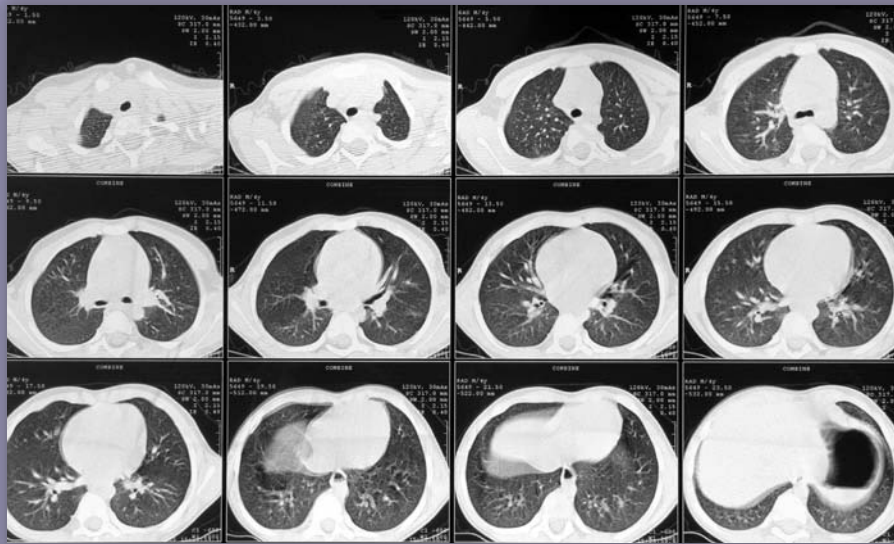


# Quantitative Chest Tomography in COPD Research



**April 3-4, 2008**  
**Hyatt Regency Bethesda**  
**Bethesda, Maryland**



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## “Quantitative Chest Tomography in COPD Research”



April 3, 2008

Dear Colleague:

Thank you for your participation in the Gordon L. Snider Critical Issues Workshop #10 entitled, **“Quantitative Chest Tomography in COPD Research.”** We expect that the collective wisdom of the participants will advance the field of chest tomography in COPD, and hope that the information gathered at the workshop will serve as the basis for the standardization of quantitative CT scanning in COPD.

We therefore appreciate and encourage your participation in the discussion following each talk. It is just this type of interaction and cross-fertilization of ideas that can make a multidisciplinary conference such as this one a success.

We will keep you and the other conference participants updated on the publication of the symposium, a document without which the workshop would be of little value to the research community at large. The symposium will be published in the *Proceedings of the American Thoracic Society*.

Thank you again for your participation in this conference. We look forward to your involvement in future Alpha-1 Foundation & COPD Foundation conferences and workshops.

Sincerely,

A handwritten signature in black ink, appearing to read 'H. Coxson'.

Harvey O. Coxson, Ph.D.  
Conference Chair

A handwritten signature in black ink, appearing to read 'Adam Wanner'.

Adam Wanner, M.D.  
Scientific Director

cc: John D. Newell, Jr., M.D.  
Stephen I. Rennard, M.D.  
Jan Stolk, M.D., Ph.D.



## Sponsors

The Alpha-1 Foundation & the COPD Foundation are grateful to the following organizations for providing sponsorship to support the 10<sup>th</sup> installment of the Gordon L. Snider Critical Issues Workshop Series:

### ***Quantitative Chest Tomography in COPD Research***

AlphaNet

Arriva Pharmaceuticals

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Roche Pharmaceuticals

Spiration

Talecris Biotherapeutics

# Program Agenda

## Quantitative Chest Tomography in COPD Research

The Hyatt Regency Bethesda, Bethesda, MD

**Thursday, April 3, 2008**

**Overall Chair:** Harvey O. Coxson, Ph.D.

8:00 – 9:00 am Breakfast & Registration *Haverford Room*

9:00 – 9:15 am Welcome & Opening Remarks John W. Walsh  
Introduction of the Chairs Adam Wanner, M.D.

**Session I: Clinical Aspects – Chaired by Stephen I. Rennard, M.D.** *Haverford Room*

9:15 – 9:30 am Natural History Stephen I. Rennard, M.D.  
9:30 – 9:45 am Discussion Jorgen Vestbo, M.D.

9:45 – 10:00 am General Assessment of COPD Patients Barry J. Make, M.D.  
10:00 – 10:15 am Discussion Fernando J. Martinez, M.D., M.S.

10:15 – 10:30 am Break

10:30 – 10:45 am Vascular Disease Martine Rémy-Jardin, M.D., Ph.D.  
10:45 – 11:00 am Discussion Peter D. Wagner, M.D.

11:00 – 11:15 am Nodules Annette McWilliams, M.D.  
11:15 – 11:30 am Discussion John R. Mayo, M.D.

11:30 – 12:00 pm Group Discussion

12:00 – 1:00 pm Lunch *Baccarat Room*

**Session II: CT Assessment of Airways – Chaired by Harvey O. Coxson, Ph.D.**

*Haverford Room*

1:00 – 1:15 pm Overview of CT Measurement of Airways Harvey O. Coxson, Ph.D.  
1:15 – 1:30 pm Discussion John J. Reilly, M.D.

1:30 – 1:45 pm Accuracy of CT Airway Measurements J. Ken Leader, Ph.D.  
1:45 – 2:00 pm Discussion Eric A. Hoffman, Ph.D.

2:00 – 2:15 pm 3D Airway Algorithms Raúl San José Estépar, Ph.D.  
2:15 – 2:30 pm Discussion Matthew S. Brown, Ph.D.

2:30 – 2:45 pm	Break	
2:45 – 3:00 pm	Application of 3D Airway Algorithms in a Clinical Study	Masaharu Nishimura, M.D.
3:00 – 3:15 pm	Discussion	Sanjay Sharma, M.D., M.Sc.
3:15 – 4:00 pm	Group Discussion	
4:00 – 6:00 pm	Manuscript Submission	
6:30 – 8:00 pm	Dinner	<i>Concours Terrace</i>

### **Friday, April 4, 2008**

8:00 – 9:00 am      Breakfast      *Haverford Room*

**Session III: CT Assessment of Lung Parenchyma – Chaired by John D. Newell, Jr., M.D.**  
*Haverford Room*

9:00 – 9:15 am	Overview of Quantitative Scanning	John D. Newell, Jr., M.D.
9:15 – 9:30 am	Discussion	Edwin K. Silverman, M.D., Ph.D.
9:30 – 9:45 am	CT Assessment of the Lung Parenchyma in COPD: Density, Texture and Function	Eric A. Hoffman, Ph.D.
9:45 – 10:00 am	Discussion	Alexander A. Bankier, M.D.
10:00 – 10:15 am	Technological Advances	Berend C. Stoel, Ph.D.
10:15 – 10:30 am	Discussion	Jiang Hsieh, Ph.D.
10:30 – 10:45 am	Break	
10:45 – 11:00 am	Reliability and Repeatability	Jonathan G. Goldin, M.D., Ph.D.
11:00 – 11:15 am	Discussion	Michael Flynn, Ph.D.
11:15 – 12:00 pm	Group Discussion	
12:00 – 1:00 pm	Lunch	<i>Baccarat Room</i>

**Session IV: Longitudinal Chest CT Assessment – Chaired by Jan Stolk, M.D., Ph.D.**  
*Haverford Room*

1:00 – 1:15 pm	Application of CT in an Interventional Study of Subjects with Alpha-1 Antitrypsin Deficiency	Asger Dirksen, M.D.
1:15 – 1:30 pm	Discussion	Masaharu Nishimura, M.D.
1:30 – 1:45 pm	The Validation of CT Scanners for Multi-Center and Longitudinal Studies of COPD	Berend C. Stoel, Ph.D.
1:45 – 2:00 pm	Discussion	Jonathan G. Goldin, M.D., Ph.D.

2:00 – 2:15 pm	Radiation Dose Issues in Longitudinal Studies Involving CT	John R. Mayo, M.D.
2:15 – 2:30 pm	Discussion	Koos Geleijns, Ph.D.
2:30 – 2:45 pm	The use of CT in the Phenotyping of Subjects with COPD	Harvey O. Coxson, Ph.D.
2:45 – 3:00 pm	Discussion	Edwin K. Silverman, M.D., Ph.D.
3:00 – 3:30 pm	Group Discussion	
3:30 – 3:45 pm	Break	
3:45 – 5:00 pm	Consensus Discussion	All Participants
5:00 pm	Closing Remarks & Meeting Adjourns	Harvey O. Coxson, Ph.D.

\*Additional discussants include: Michiaki Mishima, M.D., Ph.D.  
David G. Parr, M.A., M.D., M.R.C.P.

# Overview

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## Overall Chair

Harvey O. Coxson, Ph.D.  
University of British Columbia  
Vancouver, BC

## Co-Chairs

John D. Newell, Jr., M.D.  
National Jewish Medical & Research Center  
Denver, CO

Stephen I. Rennard, M.D.  
University of Nebraska Medical Center  
Omaha, NE

Jan Stolk, M.D., Ph.D.  
Leiden University Medical Center  
Leiden, Netherlands

## OBJECTIVES

### The specific objectives of the conference are:

- 1) To review the state of the art data and literature in the field of quantitative CT and COPD.
- 2) To produce a set of recommendations that will be useful in future research and assessment of COPD both in longitudinal and interventional studies.

### Anticipated Outcomes

COPD is an important disease worldwide. Unfortunately, it has been hard to study the pathogenesis of this disease non-invasively because of the insensitivity of spirometry to detect small changes in pulmonary function. Quantitative computed tomography has the potential to be a very important tool to study the pathogenesis of COPD, but more importantly, in studies of surgical, bronchoscopic and pharmacologic interventions. There have been other symposia in the past that have dealt with CT and COPD. However, the last few years have seen an explosion of both interest in the field in general, and the advancement of the technologies surrounding CT. Therefore, a symposium that deals with the use of CT in COPD is both necessary and timely. The people involved in this symposium represent the most active in the development and application of these techniques in COPD and

this meeting will generate important recommendations for the use of quantitative CT in COPD which will be read by the field in general and those who work in this area specifically, academics and industry alike. It is hoped that the information gathered at the meeting will ultimately serve as the basis for the standardization of quantitative CT scanning in COPD.

## **BACKGROUND AND SCIENTIFIC BASIS OF THE CONFERENCE**

Chronic Obstructive Pulmonary Disease (COPD) is currently the 12th leading cause of disability in the world and is predicted to be 5th by the year 2020. It is currently the 4<sup>th</sup> leading cause of death in the United States, and it has been estimated that the annual cost of morbidity and early mortality due to COPD is approximately 4.7 billion dollars. COPD is a complex genetic disorder in which environmental factors interact with genetic susceptibility to cause disease. Tobacco smoke is the most important environmental risk factor and in susceptible individuals it causes an exaggerated inflammatory response that ultimately destroys the lung parenchyma (emphysema) and/or increases airway resistance by remodeling of the airway wall. It has long been known that the pathway varies between individuals; some patients have predominant emphysema while others can have similar degrees of airflow obstruction due to severe small airway disease with relatively preserved parenchyma, but the proportion and contribution of each to the pathogenesis of disease is still unknown. The current Global initiative in Obstructive Lung Disease (GOLD) categorization of COPD classifies patients according to "global" spirometric measurements of lung function. However, it is well known that these global measurements are dependant on many factors of lung structure and are not sensitive enough to separate subjects whose airflow limitation is due to varying degrees of airway and parenchymal changes.

The need to separate these two sub-groups of COPD patients has been emphasized by studies of the genetics of COPD and because of the possibility of specific therapeutic interventions. It is likely that different gene polymorphisms impart susceptibility to one or other of these processes. In any studies of the genetics of COPD it will be important to include this phenotypic distinction in the analysis. In future clinical trials it will be important to stratify by predominant pathophysiologic process since therapy aimed at forming new alveolar walls, or preventing their destruction, will have little effect in patients whose predominant disease is in small airways. Similarly therapy aimed at inhibiting matrix remodeling in patients with predominant airway disease could be ineffective or even contra-indicated in those who have predominant parenchymal destruction.

Quantitative Computed Tomography (QCT) is a technique that has shown great potential towards the understanding of the structural changes in COPD. Unfortunately, while these techniques are common in the literature many of the methodologies, particularly with respect to the assessment of airways, have not been adequately investigated, are only partially validated, and have large associated errors. Correlations between airway and parenchyma measurements and severity of disease have been demonstrated; however, the predictive values of these measures at the individual patient level are quite low.

The purpose of this workshop is to bring together international leaders in the field to review the state of the art in quantitative CT relative to COPD with the

specific goal of arriving at a set of recommendations that will be useful in future research and assessment. This workshop is being kept to a limited number of participants to facilitate vigorous debate around the issues so that important parameters can be sorted out. Each of the speakers will be responsible for preparing a manuscript which will then be compiled into a publication in the pulmonary literature.

## **CONFERENCE FORMAT**

The format of the meeting will consist of four formal sessions lasting three hours on each of two days. In each session there will be four speakers who will give an oral presentation 15 minutes in length on a pre-determined topic. The presenters have been chosen because of their expertise in either the development or application of CT techniques in COPD research. The presentations are expected to cover the state-of-the-art in the use of the present CT technology and to elucidate shortcomings and areas of future research. Each presentation will be followed by a 15 minute discussion by an invited discussant. The discussants are chosen for either their knowledge in the application of the techniques either in clinical research or because of their specific expertise in the development or validation of these techniques. The comments by the discussant are also supposed to initiate discussion with both the presenter and the other attendees of the meeting. Following the formal part of the session there will be a 30 minute discussion that is open to the entire group on any of the topics covered in the session. As free discussion is the crux of the meeting, the speakers will be kept to their 15 minute schedule so that there will be ample time for discussion from all attendees. On the final day of the meeting there will be time set aside for a group consensus discussion on the overall theme of the meeting so that a set of recommendations can be arrived at that will be useful in future basic research and, specifically, the studies that assess the pathogenic mechanisms of COPD and the effect of interventions on these mechanisms.

The invited speakers will be required to submit to the chairperson at the time of the meeting a review manuscript that covers the topic of their presentation. These manuscripts and an overall meeting summary along with the recommendations will be compiled by the session chairs and the meeting chair and will be submitted for publication in the *Proceedings of the American Thoracic Society* as a special issue.

# Biographies

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## **Alexander A. Bankier, M.D.**

Dr. Bankier was born in Vienna, Austria. He attended Medical School and completed his Radiology Residency in Vienna. Dr. Bankier held internships in Internal Medicine and Surgery. He completed post-doctoral fellowships in Lille, France, and Boston, MA. Dr. Bankier was promoted to Associate Professor of Radiology in 1998, thereafter member of staff at the Department of Radiology, University of Vienna. He wrote numerous original publications and book chapters covering all aspects of thoracic imaging, but with a special focus on functional lung imaging. He holds multiple functions in national and international scientific societies. Dr. Bankier serves as a reviewer and an editorial board member of radiological and pulmonological journals, among others Associate Editor of RADIOLOGY. He moved to Boston, MA, in 2007. He currently serves as Director of Respiratory Functional Imaging at Beth Israel Deaconess Medical Center, Harvard Medical School and is the Deputy Editor of RADIOLOGY.

## **Matthew S. Brown, Ph.D.**

After receiving his doctorate in Computer Science from the University of New South Wales in his native Australia, Dr. Brown joined the UCLA Department of Radiological Sciences Faculty where he is currently an Associate Professor in the Section of Thoracic Imaging. Dr. Brown's research focuses include computer-aided diagnosis and computer vision.

## **Harvey O. Coxson, Ph.D.**

Harvey Coxson is an Assistant Professor of Radiology at the University of British Columbia and Vancouver General Hospital as well as a Principal Investigator at the James Hogg iCAPTURE Centre in Cardiovascular and Pulmonary Research at St Paul's Hospital. Dr. Coxson trained with Dr. James Hogg at UBC in quantitative pathology and now specializes in quantitative computed tomography of the lung with correlations to quantitative pathology and pulmonary function in smoking related diseases, such as chronic obstructive pulmonary disease.

Dr. Coxson works in collaboration with Drs. Peter Paré, James Hogg, Don Sin, Nestor Müller and John Mayo at UBC as well as Drs. Frank Sciruba and Ken Leader at the University of Pittsburgh to validate methods to phenotype subjects with COPD. Dr. Coxson is also actively studying a group of smoking subjects that are receiving regular CT scans as part of a BC Cancer Agency program headed by Dr. Stephen Lam, Dr. Annette McWilliams and Dr. John Mayo to follow their lung health. Collaborations are also in place with Dr. Robert Levy in the BC Transplant Society to study the development of lung dysfunction following transplantation, and with Dr. Laird Birmingham at the British Columbia Eating Disorders Clinic to study the effects of malnutrition on lung structure and function.

Dr. Coxson's lab is also the core image analysis facility in large multi-center study of novel endpoints in COPD funded by GlaxoSmithKline (ECLIPSE).

**Asger Dirksen, M.D.**

Dr. Dirksen currently serves as Professor of Respiratory Medicine at the University of Copenhagen, Chief-physician, Department of Respiratory Medicine, Gentofte University Hospital, Denmark, and consultant of the National Board of Industrial Injuries in Denmark. He is a member of the European Respiratory Society (ERS) Ethics Committee, former member of the editorial board of the Danish Medical Journal, member of the Danish Council of Ethics, president of the Danish Respiratory Society, member of ATS Scientific Advisory Council, and national delegate of the ERS. Dr. Dirksen is the author and co-author of more than 300 papers of which more than 100 are original on respiratory medicine, allergy, immunology, cardiology and epidemiology in international journals. His doctoral thesis: "Clinical vs. Para-Clinical Data in Allergy" was published in the Danish Medical Bulletin 1982, 29 suppl 2: 5-72. His main research interests in recent years are in imaging, COPD, Alpha-1 Antitrypsin Deficiency, randomized clinical trials and computed tomography (CT) screening for lung cancer.

**Michael Flynn, Ph.D.**

Michael Flynn is a radiological scientist with 25 years of experience in medical imaging. He is employed as a Bioscientific professor in the research institute of Henry Ford Health Systems and teaches in the Nuclear Engineering and Radiological Science program at the University of Michigan. His research is directed at X-ray imaging methods for radiography and tomography. Currently active research projects include quantitative lung densitometry, musculo-skeletal tomosynthesis, phase contrast imaging, display calibration, and radiological informatics.

**Koos Geleijns, Ph.D.**

Dr. Geleijns is a medical physicist at the radiology department of the Leiden University Medical Center. He is also the coordinator of the European Commission funded project "CT Safety and Efficacy" and a member of the ICRU (International Commission on Radiation Units and Measurements) committee on "CT dose and image quality". His research focuses on CT dosimetry, image quality in CT and medical decision making.

**Jonathan G. Goldin, M.D., Ph.D.**

Jonathan Goldin is a Professor of Radiology at the David Geffen School of Medicine at UCLA. He is Chief of Radiology at the Santa Monica-UCLA Medical Center, Division Chief of the Multi-Specialty Division and Vice Clinical Chair in the Department of Radiological Sciences in the David Geffen School of Medicine. He is also a Director of both the Thoracic Imaging Research Laboratory and the Thoracic Imaging Fellowship Program.

Dr. Goldin is a member of the American Thoracic Society, Radiological Society of North America, Society of Thoracic Radiology, Association of University Radiologists, American Roentgen Ray Society, and the Society of Computed Tomography and Magnetic Resonance. He is also an editorial reviewer for Academic Radiology, The Journal of the American College of Cardiology, The American Journal of Cardiology, Radiology, and The American Journal of Respiratory and Critical Care Medicine.

Dr. Goldin's clinical and research interests include use of imaging in the early detection of disease, including lung cancer and coronary calcification screening as well as the development of computer-aided systems for the detection, characterization and quantization of diffuse lung disease and cardiovascular diseases.

### **Eric A. Hoffman, Ph.D.**

Dr. Hoffman is a professor of radiology, medicine and biomedical engineering at the University of Iowa. He is the director of the Physiological Imaging Laboratory in the Department of Radiology and the director of the Iowa Comprehensive Lung Imaging Center (I-Clic) at the University of Iowa. He received his Ph.D. in Physiology from the University of Minnesota / Mayo Graduate School of Medicine in 1981 and remained on staff at the Mayo Clinic where he was a member of the team which developed the Dynamic Spatial Reconstructor (DSR), a one of a kind CT scanner which was able to gather up to 240 contiguous CT sections of the body every 1/60 second at the time that clinical CT scanners were first introduced to image single slices of the non-moving brain.

Most recently, in addition to continuing basic physiologic research of the lung, he has begun to apply multidetector row spiral CT imaging methodology to objectively follow human lung pathology and pathophysiology with a particular emphasis on inflammatory lung diseases. Dr. Hoffman is currently the principal investigator on an NIH sponsored Biomedical Engineering Partnership Grant which is in its 7<sup>th</sup> year in which researchers at 7 institutions have joined to build a computer-based atlas/model of the normal human lung based upon all the parameters that can be assessed by high speed multi-slice spiral CT as well as newer methods of MRI scanning of the lung via use of 3-He hyperpolarized gas. Dr. Hoffman is PI on several additional NIH funded grants aimed at studying normal and pathophysiology of the lung via CT imaging and his laboratory serves as the image archive and analysis center for numerous NIH sponsored multi-center studies. The software developed by Dr. Hoffman and colleagues is being commercialized by a start-up company, VIDA Diagnostics, housed in the Oakdale Incubator facility and new activities are moving toward the development of a multicenter trials organization focused upon managing multicenter trials where imaging of the lung is being used as a safety measure of primary outcome measure.

### **Jiang Hsieh, Ph.D.**

Dr. Hsieh is a Chief Scientist in the Applied Science Laboratory of GE Healthcare Technologies and an adjunct professor in the Medical Physics Department of the University of Wisconsin, Madison. He has more than 20 years of experience in

medical imaging. He holds over 150 US patents, has co-authored well over 100 articles, book chapters, and textbook. He taught AAPM summer school, refresher courses at RSNA, short courses at IEEE Medical Imaging Conference, AAPM annual meeting, and SPIE Medical Imaging Conference. His research interests include tomographic reconstruction, CT image artifact reduction and correction, signal processing, image processing, and advanced CT applications.

**J. Ken Leader, Ph.D.**

Dr. Leader is currently a Research Assistant Professor of Radiology at the University of Pittsburgh in the Imaging Research Division. He earned a Ph.D. degree in Engineering from the Department of Bioengineering at the University of Pittsburgh in 2000. He joined the Department of Radiology as Research Associate in 2000 and was appointed to Research Assistant Professor in 2003.

Dr. Leader's research focuses on investigating the association between pulmonary disease (e.g., COPD, asthma, interstitial lung disease, and lung cancer) and structural changes depicted on CT examination. Much of his effort is concentrated on development and validation of computer algorithms to improve quantitative assessment of the structural changes in the lung that are related to COPD. The aims are to classify subjects based on structural changes that are responsible for functional abnormalities and predict the likelihood of rapid disease progression (i.e., risk). His work recognizes the value in developing methodology that provides a high predictive value at the individual patient level. As the understanding of the pathophysiological processes of COPD improves and potential therapeutic interventions are on the horizon, reasonable, non-invasive methodology to detect and quantify COPD subclassification *in vivo* may be critical for continued scientific advancement.

**Barry J. Make, M.D.**

Dr. Make practices Critical Care Medicine, Internal Medicine, and Pulmonary in Aurora and Denver, Colorado. Dr. Barry Make graduated from the Jefferson Medical College at Thomas Jefferson University in Philadelphia with an M.D. and has been in the profession for 38 years.

**Fernando J. Martinez, M.D., M.S.**

Dr. Martinez is a Professor in the Division of Pulmonary and Critical Care Medicine, Department of Internal Medicine at the University of Michigan Health System in Ann Arbor, Michigan. He is the Medical Director of the Lung Volume Reduction Program and Pulmonary Diagnostic Services, and also Co-Medical Director of Lung Transplantation. In addition, Dr. Martinez is Director of the Cough/Dyspnea Clinic in the Division of Pulmonary and Critical Care Medicine. He is a member of several medical organizations, including the American Thoracic Society, the European Respiratory Society, and the American College of Chest Physicians. Dr. Martinez has been a member of the American Thoracic Society committees generating guidelines for the management of COPD, respiratory infections, and cardiopulmonary exercise testing. He is currently the Chair of the Clinical Problems

Assembly of the American Thoracic Society. Dr. Martinez is a reviewer for *Chest*, *New England Journal of Medicine*, *Respiratory Medicine*, *European Respiratory Journal* and the *American Journal of Respiratory and Critical Care Medicine* and the *Journal of COPD*, both of which he is a member of the editorial board. Dr. Martinez is an Associate Editor for the *American Journal of Respiratory and Critical Care Medicine*. He is the author or coauthor of numerous articles for journals such as the *American Journal of Respiratory and Critical Care Medicine*, *New England Journal of Medicine*, *Chest*, *Journal of Thoracic and Cardiovascular Surgery*, and *European Journal of Nuclear Medicine*. Dr. Martinez has also written several chapters for textbooks, including *A Practical Approach to Pulmonary Medicine*, published by Lippincott-Raven, and *Emergency Care of the Woman*, published by McGraw-Hill. He received his medical degree from the University of Florida School of Medicine in Gainesville, Florida, where he was valedictorian of his class. Dr. Martinez completed his residency in internal medicine at Beth Israel Hospital in Boston, Massachusetts, and his fellowship in pulmonary medicine at Boston University Pulmonary Center. Dr. Martinez has also completed a Master's Degree program in Biostatistics and Clinical Study Design at the University of Michigan School of Public Health.

### **John R. Mayo, M.D.**

Dr. Mayo is the Director of Advanced Cardiac Imaging at the Vancouver General Hospital and Professor of Radiology and Cardiology at the University of British Columbia. He heads a collaborative cardiac CT imaging program involving radiologists and cardiologists in this academic teaching centre. His research interests include; CT and MR imaging with specific focus in cardiac imaging, CT radiation dose, pulmonary vascular imaging and the early detection of lung cancer.

### **Annette McWilliams, M.D.**

Dr. McWilliams is a Respiratory Physician at the British Columbia Cancer Agency and Vancouver General Hospital and a Clinical Assistant Professor at the University of British Columbia. Her clinical and research interests are in lung cancer. Over the last 8 years, she has been involved in research to develop a comprehensive approach for the management of lung cancer by early detection, localization, prevention and treatment.

### **Michiaki Mishima, M.D., Ph.D.**

Dr. Mishima is Professor and Chairman of the Department of Respiratory Medicine at the Graduate School of Medicine at Kyoto University. He graduated Cum laude at Faculty of Medicine, Kyoto University. He served as Associate Professor at both the Department of Physical Therapeutics and the Department of Pulmonary Physiology at Kyoto University. Dr. Mishima was a visiting Researcher at the Meakins Christie Laboratories at McGill University in Montreal, Canada. Dr. Mishima is a member of the American Thoracic Society, European Respiratory Society, Japanese Society of Internal Medicine, Japanese Society of Medical Engineering and the Japanese Society of Lung Cancer. He is also an Executive member of the Asia Pacific Society of Respirology, the International COPD Coalition, the Japan Respiratory Society and

the Japanese Society of Respiratory Rehabilitation. Dr. Mishima is privileged to serve on the Editorial Board of the American Journal of Respiratory and Critical Care Medicine and Antioxidants and Redox Signaling journal. He was also the past Associate Editor of the Respirology journal. Dr. Mishima has also been honored with the First Prize of the 42<sup>nd</sup> Beltz Prize award in 2005.

#### **John D. Newell, Jr., M.D.**

Dr. Newell received his BA degree in Chemical Physics from Occidental College in 1973 and his M.D. from the University of California at San Diego in 1976. He completed his radiology internship in 1977, radiology residency in 1979 and fellowship in cardiopulmonary radiology in 1980 all from the University of California at San Diego. Dr. Newell was an Assistant Professor of Radiology at the University of Arizona from 1983-86 and was an Associate Professor of Radiology at the University of New Mexico from 1986-1988. He has been a Professor of Radiology at National Jewish Medical and Research Center and the University of Colorado Denver Health Sciences Center since 1993. Dr. Newell is currently the Director of the Division of Radiology at National Jewish Medical and Research Center. He has authored, co-authored and edited over 140 manuscripts, book chapters, reviews, exhibits and other scholarly manuscripts. His major research interests include qualitative and quantitative CT imaging of Airway Disease and Diffuse Lung Disease. He was the Co-Chair of the Alpha-1 Foundation workshop on Quantitative CT of Emphysema in 2001. Dr. Newell is a Fellow of the American College of Radiology, Fellow of the American College of Chest Physicians, Fellow of the American Society of Emergency Radiology, Founding Member of the Society of Thoracic Radiology and a Member of the Fleischner Society.

#### **Masaharu Nishimura, M.D.**

Dr. Nishimura presently serves as Professor and Chairman of the Department of First Medicine at Hokkaido University Hospital. He is also part of the Division of Respiratory Medicine, Department of Internal Medicine at Hokkaido University Graduate School of Medicine. Dr. Nishimura's specialties include the pathogenesis, pathophysiology and treatment of COPD, the pathophysiology and treatment of acute/chronic respiratory failure and sleep apnea syndrome and control of breathing. He serves as Councilor to the Japanese Society of Internal Medicine, the Japan Lung Cancer Society, the Japanese Society of Allergology and the Japan Society for Respiratory Care Medicine. Dr. Nishimura is Executive Councilor of the Japanese Respiratory Society and the Asia-Pacific Society of Respirology. He is currently a National Delegate for the European Respiratory Society and was a former Board of Director and member of the International Relation Committee for the American Throacic Society. Dr. Nishimura also serves as an Editorial Board Member for both the American Journal of Respiratory and Critical Care Medicine and Respirology (the official Journal of the Asia-Pacific Society of Respirology).

**David G. Parr, M.A., M.D., M.R.C.P.**

Dr. Parr is a Consultant Pulmonologist at University Hospitals Coventry and Warwickshire and holds an honorary appointment on the ADAPT program in Birmingham. His research interest is in the use of quantitative imaging for the assessment of chronic lung disease.

**John J. Reilly, M.D.**

John Reilly is the Vice Chairman for Integrated Clinical Services, Department of Medicine at Brigham and Women's Hospital and an Associate Professor of Medicine at Harvard Medical School. In this role, he is responsible for overseeing the organization of the inpatient clinical activities of the Department of Medicine. He maintains an active outpatient practice, with a particular interest in patients with chronic obstructive lung disease and serves as Attending Physician in the Intensive Care Unit.

Dr. Reilly's research interests center on various aspects of chronic obstructive lung disease. He currently is a Principal Investigator in three clinical research networks funded by the National Heart, Lung and Blood Institute: COPDGene, the Long Term Oxygen Therapy Trial (LOTT) and the COPD Clinical Research network. In addition, he has active projects in the physiology of emphysema and lung volume reduction surgery, the genetics of chronic obstructive lung disease and in the development of functional genomic biomarkers of obstructive lung disease.

**Martine Rémy-Jardin, M.D., Ph.D.**

She received her M.D. in 1981 from the Montpellier School of Medicine. From 1981 to 1986 she completed her radiologic and pneumologic residency at the University Centers of Toulouse and Lille before she obtained her Specialty Board Certification in Radiology in 1986. In the same year Dr. Rémy-Jardin moved on to the Hôpital Calmette of the University Center of Lille, as a fellow in radiology until 1989, when she became associate professor of radiology, and finally in 1991 professor of radiology. In 1998 she was promoted to her current position as head of the Department of Radiology and Chairman of the Department of Thoracic Imaging at the Hôpital Calmette of the University Center of Lille. In addition Dr. Rémy-Jardin received her Ph.D. in 1993 from the University of Lille.

She acts currently as journal reviewer for European Radiology, European Respiratory Journal, Revue Française des Maladies Respiratoires, Journal de Radiologie, American Journal of Respiratory and Critical Care Medicine, Thorax, and Radiology. For her significant contributions to Radiology she received the Editor's Recognition Award with Special Distinction for Manuscript Reviewing in 1993. Dr. Rémy-Jardin is a member of the Fleischner Society, the American Thoracic Society, the Society of Thoracic Radiology, the European Society of Thoracic Imaging, the European Respiratory Society, the Radiological Society of North America, the European Society of Radiology, the French Society of Thoracic Imaging, and the French Society of Radiology, for which she served as President of the Scientific Committee from 1995 to 2006.

### **Stephen I. Rennard, M.D.**

Stephen Rennard is Larson Professor of Medicine in the Pulmonary and Critical Care Medicine Section of the Department of Internal Medicine at the University of Nebraska Medical Center in Omaha, Nebraska, and courtesy Professor of the Department of Pathology and Microbiology. He received an AB with honors in Folklore and Mythology from Harvard University and an MD with honors from the Baylor College of Medicine, Houston, Texas. He completed internal medicine training at Barnes Hospital, Washington University, St. Louis, Missouri and trained in Pulmonary Diseases at the National Institutes of Health where he remained for seven years, conducting research in the cell biology of lung disease. He joined the University of Nebraska in 1984 as Chief of Pulmonary and Critical Care, a position he retained until 1997. He is currently the Director of the Nebraska Office of Tobacco Control and Research.

Dr. Rennard is active in several professional societies and has served on the Board of Directors for the American Thoracic Society, on the Council of the American Lung Association and was a Governor for the American College of Chest Physicians. He served on the American Board of Internal Medicine, Pulmonary Section and was a member of the expert panel which prepared the global GOLD guidelines for COPD for the WHO/NHLBI. Current commitments include membership of the American Thoracic Society Committee on Corporate Relations, the National Heart Lung Education Program Executive Committee and the Board of Directors of both the Alpha-1 Foundation and the COPD Foundation. He serves on the editorial board of several journals.

Professor Rennard maintains an active program of clinical investigation in COPD and smoking cessation and a program of basic research in the mechanisms of lung tissue repair and remodeling.

### **Raúl San José Estépar, Ph.D.**

Dr. San José currently serves as Instructor in Radiology at Harvard Medical School and a member of Laboratory of Mathematics in Imaging (LMI) and Surgical Planning Laboratory (SPL) at Brigham & Women's Hospital. His research interests are focused on image analysis methods and software systems and their application to medical applications, in particular Chronic Obstructive Pulmonary Disease. His recent work has been focused on novel analytical methods for airway wall detection and localization and their implementation in the open source platform: Airway Inspector ([www.airwayinspector.org](http://www.airwayinspector.org)).

Before joining Brigham & Women's Hospital in 2002 as a visiting research fellow, he worked as a researcher in the Laboratory of Image Processing in the Department of Signal Processing at the University of Valladolid, Spain. He received his Ph.D. from the same University in 2005.

### **Sanjay Sharma, M.D., M.Sc.**

Dr. Sharma is currently the Lead Clinical Scientist at GlaxoSmithKline. He previously worked in respiratory genetics and now supports the conduct of Phase III and IV studies in COPD. His primary focus and interest is to advance imaging for better defining COPD patient populations as well as evaluating imaging for measuring drug response.

### **Edwin K. Silverman, M.D., Ph.D.**

Dr. Edwin Silverman is a pulmonologist and genetic epidemiologist whose research focuses on the genetics of chronic obstructive pulmonary disease and asthma. He is the Principal Investigator of the Boston Early-Onset COPD Study, which has demonstrated familial aggregation for COPD-related phenotypes, found an increased risk for severe, early-onset COPD in women, and provided the first linkage analysis results in COPD pedigrees. He also leads the Alpha 1-Antitrypsin Genetic Modifier Study, a multicenter study designed to identify genetic factors contributing to the markedly variable development of lung disease in alpha 1-antitrypsin deficient individuals, the NETT Genetics Ancillary Study, and the Transcontinental COPD Genetics Study. He is also one of two Principal Investigators of the COPDGene Study. In addition to his work on COPD genetics, Dr. Silverman collaborates on a variety of asthma genetics projects, including the CAMP Genetics Ancillary Study and the Costa Rica Asthma Genetics Study. He is an Associate Professor of Medicine at Brigham and Women's Hospital and Harvard Medical School, and he is the Co-Director of the COPD Center at Brigham and Women's Hospital.

### **Berend C. Stoel, Ph.D.**

Berend C. Stoel, Ph.D., is assistant professor at the division of image processing, department of Radiology at the Leiden University Medical Center (LUMC), Leiden, the Netherlands. This group of 35 people performs research, implementation and validation of image processing techniques, in order to produce objective and reproducible assessment of medical images. Dr. Stoel is heading the section of 'Orthopaedics & Pulmonology', which aims at applications mainly in these fields, but also at exploring applications in other medical specialties. He graduated in medical informatics from the Leiden University in 1989, and received his Ph.D. in 1996 on objective assessment of X-ray image quality, at the LUMC. His main interests in orthopaedics are in the quantification of micro motion of endoprostheses and automatic quantification of osteo- and rheumatoid arthritis. In pulmonology, his main research projects are on the assessment of density-related lung diseases, such as emphysema and fibrosis, the automatic detection and assessment of pulmonary embolisms and quantification of the bronchial tree using computed tomography.

### **Jan Stolk, M.D.**

Dr. Stolk is at the Department of Pulmonology, Leiden University Medical Center, Leiden, The Netherlands where he works on emphysema related to alpha-1-antitrypsin deficiency. The aim of his work is to develop outcome parameters of disease progression of emphysema and use these to evaluate the effect of new drugs for emphysema in clinical trials.

### **Jørgen Vestbo, M.D.**

Dr. Vestbo serves as Professor of Respiratory Medicine at University of Manchester, UK, and Honorary Consultant Physician at The North West Lung Centre, South Manchester University Hospital Foundation Trust, Manchester, UK. He also holds the title of Professor of Respiratory Medicine at University of Copenhagen, Denmark, and Consultant at Hvidovre University Hospital, Hvidovre, Denmark.

Dr. Vestbo graduated from Medical School at University of Copenhagen in 1984 and was certified specialist in Respiratory Medicine 1997 and Internal Medicine 1999. He received his DrMedSci in 1992 from the University of Copenhagen, Denmark.

He is a member of the Scientific Committee for the Global Initiative for Chronic Obstructive Lung Disease (GOLD) since 2006. He also serves as a member of the Executive Board of the BOLD Initiative (BOLD: Burden of Obstructive Lung Diseases, an epidemiological initiative of GOLD) since 2004.

### **Peter D. Wagner, M.D.**

Dr. Wagner is Distinguished Professor of Medicine & Bioengineering at the University of California, San Diego in La Jolla, CA. After obtaining his M.B., B.S. and B.Sc. (Medicine) degrees from Sydney University in 1968, he did postdoctoral work with Professor John West at UCSD in La Jolla, CA, USA. He then joined the UCSD medical faculty and had remained there to the present time. His research addresses the theoretical and experimental basis of oxygen transport and its limitations in the lungs and skeletal muscles in health and disease. A particular focus is muscle capillary growth regulation using molecular biological approaches in integrated systems, the role of O<sub>2</sub>, microvascular hemodynamics, physical factors, nitric oxide and inflammatory mediators in transcriptional regulation of angiogenic growth factors. Of particular interest is the role of VEGF in both pulmonary and skeletal muscle structure and function. He has served NIH as a study section member and chair, as an Associate Editor of the *Journal of Applied Physiology*, and was President of the American Thoracic Society 2005-2006. He has published 300 peer-reviewed research articles and over 100 invited chapters and other contributions.

# Alpha-1 Foundation Research Program

The Alpha-1 Foundation is a not-for-profit organization dedicated to providing the leadership and resources that will result in increased research, improved health, worldwide detection and a cure for Alpha-1 Antitrypsin Deficiency (Alpha-1).

The Alpha-1 Foundation's research activities have grown substantially each year since the organization's inception in 1995. The Foundation has invested nearly \$31 million to support Alpha-1 research and programs in more than 60 institutions in North America and Europe. The level of research activity in Alpha-1 is at an all-time high and holds much hope for the future for individuals diagnosed with Alpha-1.

This Alpha-1 Foundation's mission is partially achieved through the following programs and activities:

- **Alpha-1 Research and Grants Award Program:** The Grants Award Program is the Alpha-1 Foundation's mechanism to fund a broad range of research that leads to improvements in the lives of people living with Alpha-1. The specific goals of the Program are 1) to promote basic science and clinical research related to the alpha-1 antitrypsin protein and Alpha-1; 2) to attract and train clinical researchers for the study of Alpha-1; 3) to support and encourage established scientists to work on clinical problems and ethical, legal, and social issues within the field of Alpha-1 research (with a preference given to new investigators); and ultimately, 4) to develop effective therapies for the clinical manifestations of Alpha-1.
- The Alpha-1 Research Network represents the best expertise in North America and Europe of Alpha-1 research and clinical care. The Alpha-1 Foundation provides support for and consults with an international network of scientists and physicians, many of whom volunteer their time and expertise to the Alpha-1 Foundation through service on the Board of Directors, Medical and Scientific Advisory Committees & Working Groups.
- The Alpha-1 Research Registry at the Medical University of South Carolina is a confidential database of individuals diagnosed with Alpha-1 and persons identified as Alpha-1 carriers. It serves as a resource for investigators seeking individuals with Alpha-1 to participate in clinical trials, surveys, and other scientific and medical data collection activities. The Registry's Family Linkage Program facilitates genetic research and other studies requiring family member participation while protecting the privacy and autonomy of each family member.
- The Alpha-1 Coded Testing (ACT) Study at the Medical University of South Carolina provides free, confidential testing services and facilitates research on genetic testing. The test is administered through a research study which evaluates perceived risks and benefits of genetic testing. Anyone can request to be tested. The ACT Study provides a way for family members of Alphas and

others at risk to learn their Alpha-1 genotype. The Alpha-1 Detection Laboratory at the University of Florida performs testing services on blood samples submitted to the Medical University of South Carolina for the ACT Study. The Alpha-1 Detection Laboratory determines the genotype and alpha-1 antitrypsin level of each sample. In addition, where appropriate, the sample's phenotype is determined as well.

- The Alpha-1 DNA & Tissue Bank at the University of Florida is the central storage location for DNA and tissue samples derived from people who are lacking alpha-1 antitrypsin and from people who do not have the deficiency, but simply wish to donate their DNA or tissue. The Bank is a resource for DNA and tissue samples that are studied by researchers investigating Alpha-1 and other diseases.
- The Alpha-1 Foundation's Targeted Detection Program promotes worldwide awareness and the identification of alpha-1 antitrypsin deficient individuals in population groups at high risk for Alpha-1, such as adults with chronic obstructive pulmonary disease (COPD), irreversible asthma and children and adults with unexplained liver disease. The program is dedicated to raising awareness about Alpha-1 among medical professionals, the media and the public. An important component of the Alpha-1 Foundation's Targeted Detection Program is the State of Florida Detection Program. This state-sponsored awareness, screening and detection program for Alpha-1 is a collaboration between the State of Florida Department of Health and Human Services, the Alpha-1 Foundation and the University of Florida College of Medicine. Testing through the State of Florida Detection Program is free to Florida residents and is administered through physicians' offices. The test results are mailed directly back to the physician to ensure accurate interpretation.

Scientific Meetings, Conferences, Working Groups and Symposia focus on specialized topics that will advance knowledge of Alpha-1 and address critical issues in the areas of improved treatments, education, detection and ethical issues.

# COPD Foundation Programs

The COPD Foundation was established to speed innovations which will make treatments more effective and affordable, to undertake initiatives that result in expanded services for COPD patients, and to improve the lives of patients with COPD and related disorders through research and education that will lead to prevention, and someday, a cure for this disease.

## **Mobile Spirometry Unit**

The Mobile Spirometry Unit (MSU) travels cross-country with respiratory therapists offering free breathing tests to attendees of health fairs, senior expos, and state and county fairs. At the MSU booth, there are hundreds of copies of educational materials for patients, family members, and caregivers to talk to their doctor about the test results. The MSU's calendar is continually updated online at: [www.copdfoundation.org/MSU.htm](http://www.copdfoundation.org/MSU.htm).

## **C.O.P.D. Information Line**

The C.O.P.D. (Call Our Patients Direct) Information Line is a toll-free hotline for COPD patients, by COPD patients. The Information Line operates Monday through Friday, from 9AM to 9PM Eastern Time. Both recently diagnosed and seasoned COPD patients, as well as their family members, can call this number to speak with a volunteer COPD patient to learn more about COPD and how to live with the disease. The Information Line does not offer medical advice. The C.O.P.D. Information Line phone number is 1-866-316-COPD (2673). In addition to the patient support line, a Caregiver Information Line is currently being created. Caregivers of COPD patients will soon have a support line with informative materials specific to their needs.

## **COPD Digest**

The *COPD Digest* is the first free internationally-distributed magazine on COPD. Published quarterly, the *COPD Digest* offers practical advice, news and information on treatment and resources to COPD patients, healthcare providers, families, and caregivers. The *COPD Digest* features COPD patient success stories and consumer savvy information, along with legislative updates, and COPD Foundation program updates. Subscriptions are available in bulk for doctor's offices and pulmonary rehabilitation programs.

## **Research Registry**

The COPD Foundation began what could become the largest database of COPD patients in history. The Research Registry, hosted by the National Jewish Medical & Research Center, aims to collect the necessary cohort of COPD patients to enroll in clinical trials and studies, in effort to accelerate the development of new medicines and procedures for COPD. The COPD Foundation Survey is available online at: [www.copdfoundation.org/registry](http://www.copdfoundation.org/registry).

## **Educational Materials and Resources**

The COPD Foundation is the resource center for informative literature on COPD. Materials available include the NHLBI's *Learn More, Breathe Better* campaign

materials, COPD Foundation Brochures which cover topics on *Living with COPD*, *What is COPD?*, *What is COPD? (for Kids)*, *Getting Tested for COPD*, *Smoking Cessation*, and *End-of-Life* issues. There are also three brochures on COPD, getting tested, and living with COPD available in Spanish. The COPD Foundation has also printed a pocket-guide for physicians to use in diagnosing and treating their patients. In addition, the Foundation web site serves as the "information hub" for COPD on the Web. Visit: [www.copdfoundation.org](http://www.copdfoundation.org) for more information.

### **Educational Events, Conferences, and Workshops**

The COPD Foundation hosts patient Education Days across the U.S. bringing COPD awareness and education on COPD to patients with COPD. The Foundation also hosts CME programs for physicians to educate them in COPD diagnosis and treatment in order to improve the quality of life for their patients. Several conferences and workshops were also held in various locations to spread COPD awareness in the medical community. Visit [www.copdfoundation.org/calendar.htm](http://www.copdfoundation.org/calendar.htm) for event dates.

### **RHS Bronchiectasis Research Fund**

In the summer of 2005, the Scarborough family founded the Richard H. Scarborough Bronchiectasis Research Fund in memoriam. The goal of this research fund is to find a mechanism to reverse or cure bronchiectasis. A Bronchiectasis Research Consortium and Registry are the direct result of the RHS Fund, as are two matching grants with the ALA and ATS.

# Attendees

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