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EVALUATION OF SHORT-TERM BIOASSAYS TO  
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EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIR--ETC(U)  
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# **EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIRMENT**

## **Development of Pulmonary Bioassays in Small Animals/ Directory of Institutions/Individuals Involved in Utilization Final Report**

Steve Drill, Richard Thomas, Terry Zimmerman

October 1980

Supported by

U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND  
Fort Detrick, Frederick, Maryland 21701

Contract No. DAMD17-78-C-8068 ✓

The MITRE Corporation  
1820 Dolley Madison Boulevard  
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Contracting Officer's Technical Representative:  
Mary C. Henry, PH.D.

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| 18. SUPPLEMENTARY NOTES<br><b>This directory is a companion to <u>Selected Short-Term Pulmonary Toxicity Tests</u>.<br/>Documents and directories have also been prepared for the cardiovascular,<br/>renal and hepatic systems.</b>  |   |   |  |                    |                             |                  |           |                                    |  |                        |                              |  |                        |                        |  |              |                  |  |
| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number)<br><table border="0"> <tr> <td>Pulmonary toxicity</td> <td>Distribution of ventilation</td> <td>Toxic substances</td> </tr> <tr> <td>Directory</td> <td>Carbon monoxide diffusing capacity</td> <td></td> </tr> <tr> <td>Research organizations</td> <td>Functional residual capacity</td> <td></td> </tr> <tr> <td>Compliance, resistance</td> <td>Tests systems utilized</td> <td></td> </tr> <tr> <td>Lung volumes</td> <td>Compounds tested</td> <td></td> </tr> </table>  |   |   |  | Pulmonary toxicity | Distribution of ventilation | Toxic substances | Directory | Carbon monoxide diffusing capacity |  | Research organizations | Functional residual capacity |  | Compliance, resistance | Tests systems utilized |  | Lung volumes | Compounds tested |  |
| Pulmonary toxicity  | Distribution of ventilation                               | Toxic substances  |  |                    |                             |                  |           |                                    |  |                        |                              |  |                        |                        |  |              |                  |  |
| Directory   | Carbon monoxide diffusing capacity                        |   |  |                    |                             |                  |           |                                    |  |                        |                              |  |                        |                        |  |              |                  |  |
| Research organizations  | Functional residual capacity                              |   |  |                    |                             |                  |           |                                    |  |                        |                              |  |                        |                        |  |              |                  |  |
| Compliance, resistance  | Tests systems utilized                                    |   |  |                    |                             |                  |           |                                    |  |                        |                              |  |                        |                        |  |              |                  |  |
| Lung volumes  | Compounds tested  |   |  |                    |                             |                  |           |                                    |  |                        |                              |  |                        |                        |  |              |                  |  |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br><p>Mitre has been requested by the U.S. Army Medical Bioengineering Research and Development Laboratory to identify and evaluate short-term bioassays which have demonstrated ability to evaluate and predict pulmonary impairment resulting from toxicant exposures. This directory is a companion to <u>Selected Short-Term Pulmonary Bioassays</u>, MTR-80W00233, which describes available pulmonary testing protocols and assesses their suitability for a screening program. This directory catalogues the organizations currently engaged in pulmonary</p> <p style="text-align: right;">(continued on back page)</p> |   |   |  |                    |                             |                  |           |                                    |  |                        |                              |  |                        |                        |  |              |                  |  |

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bioassay utilization or development and provides information concerning specific measurements performed, test systems employed, compounds tested, requirements for anesthesia and terminal nature of the test. Both this directory and the companion document of testing protocols were prepared under Contract No. DAMD-17-78-C-8068.

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## EXECUTIVE SUMMARY

The Metrek Division of the MITRE Corporation under contract to the United States Army Medical Bioengineering Research and Development Laboratory, is reviewing and recommending short-term tests for evaluating and predicting the functional and/or morphological impairment produced by toxic substances using animal test systems. This document is a directory of organizations and individuals involved in the development and/or utilization of tests applicable to the screening of toxic substances in the pulmonary system. This directory serves as a companion document to the report, Evaluation of Short-Term Bioassays To Predict Function Impairment: Selected Short-Term Pulmonary Toxicity Tests, which presents information on the available tests for the pulmonary system and recommends those tests which are suitable for use in a screening program.

This directory is arranged in alphabetical order by organization. Under the organization name and address is the name of the person contacted. The information provided for each organization includes specific tests and observations performed; the test systems utilized (e.g., experimental animals or in vitro preparations); the substances administered or conditions established to elicit a toxic response; the use of anesthesia, and the terminal nature of the tasks conducted.

Three indexes have been prepared and are included as appendices. Appendix A, is an alphabetical index of tests performed by each organization engaged in developing, performing or refining the tests noted. Appendix B is an alphabetical index of tests utilized, and all the organizations employing each test system. These are further divided by tests performed. Appendix C is an alphabetical index of the individuals in the directory.

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## FOREWORD

This Directory was compiled by MITRE staff by means of a survey of the recent literature, and by discussions with leaders in the field and other personal contacts. We are grateful to all those who responded so patiently to our questions regarding their activities. All of the "contact persons" were given an opportunity to review the information relating to their organization. We recognize there may be inadvertent omissions for which we offer our sincere apologies.

Citations of organizations and trade names in this report do not constitute an official Department of the Army endorsement or approval of the products or services of these organizations.

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## INTRODUCTION

The MITRE Corporation, Metrek Division is currently assisting the United States Army Medical Bioengineering Research and Development Laboratory (USAMBRDL) in the development of a hierarchical short-term testing scheme to screen substances for functional or morphological impairment in animal test systems. Effects in four organ systems--pulmonary, hepatic, renal and cardiovascular--are being considered.

As part of this effort, Metrek has been asked to prepare directories of organizations and individuals presently involved in the development and/or utilization of tests applicable to toxicity screening. Each directory serves as a companion document to its Selected Short-Term Bioassay report, and together they evaluate the suitability of the bioassays for toxicant screening.

Entries in each directory for several organizations currently involved in the organ bioassay use or development include at least one contact individual's name, which appears under the organization name and address at the top of the page. These are the people who, during the process of directory compilation, described either their activities or the activities of their group regarding organ toxicity testing, and thereby provided the information presented in the entry. The information provided includes the specific tests and observations performed; the test systems utilized (e.g., experimental animals or

tissues in vitro); the substances administered or conditions established to elicit toxic response (e.g., stress); the use of anesthesia, and the terminal nature of the tests conducted.

In order to facilitate use and the processes of amending and adding to the directory, it has been arranged in alphabetical order by organization. In order to further simplify use of the directory, three indexes have been prepared and are included as appendices. The first, Appendix A, is an alphabetical index of tests performed by each organization engaged in developing, performing or refining the tests noted. Appendix B is an alphabetical index of tests utilized, and all the organizations employing each test system. These are further divided by tests performed. In this way it is possible to ascertain which organizations perform particular bioassays in a specific test system. Appendix C is an alphabetical index of the individuals mentioned in the directory, and the organization with which they were affiliated when contacted.

The objective of this directory is to provide a readily usable guide to that segment of the scientific community currently active in organ system toxicity testing in animals. Because research associate and graduate student positions are often temporary in nature, a deliberate attempt was made to exclude these individuals from the directory. Their efforts, however, are likely to be represented by activities associated with their organization, as in most cases these individuals are conducting research under the

auspices of someone more senior and more permanently allied with the organization, who was included in the directory. In addition, there are individuals who were active in toxicity testing at one time but are no longer; these have also been omitted from the directory. The efforts of many of those who are not currently active, but were involved over a period of many years and distinguished themselves in the field, are reflected in the various Selected Short-Term Bioassay reports.

Some of the entries in the directory may be less detailed than others, and less specific in the detail that is presented. In addition, the information presented for an organization may not be reflective of all the ongoing efforts at that organization. This is due largely to the reluctance of some individuals contacted to communicate the information and, in small part, to an inability to contact a few individuals at the time this directory was being compiled. The information in the directory was selected to provide an immediate indication of the practices of each organization concerning some issues of importance when designing a screening program. Much of this information is discussed in greater detail in the Selected Short-Term Bioassay reports.

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DIRECTORY OF ORGANIZATIONS CURRENTLY INVOLVED IN UTILIZATION  
OR DEVELOPMENT OF PULMONARY TESTS IN SMALL ANIMALS

ORGANIZATION:

ALLIED CHEMICAL CORPORATION  
MORRISTOWN, NEW JERSEY 07960

DR. DOMINGO M. AVIADO (201) 455-4524 (Contact)

TESTS PERFORMED:

FUNCTIONAL RESIDUAL CAPACITY - NITROGEN DILUTION  
COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH INTRAPLEURAL  
CATHETER  
GENERAL MORPHOLOGY, HISTOPATHOLOGY

TEST SYSTEMS UTILIZED:

RATS, MICE

COMPOUNDS TESTED:

CIGARETTE SMOKE, CHLORINATED SOLVENTS, FLUOROCARBONS

ANESTHESIA:

TESTS ARE PERFORMED UNDER COMPLETE ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

DR. DOMINGO M. AVIADO IS VERY INTERESTED IN THE VALIDATION OF  
INHALATION TECHNIQUES FOR LUNG AND HEART TESTING; IN ADDITION TO  
DR. DOMINGO M. AVIADO, DR. DAVID J.P. BASSETT IS ACTIVELY  
INVOLVED IN PULMONARY TESTING AT THIS INSTITUTION.



ORGANIZATION:

BATTELLE MEMORIAL INSTITUTE  
BIOLOGY DEPARTMENT  
P.O. BOX 999  
RICHLAND, WASHINGTON 99352

DR. SUSAN M. LOSCUTOFF (509) 946-2033 (Contact)  
DR. P. J. MILHALKO (509) 375-2131 (Contact)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION; PLETHYSMOGRAPH WITH ESOPHAGEAL CATHETERIZA-  
TION  
FUNCTIONAL RESIDUAL CAPACITY - BOYLE'S LAW WITH PLETHYSMOGRAPH  
VITAL CAPACITY - PLETHYSMOGRAPH WITH REGULATED TRANSPULMONARY  
PRESSURE  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - SINGLE AND  
MULTIPLE BREATH  
CARBON MONOXIDE DIFFUSING CAPACITY - MULTIPLE BREATH; SINGLE  
BREATH  
PRESSURE-VOLUME CURVES  
ARTERIAL BLOOD GASES  
GENERAL MORPHOLOGY, HISTOPATHOLOGY

TEST SYSTEMS UTILIZED:

RATS, GUINEA PIGS, DOGS

COMPOUNDS TESTED:

ENERGY-RELATED EMISSIONS, ENVIRONMENTAL TOXICANTS, SULFURIC  
ACID, PARTICULATES, NITROGEN OXIDES, CARBON MONOXIDE, DIESEL  
EMISSIONS AND COAL PARTICULATES, SODIUM AND LITHIUM METALS

ANESTHESIA:

TESTS ARE PERFORMED IN BOTH CONSCIOUS AND ANESTHETIZED ANIMALS

TERMINAL:

TESTS ARE OF A SERIAL NATURE AND ARE TERMINAL IN GUINEA PIGS AND  
RATS

REMARKS

THE EMPHASIS IN THIS ORGANIZATION IS ON PERFORMING A MULTITUDE  
OF TESTS FOR INDICATING DAMAGE TO THE PULMONARY SYSTEM.

ORGANIZATION:

BOSTON UNIVERSITY  
SCHOOL OF MEDICINE  
BOSTON, MASSACHUSETTS 02215

DR. GORDON L. SNIDER (617) 247-5277 (Contact)

TESTS PERFORMED:

LUNG VOLUMES, LUNG CAPACITIES - PLETHYSMOGRAPH WITH REGULATED  
TRANSPULMONARY PRESSURE  
FUNCTIONAL RESIDUAL CAPACITY - BOYLE'S LAW WITH PLETHYSMOGRAPH  
PRESSURE-VOLUME CURVES - PLETHYSMOGRAPH PLUS INFLATOR; EXCISED  
LUNGS, AIR AND SALINE INJECTION  
MAXIMUM FLOW VOLUME CURVES  
CARBON MONOXIDE DIFFUSING CAPACITY  
ARTERIAL BLOOD GASES  
MEAN ALVEOLAR INTERCEPT - LIGHT MICROSCOPY  
TYPE 1 CELL DAMAGE, TYPE 2 CELL PROLIFERATION

TEST SYSTEMS UTILIZED:

RATS, HAMSTERS

COMPOUNDS TESTED:

CADMIUM COMPOUNDS, BLEOMYCIN AND OTHERS

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

ALL TESTS EXCEPT FOR MORPHOLOGY AND EXCISED LUNG STUDIES ARE OF  
A SERIAL NATURE

REMARKS:

THIS ORGANIZATION IS ACTIVELY INVOLVED IN RESEARCH AND TESTING  
OF VARIOUS ASPECTS OF THE PULMONARY SYSTEM; CHANGING RESEARCH  
PROJECTS VARY THE TYPE OF TESTS PERFORMED; DR. GORDON L. SNIDER  
ALSO WORKS AS CHIEF OF PULMONARY MEDICINE SECTION AT THE  
VETERANS ADMINISTRATION MEDICAL CENTER (617) 232-9500 EXT. 324.

ORGANIZATION:

BROOKHAVEN NATIONAL LABORATORY  
MEDICAL DEPARTMENT  
UPTON, NEW YORK 11973

DR. DANIEL L. COSTA (516) 345-3631 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - AMDUR AND MEAD TECHNIQUE  
LUNG VOLUMES - PLETHYSMOGRAPH WITH REGULATED TRANSPULMONARY  
PRESSURE; GAS DILUTION (NEON)  
FUNCTIONAL RESIDUAL CAPACITY - MANOMETRIC INTERRUPTION  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - MULTIPLE  
BREATH  
PRESSURE-VOLUME CURVES  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH AND  
REBREATHING MEV CURVES

TEST SYSTEMS UTILIZED:

RATS, GUINEA PIGS

COMPOUNDS TESTED:

BLEOMYCIN, OIL MIST + SULFUR DIOXIDE, OIL MIST + FORMALDEHYDE  
OZONE; ACROLIN  
PHARMACOLOGIC AGENTS

ANESTHESIA:

SUSTAINED ANESTHESIA OR UNANESTHETIZED, DEPENDING ON EXPERIMENTAL OBJECTIVES

TERMINAL:

ANIMALS ARE TERMINATED OR STUDIED SERIALLY AS PROTOCOL DEMANDS.

ORGANIZATION:

CASE WESTERN RESERVE UNIVERSITY  
CLEVELAND, OHIO 44106

DR. MARY J. THOMASSEN (216) 444-3318 (CONTACT)

TESTS PERFORMED:

ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS OF BACTERIA)  
ALVEOLAR MACROPHAGE EXPOSED IN VITRO

TEST SYSTEMS UTILIZED:

RABBITS, GUINEA PIGS

COMPONENTS TESTED:

BACTERIAL CHALLENGE

ANESTHESIA:

ANESTHESIA IS NOT UTILIZED

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

DR. THOMAS F. BOAT IS ALSO INVOLVED IN PULMONARY TESTING AT THIS ORGANIZATION.

ORGANIZATION:

EASTERN TENNESSEE STATE UNIVERSITY  
COLLEGE OF MEDICINE  
JOHNSON CITY, TENNESSEE 37601

DR. ANTHONY J. DELUCIA (615) 928-6426 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - MULTIPLE  
BREATH  
BIOCHEMISTRY  
SINGLE-BREATH NITROGEN WASHOUT (SBN<sub>2</sub>)

TEST SYSTEMS UTILIZED:

MONKEYS, DOGS

COMPOUNDS TESTED:

CIGARETTE SMOKE

ANESTHESIA:

TESTS ARE PERFORMED ON CONSCIOUS ANIMALS EXCEPT FOR SBN<sub>2</sub>,  
WHERE KETAMINE AND NEMBUTAL ARE EMPLOYED.

TERMINAL:

TESTS ARE USUALLY OF A SERIAL NATURE.

ORGANIZATION:

GENERAL MOTORS RESEARCH LABORATORIES  
BIOMEDICAL SCIENCE DEPARTMENT  
WARREN, MICHIGAN 48090

DR. KENNETH B. GROSS (313) 575-3474 (CONTACT)

TESTS PERFORMED:

COMPLIANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL CATERIZATION  
FUNCTIONAL RESIDUAL CAPACITY - BOYLE'S LAW WITH PLETHYSMOGRAPH  
MAXIMUM FLOW VOLUME CURVES

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

ENVIRONMENTAL POLLUTANTS ASSOCIATED WITH AUTOMOBILE EXHAUST

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA.

TERMINAL:

TESTS ARE OF A SERIAL NATURE.

ORGANIZATION:

HARVARD SCHOOL OF PUBLIC HEALTH  
DEPARTMENT OF PHYSIOLOGY  
BOSTON, MASSACHUSETTS 02115

DR. JEFFREY DRAZEN (617) 732-5833 (CONTACT)  
WILLIAM A. SKORNIK (617) 732-1178

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION PLUS ON-LINE COMPUTER  
FUNCTIONAL RESIDUAL CAPACITY - BOYLE'S LAW WITH PLETHYSMOGRAPH  
LUNG VOLUMES  
MAXIMUM FLOW VOLUME CURVES  
PERCENT VIABILITY OF ALVEOLAR MACROPHAGES - ALVEOLAR MACROPHAGES  
EXPOSED IN VITRO  
ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS OF PLASTIC  
MICROSPHERES) - ALVEOLAR MACROPHAGES EXPOSED IN VITRO  
ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS OF RADIOLABELLED  
GOLD) - INTRATRACHEAL INSTILLATION OF LABELLED GOLD, COUNTING  
OF LABELLED MACROPHAGES IN VITRO  
GENERAL MORPHOLOGY, HISTOPATHOLOGY  
MORPHOMETRY  
BIOCHEMISTRY

TEST SYSTEMS UTILIZED:

MICE, RATS, HAMSTERS, GUINEA PIGS, DOGS

COMPOUNDS TESTED:

VARIOUS AIR POLLUTANTS INCLUDING COMBUSTION PRODUCTS OF POLY-  
VINYL CHLORIDE AND POLYSTYRENE AND VARIOUS SULFUR COMPOUNDS

ANESTHESIA:

TESTS PERFORMED ON RODENTS ARE GENERALLY PERFORMED WITHOUT THE  
USE OF ANESTHESIA; TESTS PERFORMED ON DOGS ARE PERFORMED DURING  
SUSTAINED ANESTHESIA.

TERMINAL:

THE RESPIRATORY MECHANICS TESTS ARE NOT OF A TERMINAL NATURE;  
HOWEVER, DEFENSE MECHANISM TESTS, HISTOLOGY AND BIOCHEMICAL  
RESEARCH ARE PERFORMED ON SACRIFICED ANIMALS

HARVARD SCHOOL OF PUBLIC HEALTH (CONCLUDED)

REMARKS:

THIS ORGANIZATION IS ACTIVELY INVOLVED IN RESEARCH AND TESTING OF VARIOUS ASPECTS OF THE PULMONARY SYSTEM; CHANGING RESEARCH PROJECTS VARY THE TYPE OF TESTS PERFORMED; IN ADDITION TO WILLIAM A. SKORNIK AND DR. JEFFREY DRAZEN, DR. PHILIP C. KOSCH, DAVID E. LEITH, JOSEPH D. BRAIN AND DR. EVERETT SINNETT ARE ACTIVELY INVOLVED IN PULMONARY TESTING.



ORGANIZATION:

HAZLETON LABORATORIES AMERICA, INC.  
INHALATION TOXICOLOGY DEPARTMENT  
RESTON, VIRGINIA 22090

DR. WILLIAM B. COATE (703) 893-5400 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
LUNG VOLUMES, RESPIRATORY RATE, TIDAL VOLUME - SPIROMETRY  
RESIDUAL VOLUME - GAS DILUTION (HELIUM)  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - SINGLE AND  
MULTIPLE BREATH  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH  
MAXIMUM FLOW VOLUME CURVES

TEST SYSTEMS UTILIZED:

DOGS, MONKEYS

COMPOUNDS TESTED:

VARIOUS AIR POLLUTANTS, DRUGS, CIGARETTE SMOKE

ANESTHESIA:

TESTS PERFORMED ON ANESTHETIZED AND UNANESTHETIZED ANIMALS

TERMINAL:

TESTS ARE OF A SERIAL NATURE

REMARKS:

THE EXTENT OF PULMONARY TESTING AT THIS ORGANIZATION HAS  
DECLINED DURING THE PAST FEW YEARS.

ORGANIZATION:

IIT RESEARCH INSTITUTE  
LIFE SCIENCES DIVISION  
CHICAGO, ILLINOIS 60616

CATHERINE ARANYI (312) 567-4864 (CONTACT)

TESTS PERFORMED:

RESISTANCE TO INDUCED RESPIRATORY INFECTION - PERCENT MORTALITY  
CILIA BEATING FREQUENCY (IN VITRO) - ISOLATED TRACHEAL RINGS;  
WHOLE TRACHEAL ORGAN SYSTEM  
PULMONARY CLEARANCE OF BACTERIA - INHALED RADIOLABELLED  
OR VIABLE BACTERIA COUNTED IN LUNG HOMOGENATE  
PERCENT VIABILITY OF ALVEOLAR MACROPHAGES - ALVEOLAR MACROPHAGES  
EXPOSED IN VITRO OR IN VIVO  
ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS OF PLASTIC  
MICROSPHERES) - ALVEOLAR MACROPHAGE EXPOSED IN VITRO OR  
IN VIVO  
ACTIVITY OF ALVEOLAR MACROPHAGE ATP - ALVEOLAR MACROPHAGE  
EXPOSED IN VITRO OR IN VIVO

TEST SYSTEMS UTILIZED:

RABBITS (IN VITRO TESTS ONLY), MICE, HAMSTERS

COMPOUNDS TESTED:

INDUSTRIAL AND ENERGY RELATED PARTICULATES, POLLUTANTS TYPICALLY  
ENCOUNTERED IN VARIOUS ENVIRONMENTAL OR OCCUPATIONAL SITUATIONS

ANESTHESIA:

NA

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

RICHARD EHRLICH, LEONARD J. SCHIFF AND JOHN G. DRUMMOND ARE ALSO  
ACTIVE IN PULMONARY TESTING AT THIS ORGANIZATION.

ORGANIZATION:

INTERNATIONAL RESEARCH AND DEVELOPMENT CORPORATION  
MATTAWAN, MICHIGAN 49071

CHARLES E. ULRICH (616) 668-3336 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - AMDUR AND MEAD TECHNIQUE WITH ON-LINE  
COMPUTER  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - MULTIPLE  
BREATH  
GENERAL MORPHOLOGY, HISTOPATHOLOGY

TEST SYSTEMS UTILIZED:

MICE, RATS, GUINEA PIGS, DOGS, MONKEYS

COMPOUNDS TESTED:

INDUSTRIAL CHEMICALS, DRUGS, AIR POLLUTANTS

ANESTHESIA:

INITIAL ANESTHESIA ONLY

TERMINAL:

TESTS ARE TERMINAL

ORGANIZATION:

JOHNS HOPKINS UNIVERSITY  
ENVIRONMENTAL HEALTH SCIENCES  
BALTIMORE, MARYLAND 21205

DR. GLENN A. WARR (301) 955-3622 (CONTACT)

TESTS PERFORMED:

PULMONARY CLEARANCE OF BACTERIA - RADIOLABELLED BACTERIA COUNTED  
IN LUNG HOMOGENATE  
PERCENT VIABILITY OF ALVEOLAR MACROPHAGES - ALVEOLAR  
MACROPHAGES EXPOSED IN VITO  
ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS) - ALVEOLAR  
MACROPHAGES EXPOSED IN VITRO  
BIOCHEMISTRY

TEST SYSTEMS UTILIZED:

MICE, RATS

COMPOUNDS AND CONDITIONS TESTED:

VARIOUS DRUGS, STRESS

ANESTHESIA:

ANESTHESIA IS NOT UTILIZED

TERMINAL:

TESTS ARE TERMINAL

ORGANIZATION:

LOVELACE BIOMEDICAL AND ENVIRONMENTAL RESEARCH INSTITUTE  
INHALATION TOXICOLOGY RESEARCH INSTITUTE  
ALBUQUERQUE, NEW MEXICO 87115

DR. JOE L. MAUDERLY (505) 264-1169 (CONTACT)

TESTS PERFORMED:

RESPIRATORY RATE, TIDAL VOLUME - NONREBREATHING VALVE; PLETHYS-  
MOGRAPH  
LUNG VOLUMES - GAS DILUTION  
FUNCTIONAL RESIDUAL CAPACITY - BOYLE'S LAW WITH PLETHYSMOGRAPH;  
NITROGEN DILUTION  
COMPLIANCE, RESISTANCE - WITH AND WITHOUT PLETHYSMOGRAPH,  
ESOPHAGEAL CATHETERIZATION  
PRESSURE-VOLUME CURVES  
MAXIMUM FLOW VOLUME CURVES  
OXYGEN UPTAKE, CARBON DIOXIDE OUTPUT, RESPIRATORY EXCHANGE  
RATIO, ALVEOLAR GAS PRESSURES - FACE MASK OR NONREBREATHING  
VALVE PLUS COLLECTION  
SPECIFIC VENTILATION - MINUTE VOLUME/OXYGEN UPTAKE  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH, POSITIVE  
PRESSURE INFLATION; STEADY-STATE END TIDAL  
ARTERIAL BLOOD GASES - CAROTID PUNCTURE; FEMORAL PUNCTURE  
ALVEOLAR-ARTERIAL PRESSURE DIFFERENCE  
ALVEOLAR GAS PRESSURES  
ENZYMATIC AND CELLULAR RESPONSE OF AIRWAYS SAMPLED BY  
BRONCHOPULMONARY LAVAGE - MEASUREMENTS OF LACTATE  
DEHYDROGENASE, GLUCOSE-6P-DEHYDROGENASE, ACID PHOSPHATASE,  
- GLUCORONIDASE, ALKALINE PHOSPHATASE, TRYPSIN INHIBITORY  
CAPACITY, SIALIC ACID AND NUCLEATED CELLS

TEST SYSTEMS UTILIZED:

RATS, HAMSTERS, DOGS, PONIES, RABBITS

COMPOUNDS TESTED:

ENERGY-ASSOCIATED EFFLUENT MATERIALS

ANESTHESIA:

NOT USED FOR DOGS OR PONIES; SUSTAINED ANESTHESIA FOR RATS AND  
HAMSTERS FOR ALL TESTS EXCEPT THOSE INVOLVING NONREBREATHING  
VALVE

LOVELACE BIOMEDICAL AND ENVIRONMENTAL RESEARCH INSTITUTE (CONCLUDED)

TERMINAL:

ALL TESTS WITH THE EXCEPTION OF BIOCHEMICAL ARE OF A SERIAL  
NATURE

REMARKS:

THIS ORGANIZATION IS ACTIVELY INVOLVED IN THE DEVELOPMENT OF  
SCREENING TESTS WHICH INDICATE PULMONARY TOXICITY. IN ADDITION  
TO THE RESPIRATORY MECHANICS AND BIOCHEMICAL SCREENING TESTS  
WHICH ARE BEING DEVELOPED AND REFINED, EFFORTS ARE CONSIDERABLE  
IN THE AREA OF IN VITRO ALVEOLAR MACROPHAGE FUNCTION TESTS.  
OTHER INDIVIDUALS ACTIVE IN PULMONARY TESTING AT THIS INSTITUTE  
INCLUDE DRS. EDWARD G. DAMON, ROGENE F. HENDERSON, THOMAS R.  
HENDERSON, JOSEPH D. HILL, MR. GEORGE J. NEWTON, AND DR. JOHN A.  
PICKRELL.

ORGANIZATION:

MASSACHUSETTS INSTITUTE OF TECHNOLOGY  
CAMBRIDGE, MASSACHUSETTS 02139

DR. MARY O. AMDUR (617) 253-3111 (CONTACT)  
JOHN F. MCCARTHY (617) 253-5069 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - AMDUR AND MEAD TECHNIQUE

TEST SYSTEMS UTILIZED:

GUINEA PIGS

COMPOUNDS TESTED:

VARIOUS AIR POLLUTANTS INCLUDING SULFUR COMPOUNDS AND OZONE

ANESTHESIA:

INITIAL ANESTHESIA ONLY

TERMINAL:

TESTS ARE OF A SERIAL NATURE

REMARKS:

THIS ORGANIZATION INTENDS TO EXPAND THEIR EFFORTS IN THE NEAR  
FUTURE IN THE AREA OF DEFENSE MECHANISM AND MORPHOLOGICAL  
MEASUREMENTS.

ORGANIZATION:

MEDICAL UNIVERSITY OF SOUTH CAROLINA  
CHARLESTON, SOUTH CAROLINA 92403

DR. SAMUEL S. SPICER (803) 792-2712 (CONTACT)

TESTS PERFORMED:

GENERAL MORPHOLOGY, HISTOPATHOLOGY  
MORPHOMETRY

TEST SYSTEMS UTILIZED:

RATS, DOGS

COMPOUNDS TESTED:

SULFUR DIOXIDE, (MODELS OF CYSTIC FIBROSIS)

ANESTHESIA:

NA

TERMINAL:

TESTS ARE TERMINAL



ORGANIZATION:

MOUNT SINAI MEDICAL CENTER  
MIAMI BEACH, FLORIDA 33140

MARVIN A. SACKNER (305) 674-2385 (CONTACT)

TESTS PERFORMED:

FUNCTIONAL RESIDUAL CAPACITY - HELIUM DILUTION; BOYLE'S LAW WITH  
PLETHYSMOGRAPH  
COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - MULTIPLE  
BREATH  
CARBON MONOXIDE DIFFUSING CAPACITY - MULTIPLE BREATH  
ARTERIAL, VENOUS BLOOD GASES  
BLOOD PRESSURES  
MUCOCILIARY TRANSPORT OF INERT PARTICLES - DEPOSITED TEFLON  
DISKS FILMED THROUGH BRONCHOFIBERSCOPE

TEST SYSTEMS UTILIZED:

SHEEP, DOGS

COMPOUNDS TESTED:

SULFUR AND NITROGEN OXIDES, OZONE, VARIETY OF SULFATE SALTS

ANESTHESIA:

TESTS ARE PERFORMED IN UNANESTHETIZED ANIMALS

TERMINAL:

TESTS ARE OF A SERIAL NATURE

ORGANIZATION:

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH  
EXPERIMENTAL TOXICOLOGY BRANCH  
CINCINNATI, OHIO 45226

DR. TRENT R. LEWIS (513) 684-8392 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION PLUS ON-LINE COMPUTER  
FUNCTIONAL RESIDUAL CAPACITY, RESIDUAL VOLUME, TOTAL LUNG  
CAPACITY - GAS DILUTION (HELIUM)  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - SINGLE BREATH  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH WITH POSITIVE  
PRESSURE INFLATION AND FORCED INSPIRATION VIA EXTERNAL PRES-  
SURE RESPIRATOR  
MAXIMUM FLOW VOLUME CURVES - PLETHYSMOGRAPH PLUS APPLIED PRES-  
SURE TO BODY

TEST SYSTEMS UTILIZED:

RATS, GUINEA PIGS, RABBITS, DOGS, MONKEYS

COMPOUNDS TESTED:

AIRBORNE INDUSTRIAL CONTAMINANTS

ANESTHESIA:

SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE OF A SERIAL NATURE

REMARKS:

MR. WILLIAM MOORMAN IS ALSO INVOLVED IN PULMONARY FUNCTION  
TESTING.

ORGANIZATION:

NEW YORK UNIVERSITY MEDICAL CENTER  
INSTITUTE OF ENVIRONMENTAL MEDICINE  
NEW YORK, NEW YORK 10016

DR. MORTON LIPPMANN (212) 679-3200 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
MUCOCILIARY TRANSPORT OF INERT PARTICLES - INHALED RADIOLABELLED  
FERRIC OXIDE SCANNED IN VIVO

TEST SYSTEMS UTILIZED:

DONKEYS

COMPOUNDS TESTED:

SULFURIC ACID, AMMONIUM SULFATE, SULFUR DIOXIDE, FREON®, VARIOUS  
DRUGS

ANESTHESIA:

ANESTHESIA IS NOT USED

TERMINAL:

NOT TERMINAL

ORGANIZATION:

NORTHWESTERN UNIVERSITY  
DEPARTMENT OF MEDICINE  
CHICAGO, ILLINOIS 60611

DR. PAUL A. GREENBERGER (312) 649-8205 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION PLUS ON-LINE COMPUTER  
MAXIMUM FLOW VOLUME CURVES

TEST SYSTEMS UTILIZED:

MONKEYS, DOGS

COMPOUNDS TESTED:

VARIOUS DRUGS

ANESTHESIA:

SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE OF A SERIAL NATURE

REMARKS:

OTHER RESEARCHERS AT THIS ORGANIZATION INCLUDE DR. ROY  
PATTERSON, DR. JACOB J. PRUZANSKY AND DR. C. RAYMOND ZEISS.

ORGANIZATION:

OAK RIDGE NATIONAL LABORATORY  
BIOLOGY DIVISION  
OAK RIDGE, TENNESSEE 37830

DR. WALDEN E. DALBEY (615) 574-0790 (CONTACT)

TESTS PERFORMED:

RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL CATHETERIZATION  
FUNCTIONAL RESIDUAL CAPACITY - NITROGEN DILUTION  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - MULTIPLE  
BREATH  
PRESSURE-VOLUME CURVES - EXCISED LUNGS  
MAXIMUM FLOW VOLUME CURVES - PLETHYSMOGRAPH PLUS APPLIED  
PRESSURE THROUGH TRACHEA

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

CIGARETTE SMOKE, CADMIUM, NITROGEN DIOXIDE

ANESTHESIA:

SUSTAINED ANESTHESIA

TERMINAL:

THE PRESSURE-VOLUME CURVE DETERMINATIONS ARE TERMINAL  
MEASUREMENTS

ORGANIZATION:

ST. LUKE'S HOSPITAL  
DEPARTMENT OF PATHOLOGY  
NEW YORK, NEW YORK 10025

DR. STEPHEN F. RYAN (212) 870-6484 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - FORCED OSCILLATIONS WITH RESPIRATOR  
TOTAL LUNG CAPACITY, FUNCTIONAL RESIDUAL CAPACITY - GAS DILUTION  
(HELIUM)  
CARBON MONOXIDE DIFFUSING CAPACITY  
ARTERIAL, VENOUS BLOOD GASES  
PRESSURE VOLUME CURVES - EXCISED LUNGS, AIR AND SALINE INJECTED  
MEAN ALVEOLAR INTERCEPT - LIGHT MICROSCOPY

TEST SYSTEMS UTILIZED:

RATS, HAMSTERS, DOGS

COMPOUNDS TESTED:

N-NITROSO-N-METHYLURETHANE (TO INDUCE ACUTE ALVEOLAR INJURY)

ANESTHESIA:

IN VIVO TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

THIS ORGANIZATION IS INVOLVED IN RESEARCH DESCRIPTIVE OF  
ALVEOLAR INJURY.

ORGANIZATION:

ST. PAUL'S HOSPITAL  
VANCOUVER, BRITISH COLUMBIA B6Z1Y6

DR. PETER D. PARE (604) 682-2344 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
LUNG VOLUMES, CAPACITIES - PLETHYSMOGRAPH  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - SINGLE BREATH  
PRESSURE-VOLUME CURVES  
ARTERIAL, VENOUS BLOOD GASES  
PULMONARY VASCULAR RESISTANCE  
BLOOD PRESSURES  
GENERAL MORPHOLOGY, HISTOPATHOLOGY

TEST SYSTEMS UTILIZED:

DOGS (ALL TESTS) MONKEYS (RESPIRATORY MECHANICS), GUINEA PIGS  
(RESISTANCE, COMPLIANCE AND LUNG VOLUMES, CAPACITIES)

COMPOUNDS TESTED:

NITROGEN DIOXIDE, (MODELS OF ASTHMA AND PULMONARY EDEMA)

ANESTHESIA:

TESTS PERFORMED ON DOGS AND MONKEYS ARE CONDUCTED UNDER  
SUSTAINED ANESTHESIA; TESTS PERFORMED ON GUINEA PIGS ARE  
CONDUCTED IN BOTH CONSCIOUS AND UNCONSCIOUS ANIMALS.

TERMINAL:

DOGS AND GUINEA PIGS ARE TERMINATED; MONKEYS ARE NOT

REMARKS:

THIS ORGANIZATION HAS CAPABILITIES FOR MORPHOMETRIC ANALYSIS;  
HOWEVER, THESE MEASUREMENTS ARE NOT CURRENTLY PERFORMED; DR.  
PETER D. PARE IS ALSO AN ASSISTANT PROFESSOR OF MEDICINE AT THE  
UNIVERSITY OF BRITISH COLUMBIA.

ORGANIZATION:

SRI INTERNATIONAL  
MEDICAL SCIENCES DEPARTMENT  
LIFE SCIENCES DIVISION  
MENLO PARK, CALIFORNIA 94025

DR. MICHAEL J. EVANS (415) 326-2928 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH EITHER PLEURAL OR  
ESOPHAGEAL CATHETERIZATION  
GENERAL MORPHOLOGY, HISTOPATHOLOGY  
MORPHOMETRY  
BIOCHEMISTRY

TEST SYSTEMS UTILIZED:

RATS, MONKEYS

COMPOUNDS TESTED:

OZONE, SULFUR AND NITROGEN OXIDES

ANESTHESIA:

RESPIRATORY MECHANICS MEASUREMENTS ARE PERFORMED UNDER SUSTAINED  
ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL



ORGANIZATION:

STATE UNIVERSITY OF FLORIDA  
DEPARTMENT OF METABOLISM  
SCHOOL OF VETERINARY MEDICINE  
GAINESVILLE, FLORIDA 32601

DR. DALLAS M. HYDE (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - BODY PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
FUNCTIONAL RESIDUAL CAPACITY, RESIDUAL VOLUME - NITROGEN  
DILUTION  
PRESSURE-VOLUME CURVES  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH  
ARTERIAL, VENOUS BLOOD GASES  
MORPHOMETRY

TEST SYSTEMS UTILIZED:

DOGS

COMPOUNDS TESTED:

AUTO EXHAUST, SULFUR AND NITROGEN OXIDES, OZONE

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

MORPHOMETRIC MEASUREMENTS REQUIRE TERMINATION OF THE ANIMALS

ORGANIZATION.

SYNTEX RESEARCH  
PRELIMINARY PHARMACOLOGY  
PALO ALTO, CALIFORNIA 94304

ROBERT WEISSBERG (415) 855-5050 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - AMDUR AND MEAD TECHNIQUE PLUS ON-LINE  
COMPUTER; PLETHYSMOGRAPH WITH ENDOTRACHEAL CANNULATION AND  
RESPIRATOR PLUS ON-LINE COMPUTER

TEST SYSTEMS UTILIZED:

GUINEA PIGS, RABBITS, MONKEYS

COMPOUNDS TESTED:

VARIOUS DRUGS

ANESTHESIA:

INITIAL AND SUSTAINED ANESTHESIA IS USED

TERMINAL:

ONLY ARTIFICIALLY VENTILATED ANIMALS (GUINEA PIGS AND RABBITS)  
ARE TERMINATED

ORGANIZATION:

TEMPLE UNIVERSITY  
MEDICAL SCHOOL  
PHILADELPHIA, PENNSYLVANIA 19140

DR. THOMAS H. SHAFFER, III (215) 221-3277 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
LUNG VOLUMES, CAPACITIES - NEON AND HELIUM DILUTION  
MAXIMUM FLOW VOLUME CURVES  
ARTERIAL BLOOD GASES  
LEFT-TO-RIGHT SHUNT  
GENERAL MORPHOLOGY, HISTOPATHOLOGY

TEST SYSTEMS UTILIZED:

SHEEP, CATS, DOGS, RABBITS

COMPOUNDS TESTED:

VARIOUS DRUGS, VITAMIN DEFICIENCIES, DEVELOPMENTAL CHANGES

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL

ORGANIZATION:

UNIVERSITY OF ALBERTA  
PULMONARY DIVISION  
EDMONTON, ALBERTA

DR. THOMAS P. CONNOLLY (403) 432-6688 (CONTACT)

TESTS PERFORMED:

MUCOCILIARY TRANSPORT OF INERT PARTICLES - DEPOSITED  
RADIOLABELLED ION EXCHANGE PARTICLES SCANNED IN VIVO

TEST SYSTEMS UTILIZED:

DOGS

COMPOUNDS TESTED:

(TECHNIQUE DEVELOPMENT)

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE OF A SERIAL NATURE

ORGANIZATION:

UNIVERSITY OF ARIZONA  
DEPARTMENT OF TOXICOLOGY  
BIOLOGICAL SCIENCES  
TUSCON, ARIZONA 85721

DR. JOHN W. CLAYTON (606) 626-3027 (CONTACT)

TESTS PERFORMED:

ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS OF RADIOLABELLED  
MICROSPHERE) - ALVEOLAR MACROPHAGES EXPOSED IN VITRO  
PERCENT VIABILITY OF ALVEOLAR MACROPHAGES - ALVEOLAR MACROPHAGES  
EXPOSED IN VIVO

TEST SYSTEMS UTILIZED:

RABBITS

COMPOUNDS TESTED:

SULFURIC ACID, COMBUSTION PRODUCTS

ANESTHESIA:

NA

TERMINAL:

TESTS ARE TERMINAL

ORGANIZATION:

UNIVERSITY OF CALIFORNIA  
DEPARTMENT OF PHYSIOLOGICAL SCIENCES  
SCHOOL OF VETERINARY MEDICINE  
DAVIS, CALIFORNIA 95616

DR. JERRY R. GILLESPIE (916) 752-0172 (CONTACT)

TESTS PERFORMED:

MAXIMUM FLOW VOLUME CURVES (APPLIED PRESSURE THROUGH TRACHEA)  
RESISTANCE - FORCED OSCILLATION WITH PLETHYSMOGRAPH  
FUNCTIONAL RESIDUAL CAPACITY - BOYLE'S LAW WITH PLETHYSMOGRAPH;  
NITROGEN DILUTION  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH WITH POSITIVE  
PRESSURE INFLATION  
CAPILLARY BLOOD VOLUME ( $V_c$ ) - CALCULATED FROM -  $\theta_{CO}$  AND VALUES  
OF  $D_{L_{CO}}$  AT DIFFERENT  $P_{aO_2}$   
PULMONARY CLEARANCE - INHALED RADIOLABELLED PARTICLES COUNTED IN  
LUNG HOMOGENATE  
RESPIRATION AND ATPASE ACTIVITY OF ALVEOLAR MACROPHAGE -  
ALVEOLAR MACROPHAGES EXPOSED IN VITRO  
ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS OF BACTERIA) -  
ALVEOLAR MACROPHAGES EXPOSED IN VITRO  
GENERAL MORPHOLOGY, HISTOPATHOLOGY

TEST SYSTEMS UTILIZED:

RATS, GUINEA PIGS, MONKEYS, DOGS

COMPOUNDS TESTED:

OZONE, OXIDES OF SULFUR, OXIDES OF NITROGEN, FLY ASH

ANESTHESIA:

SUSTAINED ANESTHESIA

TERMINAL:

ONLY MFVC IS TERMINAL; HISTOPATHOLOGICAL EXAMINATION REQUIRES  
THAT THE ANIMALS BE TERMINATED

UNIVERSITY OF CALIFORNIA (CONCLUDED)

REMARKS:

THIS ORGANIZATION IS ACTIVELY INVOLVED IN PULMONARY TESTING AND RESEARCH; IN ADDITION TO DR. JERRY R. GILLESPIE, THE FOLLOWING INDIVIDUALS ARE ALSO INVOLVED IN PULMONARY TESTING: JIM BERRY, DR. JERRY F. GREEN, MARTHA H. LYNN, CHRIS PETERS, JOHN W. WATSON AND CRAIG D. WEGNER.

ORGANIZATION:

UNIVERSITY OF CALIFORNIA, IRVINE  
AIR POLLUTION HEALTH EFFECTS LABORATORY  
COMMUNITY AND ENVIRONMENTAL MEDICINE  
SCHOOL OF MEDICINE  
IRVINE, CALIFORNIA 92717

T.T. CROCKER (714) 833-5853 (CONTACT)  
R.F. PHALEN (714) 833-5860  
P. REISCHL (714) 833-6371

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - FLOW METER PLUS ESOPHAGEAL  
CATHETERIZATION  
O<sub>2</sub> UPTAKE, CO<sub>2</sub> OUTPUT  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE, MULTIPLE BREATH  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT-MULTIPLE  
BREATH  
ARTERIAL BLOOD GASES  
MUCOCILIARY TRANSPORT OF INERT PARTICLES - INHALED CHROMIUM  
LABELLED POLYSTYRENE PARTICLES COUNTED IN FECES AND IN CHEST  
MORPHOLOGY, HISTOPATHOLOGY - MANUAL AND AUTOMATED MORPHOMETRIC  
ANALYSIS; LUNG CASTING FOR MORPHOMETRY  
MACROPHAGE MOBILITY-IN VITRO

TEST SYSTEMS UTILIZED:

RATS (DEFENSE MECHANISM TESTS AND SEMI-QUANTITATIVE HISTOLOGY),  
DOGS (RESPIRATORY MECHANICS, MORPHOMETRIC ANALYSIS),  
MACROPHAGES (EXPOSURE IN VIVO, MEASURE MOBILITY IN VITRO)

COMPOUNDS AND CONDITIONS TESTED:

INHALATION ONLY, MASKS AND CHAMBERS:  
OZONE, SULFUR DIOXIDE, NITROGEN DIOXIDE, SULFATES, NITRATES,  
SULFURIC ACID, RELATIVE HUMIDITY AND TEMPERATURE ARE  
CONTROLLED, ATMOSPHERES CAN BE AGED FOR VARIABLE PERIODS

ANESTHESIA:

ANESTHESIA IS NOT UTILIZED DURING POLLUTANT EXPOSURES  
ANESTHESIA IS UTILIZED WHEN ANIMALS ARE SACRIFICED

TERMINAL:

MORPHOLOGY AND MICROCILIARY TRANSPORT TESTS ARE TERMINAL.



UNIVERSITY OF CALIFORNIA, IRVINE (CONCLUDED)

REMARKS:

STUDY COMBINATIONS OF GASES AND PARTICLES IN  
SINGLE ACUTE OR REPEATED ACUTE EXPOSURES.  
ANIMALS ARE EXPOSED AT REST OR WHILE EXERCISING.

ORGANIZATION:

UNIVERSITY OF CALIFORNIA  
DIVISION OF ENVIRONMENTAL AND NUTRITIONAL  
SCIENCES  
SCHOOL OF PUBLIC HEALTH  
CENTER FOR HEALTH SERVICES  
LOS ANGELES, CALIFORNIA 90024

DR. MAHAMMAD G. MUSTAFA (213) 825-1153 (CONTACT)

TESTS PERFORMED:

BIOCHEMICAL BATTERY  
MORPHOLOGY  
ISOLATED LUNG PERFUSION

TEST SYSTEMS UTILIZED:

RATS; IN THE PAST OTHER SYSTEMS, INCLUDING MONKEYS, HAVE BEEN  
UTILIZED

COMPOUNDS TESTED:

AIR POLLUTANTS (e.g., OZONE, SULFUR AND NITROGEN OXIDES)

ANESTHESIA:

FOR LUNG PERFUSION STUDIES

TERMINAL:

YES

REMARKS:

IN ADDITION TO DR. MUSTAFA, DR. DONALD F. TIERNEY IS ALSO ACTIVE  
IN PULMONARY TESTING IN THIS ORGANIZATION. THIS LABORATORY  
COLLABORATES WITH DR. TIMOTHY T. CROCKER AND ASSOCIATES AT THE  
UNIVERSITY OF CALIFORNIA AT IRVINE. DR. MAHAMMAD G. MUSTAFA  
ALSO WORKS AT THE PULMONARY DIVISION, DEPARTMENT OF MEDICINE.

ORGANIZATION:

UNIVERSITY OF CALIFORNIA  
CARDIOVASCULAR RESEARCH INSTITUTE  
SAN FRANCISCO, CALIFORNIA 94143

DR. BRIAN DAVIS (415) 666-2282 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
LUNG VOLUMES AND CAPACITIES - HELIUM DILUTION  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE AND MULTIPLE BREATH  
TECHNIQUES  
PRESSURE-VOLUME CURVES - PNEUMOTACHOGRAPH WITH RESPIRATOR  
ARTERIAL BLOOD GASES  
MUCOCILLIARY TRANSPORT OF INERT PARTICLES - INHALED  
RADIOLABELLED PARTICLES SCANNED IN VIVO AND IN EXCISED  
TRACHEA  
MORPHOLOGICAL STUDIES; MORPHOMETRIC ANALYSES  
BIOCHEMICAL STUDIES

TEST SYSTEMS UTILIZED:

DOGS, CATS, FERRETS, RATS (SMALL ANIMALS USUALLY FOR MORPHOLOGY,  
AND BIOCHEMISTRY STUDIES ONLY)

COMPOUNDS TESTED:

OZONE, AUTONOMIC AGENTS

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE USUALLY TERMINAL, EXCEPT SOME CHRONIC STUDIES WITH  
DOGS

ORGANIZATION:

UNIVERSITY OF CINCINNATI  
DEPARTMENT OF ENVIRONMENTAL HEALTH  
SCHOOL OF MEDICINE  
CINCINNATI, OHIO 45221

DR. ALLEN VINEGAR (513) 872-5718 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - VARIOUS TECHNIQUES, WITH AND WITHOUT  
PLETHYSMOGRAPH  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH  
PRESSURE-VOLUME CURVES  
MAXIMUM FLOW VOLUME CURVES

TEST SYSTEM UTILIZED:

RATS, GUINEA PIGS

COMPOUNDS TESTED:

SULFUR DIOXIDE, SULFURIC ACID, ALUMINUM SULFATE, CADMIUM  
CHLORIDE (DRINKING WATER)

ANESTHESIA:

SUSTAINED ANESTHESIA IS USED FOR MOST TESTS; CERTAIN COMPLIANCE,  
RESISTANCE TECHNIQUES DO NOT REQUIRE ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

DR. ALLEN VINEGAR IS WORKING TO REFINE TECHNIQUES AND EQUIPMENT  
USED FOR PULMONARY FUNCTION TESTING.

ORGANIZATION:

UNIVERSITY OF GUELPH  
DEPARTMENT OF BIOMEDICAL SCIENCES  
GUELPH, ONTARIO

DR. PARVATHI K. BASRUR (519) 824-4120 (CONTACT)

TESTS PERFORMED:

GENERAL MORPHOLOGY, HISTOPATHOLOGY  
MORPHOMETRY - SCANNING ELECTRON MICROSCOPY, TRANSMISSION  
ELECTRON MICROSCOPY  
SIZE AND DISTRIBUTION OF MUCUS SECRETING CELLS

TEST SYSTEMS UTILIZED:

HAMSTERS

COMPOUNDS TESTED:

COMPONENTS OF CIGARETTE SMOKE

ANESTHESIA:

ANESTHESIA IS NOT UTILIZED

TERMINAL:

TESTS ARE TERMINAL

ORGANIZATION:

UNIVERSITY OF KENTUCKY  
PHARMACODYNAMICS AND TOXICOLOGY  
COLLEGE OF PHARMACY  
LEXINGTON, KENTUCKY 40506

DR. LOUIS DIAMOND (606) 257-2770 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION; PLETHYSMOGRAPH WITH FORCED OSCILLATIONS  
FUNCTIONAL RESIDUAL CAPACITY - BOYLE'S LAW WITH PLETHYSMOGRAPH  
PRESSURE-VOLUME CURVES - PLETHYSMOGRAPH PLUS RESPIRATOR; EXCISED  
LUNGS  
MAXIMUM FLOW VOLUME CURVES - PLETHYSMOGRAPH PLUS APPLIED  
PRESSURE THROUGH TRACHEA  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH, POSITIVE  
PRESSURE INFLATION

TEST SYSTEMS UTILIZED:

RATS, RABBITS, CATS

COMPOUNDS TESTED:

VARIOUS DRUGS

ANESTHESIA:

SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE OF A SERIAL NATURE EXCEPT MFVC, WHICH IS TERMINAL

ORGANIZATION:

UNIVERSITY OF MICHIGAN  
PULMONARY DIVISION  
MEDICAL CENTER  
ANN ARBOR, MICHIGAN 48104

DR. DAVID R. DANTZKER (313) 764-2260 (CONTACT)

TESTS PERFORMED:

ARTERIAL BLOOD GASES  
COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION

TEST SYSTEMS UTILIZED:

DOGS, CATS

COMPOUNDS TESTED:

RESEARCH ON RESPIRATORY MUSCLE FATIGUE

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL

ORGANIZATION:

UNIVERSITY OF NORTH CAROLINA  
DEPARTMENT OF PULMONARY MEDICINE  
SCHOOL OF MEDICINE  
CHAPEL HILL, NORTH CAROLINA 27514

DR. RUSSELL L. PIMMEL (919) 966-2532 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
COMPLIANCE, RESISTANCE - FORCED OSCILLATIONS WITH RESPIRATOR  
LUNG VOLUMES, CAPACITIES - HELIUM DILUTION  
CARBON MONOXIDE DIFFUSING CAPACITY - MULTIPLE BREATH

TEST SYSTEMS UTILIZED:

GUINEA PIGS AND HAMSTERS (PLETHYSMOGRAPH TECHNIQUES) DOGS  
(ALL OTHER TECHNIQUES)

COMPOUNDS TESTED:

OZONE, PHARMACOLOGICAL AGENTS, MODELS OF INFECTION

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE OF A SERIAL NATURE

REMARKS:

IN ADDITION TO DR. RUSSELL L. PIMMEL, DR. GERALD L. STROPE AND  
DR. MITCHELL FRIEDMAN ARE ACTIVELY INVOLVED IN PULMONARY  
TESTING.



ORGANIZATION:

UNIVERSITY OF NORTH DAKOTA  
DEPARTMENT OF PHYSIOLOGY  
SCHOOL OF MEDICINE  
GRAND FORKS, NORTH DAKOTA 58202

DR. HENRY O. STINNETT (701) 777-3974 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
LUNG VOLUMES, CAPACITIES - PLETHYSMOGRAPH  
BLOOD PRESSURES  
OXYGEN UPTAKE

TEST SYSTEMS UTILIZED:

GUINEA PIGS, RABBITS, DOGS

COMPOUNDS TESTED:

(SEE REMARKS)

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

THIS ORGANIZATION HAS CAPABILITIES TO PERFORM PULMONARY TESTS IN  
ALL SIZE ANIMALS UP TO MONKEYS. THE TESTS CURRENTLY PERFORMED  
ARE DONE ROUTINELY FOR THE PURPOSE OF TEACHING PULMONARY  
PHYSIOLOGY.

ORGANIZATION:

UNIVERSITY OF PENNSYLVANIA  
PHILADELPHIA, PENNSYLVANIA 19104

DR. MARIA DELIVORIA-PAPADOPOULOS (215) 662-3225 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
FUNCTIONAL RESIDUAL CAPACITY - NEON DILUTION  
TOTAL LUNG CAPACITY  
OXYGEN CONSUMPTION  
ARTERIAL BLOOD GASES  
MORPHOLOGY - GROSS MEASUREMENTS

TEST SYSTEMS UTILIZED:

LAMBS (PRETERM AND POSTNATAL), PIGLETS

COMPOUNDS AND CONDITIONS TESTED:

CARBON MONOXIDE, STRESS

ANESTHESIA:

INITIAL ANESTHESIA ONLY

TERMINAL:

TESTS ARE USUALLY TERMINAL

REMARKS:

DR. MARIA DELIVORIA-PAPADOPOULOS ALSO WORKS AT THE HOSPITAL OF  
THE UNIVERSITY OF PENNSYLVANIA AS THE DIRECTOR OF NEWBORN  
SERVICE.

ORGANIZATION:

UNIVERSITY OF PITTSBURGH  
GRADUATE SCHOOL OF PUBLIC HEALTH  
PITTSBURGH, PENNSYLVANIA 15261

DR. YVES ALARIE (412) 624-3047 (CONTACT)

REMARKS:

ALTHOUGH THE RESEARCHERS AT THIS ORGANIZATION HAVE BEEN INVOLVED IN THE DEVELOPMENT AND APPLICATION OF MANY RESPIRATORY MECHANICS MEASUREMENT TECHNIQUES, THESE CLASSICAL TESTS ARE NO LONGER PERFORMED. THIS ORGANIZATION IS CURRENTLY INVOLVED IN DEVELOPING MEASUREMENTS IN TWO NEW AREAS: SENSORY IRRITATING PROPERTIES AND AIRBORNE PULMONARY HYPERSENSITIVITY. SEE DR. JOSEPH A. WATSON (SAME ORGANIZATION) FOR INFORMATION CONCERNING PULMONARY DEFENSE SYSTEM MEASUREMENTS PERFORMED BY THIS GROUP.

ORGANIZATION:

UNIVERSITY OF PITTSBURGH  
GRADUATE SCHOOL OF PUBLIC HEALTH  
PITTSBURGH, PENNSYLVANIA 15261

DR. JOSEPH A. WATSON (412) 624-2732 (CONTACT)

TESTS PERFORMED:

ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS OF INHALED  
COMPOUNDS)-ALVEOLAR MACROPHAGE EXPOSED IN VIVO  
MUCOCILIARY TRANSPORT OF INHALED COMPOUNDS

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

COAL DUST (INSTILLATION)

ANESTHESIA:

INITIAL ANESTHESIA ONLY

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

NEW TEST METHODS DEVELOPMENT IS ALSO BEING CONDUCTED,  
SEE ENTRY UNDER DR. YVES ALARIE, SAME ORGANIZATION.

ORGANIZATION:

UNIVERSITY OF ROCHESTER  
RADIATION BIOLOGY AND BIOPHYSICS DEPARTMENT  
SCHOOL OF MEDICINE AND DENTISTRY  
ROCHESTER, NEW YORK 14642

DR. JURAJ FERIN (716) 275-3726 (CONTACT)

TESTS PERFORMED:

PULMONARY CLEARANCE OF INERT PARTICLES - LUNG BURDEN OF INHALED  
TiO<sub>2</sub> DETERMINED IN LUNG HOMOGENATE  
PULMONARY CLEARANCE OF BACTERIA - INHALED RADIOLABELLED BACTERIA  
COUNTED IN LUNG HOMOGENATE; INHALED VIABLE BACTERIA COUNTED IN  
LUNG HOMOGENATE  
ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS OF INERT PARTICLES)

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

SULFUR AND NITROGEN OXIDES, OZONE, DIESEL EXHAUST

ANESTHESIA:

NA

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

SEE DR. RICHARD W. HYDE (SAME ORGANIZATION) FOR INFORMATION  
CONCERNING RESPIRATORY MECHANICS MEASUREMENTS PERFORMED BY THIS  
GROUP.

ORGANIZATION:

UNIVERSITY OF ROCHESTER  
SCHOOL OF MEDICINE AND DENTISTRY  
ROCHESTER, NEW YORK 14642

DR. RICHARD W. HYDE (716) 275-4861 (CONTACT)

TESTS PERFORMED:

LUNG VOLUMES - GAS DILUTION (HELIUM)  
COMPLIANCE, RESISTANCE - FORCED OSCILLATIONS WITHOUT  
PLETHYSMOGRAPH

TEST SYSTEMS UTILIZED:

DOGS

COMPOUNDS TESTED:

HISTAMINE, EPOXY

ANESTHESIA:

SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE OF A SERIAL NATURE

REMARKS:

TESTS ARE USED TO STUDY MECHANISMS OF PULMONARY EDEMA IN DOGS.  
SEE DR. JURAJ FERIN (SAME ORGANIZATION) FOR INFORMATION CONCERN-  
ING DEFENSE MECHANISM MEASUREMENTS PERFORMED BY THIS GROUP.

ORGANIZATION:

UNIVERSITY OF SOUTH ALABAMA  
COLLEGE OF MEDICINE  
MOBILE, ALABAMA 36688

DR. AUBREY E. TAYLOR (205) 460-7004 (CONTACT)

TESTS PERFORMED:

PULMONARY VASCULAR RESISTANCE  
LONGITUDINAL DISTRIBUTION OF VASCULAR RESISTANCE  
BLOOD PRESSURES

TEST SYSTEMS UTILIZED:

DOGS

COMPOUNDS TESTED:

(MODELS OF LUNG DAMAGE)

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL

ORGANIZATION:

UNIVERSITY OF TEXAS  
MEDICAL BRANCH  
GALVESTON, TEXAS 77550

DR. ROBERT E. BARROW (713) 765-2786 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
RESPIRATORY RATE, TIDAL VOLUME - CAPACITANCE RESPIROMETER

TEST SYSTEMS UTILIZED:

RABBITS, DOGS, RATS

COMPOUNDS TESTED:

CHLORINE GAS, OXYGEN TOXICITY

ANESTHESIA:

ANESTHESIA IS NOT USED

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

GAS EXCHANGE AND CIRCULATORY MEASUREMENTS ARE ALSO PERFORMED,  
SEE ENTRY UNDER DR. ROBERT E. DRAKE, SAME ORGANIZATION.



ORGANIZATION:

UNIVERSITY OF TEXAS  
DEPARTMENT OF ANESTHESIOLOGY  
MEDICAL BRANCH  
GALVESTON, TEXAS 77550

DR. ROBERT E. DRAKE (713) 765-1906 (CONTACT)

TESTS PERFORMED:

ARTERIAL AND VENOUS BLOOD GASES  
PULMONARY VASCULAR RESISTANCE  
LONGITUDINAL DISTRIBUTION OF VASCULAR RESISTANCE  
BLOOD PRESSURES  
LEFT-TO-RIGHT SHUNT  
GENERAL MORPHOLOGY, HISTOPATHOLOGY

TESTS SYSTEMS UTILIZED:

DOGS

COMPOUNDS TESTED:

HISTAMINE, ALLOXAN, SHOCK THERAPY

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

RESPIRATORY MECHANICS MEASUREMENTS ARE ALSO PERFORMED, SEE ENTRY  
UNDER DR. ROBERT E. BARROW, SAME ORGANIZATION.

ORGANIZATION:

UNIVERSITY OF TEXAS  
DIVISION OF PULMONARY DISEASES  
SCHOOL OF MEDICINE  
SAN ANTONIO, TEXAS 78284

DR. WALDEMAR G. JOHANSON, JR. (512) 696-9660 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH (LARGE ANIMALS) OR  
PNEUMOTACHOGRAPH (SMALL ANIMALS) WITH ESOPHAGEAL  
CATHETERIZATION  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - SINGLE AND  
MULTIPLE BREATH TECHNIQUES (LARGE ANIMALS)  
MAXIMUM FLOW VOLUME CURVES (LARGE ANIMALS)  
CARBON MONOXIDE DIFFUSING CAPACITY - MULTIPLE BREATH (LARGE  
ANIMALS)  
PULMONARY CLEARANCE OF BACTERIA - INHALED VIABLE BACTERIA  
COUNTED IN LUNG HOMOGENATE (SMALL ANIMALS)  
ARTERIAL BLOOD GASES  
GENERAL MORPHOLOGY, HISTOPATHOLOGY (SMALL ANIMALS)  
MORPHOMETRY (SMALL ANIMALS)  
BIOCHEMISTRY

TEST SYSTEMS UTILIZED:

RATS, HAMSTERS, RABBITS, DOGS, BABOONS

COMPOUNDS TESTED:

CIGARETTE SMOKE, NICOTINE, OLEIC ACID, HCl, BLEOMYCIN, PARAQUAT,  
STRESS

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA

TERMINAL:

DOGS AND SMALL ANIMALS ARE USUALLY TERMINATED; MEASUREMENTS  
IN BABOONS ARE OF A SERIAL NATURE

REMARKS:

DR. HENRY C. MCGILL IS ALSO ACTIVE IN PULMONARY RESEARCH AT THIS  
ORGANIZATION.

ORGANIZATION:

UNIVERSITY OF TEXAS SOUTHWESTERN MEDICAL SCHOOL  
DALLAS, TEXAS 75235

DR. ROBERT L. JOHNSON (214) 688-3421 (CONTACT)  
DR. ALAN K. PIERCE (214) 688-3429 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PLETHYSMOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
LUNG VOLUMES AND CAPACITIES - HELIUM DILUTION  
CARBON MONOXIDE DIFFUSING CAPACITY - MULTIPLE BREATH  
PULMONARY CLEARANCE OF BACTERIA - INHALED VIABLE BACTERIA  
COUNTED IN LUNG HOMOGENATE  
GENERAL MORPHOLOGY, HISTOPATHOLOGY  
MORPHOMETRY - MEAN ALVEOLAR INTERCEPT

TEST SYSTEMS UTILIZED:

DOGS, MICE (PULMONARY CLEARANCE)

COMPOUNDS TESTED:

PHARMACOLOGICALLY ACTIVE AGENTS

ANESTHESIA:

ANESTHESIA IS NOT UTILIZED

TERMINAL:

MICE STUDIES ARE TERMINAL. DOG TESTS ARE OF A SERIAL NATURE;  
HOWEVER, THEY MAY BE EUTHANIZED FOR PURPOSES OF MORPHOLOGICAL  
EXAMINATION.

ORGANIZATION:

UNIVERSITY OF UTAH  
SCHOOL OF MEDICINE  
SALT LAKE CITY, UTAH 84132

DR. SUETARO WATANABE (801) 581-7806 (CONTACT)

TESTS PERFORMED:

PRESSURE-VOLUME CURVES - EXCISED LUNGS, AIR AND SALINE INJECTION

TEST SYSTEMS UTILIZED:

PIGS

COMPOUNDS TESTED:

TECHNIQUE DEVELOPMENT

ANESTHESIA:

NA

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

THIS ORGANIZATION IS PREPARING FOR FURTHER INVOLVEMENT IN  
RESPIRATORY MECHANICS MEASUREMENTS. OTHER RESEARCHERS INCLUDE  
DR. LAWRENCE B. SANDBERG.

ORGANIZATION:

UNIVERSITY OF WASHINGTON  
DEPARTMENT OF ENVIRONMENTAL HEALTH  
SCHOOL OF PUBLIC HEALTH AND COMMUNITY MEDICINE  
SEATTLE, WASHINGTON 98195

DR. ROBERT FRANK (206) 543-4383 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - AMDUR AND MEAD TECHNIQUE;  
PLETHYSMOGRAPH WITH ENDOTRACHEAL CANNULATION AND RESPIRATOR  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - MULTIPLE  
BREATH  
FUNCTIONAL RESIDUAL CAPACITY - GAS DILUTION  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH  
MAXIMUM FLOW VOLUME CURVES  
GENERAL MORPHOLOGY, HISTOPATHOLOGY

TEST SYSTEMS UTILIZED:

RATS, GUINEA PIGS (AMDUR/MEAD TECHNIQUE ONLY), DOGS

COMPOUNDS TESTED:

OZONE, SULFUR DIOXIDE, SULFURIC ACID, SODIUM AND ALUMINUM  
SULFATE

ANESTHESIA:

TESTS (EXCEPT AMDUR AND MEAD TECHNIQUE) ARE PERFORMED UNDER  
SUSTAINED ANESTHESIA

TERMINAL:

TESTS ARE TERMINAL

REMARKS:

IN ADDITION TO DR. ROBERT FRANK, DR. THOMAS A. STANDAERT, DR.  
LEONARD D. HUDSON AND MARIANNE HOWARD ARE ACTIVELY INVOLVED IN  
DEVELOPING SYSTEMS FOR PULMONARY TESTING.

ORGANIZATION:

UNIVERSITY OF WISCONSIN  
AGRICULTURAL EXPERIMENT STATION  
MADISON, WISCONSIN 53705

DR. GERALD E. BISGARD (608) 262-2962 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTOCHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION  
FUNCTIONAL RESIDUAL CAPACITY - NITROGEN DILUTION  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT  
ARTERIAL BLOOD GASES

TEST SYSTEMS UTILIZED:

DOGS, COWS, GOATS, PONIES

COMPOUNDS TESTED:

RESPIRATORY DISEASES

ANESTHESIA:

TESTS ARE PERFORMED IN CONSCIOUS ANIMALS

TERMINAL:

TESTS ARE OF A SERIAL NATURE

ORGANIZATION:

THE UPJOHN COMPANY  
HYPERSENSITIVITY DEPARTMENT  
KALAMAZOO, MICHIGAN 49001

FRANK B. MARSALISI (616) 323-4000 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH PLEURAL  
CATHETERIZATION

TEST SYSTEMS UTILIZED:

DOGS

COMPOUNDS TESTED:

DRUGS

ANESTHESIA:

SUSTAINED

TERMINAL:

TESTS ARE OF A SERIAL NATURE

ORGANIZATION:

U.S. ARMY MEDICAL RESEARCH INSTITUTE OF INFECTIOUS DISEASES  
ANIMAL ASSESSMENT DIVISION  
FORT DETRICK  
FREDERICK, MARYLAND 21701

DR. CHING-TONG LIU (301) 663-2148 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - PNEUMOTACHOGRAPH WITH ESOPHAGEAL  
CATHETERIZATION, ENDOTRACHEAL CANNULA  
TIDAL VOLUME, RESPIRATORY RATE, OXYGEN UPTAKE - HEAD COVER WITH  
SPIROMETER  
FUNCTIONAL RESIDUAL CAPACITY - HELIUM DILUTION  
CARBON DIOXIDE OUTPUT - ENDOTRACHEAL CANNULA, ONE-WAY VALVE  
SPECIFIC VENTILATION

TEST SYSTEMS UTILIZED:

MONKEYS

COMPOUNDS TESTED:

DISEASE EXPOSURES

ANESTHESIA:

SUSTAINED ANESTHESIA EXCEPT FOR TIDAL VOLUME, RESPIRATORY RATE  
AND OXYGEN UPTAKE.

TERMINAL:

TESTS ARE OF A SERIAL NATURE

REMARKS:

THE PULMONARY TESTS PERFORMED IN MONKEYS ARE A SMALL PART OF  
OVERALL DISEASE TESTING. DR. MICHAEL KASTELLO (SAME ORGANIZA-  
TION, 663-7453) IS PREPARING TO PERFORM COMPLIANCE, RESISTANCE  
(PLETHYSMOGRAPH WITH ESOPHAGEAL CATHETERIZATION) AND LUNG  
VOLUMES (GAS DILUTION) ON RODENTS EXPOSED TO VARIOUS DISEASES.



ORGANIZATION:

U.S. ENVIRONMENTAL PROTECTION AGENCY  
FUNCTIONAL PATHOLOGY BRANCH  
LABORATORY SCIENCES DIVISION  
HEALTH EFFECTS RESEARCH LABORATORY  
CINCINNATI, OHIO 45268

DR. WILLIAM E. PEPELKO (513) 684-7431 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - AMDUR AND MEAD TECHNIQUE WITH ON-LINE  
COMPUTER  
RESISTANCE TO INDUCED INFECTION - PERCENT MORTALITY

TEST SYSTEMS UTILIZED:

GUINEA PIGS, MICE

COMPOUNDS TESTED:

TRANSPORTATION- AND ENERGY-RELATED EMISSIONS, VARIOUS DRUGS

ANESTHESIA:

INITIAL ANESTHESIA IS USED FOR COMPLIANCE, RESISTANCE TESTS

TERMINAL:

COMPLIANCE, RESISTANCE TESTS ARE OF A SERIAL NATURE

ORGANIZATION:

U.S. ENVIRONMENTAL PROTECTION AGENCY  
HEALTH EFFECTS RESEARCH LABORATORY  
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27711

JUDITH A. GRAHAM (919) 541-2531 (CONTACT)

TESTS PERFORMED:

RESISTANCE TO INDUCED RESPIRATORY INFECTION - PERCENT MORTALITY  
CILIA BEATING FREQUENCY (IN VITRO) - ISOLATED TRACHEAL RINGS  
WITH ELECTRONIC STROBOSCOPE  
PULMONARY CLEARANCE OF BACTERIA - INHALED RADIOLABELLED OR  
VIABLE BACTERIA COUNTED IN LUNG HOMOGENATE  
PERCENT VIABILITY OF ALVEOLAR MACROPHAGE - ALVEOLAR MACROPHAGE  
EXPOSED IN VITRO  
ALVEOLAR MACROPHAGE FUNCTION (PHAGOCYTOSIS OF PLASTIC MICRO-  
SPHERES) - ALVEOLAR MACROPHAGES EXPOSED IN VITRO  
ACTIVITY OF ALVEOLAR MACROPHAGE ATP - ALVEOLAR MACROPHAGES  
EXPOSED IN VITRO

TEST SYSTEMS UTILIZED:

GUINEA PIGS, MICE, RABBITS

COMPOUNDS TESTED:

OZONE, NITROGEN DIOXIDE, SULFURIC ACID, HEAVY METALS, SULFATES,  
NITRATES, VARIOUS POLLUTANT MIXTURES

ANESTHESIA:

NA

TERMINAL:

ALL TESTS ARE TERMINAL

REMARKS:

IN ADDITION TO DEFENSE MECHANISM STUDIES, DR. JOHN J. O'NEIL AND  
ASSOCIATES ARE ACTIVELY INVOLVED IN RESPIRATORY MECHANICS TEST-  
ING, SEE FOLLOWING ENTRY.

ORGANIZATION:

U.S. ENVIRONMENTAL PROTECTION AGENCY  
HEALTH EFFECTS RESEARCH LABORATORY  
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27711

DR. JOHN J. O'NEIL (919) 541-2711 (CONTACT)

TESTS PERFORMED:

LUNG VOLUMES, LUNG CAPACITIES - GAS DILUTION (NEON) AND AIR  
INJECTION  
FUNCTIONAL RESIDUAL CAPACITY - BOYLE'S LAW WITHOUT  
PLETHYSMOGRAPH  
DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT - MULTIPLE  
BREATH  
CARBON MONOXIDE DIFFUSING CAPACITY - SINGLE BREATH, POSITIVE  
PRESSURE INFLATION  
PRESSURE-VOLUME CURVES

TEST SYSTEMS UTILIZED:

RATS, HAMSTERS, GUINEA PIGS, RABBITS

COMPOUNDS TESTED:

OZONE, SULFUR AND NITROGEN OXIDES AND TRANS-2-BUTENE MIXTURE

ANESTHESIA:

SUSTAINED ANESTHESIA

TERMINAL:

NO

REMARKS:

THIS ORGANIZATION IS INVOLVED IN STANDARDIZING PULMONARY FUNCTION PROTOCOLS TO BE USED IN TOXICITY SCREENING; IN ADDITION TO DR. JOHN J. O'NEIL, ROBERT MERCER IS ACTIVELY INVOLVED IN PULMONARY TESTING; JUDITH A. GRAHAM AND ASSOCIATES ARE INVOLVED IN DEFENSE MECHANISM TESTING, SEE PRECEEDING ENTRY.

ORGANIZATION:

VANDERBILT UNIVERSITY  
SCHOOL OF MEDICINE  
NASHVILLE, TENNESSEE 37232

DR. KENNETH L. BRIGHAM (615) 322-3412 (CONTACT)

TESTS PERFORMED:

ARTERIAL, VENOUS BLOOD GASES  
CAPILLARY BLOOD VOLUME  
PULMONARY VASCULAR RESISTANCE  
BLOOD PRESSURES  
LEFT-TO-RIGHT SHUNT  
GENERAL MORPHOLOGY, HISTOPATHOLOGY

TEST SYSTEMS UTILIZED:

SHEEP

COMPOUNDS TESTED:

HISTAMINE, PROSTAGLANDINS, ENDOTOXIN, BACTERIA

ANESTHESIA:

ANESTHESIA IS NOT USED

TERMINAL:

TESTS ARE OF A SERIAL NATURE

REMARKS:

THIS ORGANIZATION IS PREPARING FOR FURTHER INVOLVEMENT IN  
RESPIRATORY MECHANICS MEASUREMENTS. OTHER RESEARCHERS INCLUDE  
DR. THOMAS R. HARRIS.

ORGANIZATION:

VETERANS ADMINISTRATION HOSPITAL  
PULMONARY DEPARTMENT  
CINCINNATI, OHIO 45220

DR. HAMID SAHEBJAMI (513) 861-3100 (CONTACT)

TESTS PERFORMED:

PRESSURE-VOLUME CURVES - EXCISED LUNGS, AIR AND SALINE INJECTION  
MORPHOMETRY-CYTOPLASMIC COMPONENTS OF TYPE 2 CELLS  
(ELECTRON MICROSCOPE)

TEST SYSTEMS UTILIZED:

RATS

COMPOUNDS TESTED:

CADMIUM, OXYGEN, CADMIUM OXIDE

ANESTHESIA:

NA

TERMINAL:

TESTS ARE TERMINAL

ORGANIZATION:

VIRGINIA MASON RESEARCH CENTER  
RESPIRATION PHYSIOLOGY DEPARTMENT  
SEATTLE, WASHINGTON 98101

DR. JACOB HILDEBRANDT (206) 624-1144 EXT. 426 (CONTACT)  
DR. YIH-LOONG LAI (206) 624-1144 EXT. 716 (CONTACT)  
W.J.E. LAMM (206) 624-1144 EXT. 716 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE  
FUNCTIONAL RESIDUAL CAPACITY - BOYLE'S LAW WITH PLETHYSMOGRAPH;  
NITROGEN DILUTION  
PRESSURE-VOLUME CURVES - PLETHYSMOGRAPH PLUS INFLATOR; EXCISED  
LUNGS, AIR AND SALINE INJECTED  
ARTERIAL BLOOD GASES

TEST SYSTEMS UTILIZED:

RATS, GUINEA PIGS, RABBITS, CATS, DOGS

COMPOUNDS TESTED:

TECHNIQUE DEVELOPMENT, CARBON DIOXIDE, OVALBUMIN SENSITIZED

ANESTHESIA:

TESTS ARE PERFORMED UNDER SUSTAINED ANESTHESIA AND DURING AWAKE  
STATES.

TERMINAL:

SOME TESTS ARE TERMINAL AND SOME ARE CHRONIC.

REMARKS:

ROBERT K. WINN, HAROLD I. MODELL AND ALFRED J. PRATT ARE ALSO  
INVOLVED IN PULMONARY RESEARCH AT THIS ORGANIZATION.

ORGANIZATION:

YALE UNIVERSITY  
NEW HAVEN, CONNECTICUT

DR. JAMES S. DOUGLAS (203) 436-4771 (CONTACT)

TESTS PERFORMED:

COMPLIANCE, RESISTANCE - AMDUR AND MEAD TECHNIQUE WITH ON-LINE  
COMPUTER

TEST SYSTEMS UTILIZED:

GUINEA PIGS

COMPOUNDS TESTED:

CARBON DIOXIDE, SULFUR OXIDES, VARIOUS DRUGS

ANESTHESIA:

INITIAL ANESTHESIA IS USED

TERMINAL:

TESTS ARE OF A SERIAL NATURE.

REMARKS:

DR. JAMES S. DOUGLAS ALSO WORKS AT THE JOHN B. PIERCE FOUNDATION  
LABORATORY (203) 562-9901 EXTENSION 51.

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APPENDIX A  
TESTS PERFORMED BY EACH ORGANIZATION

## MORPHOLOGICAL MEASUREMENTS

### GENERAL MORPHOLOGY, HISTOPATHOLOGY

Allied Chemical Corporation  
Battelle Memorial Institute  
Boston University  
Harvard School of Public Health  
International Research and Development Corporation  
St. Paul's Hospital  
South Carolina Medical University  
SRI International  
Temple University  
University of California, Davis  
University of California, Irvine  
University of California, Los Angeles  
University of California, San Francisco  
University of Guelph  
University of Pennsylvania  
University of Texas, Dallas  
University of Texas, Galveston  
University of Texas, San Antonio  
University of Washington  
Vanderbilt University

### MORPHOMETRY

Boston University  
Harvard School of Public Health  
South Carolina Medical University  
SRI International  
State University of Florida  
University of California, Irvine  
University of California, San Francisco  
University of Guelph  
University of Texas, Dallas  
University of Texas, San Antonio  
Veterans Administration Hospital

## RESPIRATORY MECHANICS MEASUREMENTS

### FUNCTIONAL RESIDUAL CAPACITY

Allied Chemical Corporation  
Battelle Memorial Institute  
Boston University  
Brookhaven National Laboratories  
General Motors Research Laboratories  
Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute  
Mount Sinai Medical Center  
National Institute of Occupational Safety and Health  
Oak Ridge National Laboratory  
St. Luke's Hospital  
State University of Florida  
University of California, Davis  
University of Kentucky  
University of Pennsylvania  
University of Washington  
University of Wisconsin  
U.S. Army Medical Research Institute of Infectious Diseases  
U.S. Environmental Protection Agency, Research Triangle Park  
Virginia Mason Research Center

### LUNG VOLUMES, LUNG CAPACITIES

Battelle Memorial Institute  
Boston University  
Brookhaven National Laboratory  
Harvard School of Public Health  
Hazelton Laboratories America, Inc.  
Lovelace Biomedical and Environmental Research Institute  
National Institute of Occupational Safety and Health  
St. Luke's Hospital  
St. Paul's Hospital  
Temple University  
University of California, San Francisco  
University of North Carolina  
University of North Dakota  
University of Pennsylvania  
University of Rochester  
University of Texas, Dallas  
U.S. Environmental Protection Agency, Research Triangle Park

RESPIRATORY MECHANICS MEASUREMENTS (Continued)

COMPLIANCE, RESISTANCE

Allied Chemical Corporation  
Battelle Memorial Institute  
Brookhaven National Laboratory  
Eastern Tennessee State University  
General Motors Research Laboratories  
Harvard School of Public Health  
Hazelton Laboratories America, Inc.  
International Research and Development Corporation  
Lovelace Biomedical and Environmental Research Institute  
Massachusetts Institute of Technology  
Mount Sinai Medical Center  
National Institute of Occupational Safety and Health  
New York University Medical Center  
Northwestern University  
Oak Ridge National Laboratory  
St. Luke's Hospital  
St. Paul's Hospital  
SRI International  
State University of Florida  
Syntex Research  
Temple University  
University of California, Davis  
University of California, Irvine  
University of California, San Francisco  
University of Cincinnati  
University of Kentucky  
University of Michigan  
University of North Carolina  
University of North Dakota  
University of Pennsylvania  
University of Rochester  
University of Texas, Dallas  
University of Texas, Galveston  
University of Texas, San Antonio  
University of Washington  
University of Wisconsin  
The Upjohn Company  
U.S. Army Medical Research Institute of Infectious Diseases  
U.S. Environmental Protection Agency, Cincinnati  
Virginia Mason Research Center  
Yale University

RESPIRATORY MECHANICS MEASUREMENTS (Continued)

DISTRIBUTION OF VENTILATION BY NITROGEN-WASHOUT

Battelle Memorial Institute  
Brookhaven National Laboratory  
Eastern Tennessee State University  
Hazelton Laboratories America, Inc.  
International Research and Development Corporation  
Mount Sinai Medical Center  
National Institute of Occupational Safety and Health  
Oak Ridge National Laboratory  
St. Paul's Hospital  
University of California, Irvine  
University of Texas, San Antonio  
University of Washington  
University of Wisconsin  
U.S. Environmental Protection Agency, Research Triangle Park

PRESSURE-VOLUME CURVES

Battelle Memorial Institute  
Boston University  
Brookhaven National Laboratory  
Lovelace Biomedical and Environmental Research Institute  
Oak Ridge National Laboratory  
St. Luke's Hospital  
St. Paul's Hospital  
State University of Florida  
University of California, San Francisco  
University of Cincinnati  
University of Kentucky  
University of Utah  
U.S. Environmental Protection Agency, Research Triangle Park  
Veterans Administration Hospital  
Virginia Mason Research Center

MAXIMUM FLOW VOLUME CURVES

Boston University  
General Motors Research Laboratories  
Harvard School of Public Health  
Hazelton Laboratories America, Inc.  
Lovelace Biomedical and Environmental Research Institute  
National Institute of Occupational Safety and Health

RESPIRATORY MECHANICS MEASUREMENTS (Concluded)

MAXIMUM FLOW VOLUME CURVES (Concluded)

Northwestern University  
Oak Ridge National Laboratory  
Temple University  
University of California, Davis  
University of Cincinnati  
University of Kentucky  
University of Texas, San Antonio  
University of Washington

RESIDUAL VOLUME

Hazelton Laboratories America, Inc.

RESPIRATORY RATE, TIDAL VOLUME

Lovelace Biomedical and Environmental Research Institute  
University of Texas, Galveston  
U.S. Army Medical Research Institute of Infectious Diseases

## GAS EXCHANGE MEASUREMENTS

### ARTERIAL, VENOUS BLOOD GASES

Battelle Memorial Institute  
Boston University  
Lovelace Biomedical and Environmental Research Institute  
Mount Sinai Medical Center  
St. Luke's Hospital  
St. Paul's Hospital  
State University of Florida  
Temple University  
University of California, Irvine  
University of California, San Francisco  
University of Michigan  
University of Pennsylvania  
University of Texas, Galveston  
University of Texas, San Antonio  
University of Wisconsin  
Vanderbilt University  
Virginia Mason Research Center

### O<sub>2</sub> UPTAKE, CO<sub>2</sub> OUTPUT; RESPIRATORY EXCHANGE RATIO

Lovelace Biomedical and Environmental Research Institute  
University of California, Irvine  
University of North Dakota  
University of Pennsylvania  
U.S. Army Medical Research Institute of Infectious Diseases

### SPECIFIC VENTILATION

Lovelace Biomedical and Environmental Research Institute  
U.S. Army Medical Research Institute of Infectious Diseases

### ALVEOLAR-ARTERIAL DIFFERENCE

Lovelace Foundation

### CARBON MONOXIDE DIFFUSING CAPACITY

Battelle Memorial Institute  
Boston University  
Brookhaven National Laboratory

GAS EXCHANGE MEASUREMENTS (Concluded)

CARBON MONOXIDE DIFFUSING CAPACITY (Concluded)

Hazelton Laboratories America, Inc.  
Lovelace Biomedical and Environmental Research Institute  
Mount Sinai Medical Center  
National Institute of Occupational Safety and Health  
St. Luke's Hospital  
State University of Florida  
University of California, Davis  
University of California, Irvine  
University of California, San Francisco  
University of Cincinnati  
University of Kentucky  
University of North Carolina  
University of Texas, Dallas  
University of Texas, San Antonio  
University of Washington  
U.S. Environmental Protection Agency, Research Triangle Park

ALVEOLAR GAS PRESSURES

Lovelace Biomedical and Environmental Research Institute

MEAN ALVEOLAR INTERCEPT

Boston University  
St. Luke's Hospital



## CIRCULATORY MEASUREMENTS

### CAPILLARY BLOOD VOLUME

University of California, Davis  
Vanderbilt University

### PULMONARY VASCULAR RESISTANCE

St. Paul's Hospital  
University of South Alabama  
University of Texas, Galveston  
Vanderbilt University

### LONGITUDINAL DISTRIBUTION OF VASCULAR RESISTANCE

University of South Alabama  
University of Texas, Galveston

### BLOOD PRESSURES

Mt. Sinai Medical Center  
St. Paul's Hospital  
University of North Dakota  
University of South Alabama  
University of Texas, Galveston  
Vanderbilt University

### LEFT-TO-RIGHT SHUNT

Temple University  
University of Texas, Galveston  
Vanderbilt University

## DEFENSE MECHANISM MEASUREMENTS

### MUCOCILIARY TRANSPORT OF INERT PARTICLES

Mount Sinai Medical Center  
New York University Medical Center  
University of Alberta  
University of California, Irvine  
University of California, San Francisco  
University of Pittsburgh

### CILIA BEATING FREQUENCY (IN VITRO)

IIT Research Institute  
U.S. Environmental Protection Agency, Research Triangle Park

### SIZE AND DISTRIBUTION OF MUCUS SECRETING CELLS

University of Guelph

### PERCENT VIABILITY OF ALVEOLAR MACROPHAGES

Harvard School of Public Health  
IIT Research Institute  
Johns Hopkins University  
University of Arizona  
U.S. Environmental Protection Agency, Research Triangle Park

### ALVEOLAR MACROPHAGE FUNCTION

Case Western Reserve University  
Harvard School of Public Health  
IIT Research Institute  
Johns Hopkins University  
University of Arizona  
University of California, Davis  
University of Pittsburgh  
University of Rochester  
U.S. Environmental Protection Agency, Research Triangle Park

### RESPIRATION AND ATPASE ACTIVITY OF ALVEOLAR MACROPHAGE

IIT Research Institute  
University of California, Davis  
U.S. Environmental Protection Agency, Research Triangle Park

DEFENSE MECHANISM MEASUREMENTS (Concluded)

PULMONARY CLEARANCE OF INERT PARTICLES

University of California, Davis  
University of Rochester

PULMONARY CLEARANCE OF BACTERIA

IIT Research Institute  
Johns Hopkins University  
University of Rochester  
University of Texas, San Antonio  
University of Texas, Dallas  
U.S. Environmental Protection Agency, Research Triangle Park

RESISTANCE TO INDUCED RESPIRATORY INFECTION

IIT Research Institute  
U.S. Environmental Protection Agency, Cincinnati  
U.S. Environmental Protection Agency, Research Triangle Park

BIOCHEMICAL MEASUREMENTS

Eastern Tennessee State University  
Harvard School of Public Health  
Johns Hopkins University  
Lovelace Biomedical and Environmental Research Institute  
SRI International  
University of California, Los Angeles  
University of California, San Francisco  
University of Texas, San Antonio

APPENDIX B

TEST SYSTEMS UTILIZED BY EACH ORGANIZATION

CATS

Temple University  
University of California, San Francisco  
University of Kentucky  
University of Michigan  
Virginia Mason Research Center

Arterial Blood Gases

Temple University  
University of California, San Francisco  
University of Michigan  
Virginia Mason Research Center

Biochemistry

University of California, San Francisco

Carbon Monoxide Diffusing Capacity

University of Kentucky  
University of California, San Francisco

Compliance, Resistance

Temple University  
University of California, San Francisco  
University of Kentucky  
University of Michigan  
Virginia Mason Research Center

Functional Residual Capacity

University of Kentucky  
Virginia Mason Research Center

Left-to-Right Shunt

Temple University

Lung Volumes and Capacities

Temple University  
University of California, San Francisco

Maximum Flow Volume Curves

Temple University  
University of Kentucky

Morphology

Temple University  
University of California, San Francisco

Mucociliary Transport of Inert Particles

University of California, San Francisco

Pressure-Volume Curves

University of California, San Francisco  
University of Kentucky  
Virginia Mason Research Center

## COWS

University of Wisconsin

### Arterial Blood Gases

University of Wisconsin

### Compliance, Resistance

University of Wisconsin

### Distribution of Ventilation

University of Wisconsin

### Functional Residual Capacity

University of Wisconsin

## DOGS

Battelle Memorial Institute

Eastern Tennessee State University

Harvard School of Public Health

Hazelton Laboratories America, Inc.

International Research and Development Corporation

Lovelace Biomedical and Environmental Research Institute

Medical University of South Carolina

Mount Sinai Medical Center

National Institute for Occupational Safety and Health

Northwestern University

St. Luke's Hospital

St. Paul's Hospital

State University of Florida

Temple University

University of Alberta

University of California, Davis

University of California, Irvine

University of California, San Francisco

University of Michigan

University of North Carolina

University of North Dakota

University of Rochester

University of South Alabama

University of Texas, Galveston

University of Texas, San Antonio

University of Texas Southwestern Medical School

University of Washington

University of Wisconsin

The Upjohn Company

Virginia Mason Research Center

DOGS (Continued)

Alveolar Gas Pressures

Lovelace Biomedical and Environmental Research Institute

Alveolar Macrophage Function

Harvard School of Public Health

University of California, Davis

Arterial Blood Gases

Battelle Memorial Institute

Lovelace Biomedical and Environmental Research Institute

Mount Sinai Medical Center

St. Luke's Hospital

St. Paul's Hospital

State University of Florida

Temple University

University of California, Irvine

University of California, San Francisco

University of Michigan

University of Texas, Galveston

University of Texas, San Antonio

University of Wisconsin

Virginia Mason Research Center

Biochemistry

Harvard School of Public Health

Eastern Tennessee State University

Lovelace Biomedical and Environmental Research Institute

University of California, San Francisco

University of Texas, San Antonio

Blood Pressures

Mount Sinai Medical Center

St. Luke's Hospital

University of North Dakota

University of South Alabama

University of Texas, Galveston

Capillary Blood Volume

University of California, Davis

Carbon Monoxide Diffusing Capacity

Battelle Memorial Institute

Hazleton Laboratories America, Inc.

Lovelace Biomedical and Environmental Research Institute

Mount Sinai Medical Center

National Institute for Occupational Safety and Health

St. Luke's Hospital

State University of Florida



DOGS (Continued)

Carbon Monoxide Diffusing Capacity (Concluded)

University of California, Davis  
University of California, Irvine  
University of California, San Francisco  
University of North Carolina  
University of Texas, San Antonio  
University of Texas Southwestern Medical School  
University of Washington

Compliance, Resistance

Battelle Memorial Institute  
Eastern Tennessee State University  
Harvard School of Public Health  
Hazleton Laboratories America, Inc.  
International Research and Development Corporation  
Lovelace Biomedical and Environmental Research Institute  
Mount Sinai Medical Center  
National Institute for Occupational Safety and Health  
Northwestern University  
St. Luke's Hospital  
St. Paul's Hospital  
State University of Florida  
Temple University  
University of California, Davis  
University of California, Irvine  
University of California, San Francisco  
University of Michigan  
University of North Carolina  
University of North Dakota  
University of Rochester  
University of Texas, Galveston  
University of Texas, San Antonio  
University of Texas Southwestern Medical School  
University of Washington  
University of Wisconsin  
The Upjohn Company  
Virginia Mason Research Center

Distribution of Ventilation

Battelle Memorial Institute  
Eastern Tennessee State University  
Hazleton Laboratories America, Inc.  
International Research and Development Corporation  
Mount Sinai Medical Center  
National Institute for Occupational Safety and Health  
St. Paul's Hospital  
University of California, Irvine  
University of Texas, San Antonio  
University of Washington  
University of Wisconsin

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EVALUATION OF SHORT-TERM BIOASSAYS TO PREDICT FUNCTIONAL IMPAIR--ETC(U)

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DOGS (Continued)

Functional Residual Capacity

Battelle Memorial Institute  
Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute  
Mount Sinai Medical Center  
National Institute for Occupational Safety and Health  
State University of Florida  
University of California, Davis  
University of Washington  
University of Wisconsin  
Virginia Mason Research Center

Left-to-Right Shunt

Harvard School of Public Health  
University of Texas, Galveston

Longitudinal Distribution of Vascular Resistance

University of South Alabama  
University of Texas, Galveston

Lung Volumes

Harvard Laboratories America, Inc.  
Lovelace Biomedical and Environmental Research Institute  
St. Paul's Hospital  
Temple University  
University of California, San Francisco  
University of North Carolina  
University of North Dakota  
University of Rochester  
University of Texas Southwestern Medical School

Maximum Flow Volume Curves

Harvard School of Public Health  
Hazelton Laboratories America, Inc.  
Lovelace Biomedical and Environmental Research Institute  
National Institute for Occupational Safety and Health  
Northwestern University  
Temple University  
University of California, Davis  
University of Texas, San Antonio  
University of Washington

Mean Alveolar Intercept

St. Luke's Hospital

DOGS (Concluded)

Morphology/Morphometry

Battelle Memorial Institute  
Harvard School of Public Health  
International Research and Development Corporation  
Medical University of South Carolina  
St. Paul's Hospital  
State University of Florida  
Temple University  
University of California, Davis  
University of California, Irvine  
University of California, San Francisco  
University of Texas, Galveston  
University of Texas, San Antonio  
University of Texas Southwestern Medical School  
University of Washington

Mucociliary Transport of Inert Particles

Mount Sinai Medical Center  
University of Alberta  
University of California, Irvine  
University of California, San Francisco

O<sub>2</sub> Uptake, Co<sub>2</sub> Output

Lovelace Biomedical and Environmental Research Institute  
University of California, Irvine  
University of North Dakota

Percent Viability of Alveolar Macrophages

Harvard School of Public Health

Pressure-Volume Curves

Battelle Memorial Institute  
Lovelace Biomedical and Environmental Research Institute  
St. Luke's Hospital  
St. Paul's Hospital  
State University of Florida  
University of California, San Francisco  
Virginia Mason Research Center

Pulmonary Clearance

University of California, Davis  
University of Texas, San Antonio  
University of Texas Southwestern Medical School

DOGS (Concluded)

Pulmonary Vascular Resistance

St. Paul's Hospital  
University of South Alabama  
University of Texas, Galveston

Residual Volume

Hazelton Laboratories America, Inc.

Respiratory Rate, Tidal Volume

Lovelace Biomedical and Environmental Research Institute  
University of Texas, Galveston

Specific Ventilation

Lovelace Biomedical and Environmental Research Institute

Total Lung Capacity

St. Luke's Hospital  
St. Paul's Hospital  
Temple University  
University of California, San Francisco  
University of North Carolina  
University of North Dakota  
University of Texas Southwestern Medical School

Venous Blood Gases

Mount Sinai Medical Center  
St. Luke's Hospital  
St. Paul's Hospital  
State University of Florida  
University of Texas, Galveston

Vital Capacity

Battelle Memorial Institute  
St. Paul's Hospital  
Temple University  
University of California, San Francisco  
University of North Carolina  
University of North Dakota  
University of Texas Southwestern Medical School

DONKEYS

New York University Medical Center

Compliance, Resistance

New York University Medical Center

DONKEYS (Concluded)

Mucociliary Transport of Inert Particles  
New York University Medical Center

FERRETS

University of California, San Francisco

Arterial Blood Gases  
University of California, San Francisco

Biochemistry  
University of California, San Francisco

Carbon Monoxide Diffusing Capacity  
University of California, San Francisco

Compliance, Resistance  
University of California, San Francisco

Lung Volumes  
University of California, San Francisco

Morphology/Morphometry  
University of California, San Francisco

Mucociliary Transport of Inert Particles  
University of California, San Francisco

Pressure Volume Curves  
University of California, San Francisco

Vital Capacity  
University of California, San Francisco

GOATS

University of Wisconsin

Arterial Blood Gases  
University of Wisconsin

Compliance, Resistance  
University of Wisconsin

Distribution of Ventilation  
University of Wisconsin

Functional Residual Capacity  
University of Wisconsin

## GUINEA PIGS

Battelle Memorial Institute  
Brookhaven National Laboratory  
Case Western Reserve University  
Harvard School of Public Health  
International Research and Development Corporation  
Massachusetts Institute of Technology  
National Institute for Occupational Safety and Health  
St. Paul's Hospital  
Syntex Research  
University of California, Davis  
University of Cincinnati  
University of North Carolina  
University of North Dakota  
University of Washington  
U.S. Environmental Protection Agency, Cincinnati  
U.S. Environmental Protection Agency, Research Triangle Park  
Virginia Mason Research Center  
Yale University

### Alveolar Macrophage Function

Case Western Reserve University  
Harvard School of Public Health  
University of California, Davis

### Arterial Blood Gases

Battelle Memorial Institute  
Virginia Mason Research Center

### Biochemistry

Harvard School of Public Health

### Blood Pressures

University of North Dakota

### Capillary Blood Volume

University of California, Davis

### Carbon Monoxide Diffusing Capacity

Battelle Memorial Institute  
Brookhaven National Laboratory  
National Institute for Occupational Safety and Health  
University of California, Davis  
University of Cincinnati  
University of North Carolina  
University of Washington  
U.S. Environmental Protection Agency, Research Triangle Park

GUINEA PIGS (Continued)

Cilia Beating Frequency

U.S. Environmental Protection Agency, Research Triangle Park

Compliance, Resistance

Battelle Memorial Institute

Brookhaven National Laboratory

Harvard School of Public Health

International Research and Development Corporation

Massachusetts Institute of Technology

National Institute for Occupational Safety and Health

St. Paul's Hospital

Syntex Research

University of California, Davis

University of Cincinnati

University of North Carolina

University of North Dakota

University of Washington

U.S. Environmental Protection Agency, Cincinnati

U.S. Environmental Protection Agency, Research Triangle Park

Virginia Mason Research Center

Yale University

Distribution of Ventilation

Battelle Memorial Institute

Brookhaven National Laboratory

International Research and Development Corporation

National Institute for Occupational Safety and Health

University of Washington

U.S. Environmental Protection Agency, Research Triangle Park

Functional Residual Capacity

Battelle Memorial Institute

Brookhaven National Laboratory

Harvard School of Public Health

National Institute for Occupational Safety and Health

University of California, Davis

University of Washington

U.S. Environmental Protection Agency, Research Triangle Park

Virginia Mason Research Center

Lung Capacities

St. Paul's Hospital

University of North Carolina

University of North Dakota

U.S. Environmental Protection Agency, Research Triangle Park



## GUINEA PIGS (Concluded)

### Lung Volumes

Brookhaven National Laboratory  
Harvard School of Public Health  
St. Paul's Hospital  
University of North Carolina  
University of North Dakota  
U.S. Environmental Protection Agency, Research Triangle Park

### Maximum Flow Volume Curves

Harvard School of Public Health  
National Institute for Occupational Safety and Health  
University of California, Davis  
University of Cincinnati  
University of Washington

### Morphology/Morphometry

Battelle Memorial Institute  
Harvard School of Public Health  
International Research and Development Corporation  
University of California, Davis  
University of Washington

### Oxygen Uptake

University of North Dakota

### Pressure-Volume Curves

Battelle Memorial Institute  
Brookhaven National Laboratory  
University of Cincinnati  
U.S. Environmental Protection Agency, Research Triangle Park  
Virginia Mason Research Center

### Pulmonary Clearance

University of California, Davis  
U.S. Environmental Protection Agency, Research Triangle Park

### Pulmonary Vascular Resistance

St. Paul's Hospital

### Resistance to Induced Infection

U.S. Environmental Protection Agency, Cincinnati  
U.S. Environmental Protection Agency, Research Triangle Park

### Vital Capacity

Battelle Memorial Institute

## HAMSTERS

Boston University  
Harvard School of Public Health  
IIT Research Institute  
Lovelace Biomedical and Environmental Research Institute  
St. Luke's Hospital  
University of Guelph  
University of North Carolina  
University of Texas, San Antonio  
U.S. Environmental Protection Agency, Research Triangle Park

### Alveolar Gas Pressures

Lovelace Biomedical and Environmental Research Institute

### Alveolar Macrophage Function

Harvard School of Public Health  
IIT Research Institute

### Arterial Blood Gases

Boston University  
Lovelace Biomedical and Environmental Research Institute  
St. Luke's Hospital  
University of Texas, San Antonio

### Biochemistry

Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute  
University of Texas, San Antonio

### Carbon Monoxide Diffusing Capacity

Boston University  
Lovelace Biomedical and Environmental Research Institute  
St. Luke's Hospital  
University of North Carolina  
U.S. Environmental Protection Agency, Research Triangle Park

### Cilia Beating Frequency

IIT Research Institute

### Compliance, Resistance

Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute  
St. Luke's Hospital  
University of North Carolina  
University of Texas, San Antonio

### Distribution of Ventilation

U.S. Environmental Protection Agency, Research Triangle Park

## HAMSTERS (Concluded)

### Functional Residual Capacity

Boston University  
Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute  
St. Luke's Hospital  
U.S. Environmental Protection Agency, Research Triangle Park

### Lung Volumes/Capacities

Boston University  
Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute  
St. Luke's Hospital  
University of North Carolina  
U.S. Environmental Protection Agency, Research Triangle Park

### Maximum Flow Volume Curves

Boston University  
Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute

### Mean Alveolar Intercept

Boston University  
St. Luke's Hospital

### Morphology/Morphometry

Harvard School of Public Health  
University of Guelph  
University of Texas, San Antonio

### Oxygen Uptake, Carbon Dioxide Output

Lovelace Biomedical and Environmental Research Institute

### Pressure-Volume Curves

Boston University  
Lovelace Biomedical and Environmental Research Institute  
U.S. Environmental Protection Agency, Research Triangle Park  
St. Luke's Hospital

### Pulmonary Clearance

IIT Research Institute  
University of Texas, San Antonio

### Resistance to Induced Infection

IIT Research Institute

### Size and Distribution of Mucus Secreting Cells

University of Guelph

### Specific Ventilation

Lovelace Biomedical and Environmental Research Institute

### Venous Blood Gases

St. Luke's Hospital

LAMBS

University of Pennsylvania

Arterial Blood Gases

University of Pennsylvania

Compliance, Resistance

University of Pennsylvania

Functional Residual Capacity

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Morphology

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Oxygen Consumption

University of Pennsylvania

Total Lung Capacity

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U.S. Environmental Protection Agency, Cincinnati

U.S. Environmental Protection Agency, Research Triangle Park

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Johns Hopkins University

U.S. Environmental Protection Agency, Research Triangle Park

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Johns Hopkins University

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University of Utah

Arterial Blood Gases

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University of Pennsylvania

Oxygen Consumption

University of Pennsylvania

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Total Lung Capacity

University of Pennsylvania

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University of Wisconsin

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Lovelace Biomedical and Environmental Research Institute

Carbon Monoxide Diffusing Capacity

Lovelace Biomedical and Environmental Research Institute

Compliance, Resistance

Lovelace Biomedical and Environmental Research Institute  
University of Wisconsin

Distribution of Ventilation

University of Wisconsin

Functional Residual Capacity

Lovelace Biomedical and Environmental Research Institute  
University of Wisconsin

Lung Volumes

Lovelace Biomedical and Environmental Research Institute

Maximum Flow Volumes

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Oxygen Uptake, Carbon Dioxide Output

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Pressure Volume Curves

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Respiratory Rate, Tidal Volume

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Northwestern University  
St. Paul's Hospital  
SRI International  
Syntex Research  
University of California, Davis  
University of Texas, San Antonio  
U.S. Army Medical Research Institute of Infectious Diseases

Alveolar Macrophage Function  
University of California, Davis

Arterial Blood Gases  
University of Texas, San Antonio

Biochemistry  
Eastern Tennessee State University  
SRI International  
University of Texas, San Antonio

Carbon Monoxide Diffusing Capacity  
Hazelton Laboratories America, Inc.  
National Institute for Occupational Safety and Health  
University of California, Davis  
University of Texas, San Antonio

Capillary Blood Volume  
University of California, Davis

Compliance, Resistance  
Eastern Tennessee State University  
Hazelton Laboratories America, Inc.  
International Research and Development Corporation  
National Institute for Occupational Safety and Health  
Northwestern University  
St. Paul's Hospital  
SRI International  
Syntex Research  
University of California, Davis  
University of Texas, San Antonio  
U.S. Army Medical Research Institute of Infectious Diseases

PRIMATES (Concluded)

Distribution of Ventilation

Eastern Tennessee State University  
Hazelton Laboratories America, Inc.  
International Research and Development Corporation  
National Institute for Occupational Safety and Health  
St. Paul's Hospital  
University of Texas, San Antonio

Functional Residual Capacity

National Institute for Occupational Safety and Health  
University of California, Davis  
U.S. Army Medical Research Institute of Infectious Diseases

Lung Volumes

Hazelton Laboratories America, Inc.  
St. Paul's Hospital  
U.S. Army Medical Research Institute of Infectious Diseases

Maximum Flow Volume Curves

Hazelton Laboratories America, Inc.  
National Institute for Occupational Safety and Health  
Northwestern University  
University of California, Davis  
University of Texas, San Antonio

Morphology/Morphometry

International Research and Development Corporation  
SRI International  
University of California, Davis

Oxygen Uptake, Carbon Dioxide Output

U.S. Army Medical Research Institute

Pressure Volume Curves

St. Paul's Hospital

Pulmonary Clearance

University of California, Davis

Residual Volume

Hazelton Laboratories America, Inc.

Specific Ventilation

U.S. Army Medical Research Institute of Infectious Diseases



## RABBITS

Case Western Reserve University  
IIT Research Institute  
Lovelace Biomedical and Environmental Research Institute  
National Institute for Occupational Safety and Health  
Syntex Research  
Temple University  
University of Arizona  
University of Kentucky  
University of North Dakota  
University of Texas, Galveston  
University of Texas, San Antonio  
U.S. Environmental Protection Agency, Research Triangle Park  
Virginia Mason Research Institute

### Alveolar-Arterial Pressure Difference

Lovelace Biomedical and Environmental Research Institute

### Alveolar Gas Pressures

Lovelace Biomedical and Environmental Research Institute

### Alveolar Macrophage Function

Case Western Reserve University  
IIT Research Institute  
University of Arizona  
U.S. Environmental Protection Agency, Research Triangle Park

### Arterial Blood Gases

Lovelace Biomedical and Environmental Research Institute  
Temple University  
University of Texas, San Antonio  
Virginia Mason Research Center

### Blood Pressures

University of North Dakota

### Biochemistry

Lovelace Biomedical and Environmental Research Institute  
University of Texas, San Antonio

### Carbon Monoxide Diffusing Capacity

Lovelace Biomedical and Environmental Research Institute  
National Institute for Occupational Safety and Health  
University of Kentucky  
U.S. Environmental Protection Agency, Research Triangle Park

### Cilia Beating Frequency

IIT Research Institute  
U.S. Environmental Protection Agency, Research Triangle Park

RABBITS (Continued)

Compliance, Resistance

Lovelace Biomedical and Environmental Research Institute  
National Institute for Occupational Safety and Health  
Syntex Research  
Temple University  
University of Kentucky  
University of North Dakota  
University of Texas, Galveston  
University of Texas, San Antonio  
Virginia Mason Research Center

Distribution of Ventilation

National Institute for Occupational Safety and Health  
U.S. Environmental Protection Agency, Research Triangle Park  
University of Texas, San Antonio

Functional Residual Capacity

Lovelace Biomedical and Environmental Research Institute  
National Institute for Occupational Safety and Health  
University of Kentucky  
U.S. Environmental Protection Agency, Research Triangle Park  
Virginia Mason Research Center

Left-to-Right Shunt

Temple University

Lung Volumes

Lovelace Biomedical and Environmental Research Institute  
Temple University  
University of North Dakota  
University of Texas, Galveston  
U.S. Environmental Protection Agency, Research Triangle Park

Maximum Flow Volume Curves

Lovelace Biomedical and Environmental Research Institute  
National Institute for Occupational Safety and Health  
Temple University  
University of Kentucky

Morphology

Temple University  
University of Texas, San Antonio

Oxygen Uptake, Carbon Dioxide Output

Lovelace Biomedical and Environmental Research Institute  
University of North Dakota

## RABBITS (Concluded)

### Pressure Volume Curves

Lovelace Biomedical and Environmental Research Institute  
University of Kentucky  
U.S. Environmental Protection Agency, Research Triangle Park  
Virginia Mason Research Center

### Pulmonary Clearance

University of Texas, San Antonio  
U.S. Environmental Protection Agency, Research Triangle Park

### Resistance to Induced Infection

U.S. Environmental Protection Agency, Research Triangle Park

### Specific Ventilation

Lovelace Biomedical and Environmental Research Institute

## RATS

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Boston University  
Brookhaven National Laboratory  
General Motors Research Laboratories  
Harvard School of Public Health  
International Research and Development Corporation  
Johns Hopkins University  
Lovelace Biomedical and Environmental Research Institute  
Medical University of South Carolina  
National Institute for Occupational Safety and Health  
Oak Ridge National Laboratory  
St. Luke's Hospital  
SRI International  
University of California, Davis  
University of California, Irvine  
University of California, Los Angeles  
University of California, San Francisco  
University of Cincinnati  
University of Kentucky  
University of Pittsburgh  
University of Rochester  
University of Texas, Galveston  
University of Texas, San Antonio  
University of Washington  
U.S. Environmental Protection Agency, Research Triangle Park  
Veterans Administration Hospital  
Virginia Mason Research Center

RATS (Continued)

Alveolar Gas Pressures

Lovelace Biomedical and Environmental Research Institute

Alveolar Macrophage Function

Harvard School of Public Health

Johns Hopkins University

University of California, Davis

University of Pittsburgh

University of Rochester

Arterial Blood Gases

Battelle Memorial Institute

Boston University

Lovelace Biomedical and Environmental Research Institute

St. Luke's Hospital

University of Texas, San Antonio

Virginia Mason Research Center

Biochemistry

Harvard School of Public Health

Johns Hopkins University

Lovelace Biomedical and Environmental Research Institute

SRI International

University of California, Los Angeles

University of California, San Francisco

University of Texas, San Antonio

Capillary Blood Volume

University of California, Davis

Carbon Monoxide Diffusing Capacity

Battelle Memorial Institute

Boston University

Brookhaven National Laboratory

Lovelace Biomedical and Environmental Research Institute

National Institute for Occupational Safety and Health

St. Luke's Hospital

University of California, Davis

University of Cincinnati

University of Kentucky

University of Washington

U.S. Environmental Protection Agency, Research Triangle Park

Compliance and Resistance

Allied Chemical Corporation

Battelle Memorial Institute

Brookhaven National Laboratory

General Motors Research Laboratories

RATS (Continued)

Compliance and Resistance (Concluded)

Harvard School of Public Health  
International Research and Development Corporation  
Lovelace Biomedical and Environmental Research Institute  
National Institute for Occupational Safety and Health  
Oak Ridge National Laboratory  
St. Luke's Hospital  
SRI International  
University of California, Davis  
University of Cincinnati  
University of Kentucky  
University of Texas, Galveston  
University of Texas, San Antonio  
University of Washington  
Virginia Mason Research Center

Distribution of Ventilation

Battelle Memorial Institute  
Brookhaven National Laboratory  
International Research and Development Corporation  
National Institute for Occupational Safety and Health  
Oak Ridge National Laboratory  
University of Washington  
U.S. Environmental Protection Agency, Research Triangle Park

Functional Residual Capacity

Allied Chemical Corporation  
Battelle Memorial Institute  
Boston University  
Brookhaven National Laboratory  
General Motors Research Laboratory  
Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute  
National Institute for Occupational Safety and Health  
Oak Ridge National Laboratory  
University of California, Davis  
University of Kentucky  
University of Washington  
U.S. Environmental Protection Agency, Research Triangle Park  
Virginia Mason Research Center

Lung Perfusion

University of California, Los Angeles

RATS (Continued)

Lung Volumes, Capacities

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Brookhaven National Laboratory  
Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute  
St. Luke's Hospital  
University of Texas, Galveston  
U.S. Environmental Protection Agency, Research Triangle Park

Maximum Flow Volume Curves

Boston University  
General Motors Research Laboratories  
Harvard School of Public Health  
Lovelace Biomedical and Environmental Research Institute  
National Institute for Occupational Safety and Health  
Oak Ridge National Laboratory  
University of California, Davis  
University of Cincinnati  
University of Kentucky  
University of Washington

Mean Alveolar Intercept

Boston University  
St. Luke's Hospital

Morphology/Morphometry

Allied Chemical Corporation  
Battelle Memorial Institute  
Boston University  
Harvard School of Public Health  
International Research and Development Corporation  
Medical University of South Carolina  
SRI International  
University of California, Davis  
University of California, Irvine  
University of California, Los Angeles  
University of California, San Francisco  
University of Texas, San Antonio  
University of Washington  
Veterans Administration Hospital

Mucociliary Transport

University of California, Irvine  
University of Pittsburgh

Oxygen Uptake, Carbon Dioxide Output

Lovelace Biomedical and Environmental Research Institute

RATS (Concluded)

Pressure-Volume Curves

Battelle Memorial Institute  
Boston University  
Brookhaven National Laboratory  
Lovelace Biomedical and Environmental Research Institute  
Oak Ridge National Laboratory  
St. Luke's Hospital  
University of California, San Francisco  
University of Cincinnati  
University of Kentucky  
U.S. Environmental Protection Agency, Research Triangle Park  
Veterans Administration Hospital  
Virginia Mason Research Center

Pulmonary Clearance

Johns Hopkins University  
University of California, Davis  
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Specific Ventilation

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Venous Blood Gases

St. Luke's Hospital

Vital Capacity

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SHEEP

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Vanderbilt University

Arterial/Venous Blood Gases

Mount Sinai Medical Center  
Temple University  
Vanderbilt University

Blood Pressure

Vanderbilt University

Capillary Blood Volume

Vanderbilt University

SHEEP (Concluded)

Carbon Monoxide Diffusing Capacity  
Mount Sinai Medical Center

Compliance, Resistance  
Mount Sinai Medical Center  
Temple University

Distribution of Ventilation  
Mount Sinai Medical Center

Functional Residual Capacity  
Mount Sinai Medical Center

Left-to-Right Shunt  
Temple University  
Vanderbilt University

Lung Volumes/Capacities  
Temple University

Maximum Flow Volume Curves  
Temple University

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Temple University  
Vanderbilt University

Mucociliary Transport  
Mount Sinai Medical Center

Pulmonary Vascular Resistance  
Vanderbilt University



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APPENDIX C

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| Dalbey, Dr. Walden E.   | Oak Ridge National Laboratory         |

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| Pimmel, Dr. Russell L.   | University of North Carolina                                 |
| Pratt, Dr. Alfred J.     | Virginia Mason Research Center                               |
| Pruzansky, Dr. Jacob J.  | Northwestern University                                      |

| <u>NAME</u>                 | <u>ORGANIZATION</u>   |
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| Sackner, Marvin A.          | Mount Sinai Medical Center                                      |
| Sahebji, Dr. Hamid          | Veterans Administration Hospital                                |
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| Schiff, Leonard J.          | IIT Research Institute  |
| Shaffer, Dr. Thomas H., III | Temple University   |
| Sinnett, Dr. Everett        | Harvard School of Public Health                                 |
| Skornik, William A.         | Harvard School of Public Health                                 |
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| Standaert, Dr. Thomas A.    | University of Washington  |
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NAME

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| Wegner, Craig D.      | University of California, Davis |
| Weissberg, Robert M.  | Syntex Research                 |
| Winn, Dr. Robert K.   | Virginia Mason Research Center  |
| Zeiss, Dr. C. Raymond | Northwestern University         |



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APPENDIX D

INDIVIDUALS UNAVAILABLE FOR COMMENT BUT LIKELY TO BE ACTIVE  
IN PULMONARY TESTING IN SMALL ANIMALS

RESEARCHER/ORGANIZATION

PROBABLE AREA OF INTEREST

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University of California  
San Francisco, California

Respiratory mechanics

L. Cobb  
Huntington Research Center  
Cambridge, England

Respiratory mechanics

J. Crapo  
Duke University  
Durham, North Carolina

Morphology, morphometry

F. Duchosal  
Battelle Research Center  
7 Route de Drize  
1227 Carouge  
Geneva, Switzerland

Respiratory mechanics

D.M. Hiatt  
University of Manchester  
Manchester, England

Respiratory mechanics,  
general morphology,  
morphometry

M. King  
McGill University  
Montreal, Quebec

Respiratory mechanics

F.J. Miller  
U.S. Environmental Protection Agency  
Research Triangle Park, North Carolina

Respiratory mechanics

W. Mitzner  
John Hopkins University  
Baltimore, Maryland

Morphology,  
respiratory mechanics

R. Nadeau  
University of Montreal  
Montreal, Quebec

Respiratory mechanics

J.A. Nadel  
University of California  
San Francisco, California

Respiratory mechanics

C.G. Plopper  
University of California  
Davis, California

Respiratory mechanics

RESEARCHER/ORGANIZATION

PROBABLE AREA OF INTEREST

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University of Gothenburg  
Gothenburg, Sweden

Defense mechanisms

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National Institute of Health  
Bethesda, Maryland

Morphology

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Bern, Switzerland

Morphometry

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Respiratory mechanics

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