	44	White	M	166	100	DOD normotensive
7992	CHEST ABDOMEN PELVIS	12/20/07 12:46	40	Black	F	131	67	DOD normotensive
7995	CHEST ABDOMEN PELVIS	12/17/07 1:34	38	White	F	143	85	DOD normotensive
7996	CHEST ABDOMEN PELVIS	12/15/07 3:11	25	White	M	121	68	DOD normotensive
8009	CHEST ABDOMEN PELVIS	5/11/08 10:04	24	White	M	149	76	DOD normotensive
8863	CHEST ABDOMEN PELVIS	12/13/07 5:43	21	White	M	140	96	DOD normotensive
8864	CHEST ABDOMEN PELVIS	12/13/07 6:30	44	White	M	145	88	DOD normotensive
8866	CHEST ABDOMEN PELVIS	12/12/07 4:38	36	Hispanic	M	140	97	DOD normotensive
8868	CHEST ABDOMEN PELVIS	12/11/07 3:42	38	Black	M	183	80	DOD normotensive
8873	CHEST ABDOMEN PELVIS	12/7/07 18:31	23	White	F	118	86	DOD normotensive
8875	CHEST ABDOMEN PELVIS	12/6/07 14:08	25	Black	M	150	88	DOD normotensive
8877	CHEST ABDOMEN PELVIS	12/4/07 18:15	21	White	M	122	94	DOD normotensive
8879	CHEST ABDOMEN PELVIS	12/3/07 10:30	19	White	F	125	84	DOD normotensive
8881	CHEST ABDOMEN PELVIS	12/1/07 17:23	45	Hispanic	M	139	51	DOD normotensive
8894	CHEST ABDOMEN PELVIS	11/11/07 18:04	18	White	M	159	78	DOD normotensive
8895	CHEST ABDOMEN PELVIS	11/11/07 2:46	19	White	M	157	84	DOD normotensive
8898	CHEST ABDOMEN PELVIS	11/1/07 14:22	44	White	F	127	85	DOD normotensive
8908	CHEST ABDOMEN PELVIS	10/22/07 3:09	48	White	M	100	51	DOD normotensive

8915	CHEST ABDOMEN PELVIS	10/7/07 18:23	33	White	M	142	70	DOD normotensive
8918	CHEST ABDOMEN PELVIS	10/10/07 4:28	36	Black	M	142	84	DOD normotensive
8923	CHEST ABDOMEN PELVIS	9/30/07 19:15	39	Other	M	120	71	DOD normotensive
8925	CHEST ABDOMEN PELVIS	9/29/07 11:29	25	White	F	130	100	DOD normotensive
8926	CT THORAX W IV CONTRAS	9/29/07 6:07	33	White	M	119	68	DOD normotensive
8934	CT THORAX W IV CONTRAS	9/22/07 19:53	36	White	M	154	85	DOD normotensive
8937	CHEST ABDOMEN PELVIS	9/21/07 9:33	36		F	149	78	DOD normotensive
8944	CHEST ABDOMEN PELVIS	9/19/07 19:26	45	White	M	145	76	DOD normotensive
8946	CHEST ABDOMEN PELVIS	9/17/07 19:00	25	White	M	155	80	DOD normotensive
8951	CHEST ABDOMEN PELVIS	9/16/07 2:14	20	White	M	136	84	DOD normotensive
8953	CHEST ABDOMEN PELVIS	9/12/07 9:19	20	White	F	149	85	DOD normotensive
9111	CHEST ABDOMEN PELVIS	9/9/07 19:30	24	White	M	140	87	DOD normotensive
9116	CHEST ABDOMEN PELVIS	9/5/07 22:08	28	Black	F	156	94	DOD normotensive
9118	CHEST ABDOMEN PELVIS	9/6/07 0:25	32	White	M	135	89	DOD normotensive
9120	CT THORAX W IV CONTRAS	9/3/07 5:31	30	White	M	96	43	DOD normotensive
9124	CHEST ABDOMEN PELVIS	9/1/07 23:48	49	White	F	144	78	DOD normotensive
9125	CHEST ABDOMEN PELVIS	9/1/07 18:31	29	Asian	M	120	92	DOD normotensive
9127	CHEST ABDOMEN PELVIS	8/31/07 19:42	23	Asian	F	125	66	DOD normotensive
9129	CHEST ABDOMEN PELVIS	8/27/07 19:04	24	Asian	M	134	86	DOD normotensive
9136	CHEST ABDOMEN PELVIS	8/23/07 22:41	19	White	M	188	99	DOD normotensive
9143	CHEST ABDOMEN PELVIS	8/19/07 1:07	36	White	M	140	92	DOD normotensive
9145	CHEST ABDOMEN PELVIS	8/16/07 16:19	22	White	M	181	76	DOD normotensive
9147	CHEST ABDOMEN PELVIS	8/15/07 16:41	20	White	M	157	65	DOD normotensive
9149	CHEST ABDOME PELVIS	8/13/07 14:19	25	White	M	121	59	DOD normotensive
9153	CHEST ABDOMEN PELVIS	8/12/07 8:15	19	White	M	122	103	DOD normotensive
9156	CHEST ABDOMEN PELVIS	8/11/07 16:10	45	White	M	175	71	DOD normotensive
9165	CT THORAX W IV CONTRAS	8/3/07 1:30	30	Other	M	159	71	DOD normotensive
9170	CHEST ABDOMEN PELVIS	7/30/07 2:48	18	White	M	118	66	DOD normotensive
9173	CHEST ABDOMEN PELVIS	7/28/07 19:51	33	White	M	173	90	DOD normotensive
9179	CHEST ABDOMEN PELVIS	7/27/07 0:34	49	White	M	162	70	DOD normotensive

9181	CHEST ABDOMEN PELVIS	7/24/07 4:08	48	White	M	170	82	DOD	normotensive
9184	CHEST ABDOMEN PELVIS	7/21/07 20:04	18	White	M	149	82	DOD	normotensive
9186	CHEST ABDOMEN PELVIS	7/22/07 17:19	38	White	M	138	85	DOD	normotensive
9187	CHEST ABDOMEN PELVIS	7/15/07 19:25	45	White	M	169	76	DOD	normotensive
9189	CT THORAX W IV CONTRAS	7/16/07 19:09	45	White	M	140	98	DOD	normotensive
9191	CHEST ABDOMEN PELVIS	7/20/07 14:19	26	White	M	131	82	DOD	normotensive
9194	CHEST ABDOMEN PELVIS	7/15/07 2:21	35	Asian	M	141	88	DOD	normotensive
9195	CHEST ABDOMEN PELVIS	7/18/07 15:02	44	White	F	122	81	DOD	normotensive
9200	CHEST ABDOMEN PELVIS	7/12/07 13:33	19	White	M	159	74	DOD	normotensive
9203	CHEST ABDOMEN PELVIS	7/1/07 12:58	49	White	M	139	83	DOD	normotensive
9214	CHEST ABDOMEN PELVIS	6/26/07 15:35	19	White	M	149	60	DOD	normotensive
9216	CHEST ABDOMEN PELVIS	7/4/07 21:01	32	White	M	132	75	DOD	normotensive
9217	CHEST ABDOMEN PELVIS	6/20/07 18:37	36	White	M	138	89	DOD	normotensive
9218	CHEST ABDOMEN PELVIS	7/4/07 17:57	32	Other	F	156	75	DOD	normotensive
9223	CT THORAX W IV CONTRAS	6/29/07 0:22	25	Black	M	154	78	DOD	normotensive
9230	CT THORAX W IV CONTRAS	6/23/07 21:17	18		M	157	99	DOD	normotensive
9232	CHEST ABDOMEN PELVIS	6/22/07 17:56	19	White	M	144	95	DOD	normotensive
9234	CHEST ABDOMEN PELVIS	6/22/07 8:27	37	White	M	155	61	DOD	normotensive
9235	CHEST ABDOMEN PELVIS	6/21/07 23:49	20	White	M	132	81	DOD	normotensive
9237	CHEST ABDOMEN PELVIS	6/21/07 18:16	36		M	146	89	DOD	normotensive
9244	CHEST ABDOMEN PELVIS	6/19/07 3:36	44	White	M	153	94	DOD	normotensive
9250	CHEST ABDOMEN PELVIS	6/16/07 17:51	48	White	M	142	76	DOD	normotensive
9251	CHEST ABDOMEN PELVIS	6/16/07 20:45	43	White	M	140	81	DOD	normotensive
9258	CHEST ABDOMEN PELVIS	6/11/07 4:22	48	White	M	170	75	DOD	normotensive
9260	CT THORAX W IV CONTRAS	6/7/07 10:44	21	Other	F	127	83	DOD	normotensive
9261	CHEST ABDOMEN PELVIS	6/6/07 19:37	49	White	M	156	99	DOD	normotensive
9267	CHEST ABDOMEN PELVIS	6/2/07 22:08	50	White	M	156	76	DOD	normotensive
9268	CT THORAX W IV CONTRAS	5/31/07 14:53	30	White	M	137	92	DOD	normotensive
9269	CHEST ABDOMEN PELVIS	5/31/07 21:13	43	White	M	138	75	DOD	normotensive
9273	CT THORAX W IV CONTRAS	5/27/07 17:51	50	White	F	137	77	DOD	normotensive

9275	CHEST ABDOMEN PELVIS	5/27/07 23:44	35	White	M	130	96	DOD normotensive
9279	CT THORAX W IV CONTRAS	5/21/07 23:14	23	White	M	151	91	DOD normotensive
9280	CHEST ABDOMEN PELVIS	5/20/07 10:42	21	White	F	128	75	DOD normotensive
9281	CHEST ABDOMEN PELVIS	5/20/07 17:38	19	White	M	135	100	DOD normotensive
9282	CHEST ABDOMEN PELVIS	5/20/07 3:52	44	White	M	131	90	DOD normotensive
9290	CHEST ABDOMEN PELVIS	5/14/07 17:28	19	White	M	148	88	DOD normotensive
9292	CT THORAX W IV CONTRAS	5/15/07 1:17	40	White	F	127	88	DOD normotensive
9293	CHEST ABDOMEN PELVIS	5/13/07 5:13	22	White	M	144	95	DOD normotensive
9297	CHEST ABDOMEN PELVIS	5/6/07 3:58	31	White	M	146	90	DOD normotensive
9301	CHEST ABDOMEN PELVIS	5/3/07 3:30	26	White	M	163	120	DOD normotensive
9307	CHEST ABDOMEN PELVIS	5/1/07 9:16	45	White	F	158	100	DOD normotensive
9324	CHEST ABDOMEN PELVIS	4/12/07 18:29	18	White	M	146	83	DOD normotensive
9335	CHEST ABDOMEN PELVIS	3/30/07 20:56	46	White	M	135	78	DOD normotensive
9337	CHEST ABDOMEN PELVIS	3/27/07 14:44	29	White	M	150	87	DOD normotensive
9357	CHEST ABDOMEN PELVIS	3/3/07 2:40	47	White	M	155	80	DOD normotensive
9362	CHEST ABDOMEN PELVIS	2/27/07 17:34	19	White	M	134	70	DOD normotensive
9429	CHEST ABDOMEN PELVIS	2/17/07 5:00	48	White	M	158	84	DOD normotensive
9434	CT THORAX W IV CONTRAS	2/10/07 17:02	39	White	M	142	64	DOD normotensive
9442	CT THORAX W IV CONTRAS	1/30/07 7:08	20	White	M	136	76	DOD normotensive
9445	CHEST ABDOMEN PELVIS	1/27/07 5:14	23	White	M	122	76	DOD normotensive
9452	CHEST ABDOMEN PELVIS	1/23/07 0:30	21	White	M	150	97	DOD normotensive
9458	CHEST ABDOMEN PELVIS	1/18/07 3:00	33	White	M	174	100	DOD normotensive
9463	CHEST ABDOMEN PELVIS	1/12/07 20:15	21	White	M	133	80	DOD normotensive
9485	CT ABDOMEN W IV CONTRA	12/14/06 12:34	43	Black	M	137	88	DOD normotensive
9487	CHEST ABDOMEN PELVIS	12/13/06 18:52	23	White	M	141	91	DOD normotensive
9497	CHEST ABDOMEN PELVIS	12/5/06 21:41	26	White	M	133	85	DOD normotensive
9498	CHEST ABDOMEN PELVIS	12/2/06 3:32	19	White	M	137	91	DOD normotensive
9499	CHEST ABDOMEN PELVIS	12/1/06 2:04	19	White	M	172	80	DOD normotensive
9514	CHEST ABDOMEN PELVIS	5/28/06 5:06	21	White	M	156	99	DOD normotensive
9515	CHEST ABDOMEN PELVIS	5/28/06 14:14	45	White	M	136	80	DOD normotensive

9521	CHEST ABDOMEN PELVIS	5/24/06 12:35	35	White	M	152	84	DOD normotensive
9524	CHEST ABDOMEN PELVIS	5/24/06 7:25	18	White	F	160	95	DOD normotensive
9525	CHEST ABDOMEN PELVIS	5/24/06 0:56	31	White	M	120	83	DOD normotensive
9528	CT ABDOMEN W IV CONTRA	5/16/06 2:20	34	Hispanic	M	130	100	DOD normotensive
9533	CHEST ABDOMEN PELVIS	5/9/06 20:21	36	White	M	139	87	DOD normotensive
9534	chest abdomen pelvis	5/9/06 8:01	27	White	M	132	74	DOD normotensive
9540	CHEST ABDOMEN PELVIS	5/7/06 21:29	49	White	F	143	89	DOD normotensive
9541	CHEST ABDOMEN PELVIS	5/7/06 17:11	47	Hispanic	M	126	78	DOD normotensive
9542	CHEST ABDOMEN PELVIS	5/7/06 23:01	47	White	M	149	98	DOD normotensive
9556	CHEST ABDOMEN PELVIS	4/7/06 18:52	30	White	M	120	59	DOD normotensive
10543	CT THORAX W IV CONTRAST	7/2/09 23:06	48	White	M	160	88	DOD normotensive
10546	CT THORAX W IV CONTRAST	8/12/09 19:12	47	White	F	141	84	DOD normotensive
10552	CT THORAX W IV CONTRAST	8/19/09 0:32	25	White	M	144	60	DOD normotensive
10815	CT THORAX W IV CONTRAST	9/9/09 10:36	35	White	M	123	88	DOD normotensive
10820	CT ABDOMEN W IV CONTRAST	9/29/09 17:10	35	White	M	153	93	DOD normotensive
10824	CT ABDOMEN W IV CONTRAST	10/18/09 17:53	39	White	M	159	84	DOD normotensive
10825	CT THORAX W IV CONTRAST	10/19/09 20:15	36	White	M	154	97	DOD normotensive
10883	CT THORAX W IV CONTRAST	7/21/09 0:57	40	White	M	144	74	DOD normotensive
10886	CT THORAX W IV CONTRAST	7/19/09 22:09	22	Hispanic	M	145	85	DOD normotensive
10889	CT THORAX W IV CONTRAST	7/24/09 18:18	46	Black	M	165	78	DOD normotensive
10891	CT THORAX W IV CONTRAST	7/25/09 6:30	24	Black	M	140	84	DOD normotensive
10894	CT THORAX W IV CONTRAST	12/10/09 2:45	31	Other	M	147	80	DOD normotensive
10928	CT THORAX W IV CONTRAST	7/28/09 12:06	31	White	M	197	83	DOD normotensive
10932	CT THORAX W IV CONTRAST	7/31/09 12:43	30	Black	M	135	79	DOD normotensive
10934	CT THORAX W IV CONTRAST	1/5/10 23:30	41	Hispanic	M	167	65	DOD normotensive
10937	CT ABDOMEN W IV CONTRAST	2/1/10 16:29	45	White	M	138	94	DOD normotensive
10940	CT ABDOMEN W IV CONTRAST	2/13/10 16:20	50	White	M	125	58	DOD normotensive
11126	CT THORAX W IV CONTRAST	3/28/10 9:11	44	White	M	127	78	DOD normotensive
11312	CT THORAX WO IV CONTRAST	1/5/10 0:00	48	White	F	120	95	DOD normotensive
11317	CT THORAX W IV CONTRAST	11/26/09 15:42	46	White	M	147	59	DOD normotensive

11318	CT THORAX W IV CONTRAST	11/26/09 14:33	24	White	M	135	72	DOD normotensive
11319	CT ABDOMEN W IV CONTRAST	11/27/09 18:19	21	White	M	146	72	DOD normotensive
11320	CT THORAX W IV CONTRAST	10/1/09 10:45	20	White	F	129	87	DOD normotensive
11323	CT THORAX W IV CONTRAST	2/26/10 9:59	32	White	M	147	89	DOD normotensive
11324	CT THORAX WO IV CONTRAST	7/4/10 17:27	49	White	M	124	86	DOD normotensive
11326	CT THORAX W IV CONTRAST	11/24/09 18:53	24	Black	M	142	98	DOD normotensive
11368	CT THORAX W IV CONTRAST	6/1/08 13:06	28	White	M	156	85	DOD normotensive
11371	CT THORAX W IV CONTRAST	12/11/07 3:42	38	Black	M	183	80	DOD normotensive
11375	CT THORAX W IV CONTRAST	9/5/07 22:08	28	Black	F	156	94	DOD normotensive
11387	CT ABDOMEN W IV CONTRAST	4/17/10 17:58	22	White	M	164	92	DOD normotensive
11388	CT ABDOMEN W IV CONTRAST	4/18/10 11:24	35	Asian	F	149	72	DOD normotensive
11402	CT ABDOMEN W IV CONTRAST	4/23/10 20:42	50	White	M	160	79	DOD normotensive
11440	CT THORAX W IV CONTRAST	5/1/10 8:26	46	White	M	186	81	DOD normotensive
11524	CT ABDOMEN W IV CONTRAST	9/4/10 16:58	21	White	M	156	65	DOD normotensive
11569	CT THORAX W IV CONTRAST	5/27/10 11:49	38	White	F	137	80	DOD normotensive
11576	CT ABDOMEN W IV CONTRAST	6/1/10 16:13	23	White	M	146	88	DOD normotensive
11577	CT ABDOMEN W IV CONTRAST	6/6/10 22:24	45	White	F	145	80	DOD normotensive
11580	CT ABDOMEN W IV CONTRAST	6/12/10 23:15	22	White	M	143	80	DOD normotensive
11602	ABDOMEN	11/28/04 18:56	22	White	M	158	96	DOD normotensive
11624	CT ABDOMEN WO IV CONTRAST	10/26/09 18:36	29	White	M	165	83	DOD normotensive
11627	CT ABDOMEN W IV CONTRAST	9/13/09 0:35	37	White	M	145	68	DOD normotensive
11634	CT THORAX W IV CONTRAST	8/21/09 13:49	18	White	M	128	75	DOD normotensive
11635	CT THORAX W IV CONTRAST	8/21/09 14:23	19	White	M	149	77	DOD normotensive
11649	CHEST ABDOMEN PELVIS	9/24/03 18:21	18	White	M	176	87	DOD normotensive
11652	ABDOMEN	10/12/02 1:39	20	White	M	138	89	DOD normotensive
12061	CHEST ABDOMEN PELVIS	3/21/06 20:36	24	White	M	177	89	DOD normotensive
12064	CT THORAX W IV CONTRAS	3/14/06 13:07	49	White	F	154	72	DOD normotensive
12070	CHEST ABDOMEN PELVIS	3/7/06 5:24	41	White	M	175	100	DOD normotensive
12073	CHEST ABDOMEN PELVIS	3/5/06 8:29	44	White	M	132	93	DOD normotensive
12079	CHEST ABDOMEN PELVIS	2/26/06 3:34	23	White	M	149	90	DOD normotensive

12415	CT THORAX W IV CONTRAS	3/30/06 20:28	44	White	M	152	89	DOD normotensive
12418	CT ABDOMEN W IV CONTRAST	2/5/06 21:30	46	White	M	186	98	DOD normotensive
12434	CHEST ABDOMEN PELVIS	1/1/06 14:49	23	White	M	149	100	DOD normotensive
12602	CHEST ABDOMEN PELVIS	1/18/06 18:40	18	White	M	138	100	DOD normotensive
12776	CHEST ABDOMEN PELVIS	1/8/06 13:59	32	White	M	137	74	DOD normotensive
12799	CHEST ABDOMEN PELVIS	11/26/05 1:44	39	White	M	143	97	DOD normotensive
13041	CHEST ABDOMEN PELVIS	1/25/06 19:58	29		M	126	97	DOD normotensive
13045	CHEST ABDOMEN PELVIS	1/22/06 8:53	22	White	M	128	97	DOD normotensive
14515	CT THORAX W IV CONTRAST	6/12/07 1:37	47	Black	M	197	82	DOD normotensive
15426	CT ABDOMEN W IV CONTRAST	4/9/09 15:11	42	White	M	134	65	DOD normotensive
15432	CT THORAX W IV CONTRAST	10/5/08 2:19	31	White	M	135	88	DOD normotensive
15498	CT THORAX W IV CONTRAST	5/23/06 10:58	35	White	M	189	78	DOD normotensive
15642	CT ABDOMEN WO IV CONTRAST	11/7/10 1:12	49	Other	M	129	87	DOD normotensive
15740	CHEST ABDOMEN PELVIS	6/24/03 12:56	24	White	M	144	61	DOD normotensive
15755	CHEST	10/10/04 20:16	46	White	M	141	93	DOD normotensive
15758	CHEST ABDOMEN PELVIS	6/16/04 12:47	43	White	M	157	90	DOD normotensive
16017	CT THORAX W IV CONTRAST	6/30/09 0:38	27	White	M	147	67	DOD normotensive
16022	CT THORAX W IV CONTRAST	8/8/09 10:34	40	White	M	141	81	DOD normotensive
16024	CT ABDOMEN W IV CONTRAST	8/9/09 20:26	46	White	M	153	75	DOD normotensive
16025	CT ABDOMEN W IV CONTRAST	8/15/09 15:52	28	White	F	124	95	DOD normotensive
16026	CT ABDOMEN W IV CONTRAST	8/16/09 10:43	30	White	F	128	89	DOD normotensive
16027	CT ABDOMEN W IV CONTRAST	8/18/09 3:37	24	White	M	155	68	DOD normotensive
16029	CT ABDOMEN W IV CONTRAST	6/20/10 15:48	49	White	F	138	73	DOD normotensive
16034	CT ABDOMEN W IV CONTRAST	6/2/10 16:39	19	White	M	160	55	DOD normotensive
16035	CT ABDOMEN W IV CONTRAST	5/8/10 13:05	27	White	F	165	79	DOD normotensive
16038	CT ABDOMEN W IV CONTRAST	4/29/10 18:02	19	White	F	141	84	DOD normotensive
16044	CT ABDOMEN W IV CONTRAST	4/19/10 11:18	25	White	M	122	88	DOD normotensive
16046	CT ABDOMEN W IV CONTRAST	4/15/10 20:38	29	Black	M	150	79	DOD normotensive
16047	CT ABDOMEN W IV CONTRAST	4/15/10 13:04	27	White	M	158	62	DOD normotensive
16048	CT ABDOMEN W IV CONTRAST	4/15/10 13:42	29	White	M	144	94	DOD normotensive

16049	CT ABDOMEN W IV CONTRAST	4/12/10 10:52	43	Black	F	148	97	DOD normotensive
16058	CT ABDOMEN W IV CONTRAST	5/24/10 12:30	24	White	M	135	75	DOD normotensive
16060	CT ABDOMEN W IV CONTRAST	5/15/10 15:03	32	White	F	137	88	DOD normotensive
16061	CT ABDOMEN W IV CONTRAST	5/14/10 20:23	24	White	M	129	40	DOD normotensive
16067	CT ABDOMEN W IV CONTRAST	3/6/10 6:57	26	White	M	135	85	DOD normotensive
16068	CT ABDOMEN W IV CONTRAST	2/28/10 5:39	40	White	F	131	78	DOD normotensive
16069	CT ABDOMEN W IV CONTRAST	2/20/10 13:02	20	Hispanic	M	134	78	DOD normotensive
16070	CT ABDOMEN W IV CONTRAST	8/15/09 12:34	29	White	M	144	89	DOD normotensive
16071	CT ABDOMEN W IV CONTRAST	2/24/10 21:58	50	White	M	180	94	DOD normotensive
16129	CT ABDOMEN W IV CONTRAST	2/19/10 18:20	48	Black	M	168	68	DOD normotensive
16131	CT ABDOMEN W IV CONTRAST	2/11/10 0:10	18	White	M	125	85	DOD normotensive
16134	CT ABDOMEN W IV CONTRAST	1/31/10 15:27	38	White	M	162	88	DOD normotensive
16139	CT ABDOMEN W IV CONTRAST	1/20/10 15:17	49	White	F	146	84	DOD normotensive
16140	CT ABDOMEN W IV CONTRAST	1/10/10 20:42	46	White	M	125	79	DOD normotensive
16141	CT ABDOMEN W IV CONTRAST	1/10/10 1:01	29	White	M	178	89	DOD normotensive
16153	CT ABDOMEN W IV CONTRAST	12/31/09 21:27	23	White	M	163	93	DOD normotensive
16162	CT ABDOMEN W IV CONTRAST	12/26/09 7:43	18	White	F	134	97	DOD normotensive
16173	CT ABDOMEN W IV CONTRAST	11/21/09 0:30	19	Black	F	145	88	DOD normotensive
16174	CT ABDOMEN W IV CONTRAST	11/18/09 10:23	19	White	M	142	85	DOD normotensive
16341	CHEST ABDOMEN PELVIS	10/17/02 17:30	36	White	F	121	80	DOD normotensive
16878	CT THORAX W IV CONTRAST	8/26/06 8:26	23	White	M	148	81	DOD normotensive
16879	CT THORAX W IV CONTRAST	10/29/06 1:05	44	Black	M	130	98	DOD normotensive
16921	CT ABDOMEN W IV CONTRAST	6/12/06 10:58	38	White	M	143	82	DOD normotensive
16927	CT THORAX W IV CONTRAST	4/9/11 18:15	31	White	F	126	89	DOD normotensive
16928	CT ABDOMEN PELVIS W IV CONTRAS	4/2/11 20:02	46	White	M	199	86	DOD normotensive
16930	CT THORAX W IV CONTRAST	2/5/11 14:08	31	White	M	127	84	DOD normotensive
16931	CT ABDOMEN PELVIS W IV CONTRAS	1/30/11 0:52	48	White	M	149	68	DOD normotensive
16933	CT THORAX W IV CONTRAST	1/1/11 21:40	29	White	F	132	56	DOD normotensive
16944	CT ABDOMEN W IV CONTRAST	10/23/10 1:34	42	White	M	152	93	DOD normotensive
16946	CT ABDOMEN W IV CONTRAST	9/27/10 1:22	24	White	M	169	83	DOD normotensive

16947	CT THORAX W IV CONTRAST	9/7/10 23:35	46	White	M	129	88	DOD normotensive
17034	CT THORAX W IV CONTRAST	3/24/07 6:54	22	White	M	150	89	DOD normotensive
17036	CT ABDOMEN W IV CONTRAST	1/4/10 23:46	46	White	M	123	83	DOD normotensive
17067	CT ABDOMEN W IV CONTRAST	7/14/10 13:10	46	Hispanic	F	132	85	DOD normotensive
17077	CT ABDOMEN W IV CONTRAST	2/28/10 7:52	48	White	M	130	80	DOD normotensive
17438	CT THORAX W IV CONTRAST	7/21/10 10:15	26	White	M	131	91	DOD normotensive
17445	CT THORAX W IV CONTRAST	8/31/10 13:44	40	Hispanic	M	136	76	DOD normotensive
17462	CT THORAX W IV CONTRAST	10/29/06 20:36	47	White	M	131	77	DOD normotensive
17515	CT ABDOMEN W IV CONTRAST	11/8/05 20:20	48	White	M	141	86	DOD normotensive
17556	CT ABDOMEN W IV CONTRAST	10/22/05 8:40	20		M	136	91	DOD normotensive
17576	CT ABDOMEN W IV CONTRAST	3/6/05 8:46	40	White	F	127	93	DOD normotensive
17638	CT ABDOMEN W IV CONTRAST	8/17/05 22:23	49	White	F	140	100	DOD normotensive
17644	CT ABDOMEN W IV CONTRAST	9/15/05 1:34	32	White	M	149	80	DOD normotensive
19974	CT ABDOMEN PELVIS W IV CONTRAS	8/9/11 18:13	33	White	M	125	76	DOD normotensive
20454	CT THORAX W IV CONTRAST	5/1/11 19:10	49	American I	F	120	73	DOD normotensive
20455	CT THORAX W IV CONTRAST	5/22/11 5:59	33	White	M	122	98	DOD normotensive
21328	CT THORAX W IV CONTRAST	7/30/10 21:58	31	White	M	134	77	DOD normotensive
21329	CT THORAX W IV CONTRAST	7/28/10 10:33	48	White	F	142	68	DOD normotensive
21331	CT THORAX W IV CONTRAST	7/25/10 22:34	34	White	M	126	81	DOD normotensive
21332	CT THORAX W IV CONTRAST	7/23/10 20:37	19	White	F	132	96	DOD normotensive
21333	CT THORAX W IV CONTRAST	7/22/10 10:45	40	White	F	125	83	DOD normotensive
21334	CT THORAX W IV CONTRAST	7/22/10 22:18	41	White	M	139	60	DOD normotensive
21336	CT THORAX W IV CONTRAST	7/22/10 5:59	43	White	M	123	86	DOD normotensive
21340	CT THORAX W IV CONTRAST	7/4/10 23:08	43	White	F	141	91	DOD normotensive
21341	CT THORAX W IV CONTRAST	7/4/10 18:50	37	White	F	137	80	DOD normotensive
21344	CT THORAX W IV CONTRAST	7/2/10 17:49	23	White	M	140	75	DOD normotensive
21502	CT THORAX W IV CONTRAST	4/5/04 8:17	42	White	F	137	84	DOD normotensive
21510	CT ABDOMEN W IV CONTRAST	6/6/10 22:24	45	White	F	145	80	DOD normotensive
21534	CT THORAX W IV CONTRAST	4/4/09 20:36	50	Black	F	204	68	DOD normotensive
21536	CT THORAX W IV CONTRAST	8/21/08 19:59	47	White	M	150	92	DOD normotensive

21774	CT THORAX W IV CONTRAST	8/14/10 1:39	26	White	M	176	85	DOD normotensive
21842	CT THORAX W IV CONTRAST	4/10/04 3:22	18	White	F	140	80	DOD normotensive
21885	CT ABDOMEN W IV CONTRAST	6/30/10 9:27	20	White	F	127	80	DOD normotensive
21887	CT ABDOMEN W IV CONTRAST	6/29/10 23:26	26	White	M	135	77	DOD normotensive
21896	CT ABDOMEN W IV CONTRAST	9/19/09 4:13	22	White	M	144	75	DOD normotensive
21903	CT ABDOMEN W IV CONTRAST	10/14/09 10:58	45	White	F	133	82	DOD normotensive
21905	CT ABDOMEN W IV CONTRAST	10/23/09 7:09	32	Black	M	162	98	DOD normotensive
21906	CT ABDOMEN W IV CONTRAST	10/25/09 3:12	30	White	F	129	88	DOD normotensive
21908	CT ABDOMEN W IV CONTRAST	10/27/09 14:43	41	White	M	133	76	DOD normotensive
21911	CT ABDOMEN W IV CONTRAST	11/9/09 4:03	33	White	M	138	98	DOD normotensive
21943	CT ABDOMEN PELVIS W IV CONTRAST	9/11/11 21:15	49	White	F	155	75	DOD normotensive
22712	CT THORAX W IV CONTRAST	7/24/10 17:29	19	White	M	138	90	DOD normotensive
22735	CT THORAX W IV CONTRAST	8/6/10 20:32	35	White	F	127	81	DOD normotensive
22756	CT THORAX W IV CONTRAST	8/17/10 19:57	40	White	M	129	72	DOD normotensive
23081	CT THORAX W IV CONTRAST	9/26/11 20:49	20	White	F	137	96	DOD normotensive
23085	CT THORAX W IV CONTRAST	7/28/05 22:25	30	White	M	127	98	DOD normotensive
23566	CT THORAX WO IV CONTRAST	7/14/09 18:02	21	White	M	171	97	DOD normotensive
23567	CT ABDOMEN W IV CONTRAST	4/10/10 23:41	19	White	F	121	88	DOD normotensive
23575	CT THORAX W IV CONTRAST	6/22/09 20:00	42	White	F	142	68	DOD normotensive
23590	CT THORAX W IV CONTRAST	3/3/10 19:11	34	White	M	131	98	DOD normotensive
23591	CT ABDOMEN W IV CONTRAST	12/20/09 2:18	22	White	F	122	84	DOD normotensive
23598	CT THORAX W IV CONTRAST	6/26/10 21:26	22	White	M	152	83	DOD normotensive
23602	CT ABDOMEN PELVIS W IV CONTRAST	4/23/11 2:21	21	White	M	134	98	DOD normotensive
23603	CT ABDOMEN PELVIS W IV CONTRAST	4/23/11 22:20	43	White	F	145	93	DOD normotensive
23607	CT ABDOMEN PELVIS W IV CONTRAST	4/12/11 17:13	28	Black	M	150	63	DOD normotensive
23608	CT ABDOMEN PELVIS W IV CONTRAST	4/9/11 2:56	37	White	M	132	89	DOD normotensive
23667	CT ABDOMEN PELVIS W IV CONTRAST	9/25/11 1:51	40	White	M	144	85	DOD normotensive
23668	CT ABDOMEN PELVIS W IV CONTRAST	9/24/11 15:04	23	White	F	120	61	DOD normotensive
23684	CT THORAX W IV CONTRAST	9/24/11 18:03	42	White	F	127	83	DOD normotensive
23692	CT THORAX W IV CONTRAST	9/13/11 1:46	21	White	M	149	84	DOD normotensive

23693	CT THORAX W IV CONTRAST	9/11/11 21:46	46	White	M	182	84	DOD normotensive
23696	CT THORAX W IV CONTRAST	9/8/11 17:45	26	White	M	153	58	DOD normotensive
23700	CT THORAX W IV CONTRAST	9/4/11 23:26	29	White	M	144	68	DOD normotensive
23702	CT THORAX W IV CONTRAST	9/4/11 21:21	27	White	M	144	56	DOD normotensive
23703	CT THORAX W IV CONTRAST	9/3/11 20:37	37	White	M	139	84	DOD normotensive
23711	CT THORAX W IV CONTRAST	8/23/11 15:28	22	White	M	148	91	DOD normotensive
23713	CT THORAX W IV CONTRAST	8/21/11 12:15	40	White	M	159	94	DOD normotensive
23717	CT THORAX W IV CONTRAST	8/17/11 11:21	41	White	M	120	58	DOD normotensive
23718	CT THORAX W IV CONTRAST	8/16/11 8:38	39	White	M	139	72	DOD normotensive
23724	CT THORAX W IV CONTRAST	8/3/11 11:40	19	Black	M	203	88	DOD normotensive
23729	CT THORAX W IV CONTRAST	7/27/11 18:09	35	White	M	140	76	DOD normotensive
23736	CT THORAX W IV CONTRAST	7/20/11 21:20	34	White	M	125	92	DOD normotensive
23738	CT THORAX W IV CONTRAST	7/18/11 16:40	21	White	F	131	98	DOD normotensive
23739	CT THORAX W IV CONTRAST	7/17/11 4:10	22	White	M	184	58	DOD normotensive
23781	CT ABDOMEN W IV CONTRAST	9/29/09 0:19	27	White	M	144	86	DOD normotensive
23787	CT ABDOMEN W IV CONTRAST	11/10/09 8:53	39	White	M	142	83	DOD normotensive
23788	CT ABDOMEN W IV CONTRAST	9/29/09 16:20	41	White	M	132	86	DOD normotensive
23801	CT ABDOMEN W IV CONTRAST	6/6/10 6:18	23	White	M	141	87	DOD normotensive
23840	CT ABDOMEN W IV CONTRAST	8/15/09 15:02	38	White	F	120	84	DOD normotensive
23861	CT THORAX W IV CONTRAST	6/19/11 5:36	23	White	M	141	88	DOD normotensive
23865	CT THORAX W IV CONTRAST	7/16/11 20:51	30	White	M	135	57	DOD normotensive
23868	CT THORAX W IV CONTRAST	7/16/11 15:04	42	White	M	130	64	DOD normotensive
23876	CT THORAX W IV CONTRAST	5/8/11 23:47	48	White	M	122	100	DOD normotensive
23880	CT THORAX W IV CONTRAST	7/3/11 21:51	48	White	F	158	80	DOD normotensive
23881	CT THORAX W IV CONTRAST	7/2/11 6:21	49	White	M	123	95	DOD normotensive
23882	CT THORAX W IV CONTRAST	7/2/11 4:48	19	Black	M	166	85	DOD normotensive
23883	CT THORAX W IV CONTRAST	7/2/11 7:29	47	White	M	141	96	DOD normotensive
23884	CT THORAX W IV CONTRAST	6/30/11 14:02	30	White	M	141	58	DOD normotensive
23885	CT THORAX W IV CONTRAST	6/28/11 8:55	22	White	M	146	97	DOD normotensive
23898	CT ABDOMEN PELVIS W IV CONTRAS	6/27/11 1:28	21	Other	M	129	88	DOD normotensive

23900	CT THORAX W IV CONTRAST	6/19/11 12:05	20	White	M	152	94	DOD normotensive
23901	CT ABDOMEN PELVIS W IV CONTRAST	6/16/11 22:17	38	White	M	145	61	DOD normotensive
23920	CT ABDOMEN PELVIS W IV CONTRAST	6/9/11 10:46	42	White	M	146	73	DOD normotensive
23924	CT ABDOMEN PELVIS W IV CONTRAST	6/7/11 14:37	18	White	F	141	66	DOD normotensive
23925	CT ABDOMEN PELVIS W IV CONTRAST	6/5/11 23:27	47	White	M	180	81	DOD normotensive
23928	CT ABDOMEN PELVIS W IV CONTRAST	6/2/11 23:20	18	White	M	140	87	DOD normotensive
23930	CT ABDOMEN PELVIS W IV CONTRAST	5/26/11 13:56	22	White	M	160	90	DOD normotensive
23933	CT ABDOMEN PELVIS W IV CONTRAST	5/13/11 9:56	43	White	M	150	76	DOD normotensive
23934	CT ABDOMEN PELVIS W IV CONTRAST	5/8/11 20:26	22	White	M	134	78	DOD normotensive
24274	CT ABDOMEN W IV CONTRAST	8/1/04 20:31	39	White	F	127	98	DOD normotensive
24279	CT ABDOMEN W IV CONTRAST	9/12/04 1:55	44	White	F	151	89	DOD normotensive
24293	CT THORAX W IV CONTRAST	10/16/04 9:14	40	Black	M	162	87	DOD normotensive
24294	CT ABDOMEN W IV CONTRAST	9/15/04 18:32	49	White	M	133	93	DOD normotensive
24298	CT THORAX W IV CONTRAST	8/7/04 15:17	26	White	M	137	92	DOD normotensive
24300	CT THORAX W IV CONTRAST	8/20/04 14:42	46	White	M	146	76	DOD normotensive
24302	CT ABDOMEN W IV CONTRAST	9/4/04 2:13	21	White	M	136	79	DOD normotensive
24306	CT ABDOMEN W IV CONTRAST	9/18/04 22:40	29	White	M	150	80	DOD normotensive
24310	CT ABDOMEN W IV CONTRAST	8/8/04 22:50	45	White	M	143	74	DOD normotensive
24311	CT ABDOMEN W IV CONTRAST	8/7/04 20:44	42	White	M	138	89	DOD normotensive
24314	CT THORAX W IV CONTRAST	9/7/04 23:02	42	White	M	136	98	DOD normotensive
24315	CT ABDOMEN W IV CONTRAST	10/11/04 11:07	47		M	122	46	DOD normotensive
24316	CT THORAX W IV CONTRAST	10/9/04 3:47	24	Black	M	152	89	DOD normotensive
24321	CT ABDOMEN W IV CONTRAST	2/13/05 7:44	30	Black	M	148	86	DOD normotensive
24325	CT THORAX W IV CONTRAST	3/16/05 22:50	35	White	M	146	85	DOD normotensive
24327	CT THORAX W IV CONTRAST	4/17/05 13:51	46	White	M	131	60	DOD normotensive
24329	CT THORAX W IV CONTRAST	2/19/05 1:19	24	Other	M	178	65	DOD normotensive
24330	CT ABDOMEN W IV CONTRAST	8/14/04 13:34	19	White	F	126	87	DOD normotensive
24333	CT ABDOMEN W IV CONTRAST	8/14/04 2:29	21	White	M	159	89	DOD normotensive
24339	CT THORAX W IV CONTRAST	1/11/05 10:20	37		F	132	88	DOD normotensive
24341	CT THORAX W IV CONTRAST	1/29/05 22:21	30	Black	M	146	90	DOD normotensive

24342	CT ABDOMEN W IV CONTRAST	3/4/05 5:20	29	White	M	123	77	DOD normotensive
24343	CT ABDOMEN W IV CONTRAST	4/19/05 19:20	36	White	M	145	96	DOD normotensive
24346	CT THORAX W IV CONTRAST	11/6/04 14:44	37	White	M	132	80	DOD normotensive
24366	CT THORAX W IV CONTRAST	4/11/05 5:27	19	White	M	144	96	DOD normotensive
24370	CT THORAX W IV CONTRAST	10/17/04 14:04	43	White	F	122	76	DOD normotensive
24372	CT THORAX W IV CONTRAST	1/23/05 15:20	40	White	M	150	55	DOD normotensive
24378	CT THORAX W IV CONTRAST	2/18/05 20:42	47	White	M	144	68	DOD normotensive
24381	CT ABDOMEN WO IV CONTRAST	3/25/05 17:14	43	White	F	123	98	DOD normotensive
24395	CT THORAX W IV CONTRAST	10/22/04 23:24	33	White	M	130	82	DOD normotensive
24400	CT THORAX W IV CONTRAST	12/24/04 19:12	32	White	M	149	97	DOD normotensive
24428	CT ABDOMEN W IV CONTRAST	6/3/05 4:48	42	White	M	145	81	DOD normotensive
24432	CT THORAX W IV CONTRAST	7/26/05 17:22	27	White	M	182	91	DOD normotensive
24439	CT THORAX W IV CONTRAST	6/19/05 6:12	20	White	M	140	98	DOD normotensive
24445	CT ABDOMEN W IV CONTRAST	5/10/05 11:00	19	White	M	136	89	DOD normotensive
24448	CT ABDOMEN W IV CONTRAST	7/23/05 3:57	28	White	F	128	73	DOD normotensive
24450	CT ABDOMEN W IV CONTRAST	6/26/05 11:00	20	Black	M	150	73	DOD normotensive
24459	CT ABDOMEN W IV CONTRAST	7/24/05 15:31	32	White	M	133	87	DOD normotensive
24460	CT THORAX W IV CONTRAST	7/29/05 0:17	19	White	M	123	84	DOD normotensive
24462	CT ABDOMEN W IV CONTRAST	6/9/05 22:14	43	White	F	187	82	DOD normotensive
24464	CT THORAX W IV CONTRAST	5/17/05 0:40	37	White	M	173	83	DOD normotensive
24465	CT ABDOMEN W IV CONTRAST	6/13/05 19:32	19	White	M	144	84	DOD normotensive
24466	CT ABDOMEN W IV CONTRAST	6/26/05 21:21	23		M	147	92	DOD normotensive
24472	CT ABDOMEN W IV CONTRAST	7/6/05 22:43	31	White	M	142	62	DOD normotensive
24473	CT ABDOMEN W IV CONTRAST	7/18/05 0:01	45	White	M	133	87	DOD normotensive
24476	CT THORAX W IV CONTRAST	7/27/05 15:27	25	White	M	129	97	DOD normotensive
24483	CT ABDOMEN W IV CONTRAST	7/27/05 14:11	46	White	F	164	85	DOD normotensive
24484	CT ABDOMEN W IV CONTRAST	7/29/05 10:20	49	White	F	131	69	DOD normotensive
24485	CT ABDOMEN W IV CONTRAST	4/30/05 22:53	19	White	F	144	97	DOD normotensive
24488	CT THORAX W IV CONTRAST	5/13/05 21:04	33	Black	M	154	89	DOD normotensive
24490	CT THORAX W IV CONTRAST	6/10/05 4:05	20	Black	M	155	86	DOD normotensive

24491	CT THORAX W IV CONTRAST	6/22/05 9:24	22	White	M	154	83	DOD normotensive
24496	CT THORAX W IV CONTRAST	8/2/06 8:46	21	Black	M	121	77	DOD normotensive
24519	CT THORAX W IV CONTRAST	11/17/06 20:58	44	White	M	141	78	DOD normotensive
24522	CT THORAX W IV CONTRAST	10/3/06 11:59	38	White	F	143	94	DOD normotensive
24534	CT THORAX W IV CONTRAST	4/27/08 21:26	20	White	M	159	97	DOD normotensive
24538	CT THORAX W IV CONTRAST	8/16/06 8:42	20	White	M	146	97	DOD normotensive
24540	CT THORAX W IV CONTRAST	9/27/06 17:44	18	White	M	131	99	DOD normotensive
24543	CT ABDOMEN W IV CONTRAST	10/13/06 22:39	28	White	M	135	74	DOD normotensive
24545	CT THORAX W IV CONTRAST	10/3/06 19:26	46	White	M	152	81	DOD normotensive
24546	CT ABDOMEN W IV CONTRAST	9/4/06 10:46	40	White	M	145	96	DOD normotensive
24547	CT THORAX W IV CONTRAST	10/7/06 20:53	43	White	M	174	97	DOD normotensive
24548	CT ABDOMEN W IV CONTRAST	9/2/06 3:46	50	White	M	154	82	DOD normotensive
24562	CT ABDOMEN W IV CONTRAST	10/15/06 7:29	27	White	M	147	92	DOD normotensive
24564	CT THORAX W IV CONTRAST	8/3/06 19:30	40	White	M	155	90	DOD normotensive
24569	CT THORAX W IV CONTRAST	11/3/06 13:27	23		M	146	72	DOD normotensive
24576	CT THORAX W IV CONTRAST	8/3/06 18:04	21	White	M	140	82	DOD normotensive
24579	CT THORAX W IV CONTRAST	8/13/06 16:59	21	Black	M	169	61	DOD normotensive
24602	CT THORAX W IV CONTRAST	9/9/06 19:58	41	White	M	175	82	DOD normotensive
24608	CT ABDOMEN W IV CONTRAST	10/5/06 21:36	22	White	M	133	78	DOD normotensive
24616	CT THORAX W IV CONTRAST	11/7/06 10:24	43	White	M	183	99	DOD normotensive
24620	CT ABDOMEN W IV CONTRAST	1/6/07 0:27	21	White	M	120	96	DOD normotensive
24622	CT THORAX W IV CONTRAST	3/22/07 22:49	49	White	M	135	88	DOD normotensive
24632	CT THORAX W IV CONTRAST	9/8/06 15:16	29	Black	M	141	90	DOD normotensive
24633	CT THORAX W IV CONTRAST	8/21/06 23:48	47	White	M	151	99	DOD normotensive
24635	CT THORAX W IV CONTRAST	8/29/06 19:13	22	White	M	154	76	DOD normotensive
24655	CT THORAX W IV CONTRAST	12/17/06 4:03	43	White	M	138	84	DOD normotensive
24657	CT THORAX W IV CONTRAST	10/6/07 12:52	46	Black	F	135	100	DOD normotensive
24861	CT ABDOMEN PELVIS W IV CONTRAST	1/22/12 4:15	23	White	M	149	85	DOD normotensive
29408	CT ABDOMEN PELVIS W IV CONTRAST	4/4/12 9:41	46	White	F	121	61	DOD normotensive
35582	CT THORAX W IV CONTRAST	10/22/11 17:45	32	White	F	138	66	DOD normotensive

35636	CT ABDOMEN W IV CONTRAST	10/8/06 6:35	32	White	F	132	98	DOD normotensive
35639	CT THORAX W IV CONTRAST	6/10/06 0:57	24	White	M	134	92	DOD normotensive
35648	CT ABDOMEN W IV CONTRAST	5/17/05 23:25	48	White	M	122	86	DOD normotensive
35652	CT THORAX W IV CONTRAST	2/28/04 18:55	41	White	M	138	83	DOD normotensive
40205	CHEST ABDOMEN PELVIS	10/2/06 9:44	33	White	M	123	94	DOD normotensive
41191	CT ABDOMEN PELVIS W IV CONTRAST	5/21/12 18:05	18	White	F	144	85	DOD normotensive
41592	CT ABDOMEN PELVIS W IV CONTRAST	4/5/12 13:18	44	White	M	152	67	DOD normotensive
42190	CT ABDOMEN PELVIS W IV CONTRAST	12/5/11 3:07	37	White	M	135	98	DOD normotensive
48034	CT ABDOMEN PELVIS W IV CONTRAST	7/9/12 2:17	43	White	M	128	87	DOD normotensive
48078	CT ABDOMEN PELVIS W IV CONTRAST	10/13/11 12:26	46	White	M	122	92	DOD normotensive
48812	CT THORAX W IV CONTRAST	1/6/12 22:15	30	White	M	147	85	DOD normotensive
49395	CT THORAX W IV CONTRAST	10/15/10 16:33	31	White	M	125	91	DOD normotensive
49424	CT THORAX W IV CONTRAST	9/7/10 18:50	48	White	M	170	93	DOD normotensive
49462	CT THORAX W IV CONTRAST	8/26/10 23:21	36	White	M	159	96	DOD normotensive
49464	CT THORAX W IV CONTRAST	8/27/10 0:29	35	White	M	140	82	DOD normotensive
49473	CT THORAX W IV CONTRAST	8/9/05 2:24	21	White	F	145	98	DOD normotensive
49482	CT ABDOMEN W IV CONTRAST	8/2/05 13:45	30	White	F	159	55	DOD normotensive
49488	CT THORAX W IV CONTRAST	8/13/05 6:47	22	White	M	133	90	DOD normotensive
49494	CT THORAX W IV CONTRAST	8/16/05 18:24	49	White	F	135	90	DOD normotensive
49496	CT THORAX W IV CONTRAST	9/10/05 12:23	43	Asian	F	133	89	DOD normotensive
49504	CT ABDOMEN W IV CONTRAST	8/11/05 14:49	48	White	M	135	70	DOD normotensive
49508	CT ABDOMEN W IV CONTRAST	8/6/05 12:10	18	White	M	150	60	DOD normotensive
49510	CT ABDOMEN W IV CONTRAST	9/1/05 21:02	49	White	M	184	78	DOD normotensive
49564	CT ABDOMEN W IV CONTRAST	11/8/08 19:47	21	White	M	120	84	DOD normotensive
49621	CT THORAX W IV CONTRAST	9/8/11 8:43	30	White	M	123	72	DOD normotensive
49636	CT THORAX W IV CONTRAST	10/22/05 20:22	33	White	M	153	98	DOD normotensive
49648	CT THORAX W IV CONTRAST	4/10/11 4:45	20	Black	M	152	94	DOD normotensive
49656	CT THORAX W IV CONTRAST	2/3/11 21:57	41	Hispanic	M	139	97	DOD normotensive
49658	CT ABDOMEN W IV CONTRAST	10/30/10 3:12	30	Black	M	145	87	DOD normotensive
49848	CT ABDOMEN PELVIS W IV CONTRAST	6/21/11 7:05	23	Other	F	149	87	DOD normotensive

50376	CT ABDOMEN W IV CONTRAST	10/1/05 10:03	34	White	F	128	83	DOD normotensive
50378	CT ABDOMEN W IV CONTRAST	9/29/05 2:30	38	White	M	158	85	DOD normotensive
50382	CT THORAX W IV CONTRAST	7/31/05 4:36	49	White	M	136	97	DOD normotensive
50397	CT THORAX W IV CONTRAST	9/25/05 19:10	33	White	M	206	81	DOD normotensive
50406	CT THORAX W IV CONTRAST	7/25/05 22:50	30	White	M	142	78	DOD normotensive
50409	CT ABDOMEN W IV CONTRAST	11/8/08 19:47	21	White	M	120	84	DOD normotensive
50417	CT THORAX W IV CONTRAST	2/18/06 13:51	38	White	M	127	87	DOD normotensive
50419	CT ABDOMEN W IV CONTRAST	7/9/05 15:02	29	White	F	155	65	DOD normotensive
50422	CT THORAX W IV CONTRAST	2/1/09 16:39	26	White	F	124	100	DOD normotensive
50504	CT ABDOMEN PELVIS W IV CONTRAST	7/18/12 6:26	36	White	M	144	60	DOD normotensive
50790	CT THORAX W IV CONTRAST	7/9/05 22:40	39	White	F	127	86	DOD normotensive
50809	CT THORAX W IV CONTRAST	5/27/06 13:35	24	White	M	121	100	DOD normotensive
50811	CT ABDOMEN W IV CONTRAST	12/17/05 5:39	28	White	M	136	97	DOD normotensive
50814	CT ABDOMEN W IV CONTRAST	10/8/07 12:01	47	White	M	128	80	DOD normotensive
50815	CT ABDOMEN W IV CONTRAST	10/1/05 10:03	34	White	F	128	83	DOD normotensive
50816	CT ABDOMEN W IV CONTRAST	8/25/05 11:39	48	White	M	136	66	DOD normotensive
50817	CT ABDOMEN W IV CONTRAST	5/3/05 10:27	25	Hispanic	M	133	96	DOD normotensive
50826	CT ABDOMEN W IV CONTRAST	6/20/05 3:13	26	White	M	132	73	DOD normotensive
50827	CT ABDOMEN W IV CONTRAST	6/30/05 2:35	29	White	M	137	80	DOD normotensive
50834	CT THORAX W IV CONTRAST	6/21/07 22:15	44	White	F	140	69	DOD normotensive
50909	CT THORAX WO IV CONTRAST	11/7/10 1:12	49	Other	M	129	87	DOD normotensive
50921	CT THORAX W IV CONTRAST	11/30/10 19:43	19	Hispanic	F	127	96	DOD normotensive
50923	CT THORAX W IV CONTRAST	11/30/10 19:43	19	Hispanic	F	127	96	DOD normotensive
51583	CT ABDOMEN PELVIS W IV CONTRAST	7/27/12 4:27	41	White	F	127	71	DOD normotensive
51588	CT ABDOMEN W IV CONTRAST	12/23/05 20:21	30	White	M	150	82	DOD normotensive
51701	CT THORAX W IV CONTRAST	6/15/08 15:47	29	White	F	122	90	DOD normotensive
51743	CT ABDOMEN W IV CONTRAST	11/11/05 16:08	33	Hispanic	M	134	66	DOD normotensive
51768	CT ABDOMEN PELVIS W IV CONTRAST	6/4/11 4:31	26	White	M	155	84	DOD normotensive
51793	CT ABDOMEN W IV CONTRAST	2/8/03 22:52	18	Black	M	140	96	DOD normotensive
52495	CT OUTSIDE FILM CONSULT ABDOME	6/28/12 17:01	49	White	M	143	88	DOD normotensive

52510	CT OUTSIDE FILM CONSULT ABDOME	6/18/12 21:15	36	White	M	121	80	DOD normotensive
52660	CT ABDOMEN PELVIS W IV CONTRAS	1/14/13 8:35	41	White	M	137	80	DOD normotensive
52666	CT THORAX W IV CONTRAST	10/15/12 8:40	20	Black	M	126	85	DOD normotensive
52667	CT THORAX W IV CONTRAST	11/3/12 9:15	19	White	M	155	85	DOD normotensive
52684	CT THORAX W IV CONTRAST	7/23/12 21:57	39	Black	F	143	92	DOD normotensive
52686	CT THORAX W IV CONTRAST	5/15/12 23:38	29	White	M	154	65	DOD normotensive
52936	CT ABDOMEN PELVIS W IV CONTRAS	11/23/11 9:52	47	White	M	140	85	DOD normotensive
52937	CT THORAX W IV CONTRAST	10/23/11 15:29	48	White	M	177	91	DOD normotensive
52945	CT THORAX W IV CONTRAST	12/2/11 20:34	50	White	F	195	76	DOD normotensive
52949	CT THORAX W IV CONTRAST	3/5/12 15:51	49	White	M	165	100	DOD normotensive
52952	CT THORAX W IV CONTRAST	12/17/11 2:40	33	White	M	141	90	DOD normotensive
52957	CT OUTSIDE FILM CONSULT CHEST	12/21/11 4:23	22	White	M	157	94	DOD normotensive
52963	CT ABDOMEN PELVIS W IV CONTRAS	2/22/12 7:30	48	White	F	140	78	DOD normotensive
53737	CT ABDOMEN WO IV CONTRAST	3/8/06 19:17	42	White	M	209	88	DOD normotensive
53742	CT ABDOMEN W IV CONTRAST	2/6/06 21:29	48	Black	M	162	90	DOD normotensive
53743	CT THORAX W IV CONTRAST	2/21/06 20:18	23	White	M	131	96	DOD normotensive
53748	CT ABDOMEN W IV CONTRAST	2/11/06 20:41	41	White	M	152	68	DOD normotensive
53834	CT THORAX W IV CONTRAST	10/11/11 6:16	34	Black	M	152	75	DOD normotensive
53837	CT THORAX W IV CONTRAST	10/23/11 15:29	48	White	M	177	91	DOD normotensive
53845	CT THORAX W IV CONTRAST	10/18/11 10:09	29	White	M	127	65	DOD normotensive
53846	CT THORAX W IV CONTRAST	10/22/11 18:27	31	White	M	128	71	DOD normotensive
53847	CT ABDOMEN PELVIS W IV CONTRAS	10/2/11 2:52	22	White	M	159	64	DOD normotensive
53849	CT THORAX W IV CONTRAST	10/6/11 17:56	31	White	F	125	78	DOD normotensive
53851	CT THORAX W IV CONTRAST	10/8/11 12:08	26	Black	M	145	68	DOD normotensive
53854	CT THORAX W IV CONTRAST	10/2/11 5:01	27	White	M	135	99	DOD normotensive
53858	CT ABDOMEN PELVIS W IV CONTRAS	10/23/11 14:43	37	White	M	130	96	DOD normotensive
53875	CT OUTSIDE FILM CONSULT CHEST	10/23/11 2:21	21	White	M	167	76	DOD normotensive
53879	CT THORAX W IV CONTRAST	10/24/11 23:07	28	Hispanic	F	155	94	DOD normotensive
53898	CT ABDOMEN PELVIS W IV CONTRAS	11/10/11 23:08	20	White	F	127	78	DOD normotensive
53910	CT ABDOMEN PELVIS W IV CONTRAS	12/13/11 7:35	33	White	M	139	96	DOD normotensive

53914	CT ABDOMEN PELVIS W IV CONTRAST	12/10/11 10:06	45	White	F	143	77	DOD normotensive
53939	CT THORAX W IV CONTRAST	12/18/11 6:43	41	White	M	193	78	DOD normotensive
53956	CT ABDOMEN PELVIS W IV CONTRAST	1/13/12 16:51	34	White	M	158	75	DOD normotensive
53957	CT ABDOMEN PELVIS W IV CONTRAST	1/13/12 2:36	20	White	M	137	98	DOD normotensive
53966	CT ABDOMEN PELVIS W IV CONTRAST	2/4/12 5:45	25	Black	F	129	94	DOD normotensive
53969	CT ABDOMEN PELVIS W IV CONTRAST	1/28/12 12:40	19	White	M	139	66	DOD normotensive
53974	CT THORAX W IV CONTRAST	2/10/12 22:20	46	White	M	171	100	DOD normotensive
53979	CT THORAX W IV CONTRAST	3/5/12 18:16	35	White	F	185	88	DOD normotensive
53990	CT ABDOMEN PELVIS W IV CONTRAST	3/3/12 0:58	29	White	M	137	77	DOD normotensive
54023	CT ABDOMEN PELVIS W IV CONTRAST	3/30/12 16:23	48	White	M	199	98	DOD normotensive
54025	CT THORAX W IV CONTRAST	4/18/12 19:18	25	White	M	142	85	DOD normotensive
54028	CT THORAX W IV CONTRAST	4/17/12 20:55	24	White	F	151	88	DOD normotensive
54049	CT THORAX W IV CONTRAST	5/6/12 20:40	28	White	M	152	65	DOD normotensive
54055	CT ABDOMEN PELVIS W IV CONTRAST	7/15/12 5:24	27	White	F	148	93	DOD normotensive
54066	CT ABDOMEN PELVIS W IV CONTRAST	7/25/12 2:05	48	White	M	124	84	DOD normotensive
54073	CT THORAX W IV CONTRAST	6/30/12 1:12	29	White	F	143	80	DOD normotensive
54080	CT ABDOMEN PELVIS W IV CONTRAST	8/1/12 8:03	23	White	F	134	76	DOD normotensive
54106	CT THORAX W IV CONTRAST	8/22/12 0:46	44	White	M	147	80	DOD normotensive
54111	CT OUTSIDE FILM CONSULT CHEST	8/20/12 23:38	23	Black	M	137	88	DOD normotensive
54165	CT THORAX W IV CONTRAST	5/26/12 19:25	43	White	M	127	86	DOD normotensive
54166	CT ABDOMEN PELVIS W IV CONTRAST	5/24/12 21:08	50	White	F	122	90	DOD normotensive
54170	CT THORAX W IV CONTRAST	5/12/12 17:45	19	White	M	141	86	DOD normotensive
54174	CT ABDOMEN PELVIS W IV CONTRAST	5/23/12 14:45	33	White	M	133	72	DOD normotensive
54177	CT OUTSIDE FILM CONSULT ABDOME	6/13/12 0:00	24	Black	M	151	100	DOD normotensive
54186	CT ABDOMEN PELVIS W IV CONTRAST	4/29/12 21:52	22	White	F	159	86	DOD normotensive
54189	CT ABDOMEN W IV CONTRAST	8/21/12 14:45	27	White	F	126	86	DOD normotensive
54216	CT OUTSIDE FILM CONSULT ABDOME	6/4/12 21:56	41	White	M	133	68	DOD normotensive
54217	CT ABDOMEN PELVIS W IV CONTRAST	5/28/12 8:56	35	White	F	140	86	DOD normotensive
54218	CT ABDOMEN PELVIS W IV CONTRAST	6/1/12 17:02	32	Other	M	163	74	DOD normotensive
54308	CT THORAX W IV CONTRAST	9/4/12 1:32	45	White	M	133	98	DOD normotensive

54311	CT OUTSIDE FILM CONSULT ABDOME	9/4/12 0:00	30	White	M	141	68	DOD	normotensive
54312	CT THORAX W IV CONTRAST	9/5/12 19:58	31	White	M	121	82	DOD	normotensive
54320	CT THORAX W IV CONTRAST	6/30/12 22:09	44	White	M	156	95	DOD	normotensive
54322	CT THORAX W IV CONTRAST	6/22/12 20:53	26	White	M	121	85	DOD	normotensive
54323	CT ABDOMEN PELVIS W IV CONTRAST	6/16/12 5:34	25	White	M	154	87	DOD	normotensive
54328	CT THORAX W IV CONTRAST	6/30/12 0:17	21	White	M	128	77	DOD	normotensive
54331	CT ABDOMEN PELVIS WO IV CONTRA	6/24/12 15:31	36	White	M	147	59	DOD	normotensive
54356	CT ABDOMEN PELVIS W IV CONTRAST	9/12/12 3:35	43	White	F	123	88	DOD	normotensive
54365	CT ABDOMEN PELVIS W IV CONTRAST	9/10/12 19:35	33	White	F	140	75	DOD	normotensive
54376	CT THORAX W IV CONTRAST	9/25/12 23:27	25	White	M	137	93	DOD	normotensive
54378	CT ABDOMEN PELVIS W IV CONTRAST	9/22/12 4:30	28	Black	M	148	99	DOD	normotensive
54380	CT THORAX W IV CONTRAST	10/1/12 19:37	49	White	M	153	97	DOD	normotensive
54381	CT THORAX W IV CONTRAST	9/30/12 20:31	23	White	M	141	62	DOD	normotensive
54393	CT THORAX W IV CONTRAST	10/28/12 19:53	36	White	M	178	56	DOD	normotensive
54398	CT ABDOMEN PELVIS W IV CONTRAST	10/14/12 18:12	37	White	M	157	66	DOD	normotensive
54418	CT THORAX W IV CONTRAST	10/22/12 23:37	32	Black	M	122	83	DOD	normotensive
54420	CT THORAX W IV CONTRAST	10/18/12 19:14	42	White	F	142	87	DOD	normotensive
54426	CT ABDOMEN PELVIS W IV CONTRAST	10/20/12 21:26	26	Other	F	125	82	DOD	normotensive
54429	CT ABDOMEN PELVIS W IV CONTRAST	11/4/12 3:21	28	White	M	133	90	DOD	normotensive
54431	CT THORAX W IV CONTRAST	11/10/12 14:23	49	Asian	M	141	73	DOD	normotensive
54435	CT ABDOMEN PELVIS W IV CONTRAST	12/22/12 16:27	50	Black	M	121	94	DOD	normotensive
54437	CT OUTSIDE FILM CONSULT CHEST	12/23/12 20:34	43	White	M	133	64	DOD	normotensive
54438	CT ABDOMEN PELVIS W IV CONTRAST	11/27/12 14:26	19	White	F	147	64	DOD	normotensive
54444	CT OUTSIDE FILM CONSULT ABDOME	12/21/12 6:23	47	White	M	157	77	DOD	normotensive
54514	CT ABDOMEN PELVIS W IV CONTRAST	11/24/12 0:28	24	Unk	M	135	80	DOD	normotensive
54519	CT THORAX W IV CONTRAST	11/24/12 4:39	26	Black	M	153	100	DOD	normotensive
54540	CT ABDOMEN PELVIS W IV CONTRAST	12/18/12 23:34	25	White	F	160	98	DOD	normotensive
55254	CT POST PROCESSED T SPINE	2/20/13 18:34	32	Black	F	125	82	DOD	normotensive
55946	CT ABDOMEN W IV CONTRAST	3/21/05 13:51	38	White	M	134	75	DOD	normotensive
55985	CT THORAX W IV CONTRAST	6/1/09 19:34	23	White	F	129	91	DOD	normotensive

56354	CT THORAX W IV CONTRAST	9/2/03 20:57	25	White	M	150	79	DOD normotensive
56365	CT ABDOMEN W IV CONTRAST	12/20/03 2:07	22	Asian	F	131	71	DOD normotensive
57226	CT ABDOMEN W IV CONTRAST	7/8/04 4:46	18	Black	M	145	97	DOD normotensive
57875	CT ABDOMEN PELVIS W IV CONTRAST	7/12/11 3:15	22	White	M	137	74	DOD normotensive
57878	CT THORAX W IV CONTRAST	7/12/05 20:56	27	White	M	136	68	DOD normotensive
57879	CT ABDOMEN W IV CONTRAST	9/2/05 13:42	49	White	F	163	77	DOD normotensive
57891	CT ABDOMEN W IV CONTRAST	9/11/05 0:02	29	White	M	143	95	DOD normotensive
57894	CT ABDOMEN PELVIS W IV CONTRAST	7/2/11 21:00	47	White	M	131	59	DOD normotensive
57898	CT THORAX W IV CONTRAST	6/26/05 18:52	37	White	M	133	90	DOD normotensive
57899	CT ABDOMEN W IV CONTRAST	8/28/05 6:33	50	Black	M	149	86	DOD normotensive
57903	CT ABDOMEN PELVIS W IV CONTRAST	8/15/11 13:21	19	White	M	134	93	DOD normotensive
57905	CT ABDOMEN W IV CONTRAST	5/31/05 18:49	19	White	F	131	81	DOD normotensive
57906	CT ABDOMEN W IV CONTRAST	9/4/05 18:03	29	Black	M	147	78	DOD normotensive
57909	CT ABDOMEN W IV CONTRAST	8/30/05 21:15	24	White	M	141	92	DOD normotensive
57917	CT ABDOMEN PELVIS W IV CONTRAST	4/10/11 3:00	20	White	M	124	64	DOD normotensive
57950	CT ABDOMEN W IV CONTRAST	7/11/10 23:32	44	White	M	155	70	DOD normotensive
57951	CT ABDOMEN W IV CONTRAST	9/25/05 16:03	30	White	F	134	84	DOD normotensive
57954	CT ABDOMEN PELVIS W IV CONTRAST	1/23/11 16:19	42	White	M	145	85	DOD normotensive
57955	CT ABDOMEN W IV CONTRAST	8/21/10 23:29	42	White	M	128	76	DOD normotensive
57981	CT ABDOMEN W IV CONTRAST	1/1/05 17:04	33	White	F	147	94	DOD normotensive
57985	CT THORAX W IV CONTRAST	12/26/04 14:30	42	Black	F	149	74	DOD normotensive
57986	CT ABDOMEN W IV CONTRAST	6/5/04 13:49	27	White	M	131	97	DOD normotensive
57987	CT ABDOMEN W IV CONTRAST	5/21/04 0:46	45	White	M	125	90	DOD normotensive
57992	CT ABDOMEN W IV CONTRAST	1/27/05 4:43	21	White	M	146	74	DOD normotensive
57995	CT ABDOMEN W IV CONTRAST	7/25/04 21:20	21	White	M	141	92	DOD normotensive
57996	CT THORAX W IV CONTRAST	3/24/05 22:54	48	White	M	139	96	DOD normotensive
58006	CT ABDOMEN W IV CONTRAST	9/4/03 21:44	25	White	M	132	99	DOD normotensive
58007	CT ABDOMEN W IV CONTRAST	2/19/04 18:17	20	White	M	122	93	DOD normotensive
58011	CT ABDOMEN W IV CONTRAST	11/21/03 23:25	49	White	M	137	69	DOD normotensive
58015	CT ABDOMEN W IV CONTRAST	9/25/03 21:52	20	White	F	137	84	DOD normotensive

58024	CT ABDOMEN W IV CONTRAST	11/18/03 18:22	45	White	M	158	75	DOD normotensive
58027	CT ABDOMEN WO IV CONTRAST	4/5/04 21:42	24	White	M	155	96	DOD normotensive
58030	CT ABDOMEN W IV CONTRAST	1/11/04 3:39	19	White	M	136	97	DOD normotensive
58032	CT THORAX W IV CONTRAST	2/26/04 16:31	45		M	158	85	DOD normotensive
58034	CT ABDOMEN W IV CONTRAST	10/3/05 0:12	19	White	M	140	61	DOD normotensive
58036	CT THORAX W IV CONTRAST	9/29/05 15:45	49	White	F	122	95	DOD normotensive
58042	CT ABDOMEN W IV CONTRAST	10/17/05 15:31	46	White	F	159	86	DOD normotensive
58043	CT ABDOMEN W IV CONTRAST	10/24/05 12:22	20	White	M	138	90	DOD normotensive
58045	CT ABDOMEN W IV CONTRAST	10/22/05 21:37	46	Black	F	169	100	DOD normotensive
58055	CT ABDOMEN W IV CONTRAST	7/7/03 17:47	28	White	F	137	79	DOD normotensive
58057	CT ABDOMEN W IV CONTRAST	5/27/03 19:40	46	White	M	157	68	DOD normotensive
58075	CT ABDOMEN PELVIS W IV CONTRAST	3/20/11 20:34	43	Hispanic	M	123	96	DOD normotensive
58101	CT ABDOMEN W IV CONTRAST	4/8/07 14:52	18	White	F	138	70	DOD normotensive
58104	CT OUTSIDE FILM CONSULT CHEST	12/29/06 0:32	32	Black	F	124	79	DOD normotensive
58111	CT THORAX W IV CONTRAST	11/5/05 18:12	40	White	M	145	64	DOD normotensive
58135	CT OUTSIDE FILM CONSULT ABDOME	3/30/08 14:03	36	White	M	136	67	DOD normotensive
58288	CT THORAX W IV CONTRAST	6/14/08 12:23	38	White	F	120	94	DOD normotensive
58294	CT THORAX W IV CONTRAST	10/5/07 8:08	43	White	M	151	77	DOD normotensive
59296	CT ABDOMEN PELVIS W IV CONTRAST	4/7/13 3:42	42	White	M	140	95	DOD normotensive
59297	CT ABDOMEN PELVIS W IV CONTRAST	4/7/13 3:06	28	White	M	128	97	DOD normotensive
59298	CT ABDOMEN PELVIS WO IV CONTRA	4/7/13 21:06	42	White	F	122	96	DOD normotensive
59318	CT ABDOMEN PELVIS W IV CONTRAST	4/12/13 22:29	44	White	M	160	89	DOD normotensive
59325	CT ABDOMEN PELVIS W IV CONTRAST	11/15/12 20:25	26	White	M	166	84	DOD normotensive
59330	CT ABDOMEN PELVIS W IV CONTRAST	12/2/12 2:10	34	White	M	134	79	DOD normotensive
59331	CT ABDOMEN PELVIS W IV CONTRAST	11/16/12 14:29	33	White	F	132	84	DOD normotensive
59340	CT ABDOMEN PELVIS W IV CONTRAST	1/17/13 9:48	39	White	M	203	82	DOD normotensive
59343	CT ABDOMEN PELVIS W IV CONTRAST	1/22/13 7:14	24	White	M	132	88	DOD normotensive
59356	CT ABDOMEN PELVIS W IV CONTRAST	1/29/13 17:40	34	Asian	M	129	86	DOD normotensive
59363	CT OUTSIDE FILM CONSULT ABDOME	2/10/13 17:50	23	White	F	126	69	DOD normotensive
59370	CT OUTSIDE FILM CONSULT ABDOME	2/17/13 18:01	37	White	F	162	98	DOD normotensive

59371	CT ABDOMEN PELVIS W IV CONTRAS	2/23/13 22:15	18	White	M	154	82	DOD normotensive
59375	CT ABDOMEN PELVIS W IV CONTRAS	2/23/13 1:22	45	White	M	153	82	DOD normotensive
59377	CT ABDOMEN PELVIS W IV CONTRAS	2/16/13 18:07	33	White	M	147	100	DOD normotensive
59386	CT ABDOMEN PELVIS W IV CONTRAS	3/6/13 6:30	27	White	M	168	68	DOD normotensive
59387	CT ABDOMEN PELVIS W IV CONTRAS	3/18/13 19:05	41	White	M	191	95	DOD normotensive
59390	CT ABDOMEN PELVIS W IV CONTRAS	2/18/13 11:28	40	White	M	125	62	DOD normotensive
59396	CT OUTSIDE FILM CONSULT CHEST	1/1/13 1:40	43	White	M	127	67	DOD normotensive
59484	CT ABDOMEN PELVIS W IV CONTRAS	3/26/13 20:37	31	White	M	122	99	DOD normotensive
59488	CT ABDOMEN PELVIS W IV CONTRAS	3/30/13 0:39	19	White	M	125	83	DOD normotensive
59489	CT ABDOMEN PELVIS W IV CONTRAS	3/23/13 12:34	24	White	F	141	87	DOD normotensive
59743	CT ABDOMEN W IV CONTRAST	12/13/02 19:11	18	Hispanic	M	123	67	DOD normotensive
60663	CT ABDOMEN W IV CONTRAST	8/25/10 18:44	34	Black	M	158	100	DOD normotensive
60682	CT ABDOMEN W IV CONTRAST	9/22/10 7:15	45	Black	M	142	92	DOD normotensive
60688	CT ABDOMEN W IV CONTRAST	9/18/10 14:57	24	White	F	129	98	DOD normotensive
60914	CT ABDOMEN W IV CONTRAST	1/14/04 14:25	19	White	M	147	78	DOD normotensive
60915	CT ABDOMEN W IV CONTRAST	9/10/03 5:14	19	Black	M	149	99	DOD normotensive
60917	CT ABDOMEN W IV CONTRAST	10/12/03 11:37	20	White	M	159	89	DOD normotensive
60924	CT THORAX W IV CONTRAST	1/26/04 10:37	19	Hispanic	M	144	85	DOD normotensive
60927	CT THORAX W IV CONTRAST	2/5/05 20:18	19	White	M	158	61	DOD normotensive
60928	CT ABDOMEN W IV CONTRAST	1/20/03 11:58	20	White	M	143	75	DOD normotensive
60929	CT ABDOMEN W IV CONTRAST	2/11/03 11:35	19	White	M	178	63	DOD normotensive
60931	CT ABDOMEN W IV CONTRAST	7/4/03 21:33	19	Black	M	144	72	DOD normotensive
60935	CT THORAX W IV CONTRAST	3/21/04 5:06	19	White	M	140	100	DOD normotensive
60936	CT ABDOMEN W IV CONTRAST	10/26/03 3:21	18	White	M	145	95	DOD normotensive
60938	CT ABDOMEN W IV CONTRAST	4/29/04 5:04	18	White	M	140	83	DOD normotensive
60939	CT ABDOMEN W IV CONTRAST	8/4/05 23:14	20	Hispanic	F	141	96	DOD normotensive
60940	CT ABDOMEN WO IV CONTRAST	5/11/04 17:37	19	White	M	125	54	DOD normotensive
60944	CT ABDOMEN W IV CONTRAST	3/15/05 21:28	20	White	M	145	84	DOD normotensive
60946	CT ABDOMEN W IV CONTRAST	7/10/05 21:47	19	White	M	144	57	DOD normotensive
60947	CT THORAX W IV CONTRAST	7/22/05 18:55	20	White	M	150	94	DOD normotensive

60948	CT ABDOMEN W IV CONTRAST	9/11/05 2:09	20	White	M	125	81	DOD normotensive
60950	CT THORAX W IV CONTRAST	11/3/05 8:03	20	White	M	158	77	DOD normotensive
61097	CT OUTSIDE FILM CONSULT ABDOME	2/19/11 4:03	19	White	M	126	94	DOD normotensive
66249	CT ABDOMEN W IV CONTRAST	8/14/10 1:39	26	White	M	176	85	DOD normotensive
66703	CT ABDOMEN W IV CONTRAST	4/12/10 10:52	43	Black	F	148	97	DOD normotensive
68795	CT THORAX W IV CONTRAST	9/9/09 2:54	35	White	M	181	66	DOD normotensive
68796	CT THORAX W IV CONTRAST	3/20/08 15:26	31	White	M	133	84	DOD normotensive
68797	CT THORAX W IV CONTRAST	9/22/08 9:26	36	White	M	149	100	DOD normotensive
68799	CT THORAX W IV CONTRAST	12/31/07 14:32	36	White	M	186	68	DOD normotensive
68800	CT THORAX W IV CONTRAST	6/6/10 22:24	45	White	F	145	80	DOD normotensive
68802	CT THORAX W IV CONTRAST	12/14/10 11:21	41	White	M	159	95	DOD normotensive
68803	CT THORAX W IV CONTRAST	11/1/10 2:06	19	White	M	143	96	DOD normotensive
68804	CT THORAX W IV CONTRAST	10/2/10 14:11	19	White	M	144	84	DOD normotensive
68806	CT THORAX W IV CONTRAST	4/15/12 18:16	18	White	M	159	86	DOD normotensive
68807	CT THORAX W IV CONTRAST	2/4/12 5:45	25	Black	F	129	94	DOD normotensive
68808	CT THORAX W IV CONTRAST	12/5/11 3:06	37	White	M	135	98	DOD normotensive
68812	CT ANGIO CHEST WO AND W CONTR.	8/1/12 8:03	23	White	F	134	76	DOD normotensive
68816	CT THORAX W IV CONTRAST	11/16/12 14:29	33	White	F	132	84	DOD normotensive
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71933	CT THORAX W IV CONTRAST	8/12/06 18:03	21	White	F	131	65	DOD normotensive
71934	CT THORAX W IV CONTRAST	6/10/06 15:44	19	White	M	146	50	DOD normotensive
71935	CT ABDOMEN W IV CONTRAST	7/17/06 19:16	19	White	M	164	86	DOD normotensive
71936	CT ABDOMEN WO IV CONTRAST	10/10/06 3:09	39	White	M	157	96	DOD normotensive
71937	CT THORAX W IV CONTRAST	7/1/06 0:27	50	White	M	133	72	DOD normotensive
71938	CT ANGIO CHEST WO AND W CONTR.	10/22/10 21:40	50	White	F	147	74	DOD normotensive
71939	CT THORAX W IV CONTRAST	8/6/06 21:58	32	White	M	125	70	DOD normotensive

71940	CT THORAX W IV CONTRAST	9/22/05 6:24	22	White	M	197	95	DOD normotensive
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71943	CT THORAX W IV CONTRAST	6/18/06 17:07	49	White	M	154	74	DOD normotensive
71945	CT THORAX W IV CONTRAST	7/17/05 3:04	42	White	F	123	92	DOD normotensive
71946	CT THORAX W IV CONTRAST	10/1/05 13:25	46	White	M	165	74	DOD normotensive
71947	CT THORAX WO IV CONTRAST	9/23/05 6:27	30	Black	F	164	93	DOD normotensive
71948	CT THORAX W IV CONTRAST	10/29/05 4:48	26	Black	M	193	86	DOD normotensive
71949	CT ABDOMEN W IV CONTRAST	9/14/05 14:25	29	White	M	154	90	DOD normotensive
71950	CT OUTSIDE FILM CONSULT CHEST	8/24/07 22:05	18	Other	M	147	54	DOD normotensive
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71952	CT THORAX W IV CONTRAST	8/3/06 18:41	30	White	M	152	67	DOD normotensive
71953	CT OUTSIDE FILM CONSULT CHEST	12/17/09 20:39	50	White	M	151	87	DOD normotensive
71954	CT THORAX W IV CONTRAST	10/29/11 0:54	21	Black	M	129	85	DOD normotensive
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71956	CT THORAX W IV CONTRAST	7/20/06 13:07	33	White	F	131	80	DOD normotensive
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71958	CT THORAX W IV CONTRAST	5/10/07 8:26	47	Other	M	152	87	DOD normotensive
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71960	CT ABDOMEN W IV CONTRAST	10/10/05 7:58	42	White	M	159	99	DOD normotensive
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71963	CT ABDOMEN W IV CONTRAST	11/8/06 21:43	20	White	M	165	91	DOD normotensive
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71965	CT ABDOMEN W IV CONTRAST	7/8/06 21:10	25	White	F	121	66	DOD normotensive
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71974	CT ABDOMEN W IV CONTRAST	10/30/05 17:33	38	White	M	153	90	DOD normotensive
71975	CT ABDOMEN W IV CONTRAST	6/19/06 21:17	20	White	M	182	88	DOD normotensive
71976	CT ABDOMEN W IV CONTRAST	11/3/05 13:31	21	White	M	159	74	DOD normotensive
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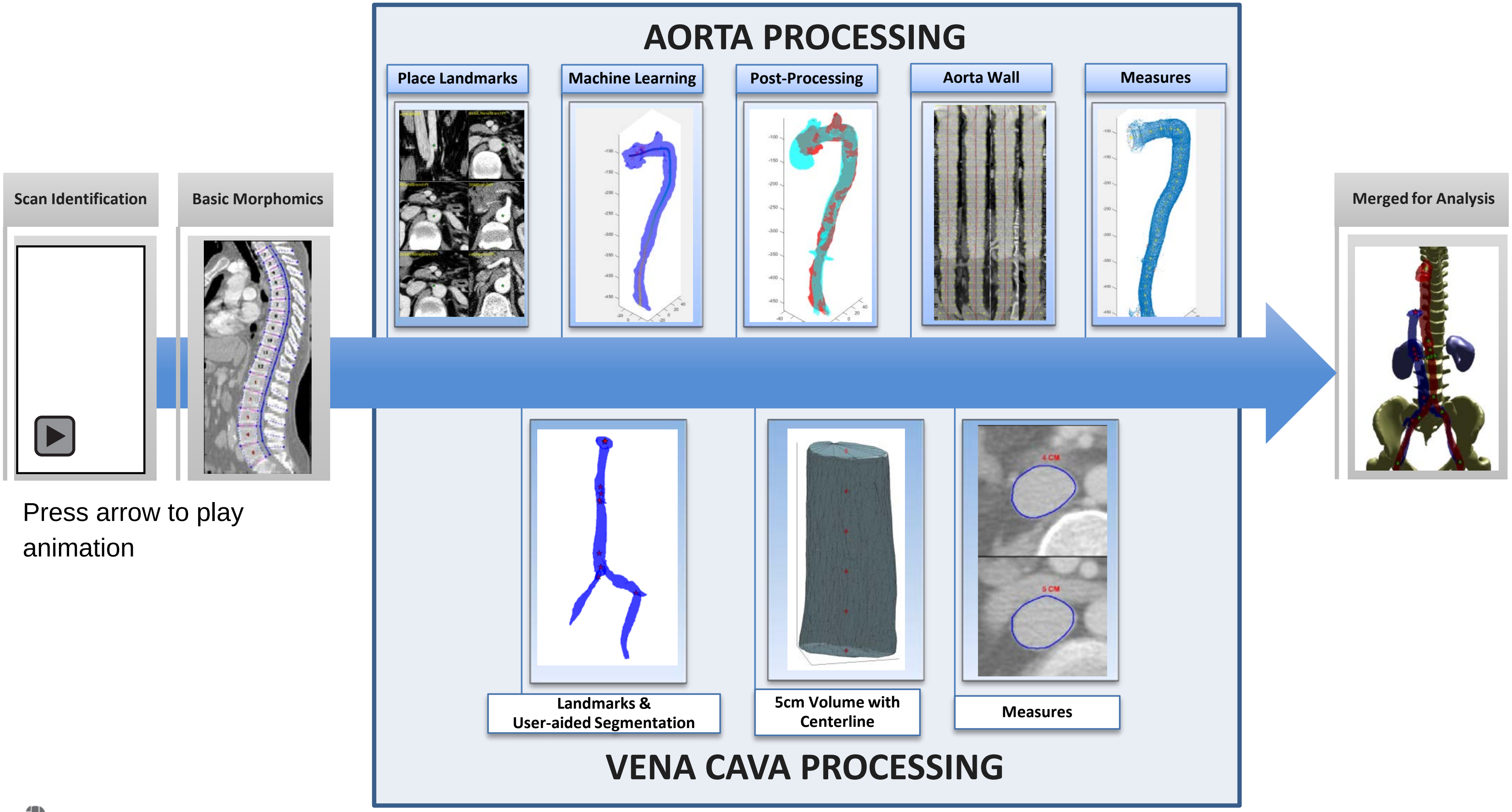
72574	CT OUTSIDE FILM CONSULT ABDOME	6/24/11 23:50	49	White	M	131	96	DOD normotensive
72575	CT OUTSIDE FILM CONSULT ABDOME	12/18/10 23:49	42	Other	M	122	79	DOD normotensive
72576	CT ABDOMEN W IV CONTRAST	10/21/06 11:06	47	White	M	134	62	DOD normotensive
72577	CT OUTSIDE FILM CONSULT ABDOME	12/2/10 21:04	35	Hispanic	M	153	70	DOD normotensive
72578	CT OUTSIDE FILM CONSULT CHEST	1/7/11 16:32	25	White	M	175	79	DOD normotensive
72579	CT ABDOMEN W IV CONTRAST	7/22/06 19:36	45	White	M	136	99	DOD normotensive
72580	CT ABDOMEN W IV CONTRAST	7/11/04 5:03	47		M	137	94	DOD normotensive
72581	CT ABDOMEN W IV CONTRAST	7/24/04 9:02	23	White	F	125	85	DOD normotensive
72582	CT ABDOMEN W IV CONTRAST	11/1/09 11:27	19	White	M	148	89	DOD normotensive
72583	CT ABDOMEN W IV CONTRAST	7/29/06 21:10	31	White	M	142	95	DOD normotensive
72584	CT ABDOMEN PELVIS W IV CONTRAST	9/30/12 21:27	34	White	M	145	96	DOD normotensive
72585	CT OUTSIDE FILM CONSULT ABDOME	8/30/07 22:08	50	White	M	164	97	DOD normotensive
72586	CT OUTSIDE FILM CONSULT ABDOME	8/6/07 13:30	47	Black	F	159	64	DOD normotensive
72587	CT ABDOMEN W IV CONTRAST	7/29/06 19:46	46	Black	M	137	90	DOD normotensive
72588	CT OUTSIDE FILM CONSULT CHEST	10/7/10 15:35	46	White	M	156	95	DOD normotensive
72589	CT ABDOMEN W IV CONTRAST	10/14/05 0:58	23	Black	M	182	80	DOD normotensive
72590	CT ABDOMEN W IV CONTRAST	7/11/04 4:26	22	White	M	137	96	DOD normotensive
72591	CT ABDOMEN PELVIS W IV CONTRAST	4/19/12 3:13	24	Asian	M	120	96	DOD normotensive

72592	CT ABDOMEN W IV CONTRAST	2/7/05 7:12	27	Black	M	148	83	DOD normotensive
72593	CT ABDOMEN W IV CONTRAST	1/6/05 20:43	38	White	M	153	83	DOD normotensive
72594	CT OUTSIDE FILM CONSULT CHEST	5/18/06 17:05	28	White	M	142	92	DOD normotensive
72595	CT OUTSIDE FILM CONSULT CHEST	10/29/08 17:04	18	Black	M	153	95	DOD normotensive
72596	CT ABDOMEN W IV CONTRAST	8/29/04 6:59	24	White	M	140	77	DOD normotensive
72597	CT ABDOMEN W IV CONTRAST	8/27/04 3:24	34	Black	M	126	79	DOD normotensive
72598	CT ABDOMEN W IV CONTRAST	7/22/04 6:54	24	White	M	133	80	DOD normotensive
72599	CT ABDOMEN W IV CONTRAST	8/24/04 20:29	46	White	M	158	79	DOD normotensive
72600	CT ABDOMEN W IV CONTRAST	10/6/04 6:02	26	White	M	148	93	DOD normotensive
72601	CT ABDOMEN W IV CONTRAST	9/10/04 15:58	28	White	M	138	98	DOD normotensive
72602	CT ABDOMEN W IV CONTRAST	6/17/06 17:49	33	White	M	125	49	DOD normotensive
72603	CT ABDOMEN W IV CONTRAST	9/18/06 10:20	29	Hispanic	M	163	95	DOD normotensive
72604	CT OUTSIDE FILM CONSULT CHEST	3/21/06 13:05	48	White	M	155	70	DOD normotensive

Appendix B: Vascular Processing

Vascular Processing Methodology



Press arrow to play animation

Aorta Centerline

Press arrow to play animation

Segmented Aorta and Vena Cava in situ

Press arrow to play animation

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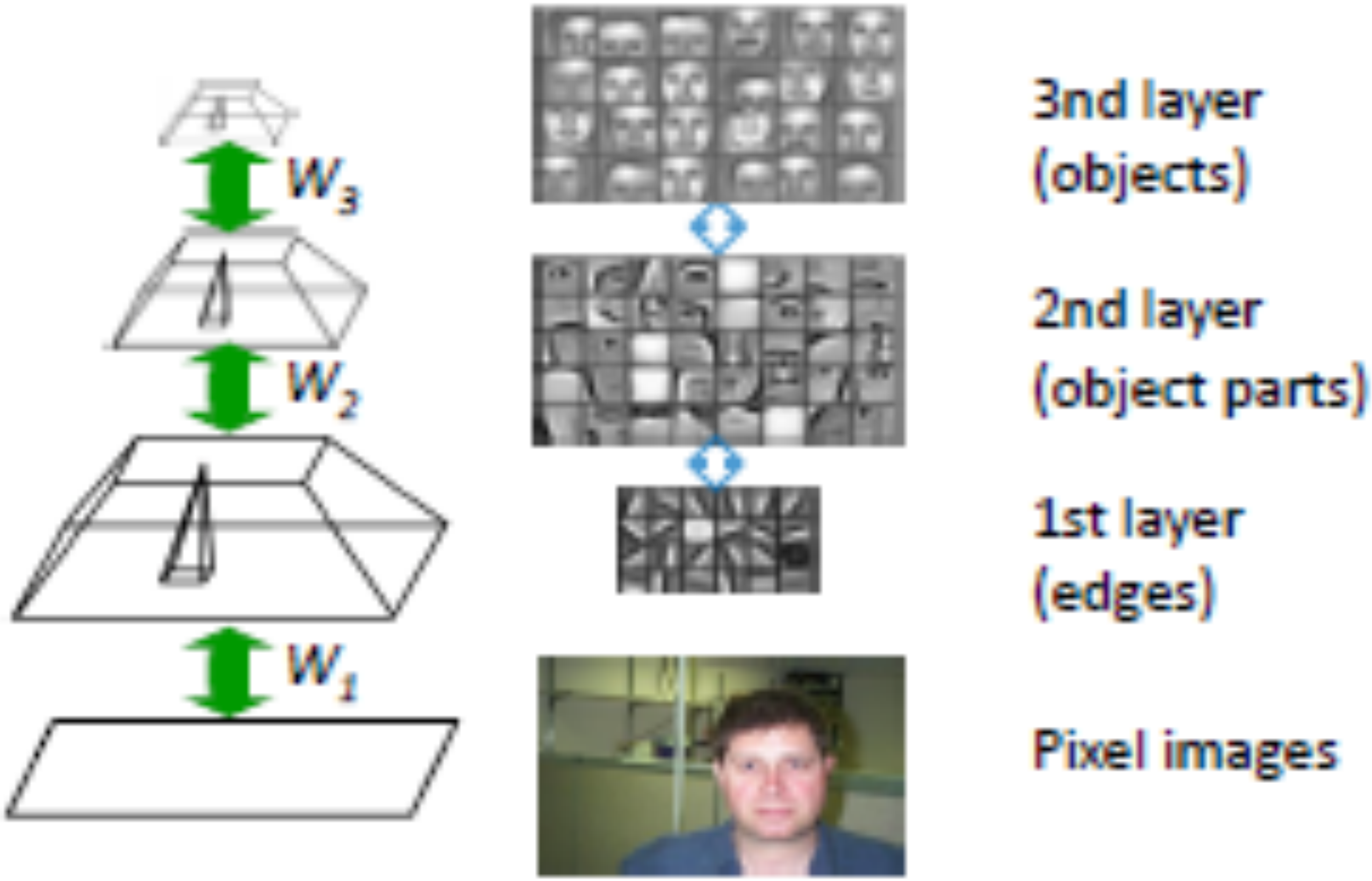
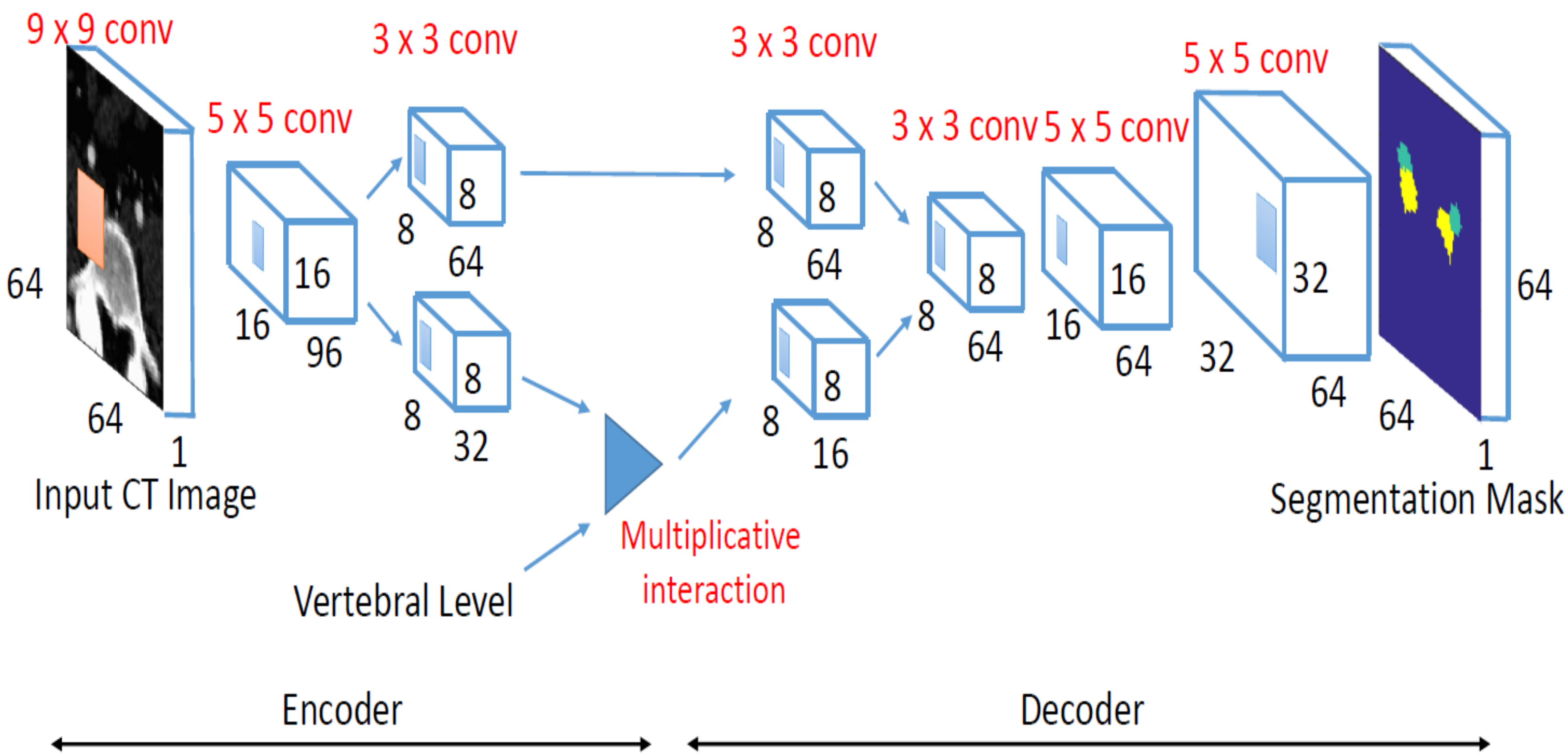
Appendix C: Machine Learning

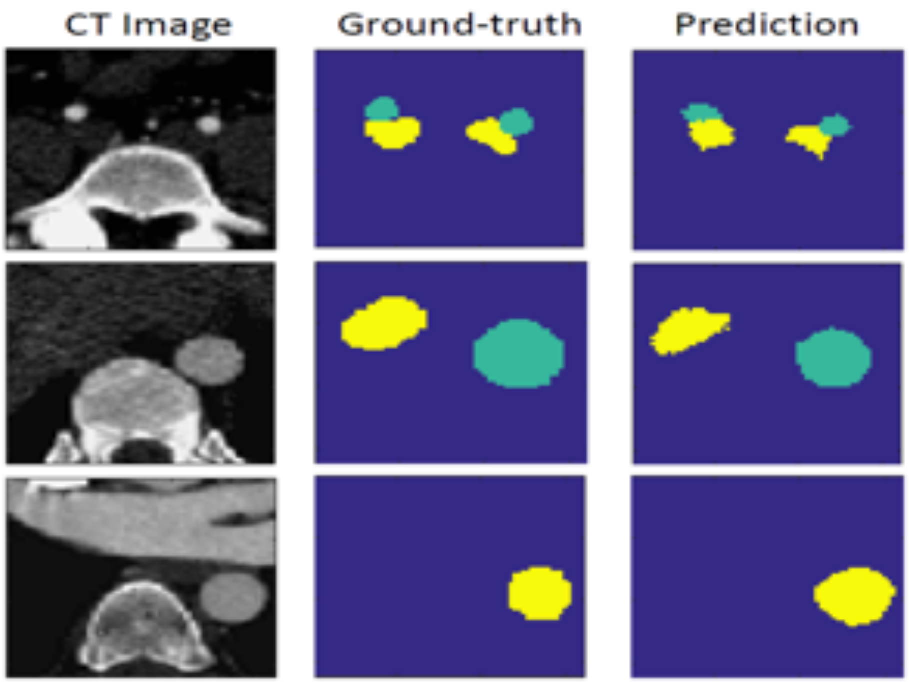
Facial Recognition

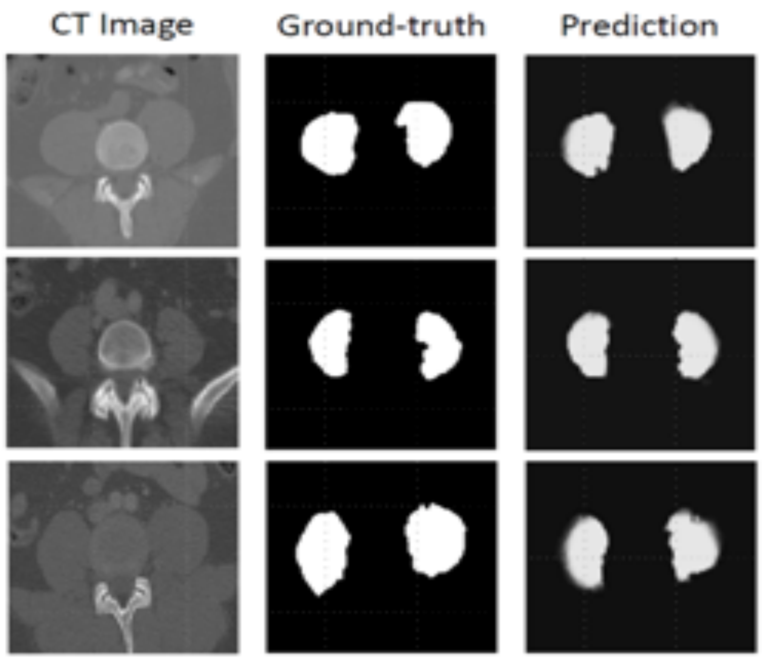


Analytic morphomics convolutional neural networks (CNN)



Machine Learning Results

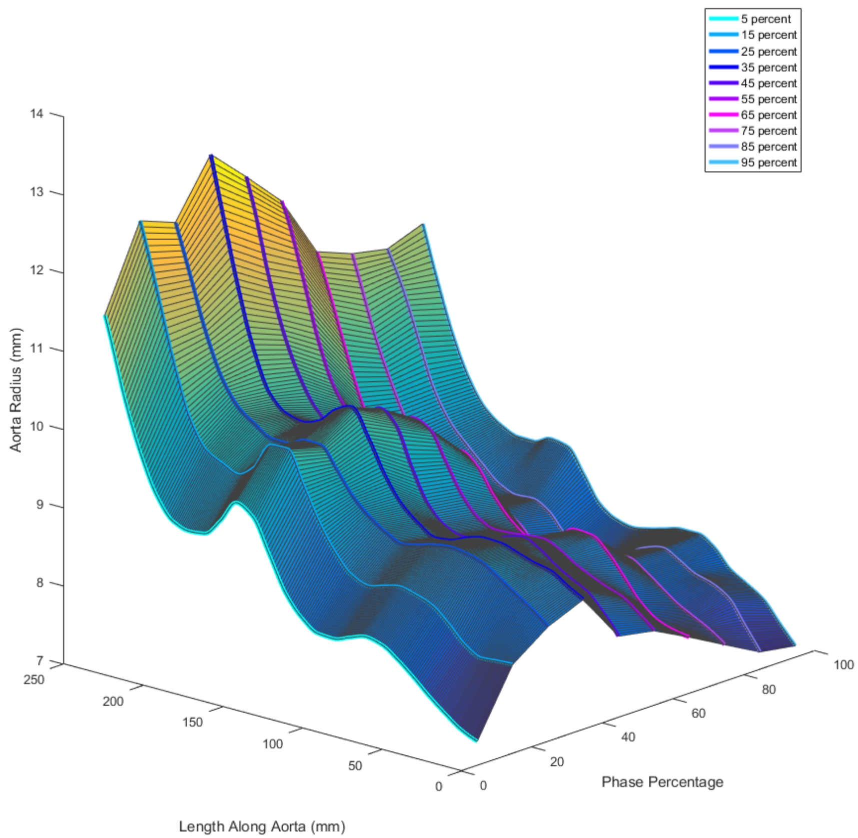


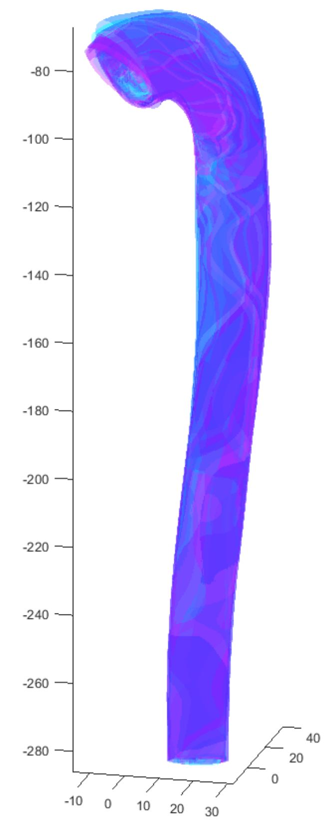


Aorta and Vena Cava

Psoas

Appendix D: Phase Overlay & Gated Radius Graph



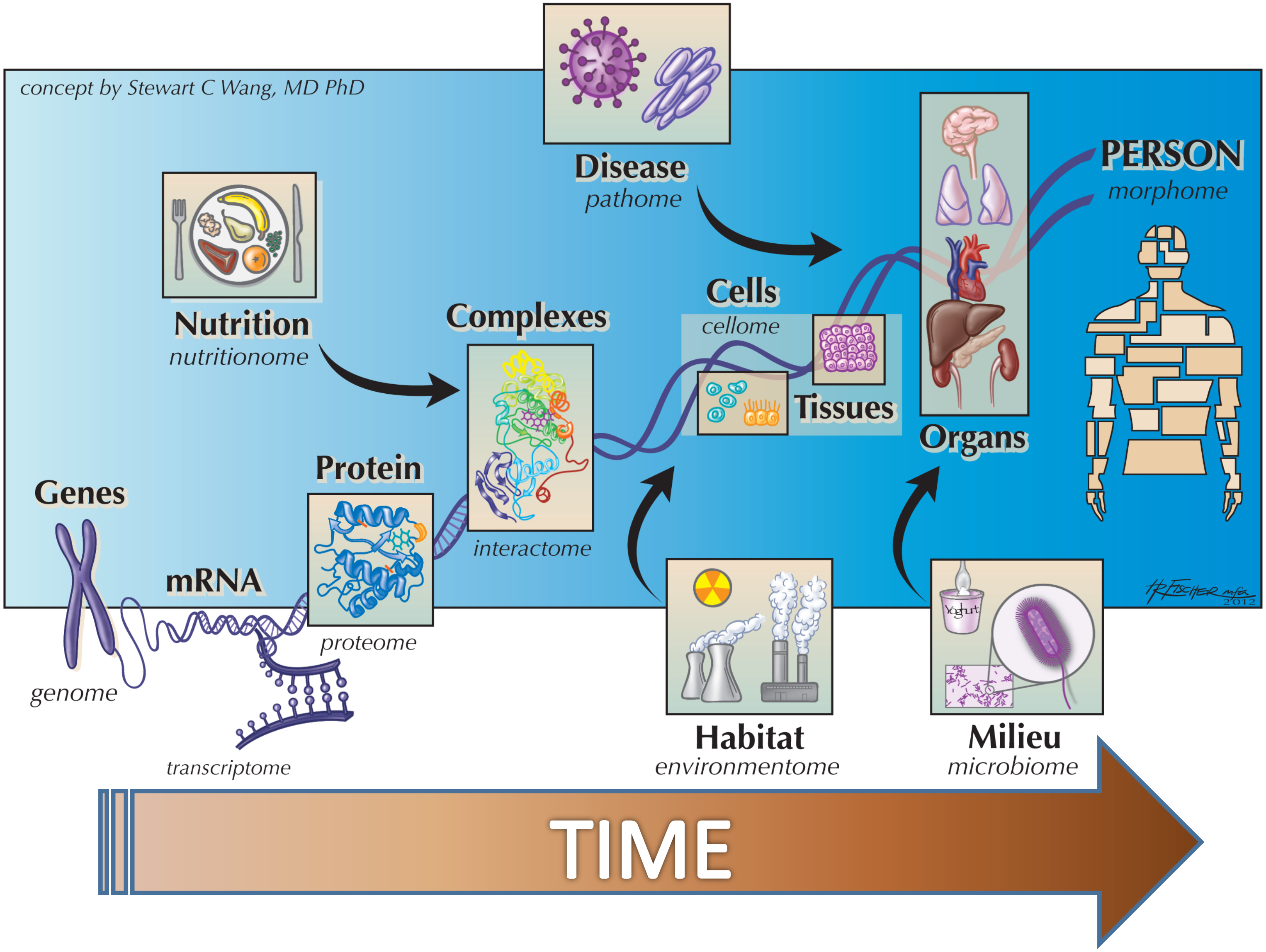


Phase overlay - All 10 Aorta volumes from different phases overlaid on top of one another

Gated Radius Graph – Aortic Radius as a function of length along the aorta and cardiac phase.

Appendix E: Morphomics Overview

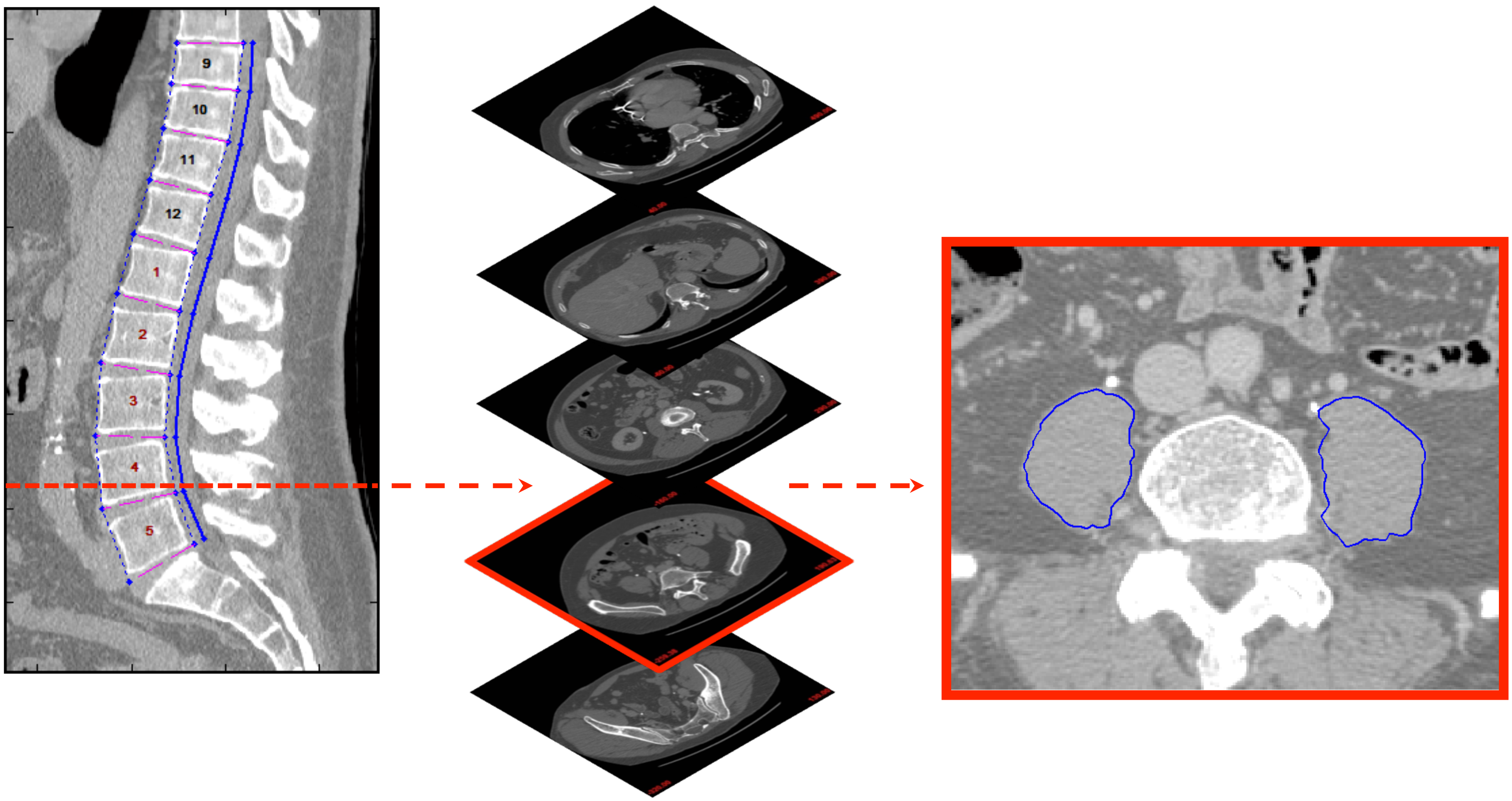
Morphomics = Personalized Medicine



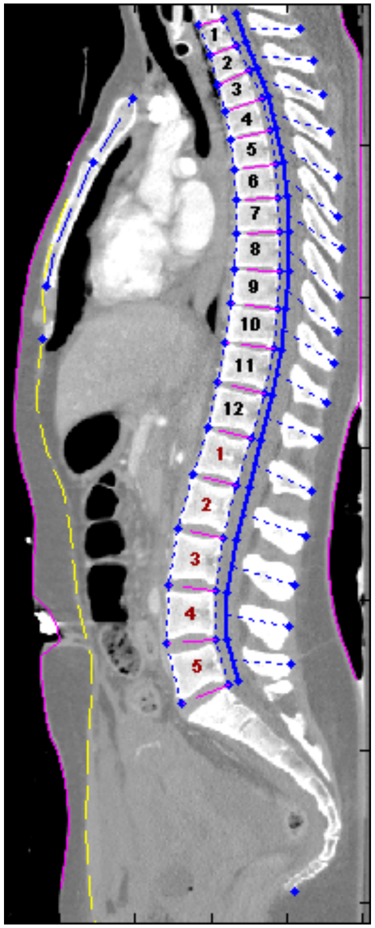
Morphomics = Personalized Medicine

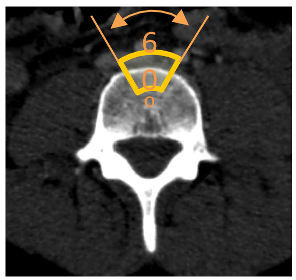
- **Multiplex** tool for patient diagnosis and stratification.
- Morphomics is based on highly-automated, high-throughput image processing to quantify millions of anatomically-indexed measures from a single patient's scan, offering remarkable opportunities for personalized treatment and surgical planning.
- Imaging data has been preserved in pristine condition (**BUT NOT USED**) while patients' response to treatment has been observed. .. Natural experiments
- Each patient's individual morphometric qualities are then assessed against population-based standards to identify patient-specific risk factors
- Morphomic assessment of trunk musculature (density and mass), body composition (fat distribution), vascular calcification, and solid organ morphomic measures have demonstrated that these patient-specific variables dominate risk prediction models and provide critical insight into patient risk. Thousands of other potential biomarkers are being tested.

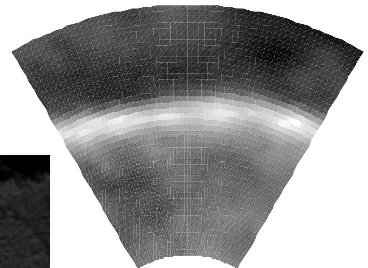
Muscle Health/Sarcopenia

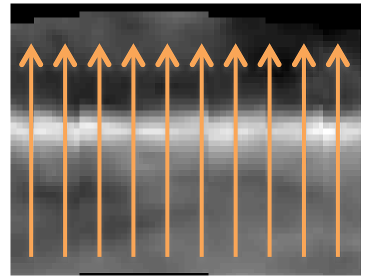


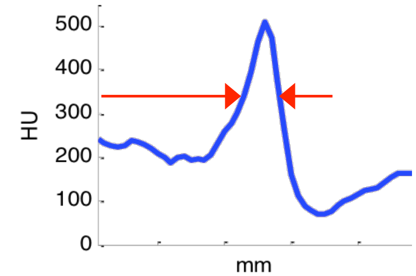
Bone Health

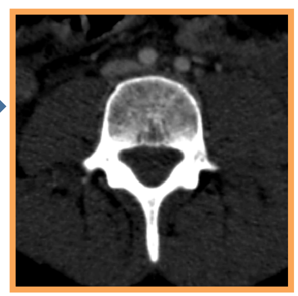


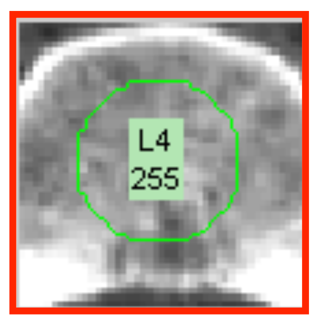


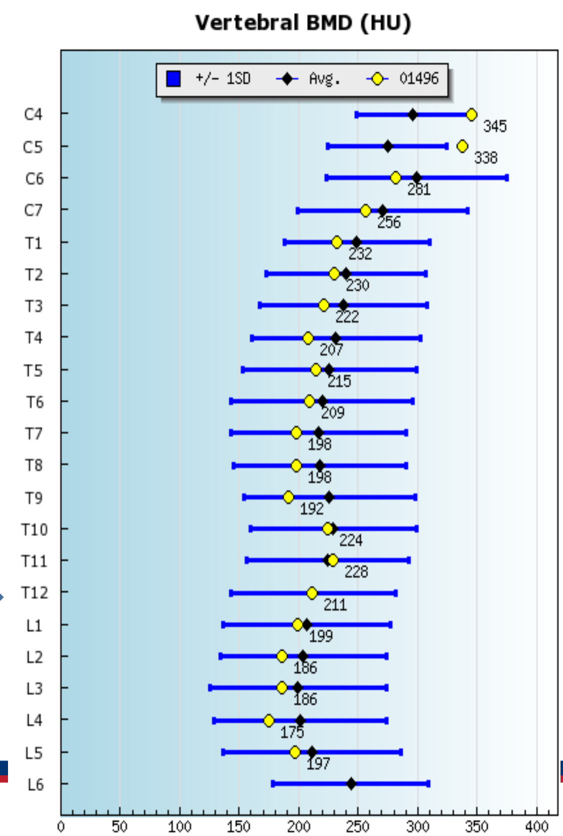












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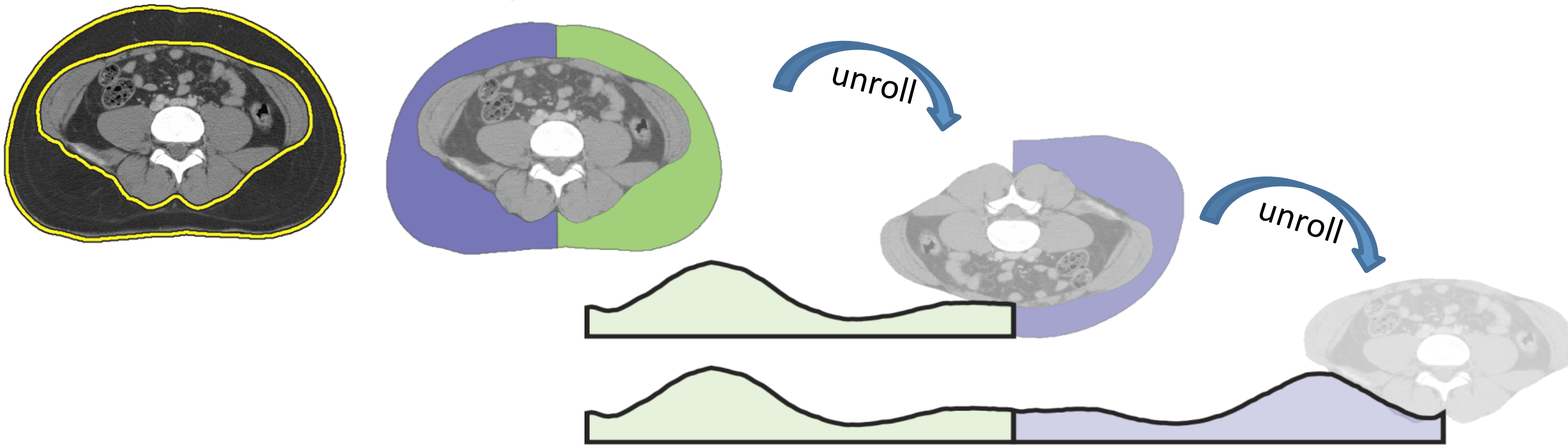
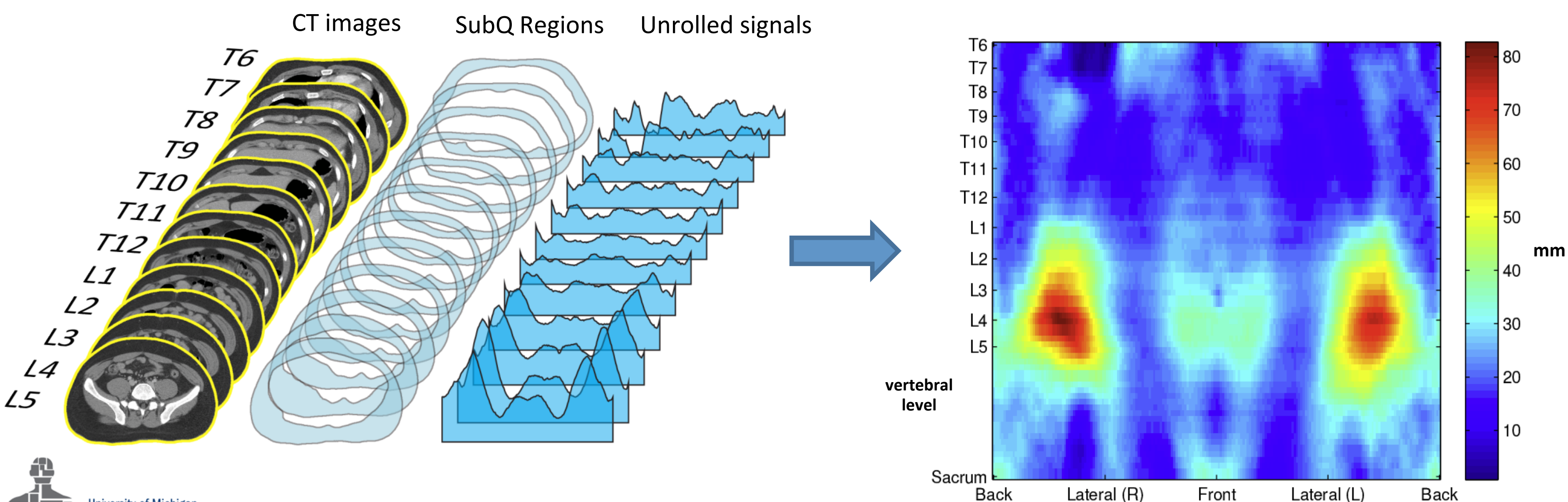
Obesity – Fat Characterization





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Appendix F: Data Analysis and Results

Data Analysis and Results

Aorta Measurements

Methods
Following institutional review board approval (HUM00041441), trauma patients who underwent CT scanning were retrospectively identified from the University of Michigan radiology database. For inclusion, CT scans were those performed on male or female patients between the ages of 18 years and 50 years, inclusive. All CT scans were continuous examinations of the chest, abdomen, and pelvis.

The individual scans were loaded on to laptop running Matlab 2015a software (The MathWorks Inc., Natick, Massachusetts). Custom high-throughput image processing algorithms permitted the measurement (in millimeters) of the vessel radius at any point along the length, and the distance between vessel origins. The aorta was divided into and examined as three previously described zones (Stannard et al. J Trauma Acute Care Surg, Volume 75, Number 2, Supplement 2) (Figure 1). Aortic Zone I extended from the origin of the left subclavian artery (LSC) to the celiac branch point (CB). The superior celiac branch point (sCB) was also noted. Aortic Zone II extended from the celiac trunk to the origin of the lowest renal artery, either left (LR) or right (RR), and the infrarenal aorta (lowest renal to the aortic bifurcation) constituted the aortic Zone III.

The centerline length (mm) of each zone was measured, and the luminal diameter (mm) (calculated as 2 x radius) of the aorta at each 5% point between the proximal and distal most extent of each of the zones was recorded. In addition, the distance from left and right common femoral artery (LFA, RFA) at the midpoint of the femoral head to the aortic bifurcation (AB) and the origin of the left subclavian artery (LSC) were recorded. The CFA landmark was chosen as a plausible site for arterial access. For the purposes of the study, the external measure of torso extent was defined the distance (mm) from the suprasternal notch of the manubrium to the midpubic symphysis (s2pdist), parallel to the subject's craniocaudal axis (this is a direct, as the crow flies, distance [e.g., as measured using a rigid yard stick]).

Due to the low correlation between torso extent and distance to zone III, and the fact that zone III represents a much smaller target, an additional external measure was developed: the straight-line distances (mm) from the umbilicus to the left and right CFA landmarks (not parallel to the craniocaudal axis). This represents a measure of lower abdominal extent which was hypothesized to better correlate with distance to zone III than torso extent and was tested as a possible replacement.

CT images were examined by one or more of three separate readers (RG, PR, NW). Data were collected in a PostgreSQL database and imported to R version 3.3.0 (R Foundation for Statistical Computing, Vienna, Austria) for analysis. Distances and diameters were reported as medians, accompanied by interquartile range (IQR) and maximum-minimum values, along with boxplots to describe their distribution. Scatter plots were generated showing aortic zone length against torso extent, and a best-fit line was drawn using simple linear regression analysis. The coefficient of determination (R^2) was reported as a measure of the strength of the linear association. Model residuals were examined for normality and residual diagnostic plots were used to investigate individual influential data points and verify that the regression assumptions were satisfied.

Outlier points have a large residual but low leverage over the resulting model fit and are therefore not worrisome. On the other hand, influential points exert leverage over the resulting model fit, and if removed, the resulting model slope would change significantly. Three data points were found to have a Cook's Distance (a measure of influence) more than 3X greater than the other data points. Upon further investigation, we found that one had a dislocated femoral head due to motor vehicle crash, and in the other two we were unable to obtain an accurate femoral artery measurement due to poor scan quality. Models were re-fit after excluding these data points.

Nomograms for predicting length to individual zone midpoints using only torso extent were developed from these simple linear regression models, and include a 95% prediction interval. We would expect vascular distances to fall within this interval in 95/100 cases, based on the torso extent measured in new subjects.

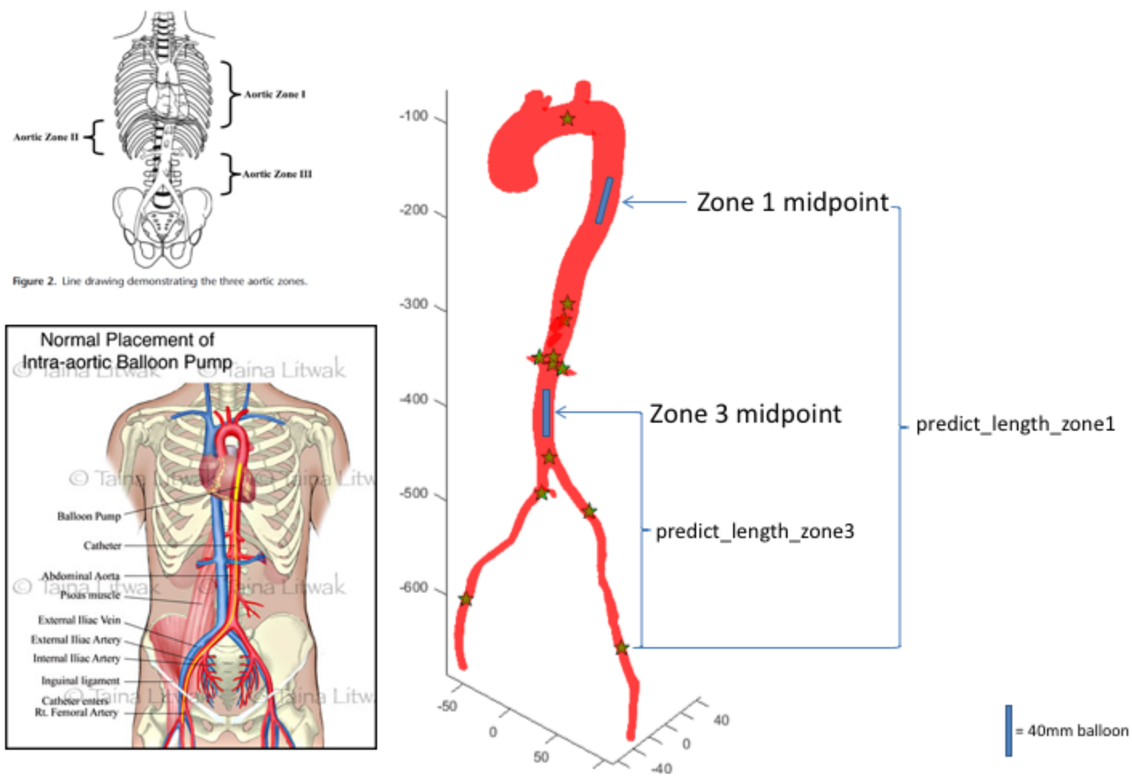


Figure 1 - Balloon placement and aorta landing zones

Results

2,247 patients underwent CT imaging following traumatic injury between 2000-06-11 and 2015-03-30. There were 458 exclusions (20.4%) due to incomplete chest, abdomen, pelvis, and femoral imaging. The final cohort was composed of 1,789 patients with a mean (SD) age of 32.8 (10.2) and a median (IQR) torso extent of 557 (537-579) mm. There were 1,280 (71.5%) male patients and 78 (4.4%) patients identified as hypotensive. For the purposes of the study, hypotensive was defined as blood pressure less than 100 and pulse over 100 at the time of emergency department trauma admission.

Arterial Lengths

On average, the distance from the CFA to the aortic bifurcation was longer by 4.9 mm on the right than on the left side. The median (IQR) distance for the right and left were 200 (190-210) mm and 195 (186-205) mm, respectively. The median (IQR) total length of the aorta from the left subclavian to the aortic bifurcation was 345 (328-363) mm (Table 1, Figure 2).

		Length (mm)				
Sex	Location	Minimum	25th	Median	75th	Maximum
F	LFA to AB	157.93	184.01	193.07	201.50	252.2
	RFA to AB	160.37	189.06	198.78	208.21	249.1
	AB to LR	31.01	77.11	84.19	92.40	134.4
	AB to RR	47.91	81.20	87.72	95.35	139.5
	AB to SMA	53.52	93.72	102.44	110.62	144.5
	AB to CB	63.92	105.73	113.64	123.14	155.6
	AB to sCB	69.12	115.01	123.03	131.34	170.1
	AB to LSC	207.83	309.65	324.94	340.52	402.7
M	LFA to AB	132.79	186.15	195.73	205.41	252.1
	RFA to AB	115.63	190.52	200.71	210.29	256.7
	AB to LR	30.01	81.71	89.33	97.41	130.8
	AB to RR	30.21	85.42	92.71	101.82	134.3
	AB to SMA	66.32	99.78	108.04	116.92	152.3
	AB to CB	76.82	112.32	121.91	131.15	164.8
	AB to sCB	81.52	120.92	130.15	140.13	170.9
	AB to LSC	263.35	336.84	353.12	369.55	497.6
All	LFA to AB	132.79	185.51	194.96	204.77	252.2
	RFA to AB	115.63	190.21	200.18	209.70	256.7
	AB to LR	30.01	80.62	87.52	96.82	134.4
	AB to RR	30.21	82.82	91.72	100.60	139.5
	AB to SMA	53.52	97.81	106.85	114.96	152.3
	AB to CB	63.92	109.92	119.02	129.31	164.8
	AB to sCB	69.12	118.74	128.13	138.23	170.9
	AB to LSC	207.83	327.60	345.46	363.26	497.6

Table 1 - Arterial length distributions

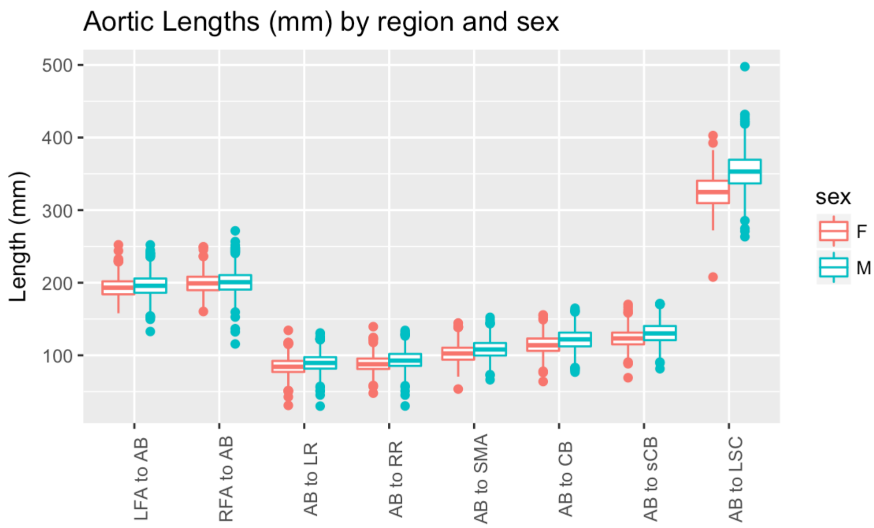


Figure 2 - Arterial length box plots

Comparing the lengths of Zone 1 and Zone III, Zone I was the longest, with a median length of 226 mm (212-238 mm). The length of Zone III was 87 mm (78-95 mm).

Arterial Diameters

The diameter of the left and right CFA were the same, measuring 6.014 mm (5-7) and 6.126 mm (5-7 mm), respectively. Aortic diameter was the smallest (13.073 mm (12-15 mm) at the bifurcation. Aortic diameter increased to 14.369 mm (13-16 mm) at the lowest renal artery, 16.598 mm (15-19 mm) at the celiac trunk, and 19.693 mm (18-22 mm) at the level of the left subclavian artery. In addition, the diameters were smaller in women than men (Table 2).

		Diameter (mm)				
Sex	Location	Minimum	25th	Median	75th	Maximum
F	LFA	2.85	4.36	5.10	6.01	15.85
	RFA	1.87	4.43	5.19	6.19	16.38
	AB	7.86	10.62	11.54	12.61	19.62
	LR	8.99	11.70	12.79	14.36	19.83
	RR	9.48	11.95	13.13	14.73	20.31
	SMA	9.97	12.85	14.43	15.97	21.35
	CB	9.94	13.49	15.21	16.77	22.74
	sCB	9.90	13.85	15.46	17.27	23.36
	LSC	13.12	17.20	18.52	20.28	29.67
M	LFA	2.98	5.49	6.42	7.38	18.41
	RFA	2.90	5.56	6.52	7.58	20.83
	AB	8.08	12.45	13.71	14.93	21.95
	LR	8.23	13.60	15.05	16.88	23.42
	RR	8.23	13.80	15.43	17.19	24.25
	SMA	8.76	14.86	16.55	18.50	25.93
	CB	8.90	15.54	17.28	19.25	26.95
	sCB	9.02	15.72	17.42	19.46	27.78
	LSC	12.62	18.47	20.20	22.28	32.67
All	LFA	2.85	5.07	6.05	7.15	18.41
	RFA	1.87	5.08	6.16	7.36	20.83
	AB	7.86	11.69	13.15	14.57	21.95
	LR	8.23	12.83	14.53	16.27	23.42
	RR	8.23	13.10	14.85	16.62	24.25
	SMA	8.76	14.17	15.95	18.01	25.93
	CB	8.90	14.79	16.68	18.72	26.95
	sCB	9.02	14.98	16.92	18.98	27.78
	LSC	12.62	18.05	19.75	21.78	32.67

Table 2 - Arterial diameters

Aortic diameter appears to increase near the end points of each the Regions of Interest (Figure 3). We hypothesize that this is due to the presence of branching vessels (renals, superior mesenteric, celiac, superior celiac), as these diameters all appear to increase at the point where the branching vessels are present.

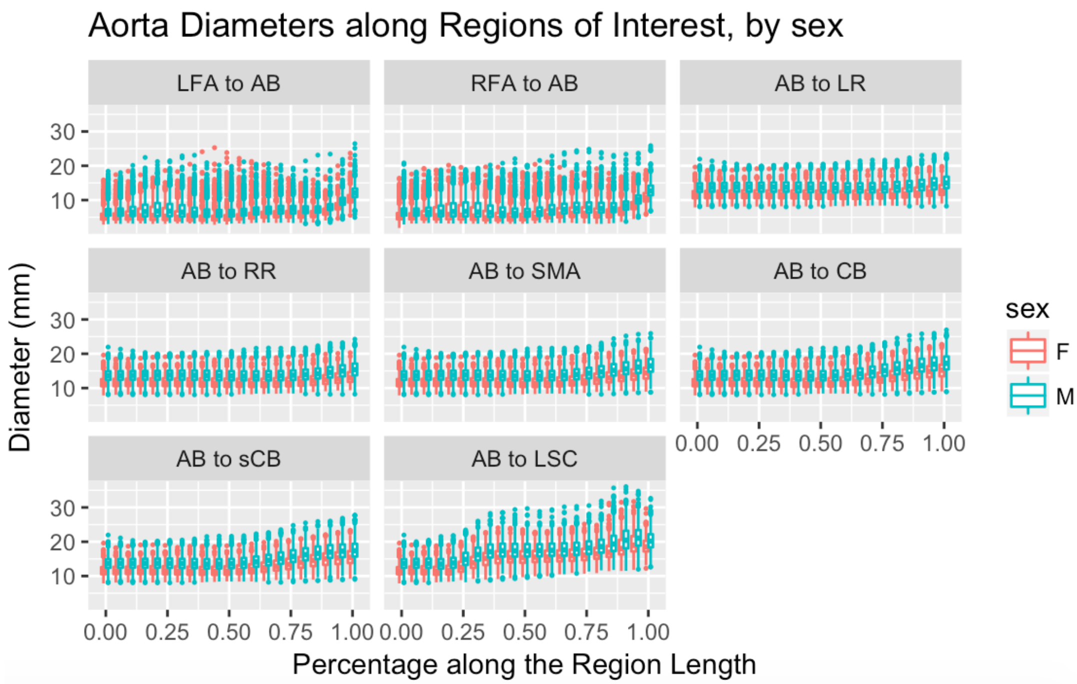


Figure 3 - Arterial diameter box plots at each 5% along the length

Univariate Linear Regression

Length measurements of the descending aorta were plotted against the measurements of torso extent, and simple linear regression was used to apply a best-fit line, on all subjects except those identified as hypotensive. Nomograms for predicting vascular lengths and distances using only torso extent were developed from the regression models, and include a 95% prediction interval (Figure 4, 5, 6). We would expect vascular distances to fall within this interval in 95/100 cases, based on the torso extent measured in new subjects. A simplified approximation of the equation for the upper and lower bounds of the interval is:

$$y * \pm 1.96 \times RSS,$$

where y* is the predicted y value from the regression equation and *RSS* is the residual sum of squares from the regression model.

An R^2 of 0.42 demonstrated that torso extent (straight-line) alone was able to explain more than 42% of the variability in total aortic length (left subclavian to AB).

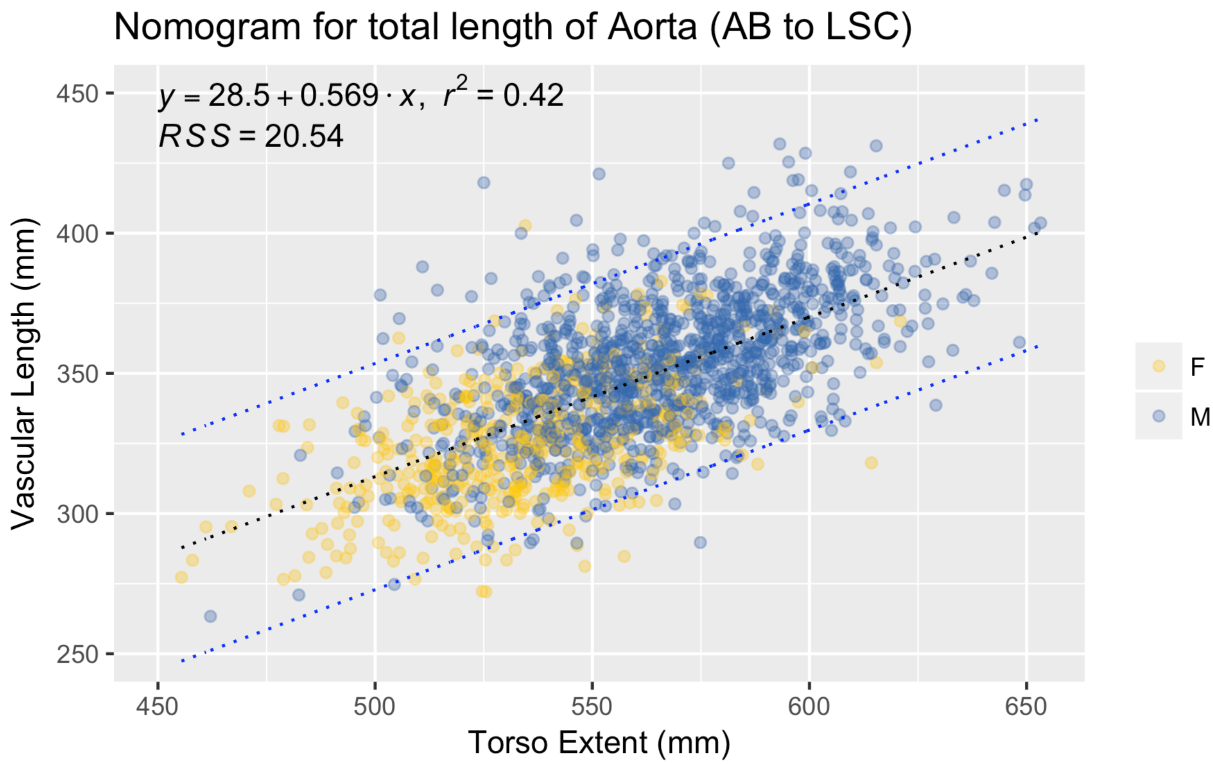


Figure 4 - Nomogram for Total Aortic Length vs. Torso Extent

This method was repeated for the distances from the left and right CFA to the midpoint of the individual aortic zones I and III resulting in R^2 values of 0.60 (left) and 0.60 (right) for Zone I, and 0.28 (left) and 0.28 (right) for Zone III, indicating that other explanatory variables may be involved, especially for Zone III. The width of the 95% prediction interval was approximately 48mm for Zone III, which is a large amount of uncertainty considering that the median length of Zone III itself (the landing zone) is short (87 mm) and most of that length will be taken up by the balloon length (40 mm). On the other hand, the width of the interval was approximately 55mm for Zone 1, which is less than a quarter of the total Zone I length (226 mm).

R^2 values of 0.18 (left) and 0.18 (right) demonstrated that CFA to umbilicus extent (straight-line) alone was not able to explain more of the variability in zone III length than was torso extent, so this measure was disregarded.

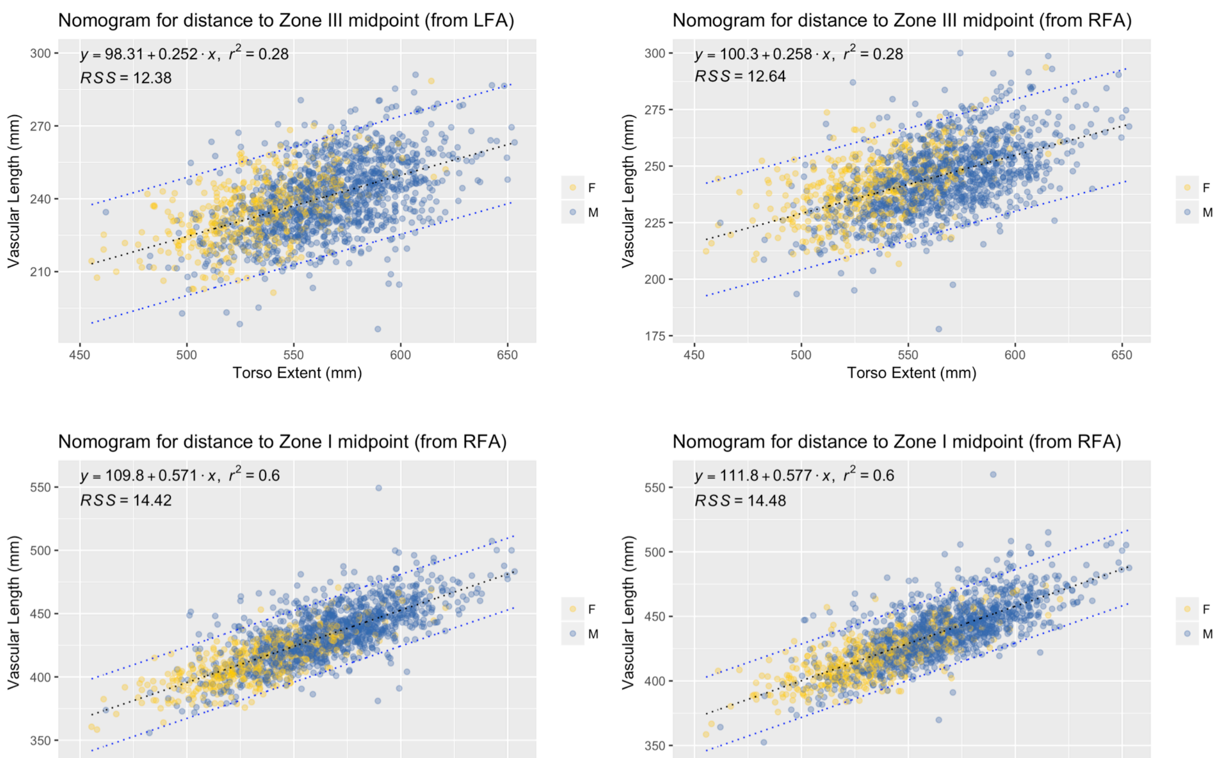


Figure 5 – Nomograms of external torso extent vs. distances to Zone I and III midpoint from the left and right femoral arteries. Dotted lines show the linear predictions of mean and 95% prediction interval.

As an aside, we also note that Zone I and III lengths were also correlated with torso height, though this should not come as a surprise given the relationships already described between vascular lengths and torso extent. Incidentally, we developed nomograms for each of the Zone lengths based on the same simple linear regression modeling technique used earlier (Figure 6). The implication of this finding is that, on average, taller individuals will have larger landing zones of roughly 0.15 cm (Zone III), and 0.35 cm (Zone I) per cm increase in torso extent.

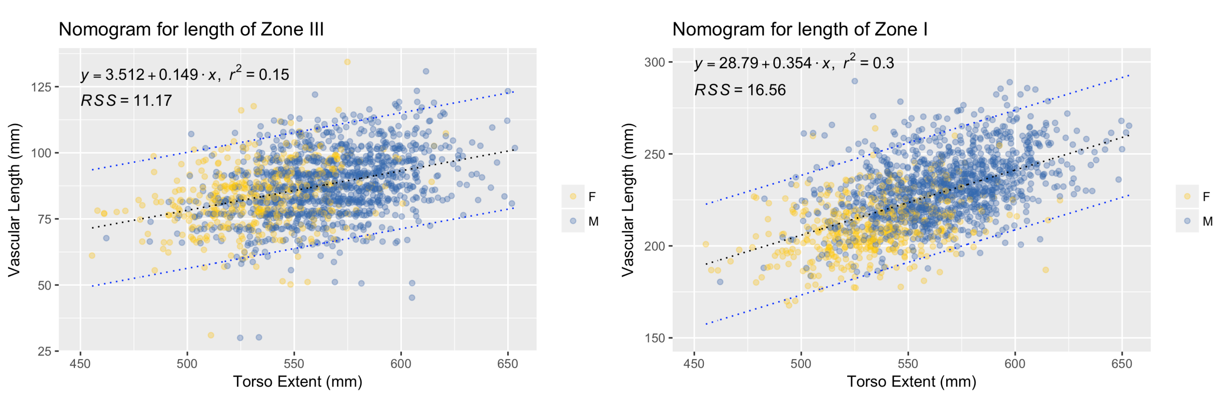


Figure 6 - Nomograms for Zone 1 and Zone III lengths vs. torso extent

Multiple Linear Regression

The dataset was split into a 60% training set and 40% validation set, excluding hypotensive patients. The training set was used to fit multivariate models predicting the length from the left and right CFA to the midpoints of Zone III and Zone I. Five models were evaluated per side (L, R) and per zone (1, 3) for a total of 20 models. Models included: torso extent (by skin convex hull) alone (univariate model), torso extent with sex, torso extent with age, torso extent with age and sex, and a constant median model (the median Zone length of the training population, also a univariate model). A sex interaction term was assessed and excluded due to lack of statistical significance. Model residuals were examined for normality and residual diagnostic plots were used to investigate individual influential data points and verify that the regression assumptions were satisfied.

The median length to the midpoint of Zone III was 244 and 239 mm from the right and left femoral arteries, respectively. The median length to the midpoint of Zone I was 433 and 428 mm from the right and left femoral arteries, respectively. These are the values used in the constant models.

Of the Zone I and III models, torso extent, sex, and age were all statistically significant predictors on both the left and right sides in all training models. We selected the models including torso extent, sex, and age for both the left and right sides as the final Zone I and III models since they had the highest adjusted R^2 values and all predictors were statistically significant ($p<.01$). Comparing the R^2 values of the models is informative. The model including torso extent alone is similar to the simple univariate regression model previously described, except it is fit on a 60% subset of the data. Once again, it explained the vast majority of the variability in vascular lengths (roughly 57% for Zone I, and 27% for Zone III). Adding an age term to the model explained an additional 6% for Zone I and 1.5% for Zone III, while the sex term explained 0.3% for Zone I and 1.5% for Zone III. The coefficient for sex in these models suggests that controlling for torso extent, and age, males will have 3.5-4.5mm shorter distance in Zone III but 3-4.4mm greater distance to Zone I, on average. The coefficient for age in these models suggests that controlling for torso extent and sex, a one-year increase in age increases the distance to the zone midpoint by 0.17 mm (Zone III), and 0.55 mm (Zone I), on average.

A brief commentary on sub-analysis of race and BMI

Race (self-reported) and BMI were available on a subset of N=1,242 patients in the dataset. A sub-analysis was performed comparing the final model above to a model including BMI, and one including race. When added to the model including torso extent, age, and sex, BMI was non-significant ($p>.05$) in both left and right Zone III midpoint models, and in both left and right Zone I midpoint models.

Race (N) was reported as one of the following: American Indian (4), Asian (33), African American (145), Hispanic (30), Other (39), Pacific Islander (1), Caucasian (1395), or Unknown (4). Groups with fewer than N=30 subjects were combined with Other, resulting in the following final race groups: Asian, African American, Hispanic, Caucasian, and Other. Race showed statistically significant differences between African American and Caucasian, but Asian, Hispanic, and Other showed no significant differences with Caucasian. Including race in the model explained only an additional 1% of the variability in Zone 1 and 0.3% to Zone III. The coefficient for race in these models suggests that controlling for torso extent, age, and sex, African Americans will have 5mm lesser distance to the midpoint, on average. These are extremely small effects compared to the overall distances, and the orders of magnitude sample size differences between the groups are so extreme that we hesitated to even make the comparison in the first place. Further study with more equivalent, and representative sample sizes would be prudent to verify these differences.

As a practical consideration, torso extent, age, and sex should be most readily apparent in the field. Height and weight (and therefore BMI) may be altered by injury or equipment and may be difficult to obtain. Self-reported race may be difficult, impractical, or simply insensitive to obtain in a wounded soldier. We believe that torso extent alone is sufficient to explain the majority of variability in the distance to Zones I and III in the field, with age and sex explaining marginally more of the variability in vascular length and therefore creating an improved statistical model in the lab (but not necessarily in the field). This is why our nomograms are reported using torso extent alone, but the multivariate models are used in the evaluation of balloon placement.

Model performance

In order to evaluate the performance of each final model, we calculated the misclassification error rate for the final models and compared them to the misclassification error rate for the constant models. This was done to compare a rather complex model with the an extremely simplified model. If the simplified model performed the same as the complex model, then the complex model would be deemed unnecessary. Each predicted length was assigned either 1 (success) or 0 (failure) based on whether the predicted length fell within the actual Region of Interest landing zone bounds for each individual and misclassification occurred if the predicted length was too short or too long. The misclassification rate was computed as the percentage of failures in the training and test datasets.

For Zone I, the misclassification rate was less than 0.1% for both the training and test datasets when using the final multivariable model (torso extent, sex, and age) to predict length to the midpoint of Zone I from both the left and right femoral artery start points. The misclassification rate was less than 0.3% for both the training and test datasets when using the constant model (the median arterial length to the midpoint) (Table 3).

	zone	side	dataset	final_model	median_model
1	1	right	train	0.1%	0.2%
2	1	right	test	0%	0.3%
3	1	left	train	0.1%	0.1%
4	1	left	test	0%	0%

Table 3 - Zone I model misclassification rates

For Zone III, the misclassification rate was about 40% for both the training and test datasets when using the final multivariable model (including torso extent, sex, and age) to predict length to Zone III from both the left and right femoral artery start points. The misclassification rate was at most 41% among the training and test datasets when using the constant model (the median arterial length to the midpoint) (Table 4).

	zone	side	dataset	final_model	median_model
1	3	right	train	39.4%	39.9%
2	3	right	test	38.9%	37.7%
3	3	left	train	38.8%	40.7%
4	3	left	test	39.7%	37.4%

Table 4 - Zone III model misclassification rates

Zone I represents a large enough landing zone (226 mm) that a multivariable model is only marginally better performing compared to a constant median model. However, as noted earlier, the median length of Zone III itself is short (87 mm) when compared to the length of a balloon (40 mm), and compared to the width of a 95% prediction interval (48mm). The balloon itself takes up nearly half the length of Zone III, severely shortening the available "safe" landing zone length. If the bounds were widened, the balloon were shortened, or the prediction interval could be narrowed, the misclassification error for Zone III would drop significantly.

The Region of Interest landing zone bounds for Zone III were: minimum length = left (right) Femoral Artery Cutpoint to AB length + 40mm (1 balloon length), maximum length = left (right) Femoral Artery Cutpoint to the lowest renal artery branch point. The Region of interest zone bounds for Zone I were: minimum length = left (right) Femoral Artery Cutpoint to superior celiac branch point + 40mm (1 balloon length), maximum length = left (right) Femoral Artery Cutpoint to left subclavian branch point. These bounds were selected in order to avoid (1) placing the balloon within the narrower femoral artery (Zone III minimum), (2) occluding the renal artery (Zone III maximum), (3) occluding the celiac artery (Zone I minimum), and (4) occluding the left subclavian (Zone I maximum). See Tables 6, 7, 8, and 9 for summaries of the results of the multiple linear regression models on the training datasets. Summary tables were created using the ‘stargazer’ package in R (Hlavac, Marek (2015). stargazer: Well-Formatted Regression and Summary Statistics Tables. R package version 5.2. http://CRAN.R-project.org/package=stargazer).

Hypothetical Analysis of Alternative Balloon Sizes:

Balloon length of 40mm was a major limiting factor in the Zone III models. We evaluated two hypothetical alternative balloon lengths of 30mm and 25mm to quantify the improvements in misclassification error if shorter balloons were used. We used the exact same Zone III linear regression models as were used above. The multivariate (MV) model included terms for torso extent, sex, and age, whereas the median model only included a constant term equal to the median length to the midpoint of Zone III. (The median length to the midpoint of Zone III was 244 and 239 mm from the right and left femoral arteries, respectively.) As before, each predicted length was assigned either 1 (success) or 0 (failure) based on whether the predicted length fell within the actual Region of Interest landing zone bounds for each individual and misclassification occurred if the predicted length was too short or too long. The misclassification rate was computed as the percentage of failures in the training and test datasets.

		MV Model		Median Model	
	balloon length	train	test	train	test
RFA to Zone III	4 cm	39.7%	39.5%	39.8%	37.4%
	3 cm	16.4%	16.9%	17.0%	18.0%
	2.5 cm	10.9%	10.3%	10.2%	12.1%
LFA to Zone III	4 cm	39.1%	40.0%	40.7%	37.2%
	3 cm	15.5%	17.2%	17.5%	18.3%
	2.5 cm	9.9%	9.8%	11.9%	12.0%

Table 5 – Misclassification error rates

As shown in Table 5, the misclassification error rates in the test datasets drop to around 17% with a 30mm balloon and 10% with a 25mm balloon using the multivariate model, and 18% and 12% using the constant model. The larger landing zone afforded by the shorter balloon results in significantly better model performance, with the percentage of failures (too short/too long) dropping by more than half.

	Dependent variable:			
	dist_to_mid_zone3r			
	(1)	(2)	(3)	(4)
s2pdist	0.250***	0.280***	0.248***	0.277***
	p = 0.000	p = 0.000	p = 0.000	p = 0.000
	(0.224, 0.276)	(0.251, 0.309)	(0.222, 0.274)	(0.248, 0.306)
sex_is_f		4.664***		4.532***
		p = 0.00001		p = 0.00002
		(2.647, 6.681)		(2.527, 6.537)
age_exact			0.177***	0.174***
			p = 0.00002	p = 0.00002
			(0.098, 0.256)	(0.095, 0.252)
Constant	104.380***	86.319***	99.541***	82.122***
	p = 0.000	p = 0.000	p = 0.000	p = 0.000
	(89.742, 119.019)	(69.852, 102.786)	(84.840, 114.242)	(65.646, 98.598)
Observations	992	992	988	988
R^2	0.261	0.276	0.275	0.289
Adjusted R^2	0.260	0.275	0.274	0.287
Residual Std. Error	13.022 (df = 990)	12.895 (df = 989)	12.918 (df = 985)	12.797 (df = 984)
F Statistic	349.575*** (df = 1; 990)	188.506*** (df = 2; 989)	186.964*** (df = 2; 985)	133.546*** (df = 3; 984)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 6 - Right CFA to Zone III models

	Dependent variable:			
	dist_to_mid_zone3l			
	(1)	(2)	(3)	(4)
s2pdist	0.250***	0.274***	0.249***	0.271***
	p = 0.000	p = 0.000	p = 0.000	p = 0.000
	(0.225, 0.276)	(0.246, 0.303)	(0.223, 0.274)	(0.243, 0.300)
sex_is_f		3.672***		3.503***
		p = 0.0003		p = 0.0005
		(1.692, 5.653)		(1.540, 5.466)
age_exact			0.185***	0.182***
			p = 0.00001	p = 0.00001
			(0.107, 0.262)	(0.105, 0.259)
Constant	99.291***	85.070***	94.171***	80.708***
	p = 0.000	p = 0.000	p = 0.000	p = 0.000
	(84.972, 113.610)	(68.904, 101.237)	(79.827, 108.515)	(64.572, 96.844)
Observations	992	992	988	988
R^2	0.271	0.280	0.287	0.296
Adjusted R^2	0.270	0.279	0.286	0.294
Residual Std. Error	12.738 (df = 990)	12.660 (df = 989)	12.604 (df = 985)	12.533 (df = 984)
F Statistic	367.353*** (df = 1; 990)	192.547*** (df = 2; 989)	198.503*** (df = 2; 985)	137.921*** (df = 3; 984)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 7 - Left CFA to Zone III models

	Dependent variable:			
	dist_to_mid_zone1r			
	(1)	(2)	(3)	(4)
s2pdist	0.569***	0.550***	0.561***	0.540***
	p = 0.000	p = 0.000	p = 0.000	p = 0.000
	(0.539, 0.600)	(0.516, 0.584)	(0.533, 0.590)	(0.508, 0.571)
sex_is_f		−2.938**		−3.329***
		p = 0.014		p = 0.003
		(−5.264, −0.611)		(−5.491, −1.167)
age_exact			0.547***	0.550***
			p = 0.000	p = 0.000
			(0.462, 0.632)	(0.465, 0.635)
Constant	115.426***	126.864***	102.179***	115.041***
	p = 0.000	p = 0.000	p = 0.000	p = 0.000
	(98.297, 132.556)	(107.526, 146.203)	(86.086, 118.271)	(96.967, 133.114)
Observations	995	995	991	991
R^2	0.572	0.575	0.631	0.634
Adjusted R^2	0.572	0.574	0.630	0.633
Residual Std. Error	14.984 (df = 993)	14.946 (df = 992)	13.928 (df = 988)	13.871 (df = 987)
F Statistic	1,328.724*** (df = 1; 993)	670.853*** (df = 2; 992)	844.998*** (df = 2; 988)	570.989*** (df = 3; 987)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 8 - Right CFA to Zone I models

	Dependent variable:			
	dist_to_mid_zone1l			
	(1)	(2)	(3)	(4)
s2pdist	0.571***	0.545***	0.563***	0.535***
	p = 0.000	p = 0.000	p = 0.000	p = 0.000
	(0.541, 0.602)	(0.512, 0.579)	(0.535, 0.592)	(0.503, 0.566)
sex_is_f		−3.982***		−4.409***
		p = 0.001		p = 0.0001
		(−6.288, −1.676)		(−6.543, −2.276)
age_exact			0.550***	0.554***
			p = 0.000	p = 0.000
			(0.466, 0.635)	(0.471, 0.638)
Constant	109.692***	125.197***	96.267***	113.303***
	p = 0.000	p = 0.000	p = 0.000	p = 0.000
	(92.667, 126.718)	(106.027, 144.367)	(80.331, 112.203)	(95.471, 131.135)
Observations	995	995	991	991
R^2	0.577	0.582	0.637	0.643
Adjusted R^2	0.576	0.581	0.637	0.642
Residual Std. Error	14.894 (df = 993)	14.816 (df = 992)	13.792 (df = 988)	13.686 (df = 987)
F Statistic	1,353.446*** (df = 1; 993)	689.572*** (df = 2; 992)	868.069*** (df = 2; 988)	593.210*** (df = 3; 987)
Note:				*p<0.1; **p<0.05; ***p<0.01

Table 9 - Left CFA to Zone I models

Arterial Tortuosity
We define tortuosity as L1/L2, where L1 = is the length of the vasculature following its centerline and L2 = the straight line length between the start and end points of the vasculature region (descending aorta, left and right femoral arteries). Mean (SD) tortuosity was 1.055 (.027) in females and 1.053 (.025) in males in the descending aorta, 1.039 (.032) in females and 1.053 (.044) in males in the left femoral artery, and 1.038 (.03) in females and 1.05 (.042) in males in the right femoral artery (Table 10).

		Tortuosity				
Vascular Region	Sex	Mean	SD	Min	Median	Max
AB to LSC	F	1.055	0.02732	1.015	1.050	1.220
	M	1.053	0.02503	1.008	1.048	1.241
LFA to AB	F	1.039	0.03177	1.003	1.029	1.222
	M	1.053	0.04443	1.004	1.038	1.339
RFA to AB	F	1.038	0.02986	1.006	1.030	1.257
	M	1.050	0.04242	1.001	1.036	1.340

Table 10 - Tortuosity statistics by vascular region and sex

The histogram of tortuosity measurements shows a distribution that is skewed, having a 'long tail' of high values (Figure 7). The majority of patients will have tortuosity values between +/- 2SD (1.0 to 1.1) suggesting that the vascular centerline distance is typically up to 10% longer than the straight line distance.

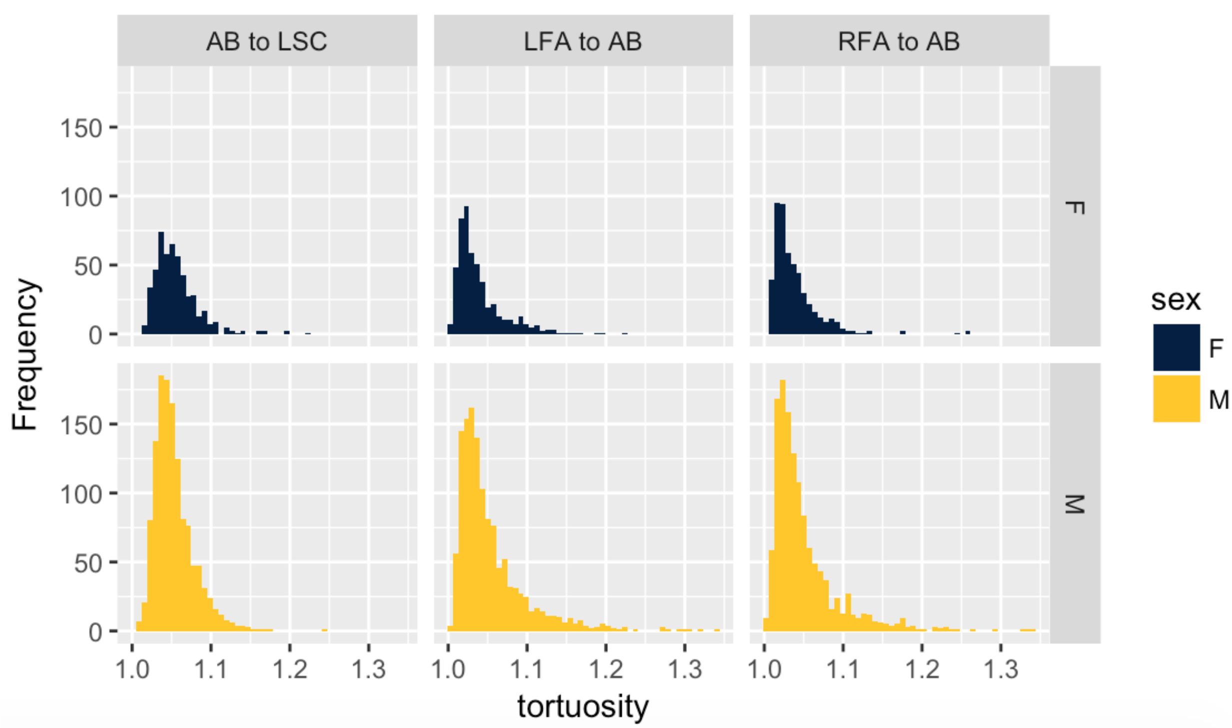


Figure 7 - Distribution of tortuosity by vascular region and sex

Pearson correlation analysis demonstrated that age was the strongest correlate with tortuosity among the available measures (r = 0.48, p<.001). Tortuosity appears to increase with age in both men and women. Scatter plots with fitted smoothing splines are used to show the relationship between tortuosity, age, and sex below (Figure 8). There is some evidence of a non-linear relationship as both the slope of the fitted spline and the variability of tortuosity appear to increase sharply at around age 40.

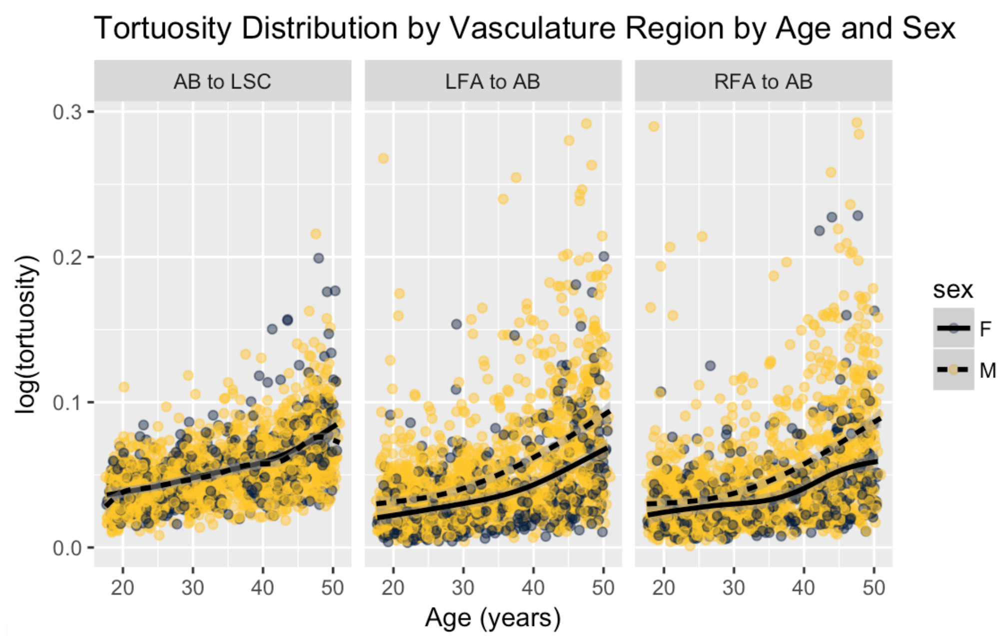
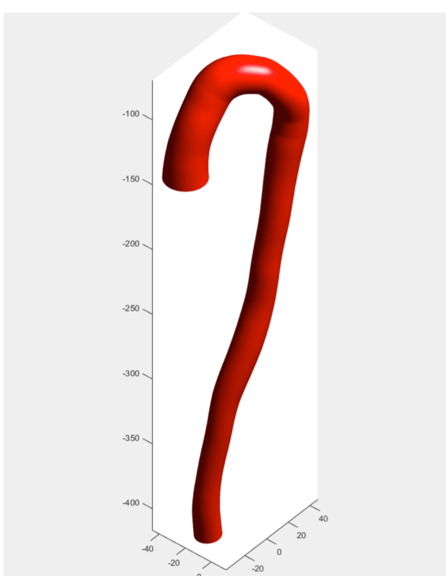


Figure 8 - Tortuosity increases with age for all vascular regions and in both sexes

The following are examples of low and high tortuosity aorta and femoral arteries whose 3-D rendering has been extracted from our database (Figure 9).

A. 

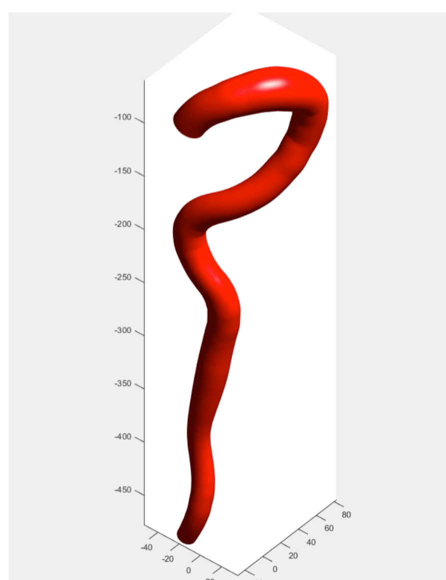
B. 

*Figure 9 - **A**: Low tortuosity aorta (1.01) and femoral arteries (1.01)   **B**: High tortuosity aorta (1.24) and femoral arteries (1.34)*

Replicating Military Population from Civilian Cohort

In lieu of an actual military population, we selected a subset of our civilian cohort between the ages of 18 and 30 with BMI between 18.5 and 25 to represent our "military population" (Figure 10).

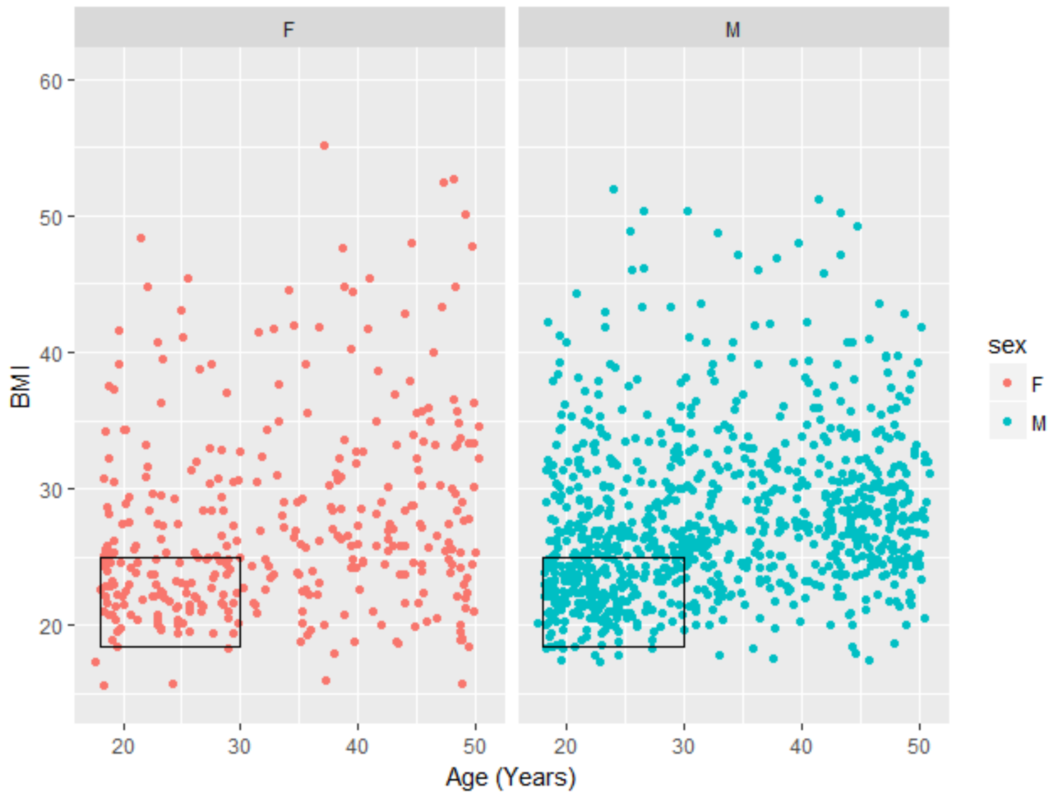


Figure 10 - Selection of 'military' population from within civilian population

This subset (Mil) was compared against the remainder of the civilian population (a) between 18 and 30 (Civ Young Obese), and (b) over 30 at any BMI (Civ Old).

However, based on the results of our prior analysis, we can predict what the results of this analysis will be since it is the same population. BMI is not a significant predictor of vascular length, so we would predict no difference between the Mil and Civ Young Obese groups, but we would predict a significant difference between Mil and Civ Old of approximately 20*.17=3.4mm (Zone III) and 20*.55=11mm (Zone I), based on the average age difference of 20 years between the two groups.

Indeed, when we fit models that include torso extent, sex, and population group (Mil [reference group], Civ Young Obese, and Civ Old), the coefficient for Civ Old in Zone III was 3.3 (right) and 3.5 (left), and in Zone I was 10.9 (left) and 10.5 (right), whereas the Civ Young Obese coefficient was non-significant (Table 11, Figure 11).

Without a true military population of CT scans of actual soldiers, it is difficult for us to determine if they would be truly and predictably different from civilians in terms of aortic vascular lengths.

	Dependent variable:			
	Zone III L	Zone III R	Zone I L	Zone I R
	(1)	(2)	(3)	(4)
s2pdist	0.271***	0.284***	0.537***	0.551***
	(0.012)	(0.012)	(0.013)	(0.013)
sexM	−3.125***	−4.319***	4.044***	2.857***
	(0.810)	(0.828)	(0.897)	(0.913)
Civ Old	3.493***	3.299***	10.866***	10.545***
	(0.831)	(0.851)	(0.922)	(0.938)
Civ Young	0.222	0.325	0.707	0.668
	(1.016)	(1.040)	(1.127)	(1.147)
Constant	88.604***	86.878***	120.127***	118.406***
	(6.205)	(6.349)	(6.900)	(7.021)
Observations	1,473	1,473	1,478	1,478
R^2	0.306	0.308	0.650	0.645
Adjusted R^2	0.304	0.307	0.650	0.644
Residual Std. Error	12.276	12.561	13.632	13.871
F Statistic	161.985***	163.648***	685.338***	668.870***
Note:	*p<0.1; **p<0.05; ***p<0.01			

Table 11 - Linear regression summary of vascular lengths including 'military' vs. civilian groups

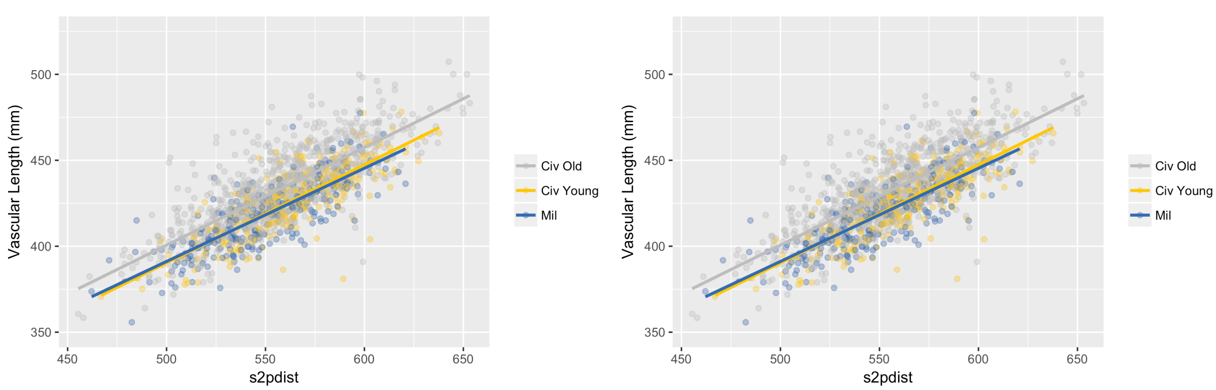


Figure 11 – 'Military', Civilian (Young Obese), and Civilian (Old) distances to midpoints of Zone I and III (from LFA)

Vena Cava Measurements

Vena Cava measurements were taken from the region of the vena cava bounded from the distal IVC point to a point 3 cm superior. The volume and surface area of this vena cava region were measured (Figure 12). Scans for which vena cava measurements could not be accurately extracted were excluded.

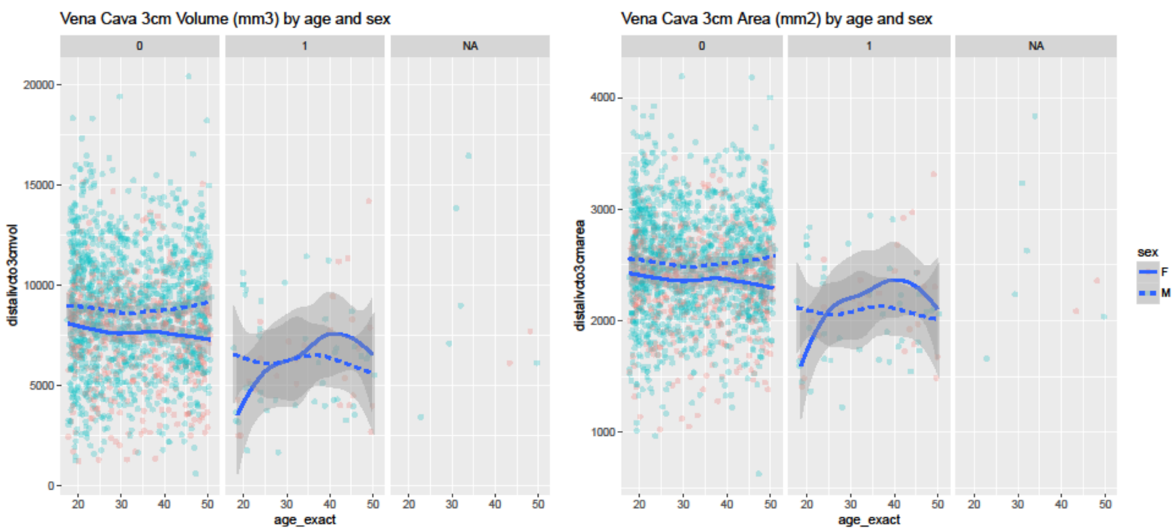


Figure 12 – Volume and area of Vena Cava 3cm region

In univariate analysis, age was not significantly correlated with volume or area; however, there were significant sex differences with both (p<.001) (Figure 13). Emergency department measured blood pressure (BP) and pulse were significantly correlated with volume and area, although the correlations were weak in magnitude (Pearson r=.16 (volume), .16 (area), p<.001 (BP) and r=-.26 (volume), -.25 (area), p<.001 (pulse)). Torso extent, measured as sternum to pelvis straight-line distance, was also correlated with both volume and area (Pearson r=.18 (volume), .17 (area), p<.001). Pulse showed the strongest association with vena cava volume and surface area. It showed a negative correlation, suggesting that as pulse increases vena cava volume and area decrease. In contrast, BP and torso extent were both positively correlated, increasing with vena cava volume and surface area (Figure 14).

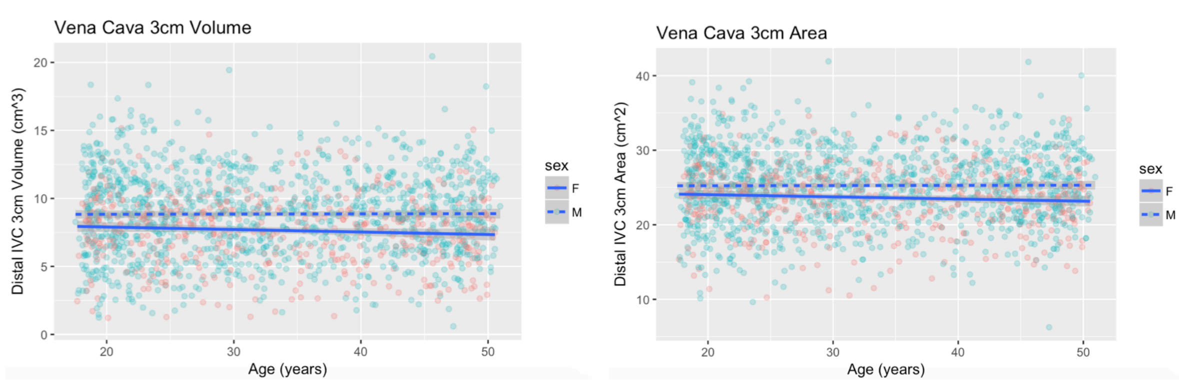


Figure 13 - Vena Cava volume and area by sex and age

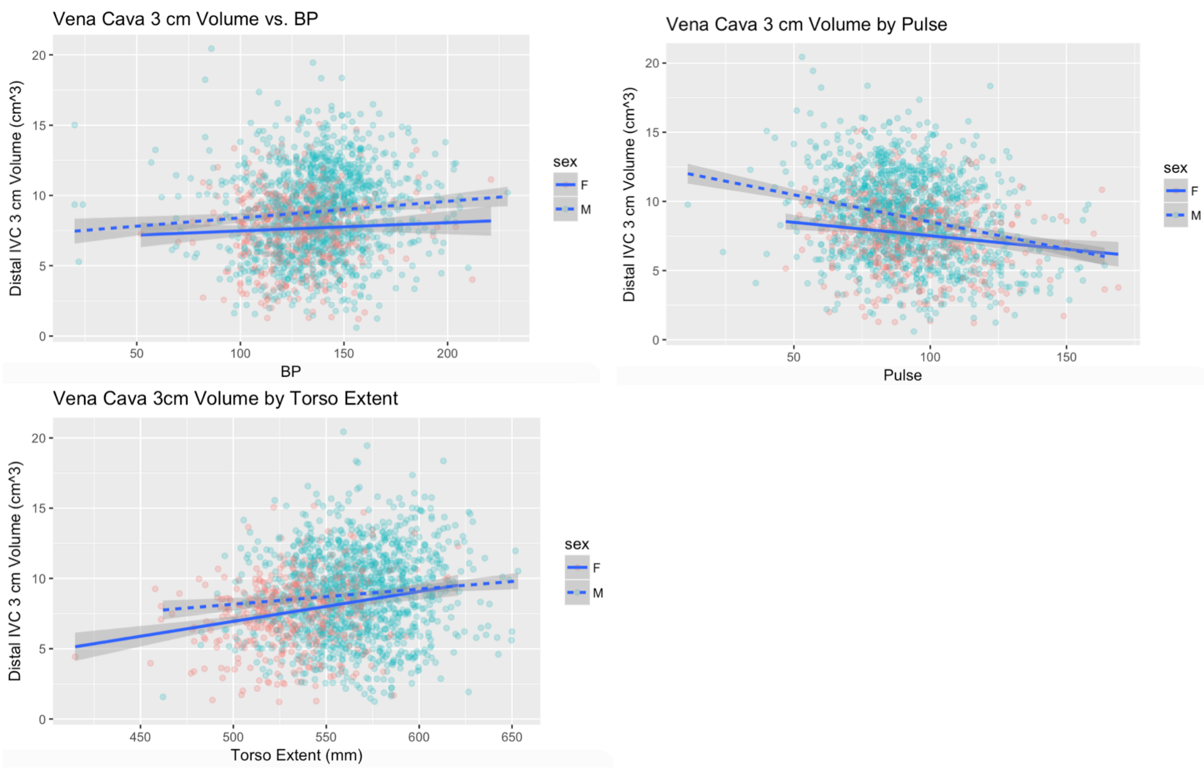


Figure 14 - Vena Cava volume in 3cm region vs. BP, pulse, and torso extent

ECG Gated Scan Measurements

We identified N=37 people with ECG-gated CT scans, 15 women and 22 men. Each patient had 10 reconstructions per scan resulting in a total of 370 series. We are able to identify and measure the aorta at ten different points in the cardiac cycle, from 5% to 95% by 10%, representing the percent R to R interval at which each series was reconstructed.

On average, the men in this subset were older than the women by six years (Table 12)

	Age		
	N	Mean	SD
F	15	32.37	10.813
M	22	38.00	9.869

Table 12 – Average age by sex in ECG-gated subset

Hemodynamic data from the trauma registry was only available for 17 of these 37 individuals, so hypotensive vs. normotensive analysis was not possible.

The ECG scan protocol includes a CT Chest, with a common region of coverage from T5 through T8 for all scans. Aorta centerline and walls were delineated, allowing the measurement of aorta radius at the inferior aspect of each vertebral body. Box plots were used to visualize the relationship between radius, vertebra number, ECG Cycle (%), and sex.

Diameter peaks at around ECG Percent 25% (women) and 35% to 45% (men) (Figure 15). This is interesting; however, due to the known effect of age on aorta diameter (presented in the first section above), more data are needed to understand whether this difference is simply due to the higher average age of men vs. women included in this subset analysis.

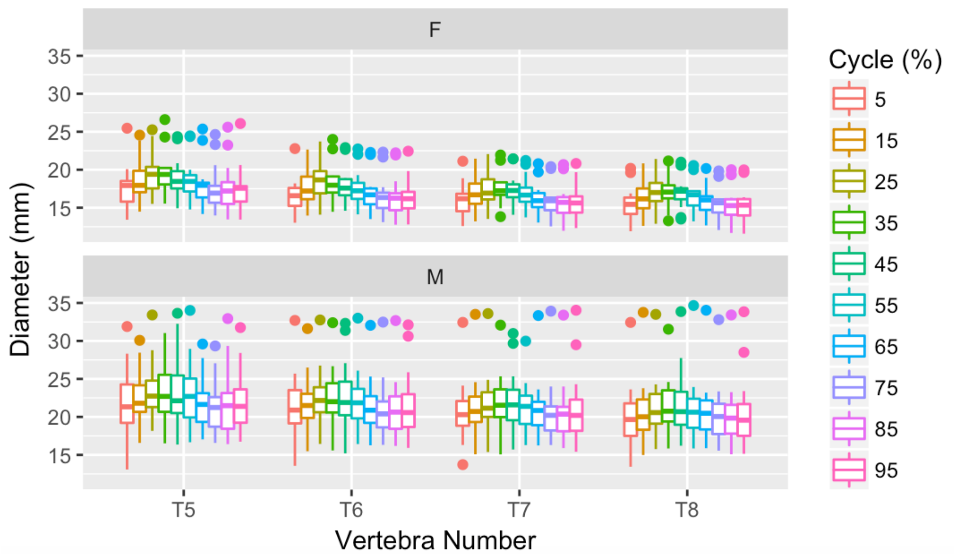


Figure 15 - Aorta diameter at points in the cardiac cycle (%) by sex and vertebra number

As shown in Figure 16, there is wide variability in T8 aorta diameter measurements in men and women due to both cardiac cycle and age.

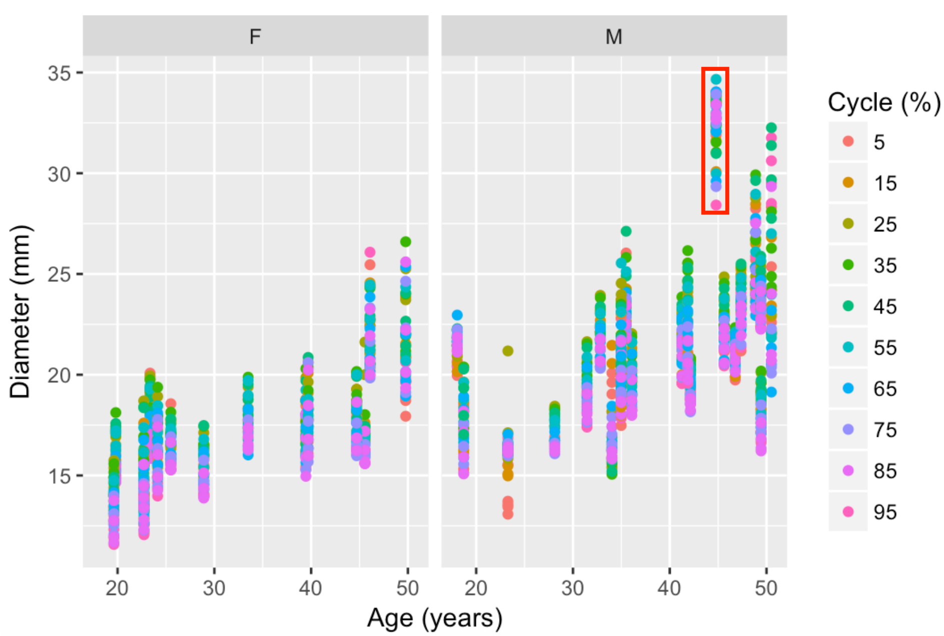


Figure 16 - T8 aorta diameter at points in the cardiac cycle (%) by age

Note that there is one male patient (UID 21556 highlighted in the red box in Figure 16) who represents a high outlier in the male chart. He is 45 years old, tall (1.88m), rather large (130kg), and appears to have a dissecting aorta (Figure 17), which could explain the outlier radius measurement.

Figure 17 - T9 aortic slice for patient 21556

Figure 18 also illustrates the effect of age and cardiac cycle on aortic diameter.

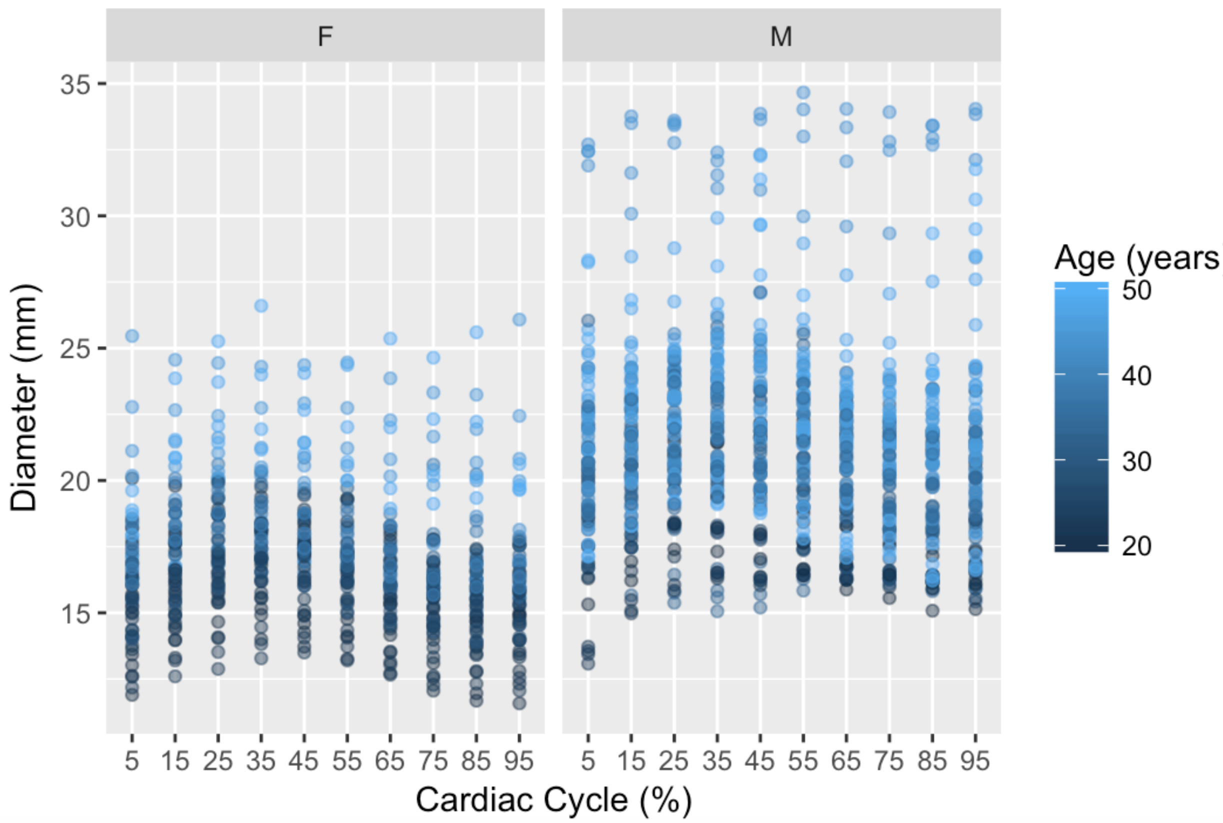


Figure 18 – Effect of age and cardiac cycle on aortic diameter

Appendix G: CRADA

CRADA COVER SHEET

Action: New Agreement
Agreement Type: CRADA - Cooperative Research & Development Agreement

[NOTE: This Cover Sheet is for internal management purposes only. It is not part of the Agreement & neither party is bound to anything contained in it]

Title: Analytical Morphomics of Human Torso for Combat Injury Characterization

Effective Date:	6/13/2016	**Expiration Date:**	6/12/2019
MRMC Control No:	W81XWH-16-0325	**DA Control No:**	
RAD:	2 - Combat Casualty Care (CCCRP)	**Lab Field:**	No RAD response
Concurrence obtained from appropriate RAD/USAMMDA/CBMS-JPMO program managers:	NO		
Concurrence obtained from US Trade Rep (if "YES" then concurrence must be attached):	N/A		
Keywords:	Analytical Morphomics	CT Scan	Battlefield Casualties

Laboratory:	USAISR - US Army Institute of Surgical Research			
	Office Symbol:	MCMR-SRR-P	**DTIC Source Code:**	404885
	3698 Chambers Pass, Building 3611			
	JBSA Fort Sam Houston	Texas	78234-7767	
	Phone:	210-539-2448	**FAX:**	210-539-8522
Lab's Technical POC:	LTC Kevin K. Chung, MD			
	Office Symbol:	MCMR-SRR	**Div/Dept:**	Research Directorate
	Phone:	210-539-4327	**FAX:**	210-539-8522
	Email Address:	Kevin.k.chung.mil@mail.mil		
Lab's Legal Counsel:	Commander, US Army Medical Research and Materiel Command ATTN: MCMR-JA (Technology Transfer Legal Staff) 504 Scott Street, Fort Detrick, MD 21702-5012 **Phone:** 301-619-2065; **FAX:** 301-619-5034			
	Legal Reviewer:	N/A - no deviation from template		

Partner's Technical POC:	Dr. Steward C. Wang			
	Regents of the University of Michigan			
	1500 E. Medical Center Drive, 1C-421-UH			
	Ann Arbor	MI	48109-5033	
	Entity Status:	Educational	**DTIC Source Code:**	228600
	Phone:	734-936-9690	**FAX:**	734-936-9657
	Email Address:	stewartw@umich.edu		
	DoD Status:	Traditional (Collaboration with DoD in the past 3 years)		

Summary:

Perform the morphomic analysis of the CT scan images of battlefield casualties.

A COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT

Between

Regents of the University of Michigan
Ann Arbor, MI 48109
("UMichigan")

and

U.S. Army Institute of Surgical Research
JBSA Fort Sam Houston, Texas 78234-7767
("USAISR")

Article 1. Background

1.00 This Agreement is entered into under the authority of the Federal Technology Transfer Act of 1986, 15 U.S.C. 3710a, et seq., between UMichigan and the USAISR, the parties to this Agreement.

1.01 USAISR, on behalf of the U.S. Government, and UMichigan desire to cooperate in research and development on **Analytical Morphomics of Human Torso for Combat Injury Characterization** according to the attached Statement of Work (SOW) described in Appendix A. NOW, THEREFORE, the parties agree as follows:

Article 2. Definitions

2.00 The following terms are defined for this Agreement as follows:

2.01 "Agreement" means this cooperative research and development agreement.

2.02 "Invention" and "Made" have the meanings set forth in Title 15 U.S.C. Section 3703(7) and (8).

2.03 "Proprietary Information" means information marked with a proprietary legend, or if disclosed orally or visually, summarized in writing, marked with a proprietary legend, and then delivered to the recipient within twenty (20) days of oral or visual disclosure, which embodies trade secrets developed at private expense or which is confidential business or financial information, provided that such information:

(i) is not generally known, or which becomes generally known or available during the period of this Agreement from other sources without obligations concerning their confidentiality;

(ii) has not been made available by the owners to others without obligation concerning its confidentiality; and

(iii) is not already available to the receiving party without obligation concerning its confidentiality.

(iv) is not independently developed by or on behalf of the receiving party, without reliance on the information received hereunder.

2.04 "Subject Data" means all recorded information first produced in the performance of this Agreement.

2.05 "Subject Invention" means any Invention Made as a consequence of, or in relation to, the performance of work under this Agreement.

Article 3. Research Scope and Administration

3.00 Statement of Work. Research performed under this Agreement shall be performed in accordance with the SOW incorporated as a part of this Agreement at Appendix A. It is agreed that any descriptions, statements, or specifications in the SOW shall be interpreted as goals and objectives of the services to be provided under this Agreement and not requirements or warranties. USAISR and UMichigan will endeavor to achieve the goals and objectives of such services; however, each party acknowledges that such goals and objectives, or any anticipated schedule of performance, may not be achieved.

3.01 Review of Work. Periodic conferences shall be held between the parties for the purpose of reviewing the progress of work. It is understood that the nature of this research is such that completion within the period of performance specified, or within the limits of financial support allocated, cannot be guaranteed. Accordingly, all research will be performed in good faith.

3.02 Principal Investigator. Any work required by the USAISR under the SOW will be performed under the supervision of LTC Kevin K. Chung, MD (Research Directorate, US Army Institute of Surgical Research, 3698 Chambers Pass, JBSA Fort Sam Houston, Texas 78234-7767, 210-539-4327, FAX 210-539-8522, kevin.k.chung.mil@mail.mil, who, as co-principal investigator has responsibility for the scientific and technical conduct of this project on behalf of the USAISR. Any work required by UMichigan under the SOW will be performed under the supervision of Stewart C. Wang, MD PhD (1500 E. Medical Center Drive, 1C-421-UH, Ann Arbor, MI 48109-5033, 734-936-9690, FAX: 734-936-

9657, stewartw@umich.edu, who, as co-principal investigator has responsibility for the scientific and technical conduct of this project on behalf of UMichigan.

3.03 Collaboration Changes. If at any time the co-principal investigators determine that the research data dictates a substantial change in the direction of the work, the parties shall make a good faith effort to agree on any necessary change to the SOW and make the change by written notice to the addresses listed in section 14.05 Notices.

3.04 Final Report. The parties shall prepare a final report of the results of this project within six months after completing the SOW.

Article 4. Ownership and Use of Physical Property

4.01 Ownership of Materials or Equipment. All materials or equipment developed or acquired under this Agreement by the parties shall be the property of the party which developed or acquired the property, except that government equipment provided by USAISR (1) which through mixed funding or mixed development must be integrated into a larger system, or (2) which through normal use at the termination of the Agreement has a salvage value that is less than the return shipping costs, shall become the property of UMichigan.

4.02 Use of Provided Materials. Both parties agree that any materials relating to them which were provided by one party to the other party will be used for research purposes only. The materials shall not be sold, offered for sale, used for commercial purposes, or be furnished to any other party without advance written approval from the Provider's official signing this Agreement or from another official to whom the authority has been delegated, and any use or furnishing of material shall be subject to the restrictions and obligations imposed by this Agreement.

Article 5. Financial Obligation

5.00 The parties shall each be individually responsible for funding its own respective researchers throughout this Agreement, including USAISR facilities, salaries, overhead and indirect costs, etc. Each party may determine at its own discretion, the amount of resources, personnel, materials or funds it will devote to the work under this Agreement.

Article 6. Patent Rights

6.00 Reporting. The parties shall promptly report to each other all Subject Inventions reported to either party by its employees. All Subject Inventions Made during the performance of this Agreement shall be listed in the Final Report required by this Agreement.

6.01 UMichigan Employee Inventions. USAISR waives any ownership rights the U.S. Government may have in Subject Inventions Made by UMichigan employees and agrees that UMichigan shall have the option to retain title in Subject Inventions Made by UMichigan employees. UMichigan shall notify USAISR promptly upon making this election and agrees to timely file patent applications on UMichigan's Subject Invention at its own expense. UMichigan agrees to grant to the U.S. Government on UMichigan's Subject Inventions a nonexclusive, nontransferable, irrevocable, paid-up license in the patents covering a Subject Invention, to practice or have practiced, throughout the world by, or on behalf of the U.S. Government. The nonexclusive license shall be evidenced by a confirmatory license agreement prepared by UMichigan in a form satisfactory to USAISR.

6.02 USAISR Employee Inventions. USAISR shall have the initial option to retain title to, and file patent application on, each Subject Invention Made by its employees. The USAISR agrees to grant an exclusive license to any invention arising under this Agreement to which it has ownership to UMichigan in accordance with Title 15 U.S. Code Section 3710a, on terms negotiated in good faith. Any invention arising under this Agreement is subject to the retention by the U.S. Government of nonexclusive, nontransferable, irrevocable, paid-up license to practice, or have practiced, the invention throughout the world by or on behalf of the U.S. Government.

6.03 Joint Inventions. Any Subject Invention patentable under U.S. patent law which is Made jointly by USAISR employees and UMichigan employees under the Scope of Work of this Agreement shall be jointly owned by the parties. The parties shall discuss together a filing strategy and filing expenses related to the filing of the patent covering the Subject Invention. If a party decides not to retain its ownership rights to a jointly owned Subject Invention, it shall offer to assign such rights to the other party, pursuant to Paragraph 6.05, below.

6.04 Government Contractor Inventions. In accordance with 37 Code of Federal Regulations 401.14, if one of USAISR's Contractors conceives an invention while performing services at USAISR to fulfill USAISR's obligations under this Agreement, USAISR may require the Contractor to negotiate a separate agreement with UMichigan regarding allocation of rights to any Subject Invention the Contractor makes, solely or jointly, under this Agreement. The separate agreement (i.e., between UMichigan and the Contractor) shall be negotiated prior to the Contractor undertaking work under this Agreement or, with the USAISR's permission, upon the identification of a Subject Invention. In the absence of such a separate agreement, the Contractor agrees to grant UMichigan an option for a license in Contractor's inventions of the same scope and terms set forth in this Agreement for inventions made by USAISR employees.

6.05 Filing of Patent Applications. The party having the right to retain title to, and file patent applications on, a specific Subject Invention may elect not to file patent applications, provided it so advises the other party within 90 days from the date it reports the Subject Invention to the other party. Thereafter, the other party may elect to file patent applications on the Subject Invention and the party initially reporting the Subject Invention agrees to assign its ownership interest in the Subject Invention to the other party.

6.06 Patent Expenses. The expenses attendant to the filing of patent applications shall be borne by the party filing the patent application, unless otherwise agreed. Each party shall provide the other party with copies of the patent applications it files on any Subject Invention, along with the power to inspect and make copies of all documents retained in the official patent application files by the applicable patent office. The parties agree to reasonably cooperate with each other in the preparation and filing of patent applications resulting from this Agreement.

Article 7. Exclusive License

7.00 Grant. The USAISR agrees to grant to UMichigan an exclusive license in each U.S. patent application, and patents issued thereon, covering a Subject Invention, which is filed by the USAISR subject to the reservation of a nonexclusive, nontransferable, irrevocable, paid-up license to practice and have practiced the Subject Invention on behalf of the United States.

7.01 Exclusive License Terms. UMichigan shall elect or decline to exercise its right to acquire an exclusive license to any Subject Invention within six months of being informed by the USAISR of the Subject Invention. The specific royalty rate and other terms of license shall be negotiated promptly in good faith and in conformance with the laws of the United States.

Article 8. Background Patent(s)

8.00 USAISR Background Patent(s): USAISR has filed patent application(s), or is the assignee of issued patent(s), listed below which contain(s) claims that are related to research contemplated under this Agreement. No license(s) to this/these patent applications or issue patents is/are granted under this Agreement, and this/these application(s) and any continuations to it/them are specifically excluded from the definitions of "Subject Invention" contained in this Agreement: None.

8.01 UMichigan Background Patent(s): UMichigan has filed patent application(s), or is the assignee of issued patent(s), listed below which contain(s) claims that are related to research contemplated under this Agreement. No license(s) to this/these patent applications or issue patents is/are granted under this Agreement, and this/these application(s) and any continuations to it/them are specifically excluded from the definitions of "Subject Invention" contained in this Agreement:

Analytic morphomics: high speed medical image automated analysis method (Wang, et al.)
January 26, 2016
United States Patent # 9,241,634

Article 9. Subject Data and Proprietary Information

9.00 Subject Data Ownership. Subject Data shall be jointly owned by the parties. Each party, upon request to the other party, shall have the right to review and to request delivery of all Subject Data, and delivery shall be made to the requesting party within two weeks of the request, except to the extent that such Subject Data are subject to a claim of confidentiality or privilege by a third party.

9.01 Proprietary Information/Confidential Information. Each party shall place a proprietary notice on all information it delivers to the other party under this Agreement that it asserts is proprietary. The parties agree that any Proprietary Information or Confidential Information furnished by one party to the other party under this Agreement, or in contemplation of this Agreement, shall be used, reproduced and disclosed by the receiving party only for the purpose of carrying out this Agreement, and shall not be released by the receiving party to third parties unless consent to such release is obtained from the providing party.

9.02 Army limited-access database. Notwithstanding anything to the contrary in this Article, the existence of established CRADAs specifying areas of research and their total dollar amounts may be documented on limited access, password-protected websites of the U.S. Army Medical Research and Materiel Command (the parent organization of USAISR), to provide the Command's leadership with a complete picture of military research efforts.

9.03 USAISR Contractors. UMichigan acknowledges and agrees to allow USAISR's disclosure of UMichigan's proprietary information to USAISR's Contractors for the purposes of carrying out this Agreement. USAISR agrees that it has or will ensure that its Contractors are under written obligation not to disclose UMichigan's proprietary information, except as required by law or court order, before Contractor employees have access to UMichigan's proprietary information under this Agreement.

9.04 Release Restrictions. USAISR shall have the right to use all Subject Data for any Governmental purpose, but shall not release Subject Data publicly except: (i) USAISR in reporting on the results of research may publish Subject Data in technical articles and other documents to the extent it determines to be appropriate; and (ii) USAISR may release Subject Data where release is required by law or court order. The parties agree to confer prior to the publication of Subject Data to assure that no Proprietary Information is released and that patent rights are not jeopardized. Prior to submitting a manuscript for review which contains the results of the research under this Agreement, or prior to publication, each party shall be offered at least fourty-five (45) days to review any proposed manuscript and request up to sixty (60) days to delay publication in order to file patent applications. In no event shall the delay in publication exceed one hundred and twenty (120) days.

9.05 FDA Documents. If this Agreement involves a product regulated by the U.S. Food and Drug Administration (FDA), then UMichigan or the U.S. Army Medical Research and Materiel Command, as appropriate, may file any required documentation with the FDA. In addition, the parties authorize and consent to allow each other or their contractors or agents access to, or to cross-reference, any documents filed with the FDA related to the product. In the event the UMichigan decides not to continue development or seeking FDA approval or stops commercializing in the US, then the Army has access to all the data/current FDA filings, and a non-exclusive license to any necessary underlying intellectual property.

Article 10. Information Assurance and Data Management

The parties to this agreement acknowledge the importance of maintaining information security and managing the data exchanged hereunder in compliance with all applicable legal authorities, affording the highest degree of protection practicable. The parties agree to the following:

10.01 The following data will be collected, shared, used or stored in support of this non-reimbursable agreement: human clinical test data.

10.02 All data generated under this agreement, as well as all rights in that data, will be jointly owned by the parties to this agreement. Both parties assume responsibility for storing, protecting and managing data in compliance with applicable legal authorities. Each party will notify the other party prior to the destruction of any data in their possession that is generated under this agreement.

10.03 Both parties will ensure that their personnel handling the data described above satisfy all necessary training requirements and obtain any requisite clearances to handle said data on any applicable information system. All personnel participating in data exchange must be under a duty to hold said data confidential. If there will be any individual lacking such a duty of confidentiality, that individual must sign a non-disclosure agreement before handling the data.

10.04 Both parties are responsible for ensuring that any data shared is both transmitted and stored in a secured information system network that is fully compliant with all applicable Federal legal authorities.

10.05 The data generated as a result of this interaction may be used to support the funding entities' regulatory filings, professional publications and other purposes.

10.06 Any public release of data prior to final transfer to the funding agency requires review and approval by the public affairs and security offices of both signatories to this agreement.

Article 11. Termination

11.00 Termination by Mutual Consent. UMichigan and USAISR may elect to terminate this Agreement, or portions thereof, at any time by mutual consent.

11.01 Termination by Unilateral Action. Either party may unilaterally terminate this entire Agreement at any time by giving the other party written notice, not less than 30 days prior to the desired termination date.

11.02 Termination Procedures. In the event of termination, the parties shall specify the disposition of all property, patents and other results of work accomplished or in progress, arising from or performed under this Agreement by written notice. Upon receipt of a written termination notice, the parties shall not make any new commitments and shall, to the extent feasible, cancel all outstanding commitments that relate to this Agreement. Notwithstanding any other provision of this Agreement, any exclusive license entered into by the parties relating to this Agreement shall be simultaneously terminated unless the parties agree to retain such exclusive license.

Article 12. Disputes

12.00 Settlement. Any dispute arising under this Agreement which is not disposed of by agreement of the principal investigators shall be submitted jointly to the signatories of this Agreement. A joint decision of the signatories or their designees shall be the disposition of such dispute. However, nothing in this section shall prevent any party from pursuing any and all administrative and/or judicial remedies which may be allowable.

Article 13. Liability

13.00 Property. Neither party shall be responsible for damages to any property provided to, or acquired by, the other party pursuant to this Agreement.

13.01 UMichigan's Employees. To the extent permitted by law, UMichigan agrees to indemnify and hold harmless the U.S. Government for liability of any kind involving an employee of UMichigan arising out of negligent act or omission in connection with this Agreement, and for all liabilities arising out of the use by UMichigan of USAISR's research and technical developments, or out of any use, sale or other disposition by UMichigan of products made based on USAISR's technical developments, except to the extent the liability is due to the negligence of USAISR under the provisions of the Federal Tort Claims Act. This provision shall survive termination or expiration of this Agreement.

13.02 No Warranty. The parties make no express or implied warranty as to any matter whatsoever, including the conditions of the research or any Invention or product, whether tangible or intangible, Made, or developed under this agreement, or the ownership, merchantability, or fitness for a particular purpose of the research or any Invention or product.

Article 14. Miscellaneous

14.00 Governing Law. The construction, validity, performance, and effect of this Agreement shall be governed for all purposes by the laws applicable to the United States Government.

14.01 Export Control and Biological Select Agents and Toxins. The obligations of the parties to transfer technology to one or more other parties, provide technical information and reports to one or more other parties, and otherwise perform under this Agreement are contingent upon compliance with applicable United States export control laws and regulations. The transfer of certain technical data and commodities may require a license from a cognizant agency of the United States Government or written assurances by the Parties that the Parties shall not export technical data, computer software, or certain commodities to specified foreign countries without prior approval of an appropriate agency of the United States Government. The Parties do not, alone or collectively, represent that a license shall not be required, nor that, if required, it shall be issued. In addition, where applicable, the parties agree to fully comply with all laws, regulations, and guidelines governing biological select agents and toxins.

14.02 Independent Contractors. The relationship of the parties to this Agreement is that of independent contractors and not as agents of each other or as joint venturers or partners.

14.03 Use of Name or Endorsements. (a) The parties shall not use the name of the other party on any product or service which is directly or indirectly related to either this Agreement or any patent license or assignment agreement which implements this Agreement without the prior approval of the other party. (b) By entering into this Agreement, USAISR does not directly or indirectly endorse any product or service provided, or to be provided, by UMichigan, its successors, assignees, or licensees. UMichigan shall not in any way imply that this Agreement is an endorsement of any such product or service. Press releases or other public releases of information shall be coordinated between the parties prior to release, except that the USAISR may release the name of UMichigan and the title of the research without prior approval from UMichigan.

14.04 Survival of Specified Provisions. The rights specified in provisions of this Agreement covering Patent Rights, Subject Data and Proprietary Information, and Liability shall survive the termination or expiration of this Agreement.

14.05 Notices. All notices pertaining to or required by this Agreement shall be in writing and shall be signed by an authorized representative addressed as follows:

If to UMichigan:	Ryan Lankton, JD, MSI Project Representative Office of Research and Sponsored Projects University of Michigan 3003 South State Street, Room 1018 Ann Arbor, MI 48109-1274
If to USAISR:	U.S. Army Institute of Surgical Research MCMR-SRR-P (Rick Jocz) 3698 Chambers Pass Building 3611 JBSA Fort Sam Houston, Texas 78234-7767

Any party may change such address by notice given to the other in the manner set forth above.

Article 15. Duration of Agreement and Effective Date

15.01 Effective Date. This Agreement shall enter into force as of the date it is signed by the last authorized representative of the parties.

15.02 Signature Execution. This Agreement may be executed in one or more counterparts by the parties by signature of a person having authority to bind the party, which may be by facsimile signature, each of which when executed and delivered, by facsimile transmission, mail, or email delivery, will be an original and all of which will constitute but one and the same Agreement.

15.03 Expiration Date. This Agreement will automatically expire three (3) years from effective date unless it is revised by written notice and mutual agreement.

IN WITNESS WHEREOF, the Parties have caused this agreement to be executed by their duly authorized representatives as follows:

For UMichigan:

RYAN LANKTON, JD, MSI
Project Representative
Office of Research and Sponsored
Projects University of Michigan

DATE 6/13/2016

For the U.S. Government:

MICHAEL D. WIRT
Colonel, US Army
Commanding
U.S. Army Institute of Surgical Research

DATE 13 Jun 16

APPENDIX A
STATEMENT OF WORK

Title: Analytical Morphomics of Human Torso for Combat Injury Characterization

In an effort to expand collaboration between the US Army Institute of Surgical Research (USAISR) and the University of Michigan (UMichigan), the institutions enter into a cooperative agreement described in the following statement of work. The points of contact for the two institutions are: Stewart C. Wang, MD, PhD, The University of Michigan and Sahar T. Leazer, MD, The US Army Institute of Surgical Research.

Background: "Analytical Morphomics" is a term described by Dr. Stewart Wang to characterize the innovative high throughput, highly automated, and anatomically indexed processing of 3D medical imaging data developed to support translational crash research. In analyzing thousands of crash cases it was apparent that occupant characteristics were significantly affecting the severity of incurred injuries. Experience in the civilian crash arena has pinpointed the influence of specific body characteristics on injury outcome following trauma. Morphomics measurements can overcome individual variability and improve by 10 to 100-fold the analytic power in crash study populations. Previous analysis of surgical outcome databases has shown that many of these morphomic factors can significantly predict and affect clinical outcomes of surgical patients following different medical treatments.

These findings can be translated to the military population injured in the battlefield. The result is the development of far more relevant and biofidelic physical test devices and methodologies that engineers need to guide military vehicle and personnel protection countermeasure development. The body composition data collected will also allow for improvements in medical and rehabilitation care for injured warfighters.

One specific application is the development of accurate measurements for aortic and venal caval dimensions based on CT scan images, hemodynamic status, habitus, gender and age in the military population. These findings will help create monograms of correlation for easily identifiable external bony landmarks and internal vascular anatomy. This is necessary to provide fluoroscopy-free insertion in the field. Aortic and vena caval dimensions differ with the hemodynamic status of the injured person as well as their gender, race, body habitus, and age. Better characterization of these differences is necessary to guide optimal field insertion and inflation of occlusive balloon catheters or other hemorrhage control devices for the treatment of battlefield casualties.

CT scans of battlefield casualties stored in the DoDTR at the USAISR will be de-identified then transferred electronically to the UMichigan. The morphomic analysis of the CT scan images provided by the USAISR will be implemented at the UMichigan using the following computer programs: MIMICS, MATLAB, ORACLE, and R for statistical analysis.

Collaboration:

The US Army Institute of Surgical Research agrees to:

1. De-identify and electronically transfer CT scans of battlefield casualties stored in the DoDTR to the UMichigan.

2. Share full research protocols and engage in good faith discussions pertaining to experimental design and objectives for the collaborative study designed to address de-identification and analysis of the CT scans provided by the USAISR and the UMichigan.

3. Share research data and engage in good faith discussions pertaining to the interpretation of data from the collaborative study as listed in paragraph 1, above.

4. Work in collaboration to publish results in appropriate peer-reviewed journals as co-authors on all manuscripts generated from analysis.

The University of Michigan agrees to:

1. Perform the morphomic analysis of the CT scan images of battlefield casualties stored in the DoDTR provided by the USAISR.

2. Share full research protocols and engage in good faith discussions pertaining to experimental design and objectives for the collaborative study designed to address de-identification and analysis of the CT scans provided by the USAISR and the UMichigan.

3. Share research data and engage in good faith discussions pertaining to the interpretation of data from the collaborative study as listed in paragraph 1, above.

4. Work in collaboration to publish results in appropriate peer-reviewed journals as co-authors on all manuscripts generated from analysis.

From time to time, USAISR personnel may work in UMichigan's facilities and UMichigan's personnel may work in USAISR's facilities as necessary to accomplish the goals of this collaboration.

Appendix H: Quad Chart

Characterization of Human Torso Vascular Morphometry in Normotensive and Hypotensive Trauma Patients

Log. No. 13057165

Award No. W81XWH-14-2-0126

PI: Stewart Wang, MD **Org:** University of Michigan **Award Amount:** $1,089,496 Direct

Study Aims

- Develop accurate measurements for aortic dimensions based on hemodynamic status, body habitus, gender, and age in the civilian population
- Develop accurate measurements for venous dimensions based on hemodynamic status, body habitus, gender, and age in the civilian population
- Translate these findings to the military population and create accurate nomograms for catheter insertion and balloon inflation based on hemodynamic status, body habitus, gender, and age.

Approach

We developed a machine learning technique for extracting the aortic structures in a more automated fashion. This entails creating algorithms that search for circular structures in a region of interest and then reference the slices above and below to validate selection.

	balloon length	Multivariate Model train	Multivariate Model test	Median Model train	Median Model test
RFA to Zone III	4 cm	39.7%	39.5%	39.8%	37.4%
	3 cm	16.4%	16.9%	17.0%	18.0%
	2.5 cm	10.9%	10.3%	10.2%	12.1%
LFA to Zone III	4 cm	39.1%	40.0%	40.7%	37.2%
	3 cm	15.5%	17.2%	17.5%	18.3%
	2.5 cm	9.9%	9.8%	11.9%	12.0%

Predicted error percentage rate for REBOA placement

Timeline and Cost

Activities CY	14	15-16*
Develop accurate measurements for aortic dimensions	■	
Develop accurate measurements for venous dimensions	■	
Translate these findings to ~~military~~ population <u>(healthier civilian)</u>		■
Perform analysis and develop nomograms		■
Estimated Budget ($K) Direct	**$517 K**	**$535 K**

*No Cost Time Extension Approved for CY16 (Yr3)

Updated: (29 JUN 2017)

Goals/Milestones

CY14 Goal – Civilian Population

% Complete	Task
100%	Identify and process civilian base morphomics
100%	Develop aortic and vena cava algorithms
100%	Process vasculature for civilian population
100%	Analyze data and create nomograms

CY15 Goals – Military Population Surrogate*

% Complete	Task
100%	Select civilian CTs to replace military CTs from AISR
100%	Extract demographic information
100%	Process base morphomics for military surrogate cohort
100%	Process aorta for military surrogate cohort
100%	Process vena cava for military surrogate cohort
100%	Validate nomograms

Comments/Challenges/Issues/Concerns

* Difficulty obtaining Military CTs resulted in a shift to a second set of Civilians with a tighter age and BMI range

Appendix I: Interim Progress Review Presentation

Award Number: W81XWH-14-2-0126

Award Date: 30-June-2014

Award Amount: $1,680,120

Science/Project Officer: Wilbur W. Malloy

Contract Officer Representative: Wilbur W. Malloy

Program Sponsor Rep: Lt. Col Antoinette Shinn

Portfolio Manager: Lt. Col Antoinette Shinn

Characterization of Human Torso Vascular Morphometry in Normotensive and Hypotensive Trauma Patients

University of Michigan
MAG Morphomic Analysis Group

Principal Investigator:
Stewart C. Wang, MD, PhD

May 2, 2017

Co-PI Acknowledgements

Jonathan L. Eliason, MD

S. Martin Lindenauer Collegiate Associate Professor of Vascular Surgery

Medical Director – Diagnostic Vascular Labs

Co-Director – Multidisciplinary Aortic Program

Study Background

Non-compressible torso hemorrhage remains the leading cause of preventable death on the battlefield and a leading cause of death in civilian centers. Investigators are researching the use of various aortic occlusion catheters that can control non-compressible torso injuries in the field. Basic morphometric understanding is prerequisite for such procedures to be done safely and effectively.

- Better characterization of these differences is necessary to guide optimal field inflation of occlusive balloon catheters or other hemorrhage control devices for the treatment of battlefield casualties.

- Better characterization of these dimensions will support the development of occlusion devices that optimally limit hemorrhage while minimizing complications.

Grant Overview:
Hypothesis & Aims

We hypothesize that aortic and venous dimensions differ with the hemodynamic status of the injured person as well as their gender, race, body habitus and age.

- AIM 1: Develop accurate measurements for aortic dimensions based on hemodynamic status, body habitus, gender and age in the civilian population.

- AIM 2: Develop accurate measurements for vena caval dimensions based on hemodynamic status, body habitus, gender and age in the civilian population.

- AIM 3: Translate these findings to the military population and create accurate nomograms for catheter design, catheter insertion and balloon inflation based on hemodynamic status, body habitus, gender, and age.

Grant Overview:
Study Design Overview

- Refine our analytic techniques to quantify aortic as well as vena caval geometry and dimensions in a much larger population (n=2000 civilians, 500 injured warfighters) to more fully determine the effects of gender, race, and age as well as hemodynamic status.
- This information will be vital to determine the dimensions of balloon inflation necessary to control internal hemorrhage while minimizing complications such as aortic dissection or rupture.

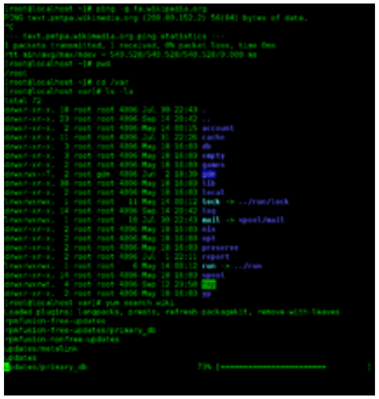
STUDY POPULATION	Target	Delivered
Civilians: 18-50 years old (60% Male / 40% Female)	2000 (1200/800)	1789 of 2247 met criteria (1280/509)
EKG-gated scans	50	37
Hemodynamic instability (HR>110, SBP<100)	75	78 (HR > 100, BP < 100)
Military Scans	500	**0**

Limitation: Military Scan Access

- Proposed: include 500 warfighter scans obtained from AISR for processing and analysis. After obtaining appropriate CRADA and IRB approval from the military, we began working with the IT resources at AISR in San Antonio to acquire these scans.
- Reality: Scans were not retrievable from AISR, even though we verified they had scans.

Military Scan Access: Mitigation Strategies We Attempted

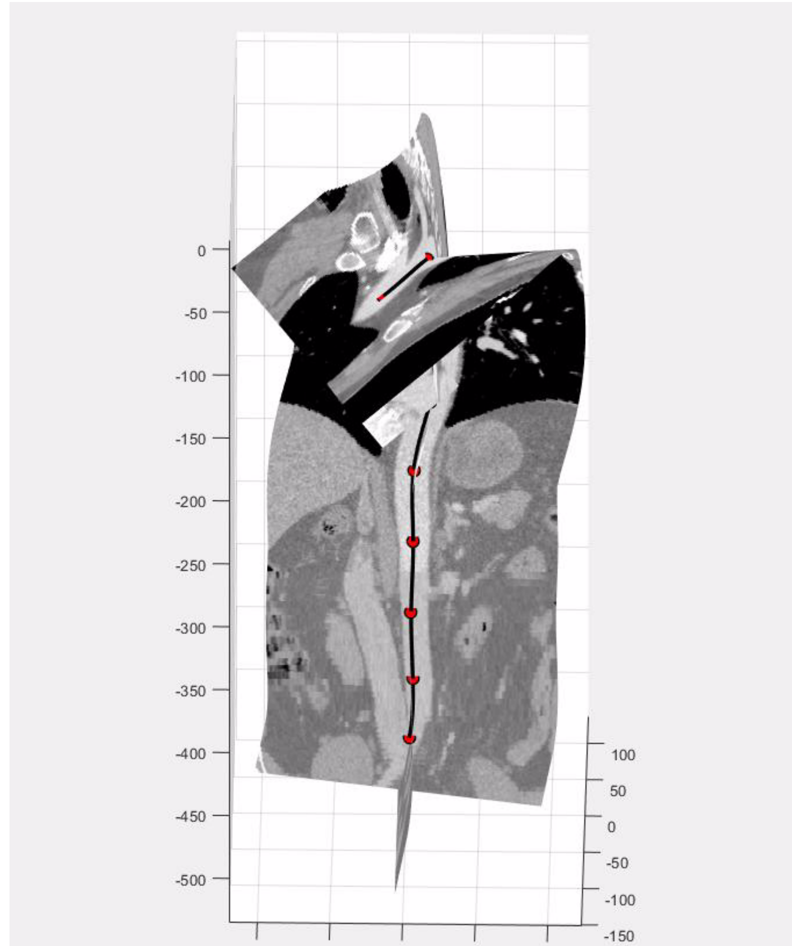
- Investigated the system that being used:
  - Found an outdated version of Orthanc, an open-source, web-based PACS, but due to their use of IE 8 (an unsupported browser), they were limited to accessing Orthanc via the command-line (i.e. 'curl').



- Developed tool to assist with scan retrieval:
  - Developed customized software to search for, anonymize, and download scans using this interface. This software was successfully tested to find 1 scan in a small sample of 10 patients.
  - After numerous attempts, including two in-person trips, the existing resources at AISR were unable to get the 500 requested scans necessary.
  - We subsequently investigated other sources for military scans to validate the civilian nomograms, but we had no success.
- Final approach:
  - We are analyzing a subset of the civilian population, limiting this validation population to people 18-30 years of age with a normal BMI.

Methodology: Aorta Centerline

- The spine was landmarked first to provide a framework for segmenting the aorta
- A set of landmarks was also manually placed for use in splitting the aorta into the 3 REBOA zones
- Machine learning model was trained on an initial set to create an aortic probability cloud for any new scan
- Optimization was used to fit a centerline to the probability cloud and scan, with an arch at the top and spline for the descending aorta to the bifurcation



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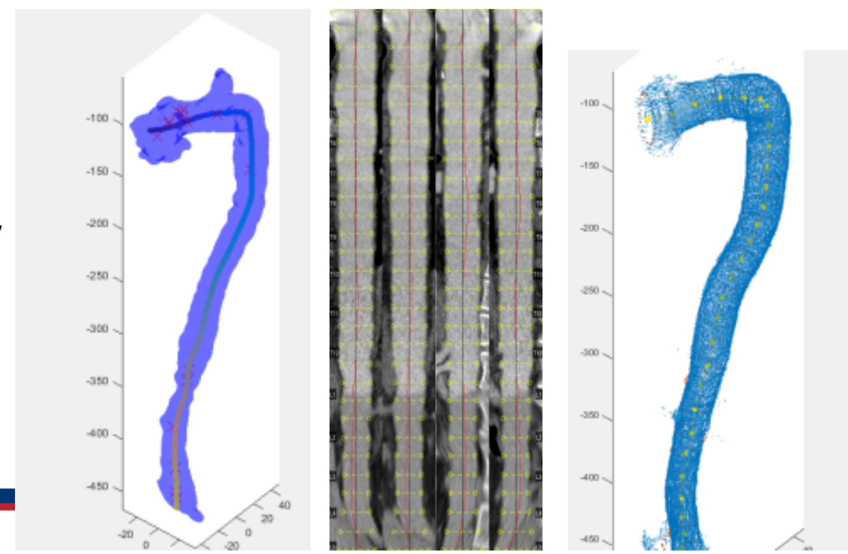
Methodology: Aortic Wall

- Using centerline, the scan was resampled radially away from the center of the aorta
- Using a 3D Sobel edge filter, the algorithm searched for the nearest significant change in density while going outward from the center of the aorta
- These resulting edges were fit with a surface and turned into the aorta modeled as a tube of variable radius
- At each step along the way, the results were verified and were manually corrected if the segmentation was unsatisfactory



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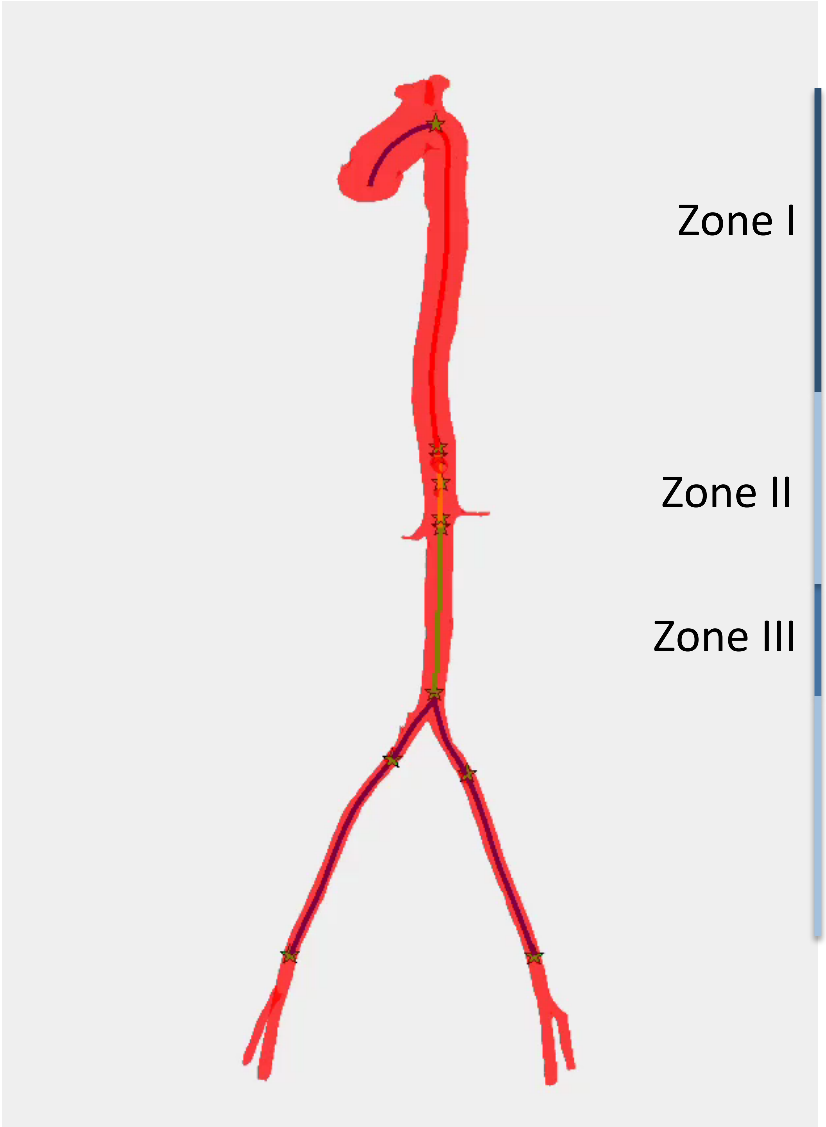
Results

	Other		Hypotensive		
	Female	Male	Female	Male	Total
# CT Scans	477 (28%)	1,226 (72%)	30 (38%)	48 (62%)	1,773
Mean Age	33.1	32.5	36.7	32.2	32.7
Std. Dev. Age	10.3	10.2	10.7	10.5	10.2
Min Age	18	18	19	18	18
Max Age	51	51	50	50	51
Mean Height (m)	1.6	1.8	1.7	1.8	1.7
Mean Weight (kg)	74.4	89.3	68.4	101.0	85.5
Mean Torso Extent convex hull (mm)	621	666	637	679	654
Mean Torso Extent straight line (mm)	534	566	546	575	557

Aortic Dimensions



Left Subclavian (LS) Branch Point

Superior Celiac (SC) Branch Point

Celiac Branch Point

SMA Branch Point

R/L Renal (RR/LR) Branch Points

Aortic Bifurcation (AB) Point

Internal Iliac Branch Point

Femoral Artery Cut (CFA) Point

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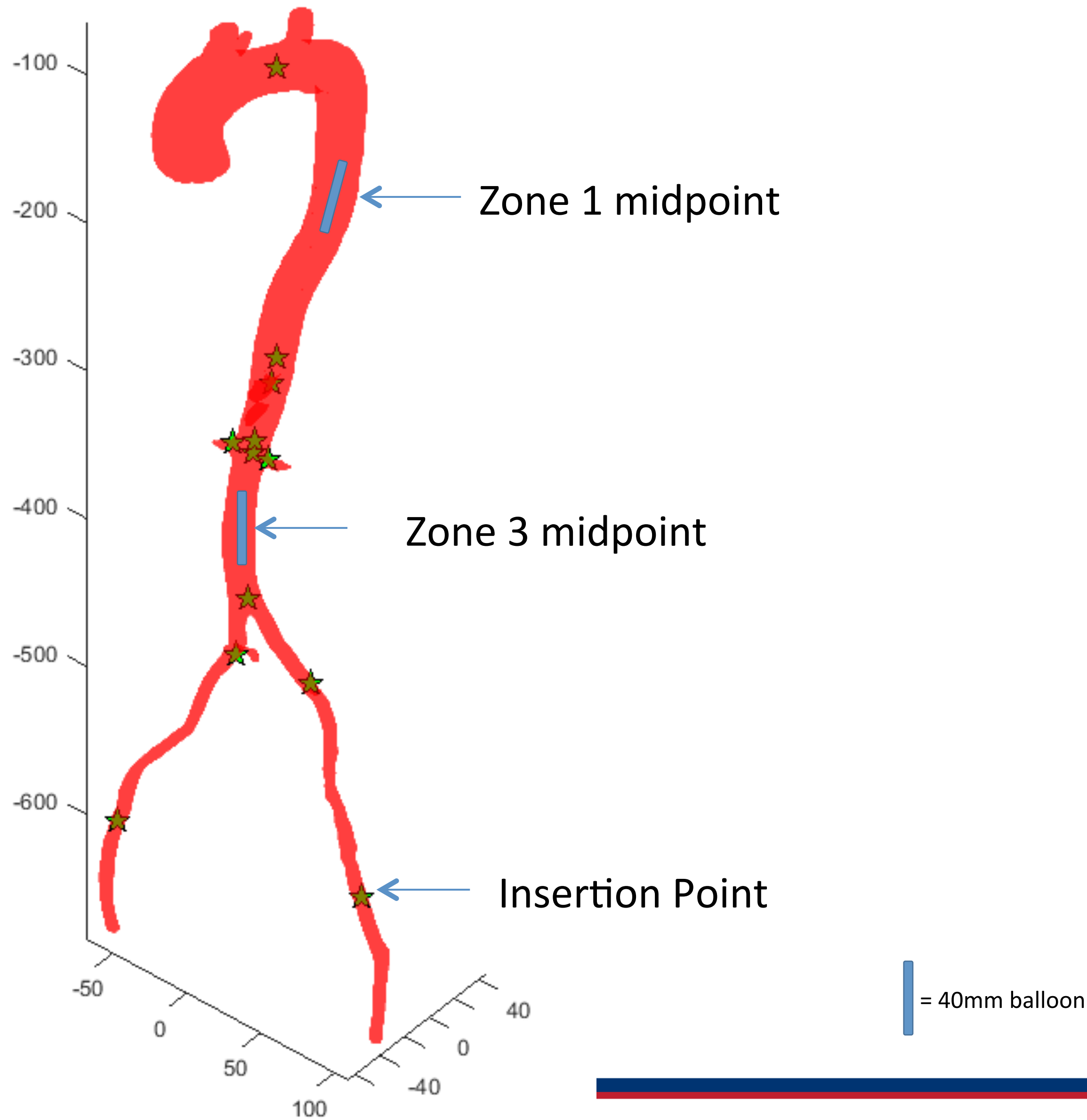
Aortic Dimensions and Balloon Target Site



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Arterial Length

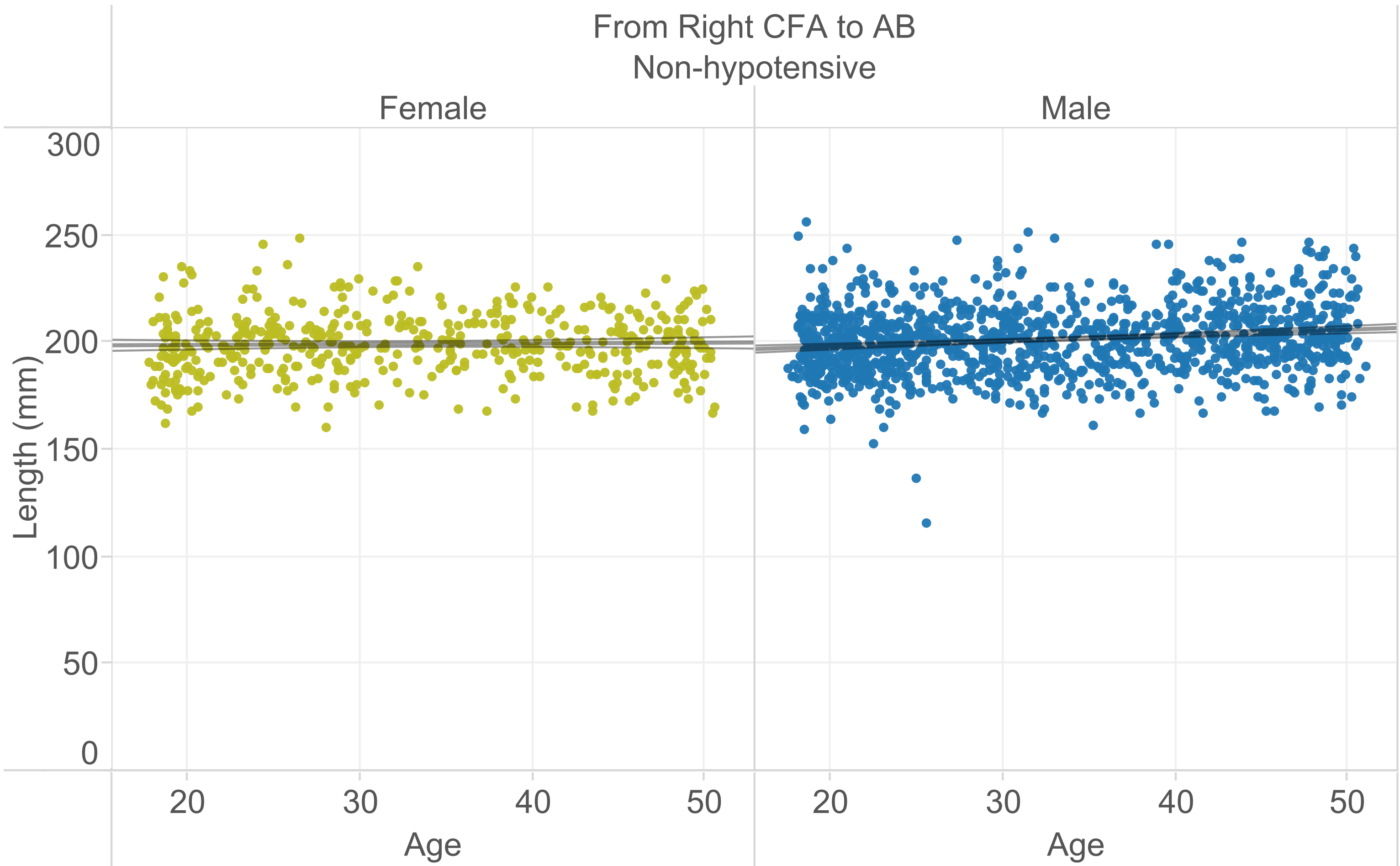
by Age and Sex

Arterial length (mm) measurements at key points

University of Michigan Morphomic Analysis Group (MAG)

Arterial Length

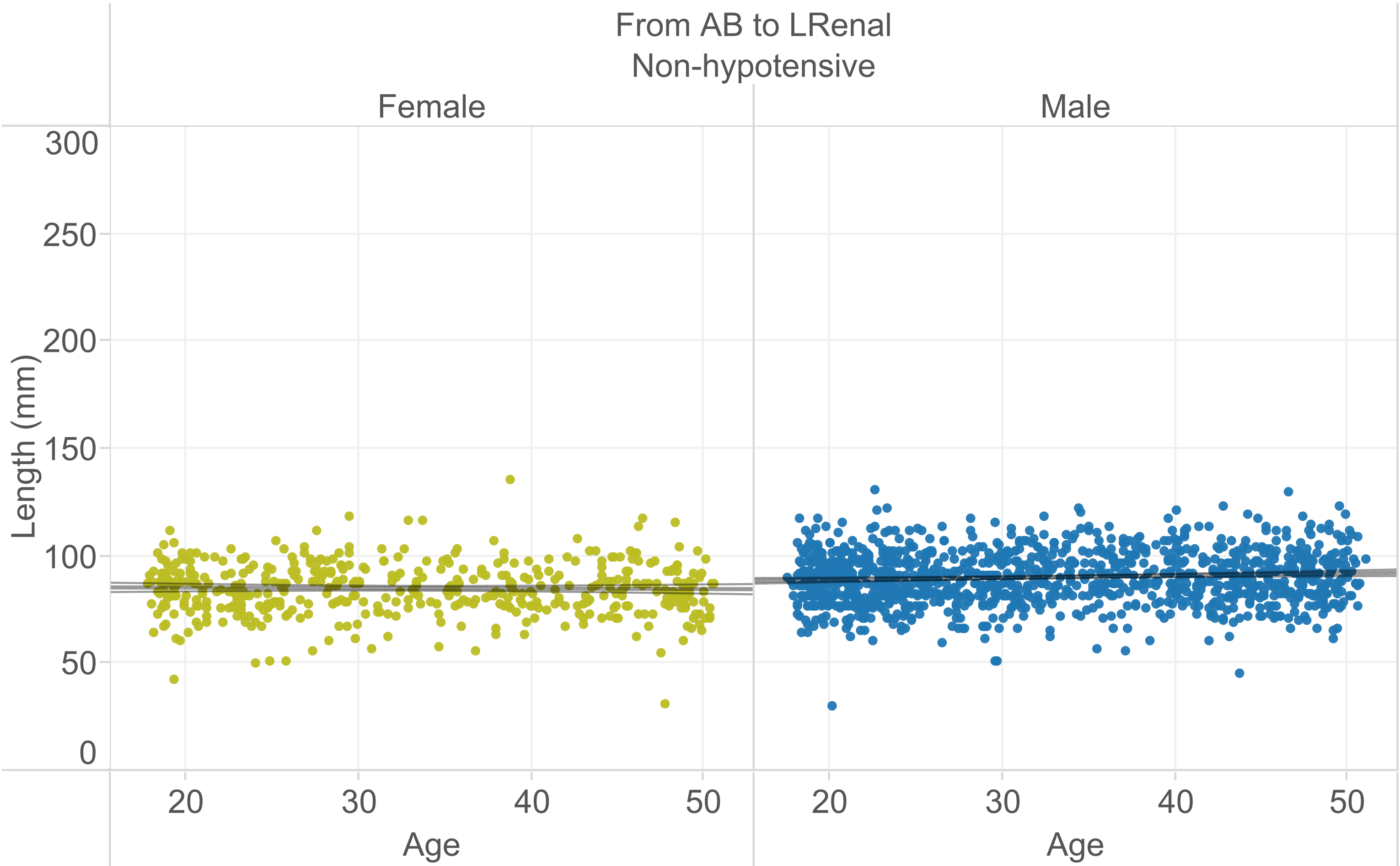
by Age and Sex



Arterial length (mm) measurements at key points

Arterial Length

by Age and Sex

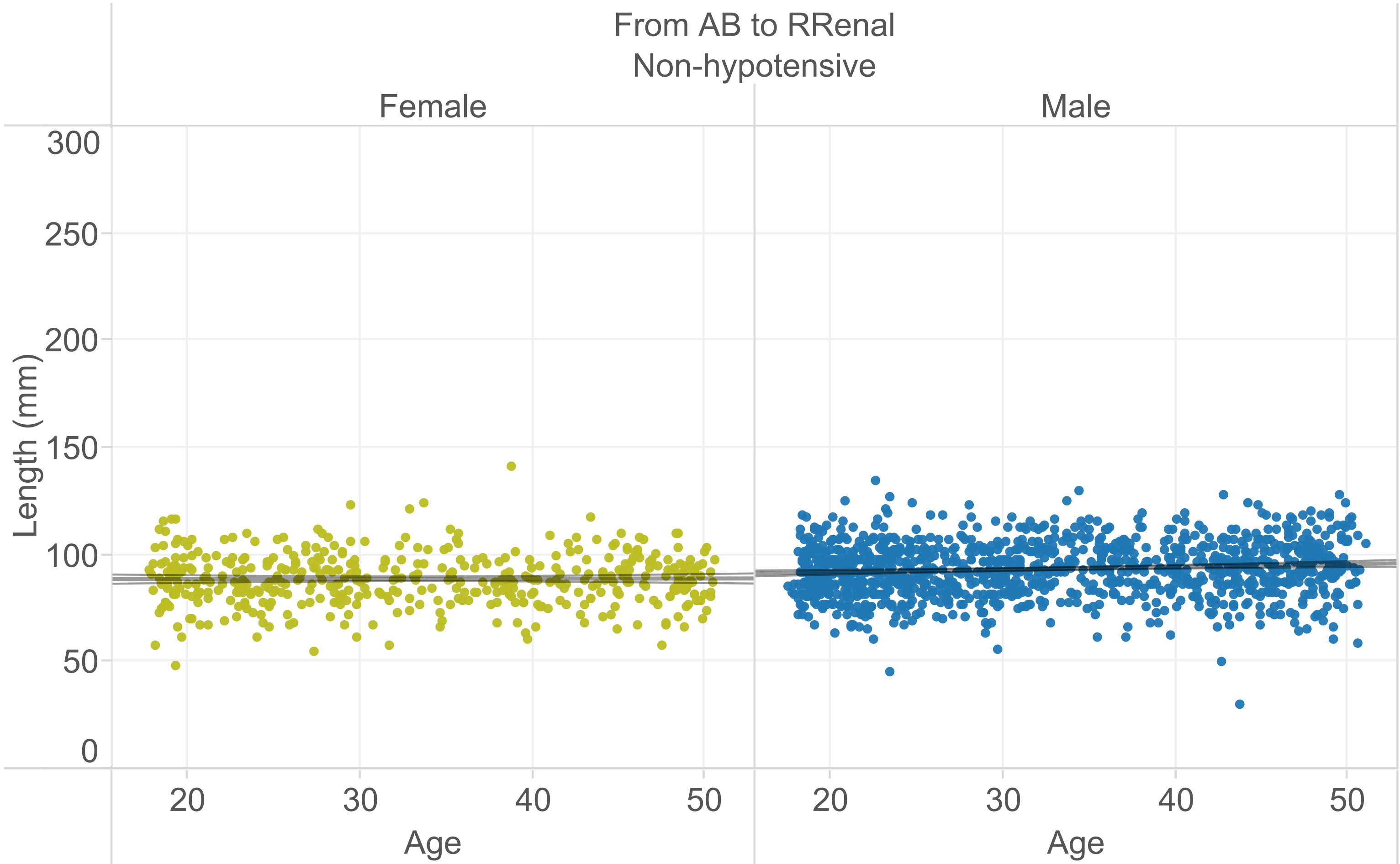


Arterial length (mm) measurements at key points

University of Michigan MAG Morphomic Analysis Group

Arterial Length

by Age and Sex



Arterial length (mm) measurements at key points

Arterial Length

by Age and Sex

Arterial length (mm) measurements at key points

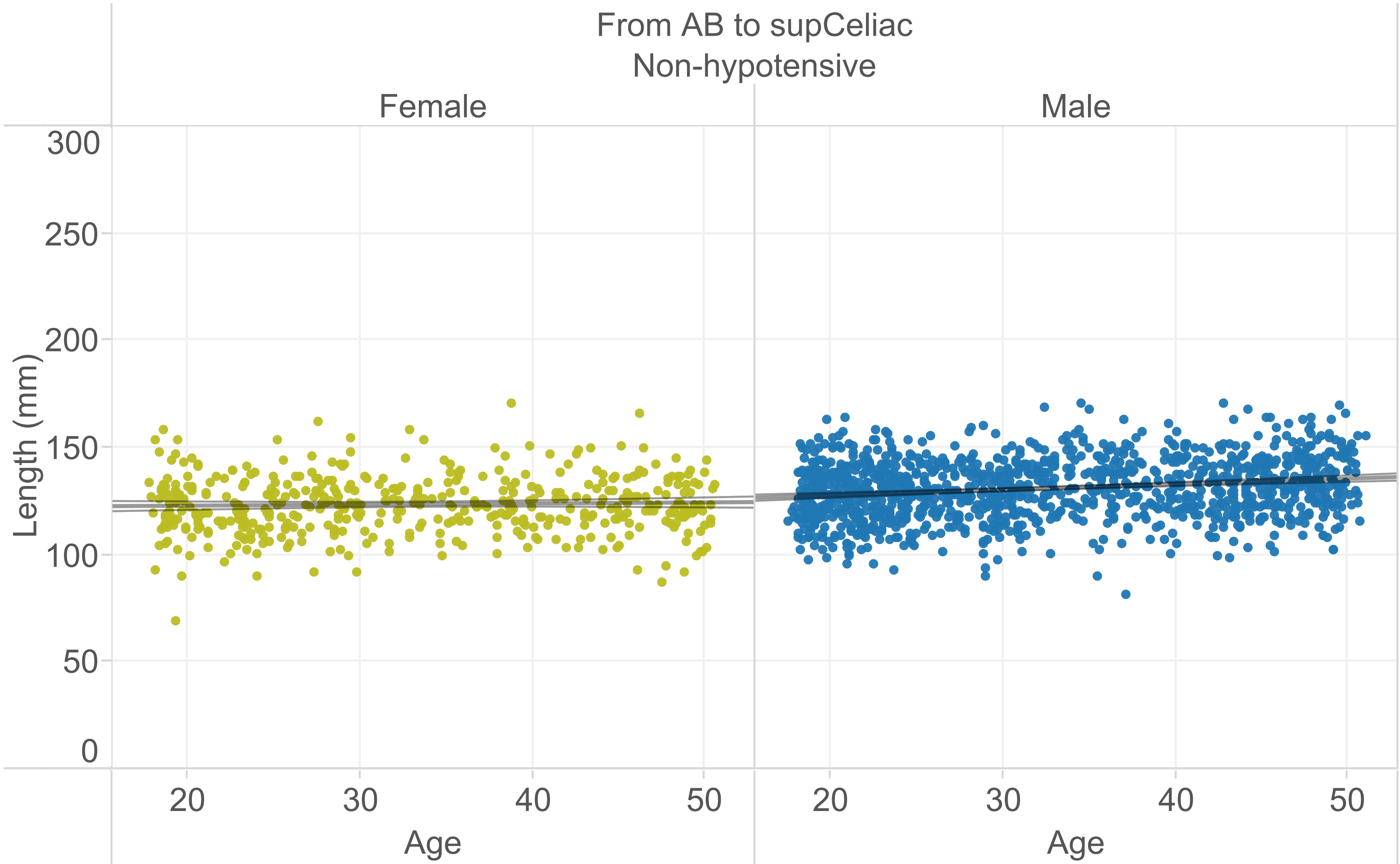
Arterial Length

by Age and Sex

Arterial length (mm) measurements at key points

Arterial Length

by Age and Sex

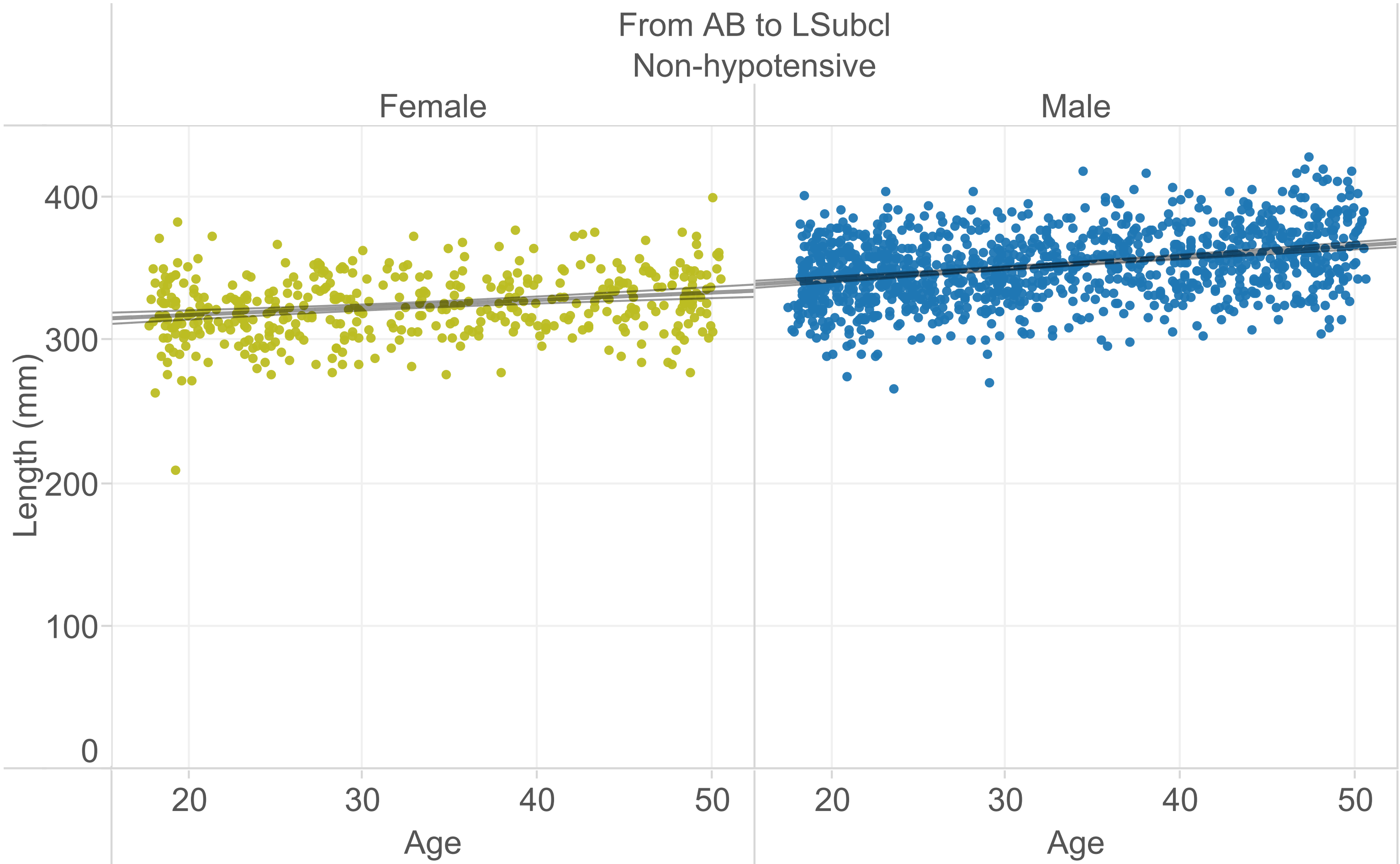


Arterial length (mm) measurements at key points

University of Michigan MAG Morphomic Analysis Group

Arterial Length

by Age and Sex

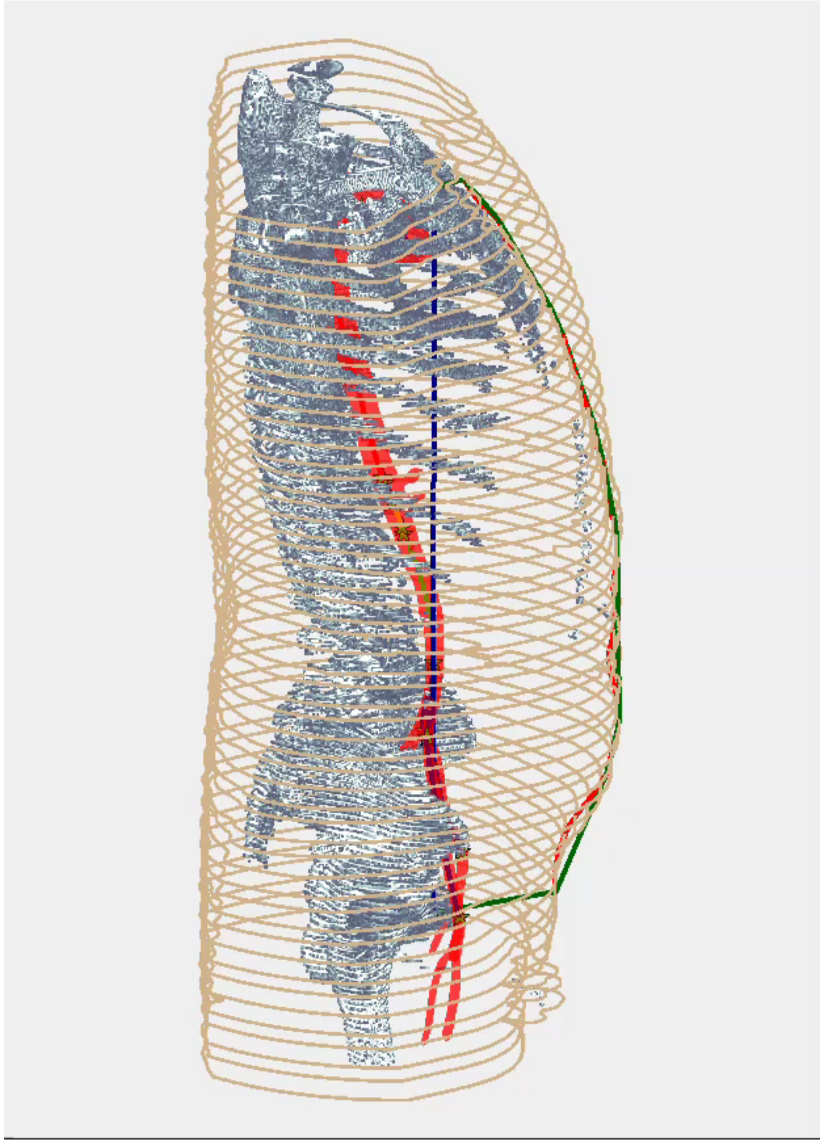


Arterial length (mm) measurements at key points

Civilian Trauma Cohort

	Avg. Length (mm)		Std. dev. of Length (mm)	
	Female	Male	Female	Male
From AB to LSubcl	324	351.9	22.5	23.9
From AB to supCeliac	123.4	130.7	13.2	13.9
From AB to Celiac	114.6	121.8	13.1	13.7
From AB to SMA	102.7	108.5	12.5	12.4
From AB to RRenal	88.5	93.1	11.9	12.6
From AB to LRenal	84.7	89.8	12	12.1
From Right CFA to AB	199.3	201.1	14.6	15.6
From Left CFA to AB	194.2	196.4	15	15.1

Torso Extent



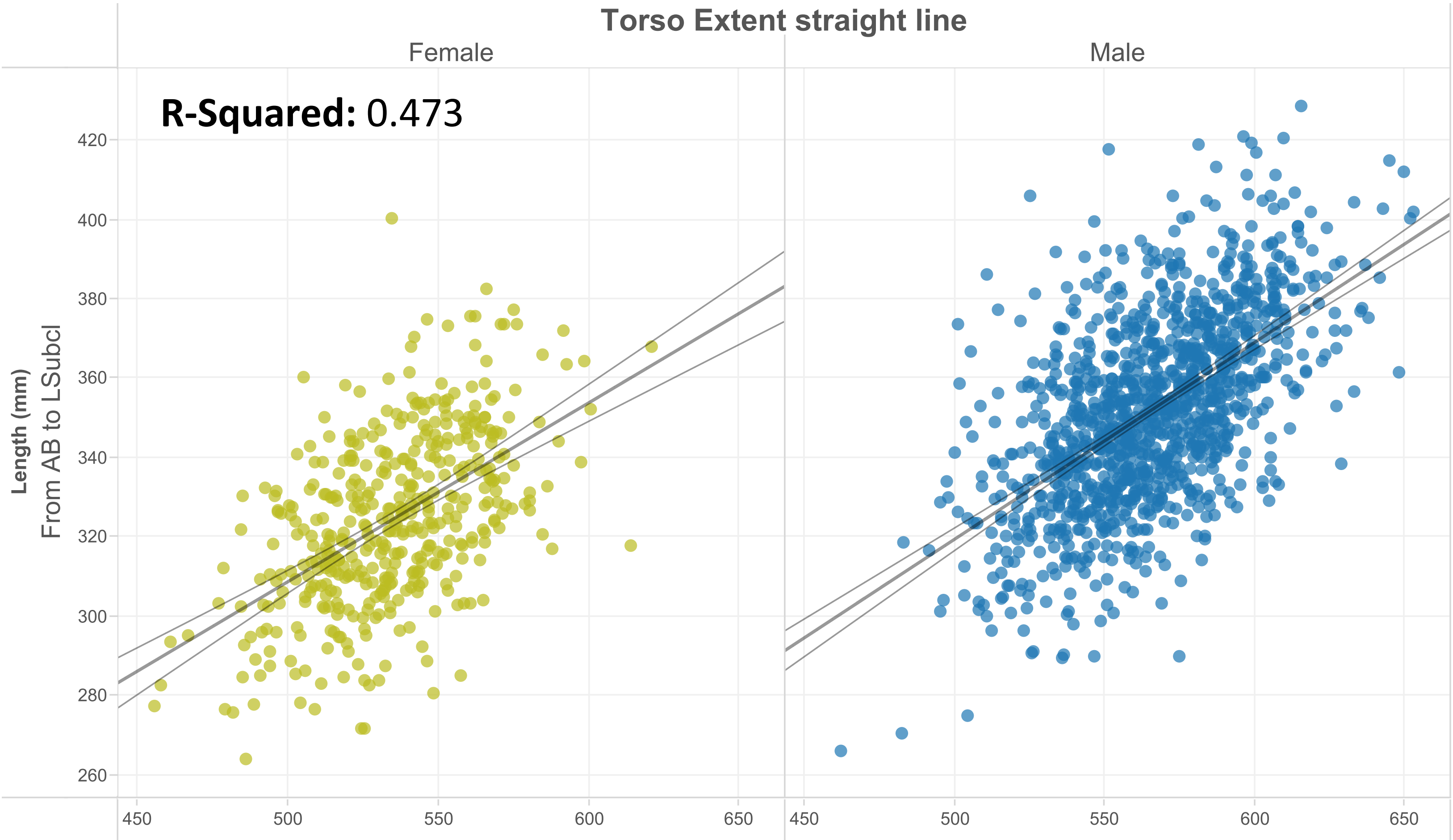
Straight Line (Blue)

Along Skin (Red)

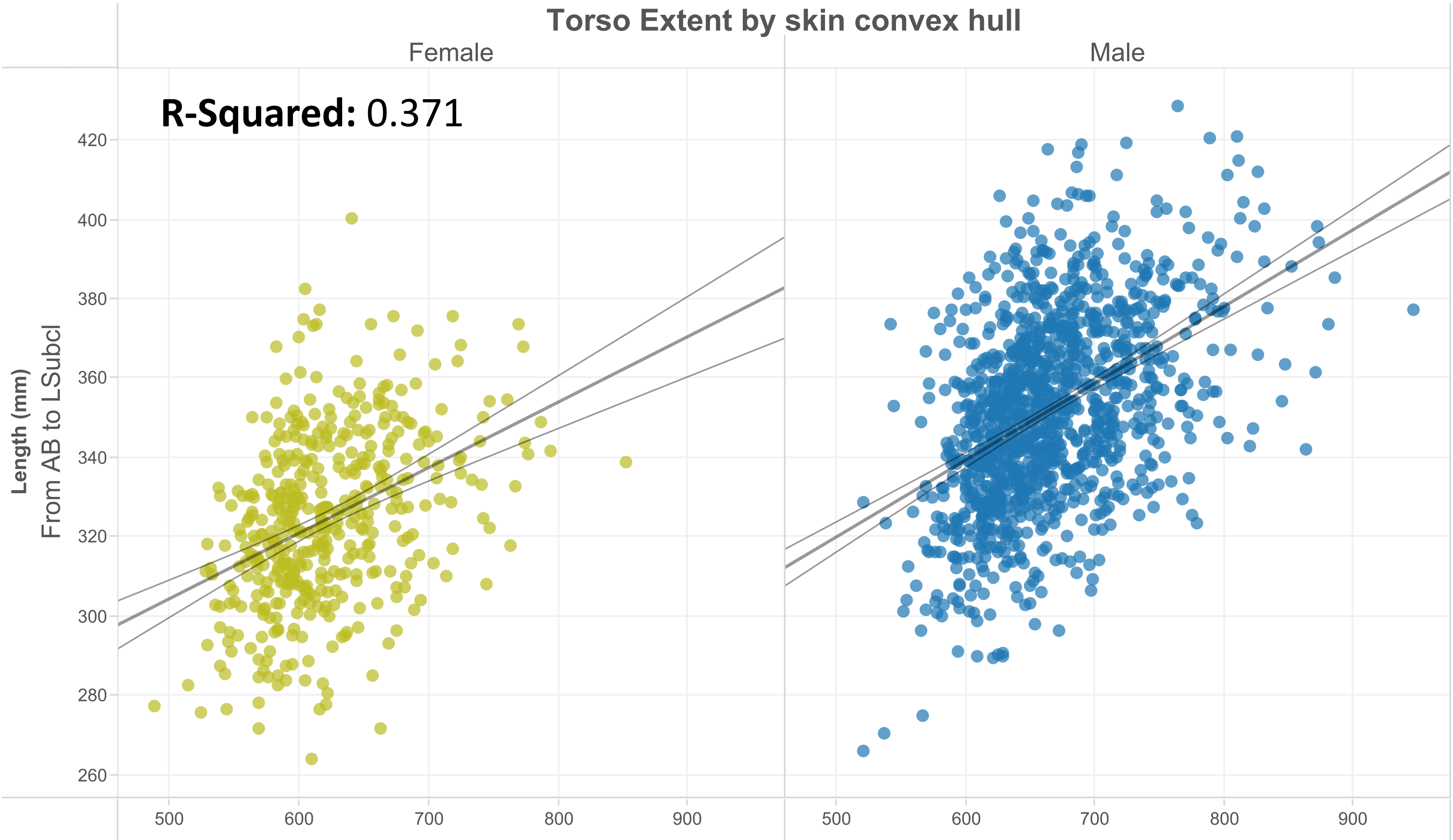
Along Skin Convex Hull (Green)

Torso Extent (Straight Line) vs. Arterial Length

by Sex

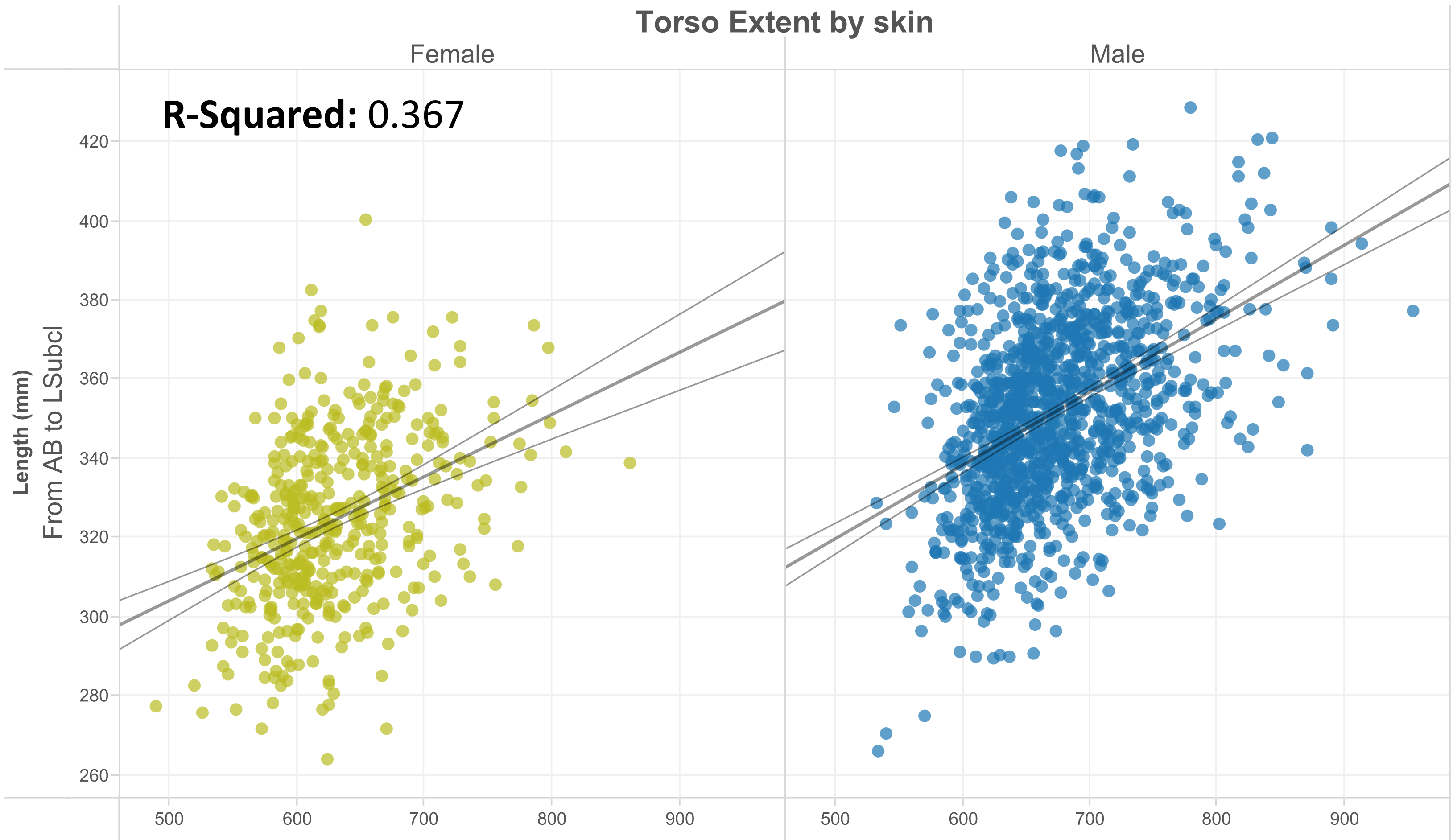


Torso Extent (Convex Hull) vs. Arterial Length
by Sex



Torso Extent (Along Skin) vs. Arterial Length

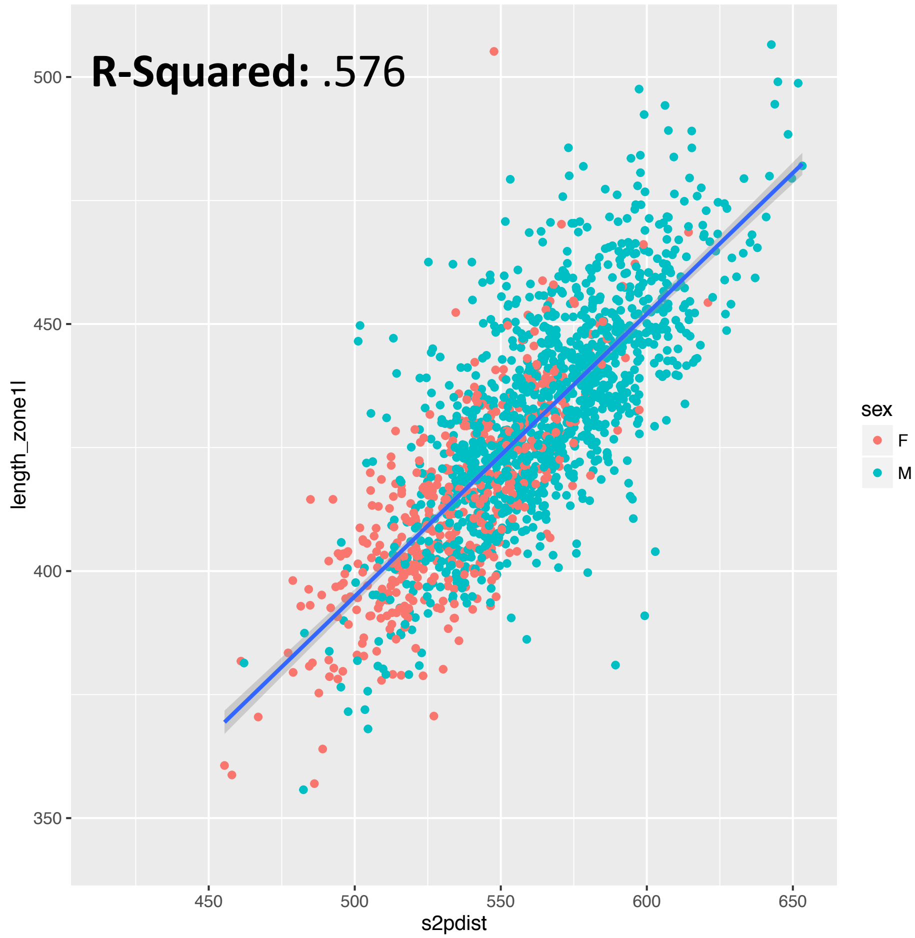
by Sex



Torso Extent (Straight Line) vs. Length to Zone 1 Midpoint

by Sex

Length to Zone 1
From Left CFA



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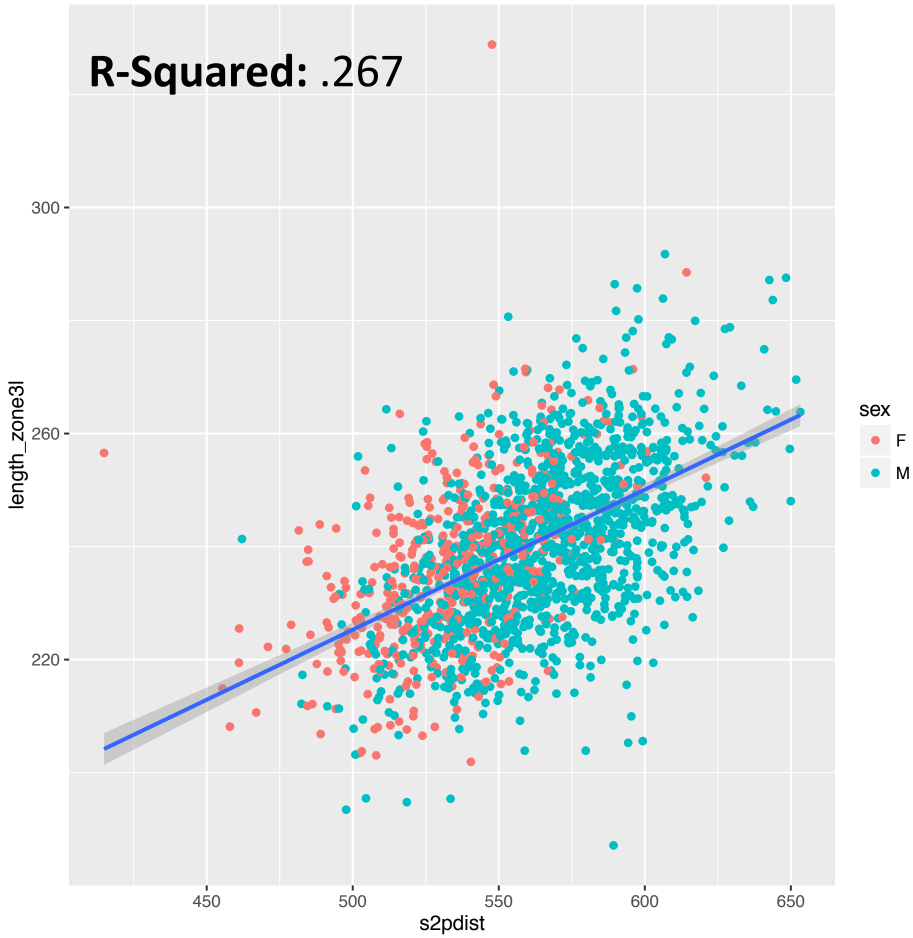
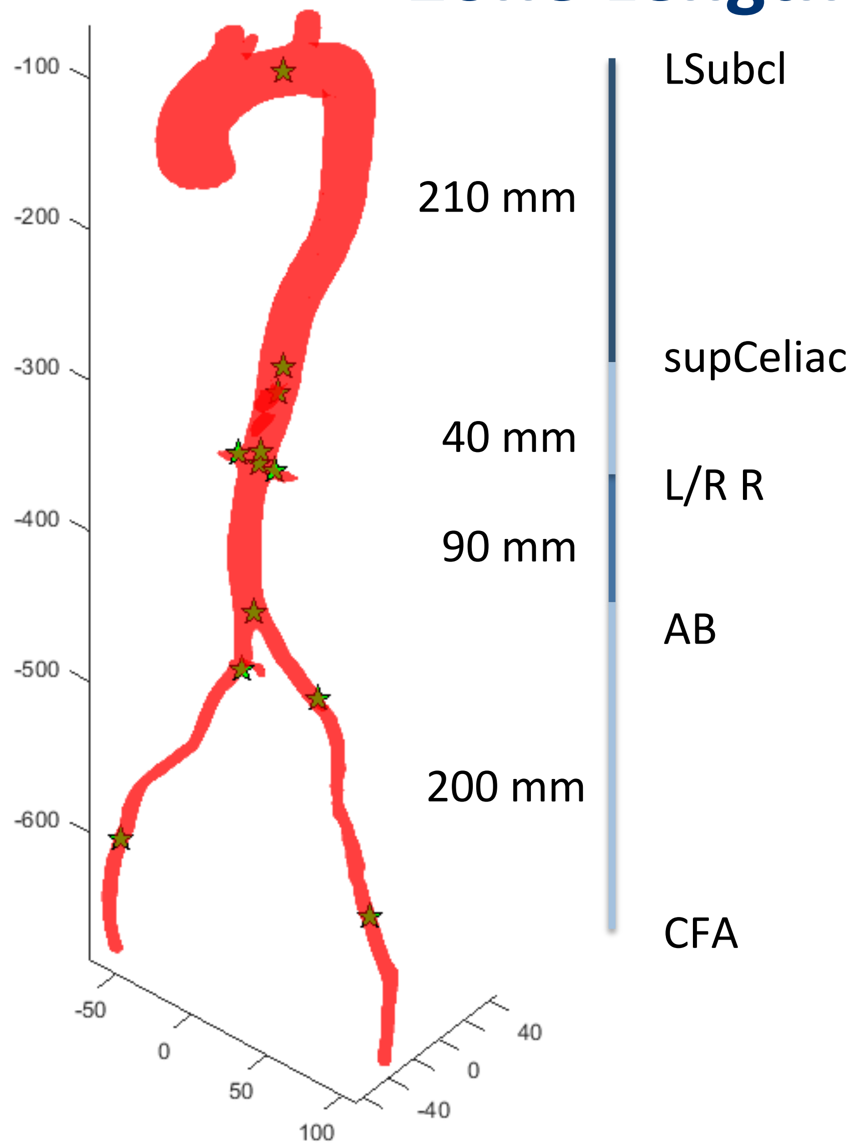
Torso Extent (Straight Line) vs. Length to Zone 3 Midpoint

by Sex

Length to Zone 3
From Left CFA



Zone Length "Norms"



So, Zone 1 (~210 mm) midpoint is located roughly 435 mm from femoral insertion

So, Zone 3 (~90 mm) midpoint is located roughly 245 mm from femoral insertion

Zone 1 Results

Train the model on a 60% random sample. Test it on the remaining 40%.

Predict Length to Zone 1	Percent of predicted lengths outside (Sup Celiac + 40mm to LSubCl)		(Sup Celiac + 5mm to LSubCl – 5mm)	
Terms in model	Left CFA	Right CFA	Left CFA	Right CFA
Median	0% (427 mm)	0% (431 mm)		
Torso Extent Straight Line (TESL)	0%	0%		
Torso Extent Convex Hull (TECH)	0%	0%		
TESL + age	0%	0%		
TECH + age	0%	0%		
TESL + age + sex	0%	0%		
TECH + age + sex				

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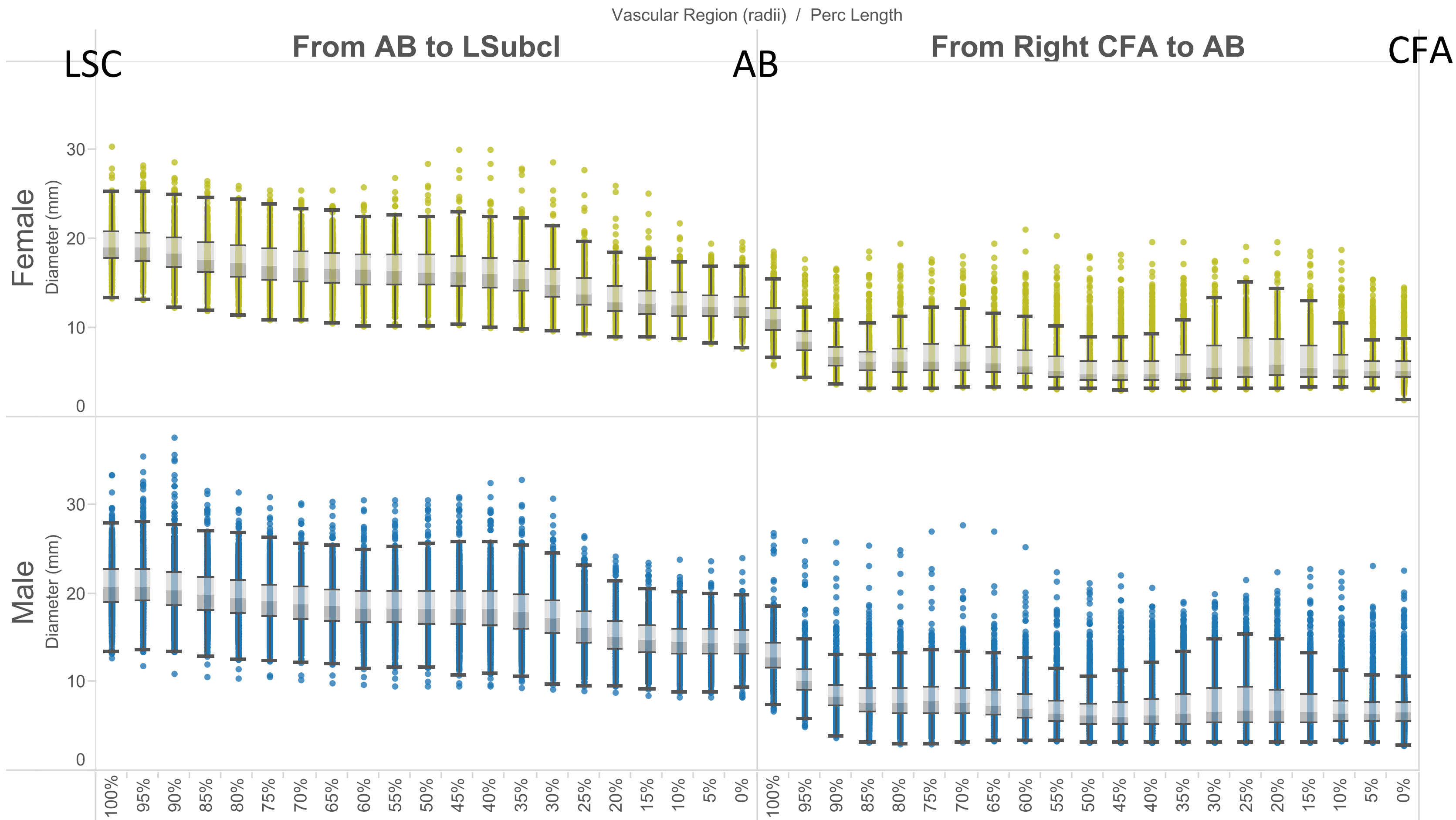
Zone 3 Results

Train the model on a 60% random sample. Test it on the remaining 40%.

Predict Length to <u>Zone 3</u>	Percent of predicted lengths outside (Balloon is <u>entirely</u> in Zone 3 and no renal occlusion)		(<u>Part</u> of balloon in Zone 3 and no renal occlusion)	
Terms in model	Left CFA	Right CFA	Left CFA	Right CFA
Median	41.8% (238 mm)	40.5% (243 mm)	2.6%	1.6%
Torso Extent Straight Line (TESL)	40.0%	38.0%	0.9%	1.2%
Torso Extent Convex Hull (TECH)	**<u>39.0%</u>**	**<u>36.7%</u>**	2.6%	1.7%
TESL + age	40.2%	38.4%	**<u>0.9%</u>**	**<u>0.9%</u>**
TECH + age	38.9%	37.3%	1.7%	1.4%
TESL + age + sex	39.2%	38.2%	1.5%	1.1%
TECH + age + sex	39.2%	37.0%	1.7%	1.2%
TESL + age + sex + TESL*sex	39.2%	37.8%	1.5%	1.1%
TECH + age + sex + TECH*sex	39.3%	37.1%	1.7%	1.2%

Arterial Diameter

By Sex at Each 5% Along the Vascular Length

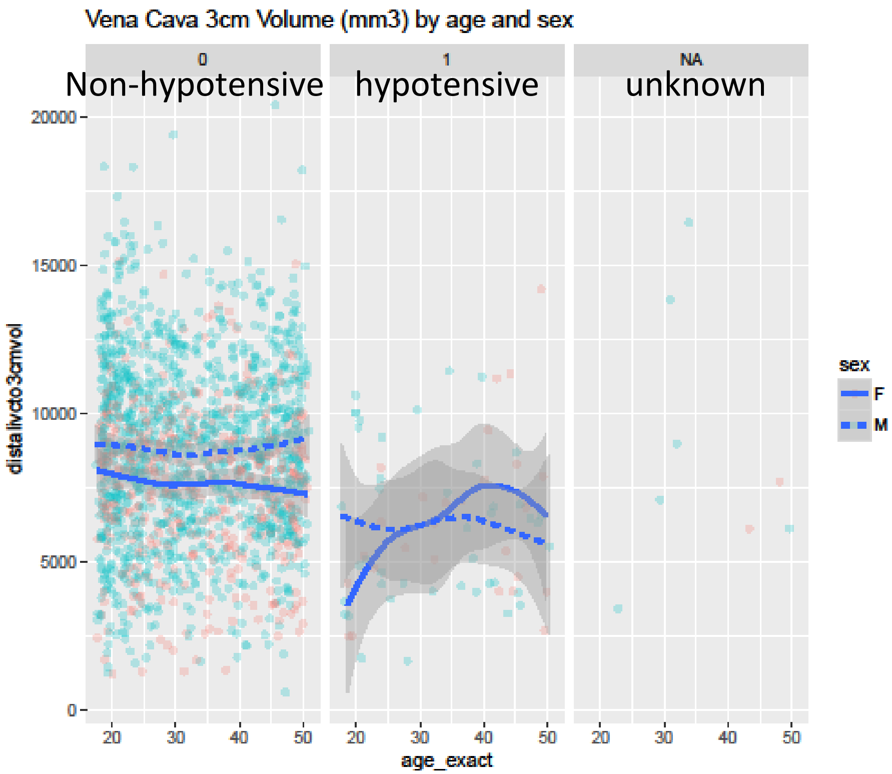


Aorta diameter (mm) measurements from Left Femoral Artery Cut Point to Superior Celiac Branch Point

Arterial Diameters

Vascular Region	Avg. Diameter (mm)		Std. dev. Diameter (mm)	
	Female	Male	Female	Male
From AB to LSubclavian	19.2	20.9	2.6	3
From AB to supCeliac	16.5	18.5	3.2	3.3
From AB to Celiac	16	18	3.1	3.1
From AB to SMA	15.5	17.5	2.9	3
From AB to RRenal	14.6	16.4	2.9	2.8
From AB to LRenal	14.2	16	2.8	2.7
From RCFA to AB	8.6	10.3	1.9	2.1
From LCFA to AB	8.4	9.8	1.8	1.7

Venous Dimensions: Volume and Area



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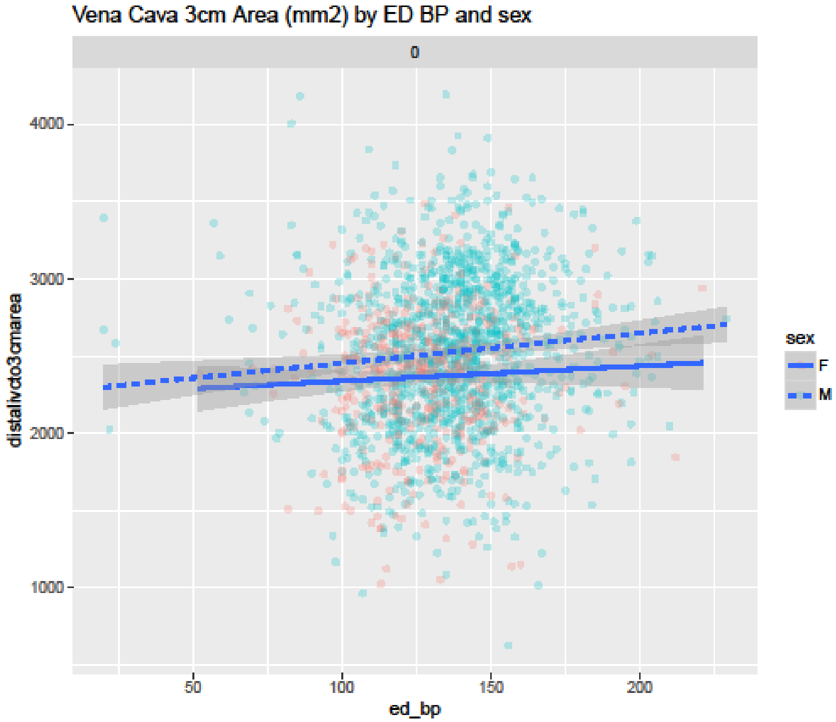
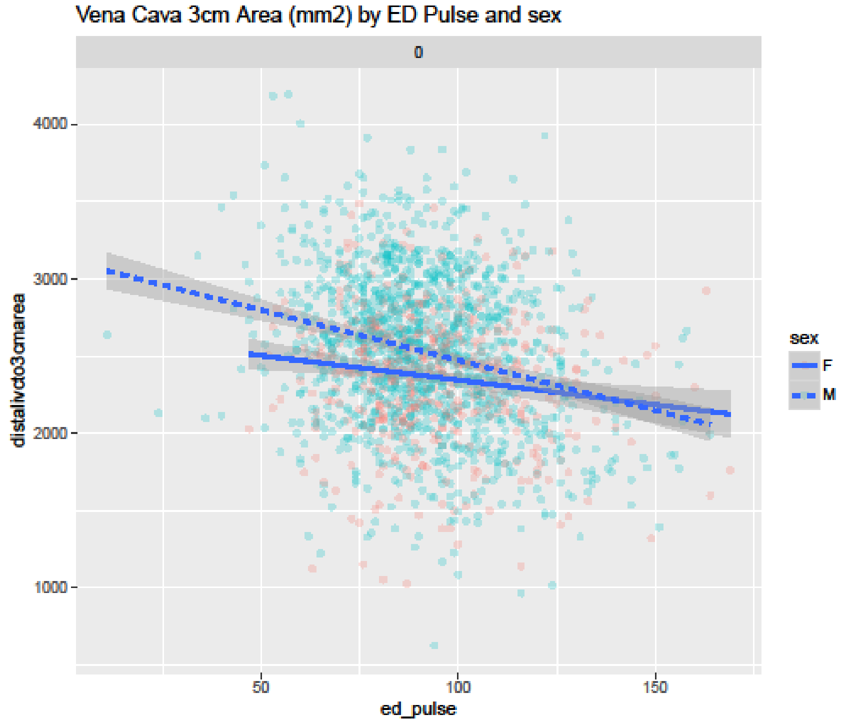
Venous Dimensions: By BP and Pulse

Non-hypotensive

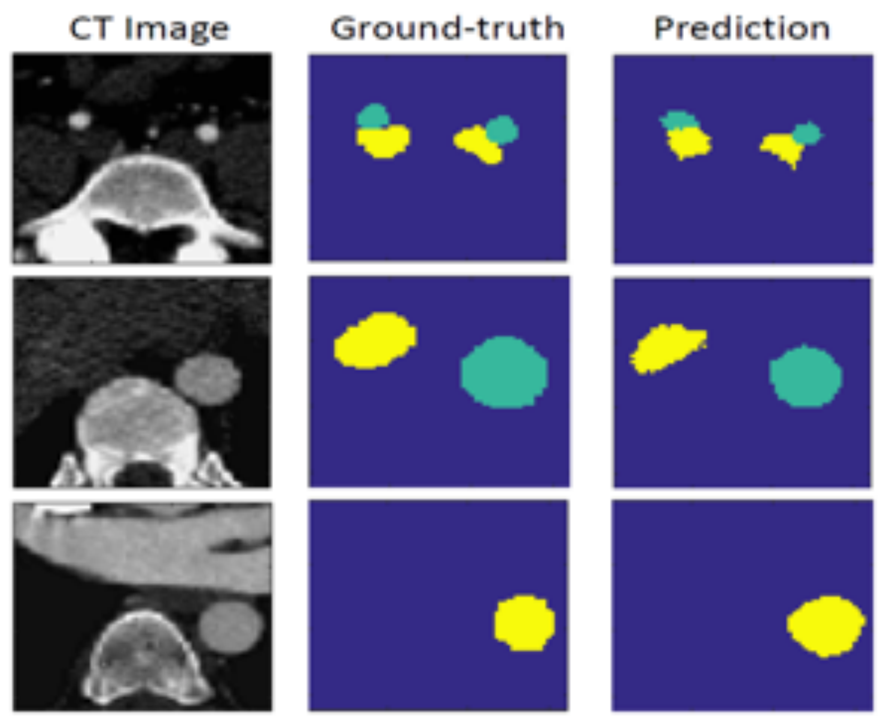


Non-hypotensive



Additional Work: Machine Learning Results

- Our initial plan was to use image processing and more manual effort to segment the aorta
  - We were able to utilize machine learning algorithms in order to make the process automatic, with manual revision
  - Machine learning will also allow us to take the results and feed them back into the model, improving our capabilities as we process more aortas



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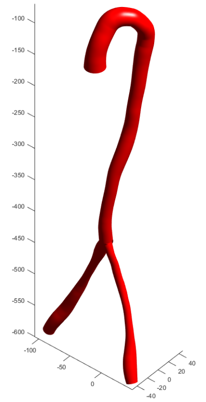
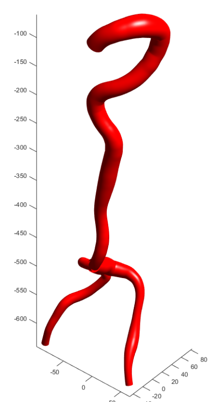
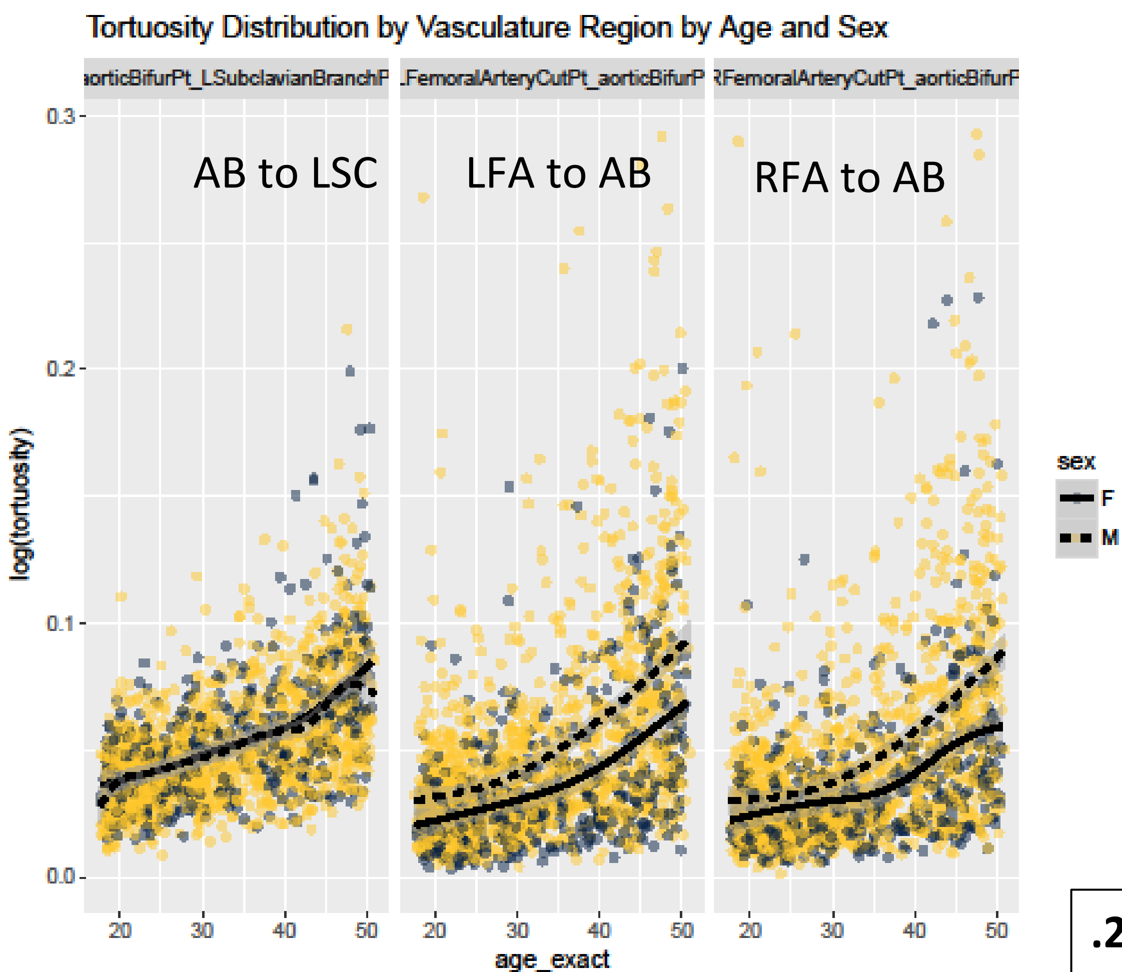
Additional Work: Tortuosity

Low Tortuosity
- Aorta (1.01),
Femoral Arteries (1.01)



High Tortuosity
- Aorta (1.24),
Femoral Arteries (1.34)





.2 = 22% longer
.1 = 10.5% longer
.05 = 5% longer

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Current Project Status

- Vascular anatomy analysis is complete in civilian population
- Civilian nomograms are complete
- Because military scans were not accessible, we are creating nomograms of a healthy, younger civilian population as a surrogate
- Final report is in development
- Manuscripts in preparation
- Database access

Appendix J: References

APPENDIX J: REFERENCES

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