Final Report
National Heart, Lung, and Blood Institute
Level 1 Strategic Planning Working Group
May 20, 2006

Lung Program – Theme # 6: New Investigator Workshop

Introduction:

This workshop brought together new investigators, including current Career Development Awardees and new independent investigators, to: 1) get input on the five DLD strategic plan theme areas; and 2) discuss issues related to research training, including whether current funding mechanisms are adequate to meet the challenges of the future, and how to improve career, mentoring and skills training. Their recommendations on the DLD Strategic Plan areas are summarized below.

Recommendations:

Theme 1: Development and Early Origins of Disease

- Develop in vivo and in vitro model systems to study gene/environment effects on lung development and maturation (animal models and ex-vivo systems).
- Promote the intersection of new technologies and the biological sciences, and a multidisciplinary approach to diseases.
- Foster collaboration between pediatric and adult pulmonary investigators; this is important because pediatric and adult lung diseases share common themes.
- Develop a large longitudinal birth cohort for all racial/ethnic groups to record and validate phenotypes, genetic markers, and environmental exposures.
- Develop better biomarkers and imaging modalities to assess lung development and immune function.

Theme 2: Integrative Approaches to Pathogenetic Research

- Enable mechanistic studies and integrative approaches to understanding lung disease pathogenesis and the molecular basis for lung function.
- Develop a systems level understanding of how different cell types and molecular components contribute to lung function in health and disease.
- Foster interdisciplinary team approaches that can better apply advances in understanding common mechanisms of disease pathogenesis to lung research.
- Promote integration of information, including common computational platforms, interdisciplinary approaches, and real-time imaging techniques.

Theme 3: Injury/Inflammation; Repair/Remodeling; and Replacement/Regeneration

- Nurture cross-disciplinary interactions with structural biology, computational modeling; bioinformatics, imaging, physics. Approaches could include: organize conferences for investigators with different expertise; develop innovative funding mechanisms for scientists from different disciplines; and promote cross-disciplinary training grants. Evolve new approaches to acknowledge effort and to provide credit for discrete contributions in new cross-disciplinary interactions.
- Develop centralized/national cores for: animal models of lung disease; repository of tissues, morphometry, transcriptome for single cell analysis; cell lineage markers. Develop biomarkers of susceptibility or progression of disease.

- Promote new mechanisms to translate findings into humans, such as new animal models, encourage industry/academic partnerships, use whole artificial organ systems, in silico virtual preclinical strategies.
- Focus in more substantive fashion on gene/environment interactions. Need to develop a common language and metrics to accelerate progress in this field.
- Understand lung development and repair in the neonatal lung and apply findings to regenerative medicine.

Theme 4: Personalized Medicine

- Identify environmental factors and make them measurable.
- Identify genetic factors and what is measurable.
- Promote collaborations between institutions, within institutions, NIH and the private sector to promote a multidisciplinary approach to lung diseases.
- Determine clinical phenotypes with more precision.
- Foster the development of genetic resources (epigenetic, proteomics).
- Establish large epidemiological cohorts.
- Support the role of statistics/network theory to integrate the data. Complex statistical problems will require integrated surveillance of outcomes.

Theme 5: Enabling Therapeutic Trials and Translational Research

- Accelerate discovery by enabling clinical research networks to leverage high throughput technologies and innovative clinical trial designs, including Bayesian and other adaptive designs to: 1) identify and validate risk factors for disease and disease severity, including genetic and environmental modifiers of disease, 2) establish specific disease phenotypes, 3) identify determinants of treatment responsiveness, and 4) improve our understanding of long-term clinical outcomes.
- Enhance participation in clinical and translational research by broadening the pool of patients and physicians who contribute to clinical research, and increasing efforts to involve community providers and their patients as partners in the research process.
- Leverage clinical research networks as efficient opportunities to train and mentor the next generation of physician-scientists to work in interdisciplinary, team-oriented contexts with multidimensional skills including genetics, population sciences, biostatistics and behavioral medicine.

Research Training

The attendees agreed that knowledge of information technology, expertise in computation, and understanding a broad array of scientific disciplines will be essential to the success of future investigators in pulmonary research. They recommended increasing training in areas that will be crucial to biomedical research in the next 10 years, such as bioinformatics, functional genomics, computational science and bioengineering. Other recommendations were:

- Support training of new investigators by encouraging and rewarding team approaches to reshape current academic silo structures; create a new training grant mechanism that specifically requires the use of multidisciplinary approaches; use PPGs and sabbaticals for outside-the- box training; and reward and promote good mentorship.
- Encourage and enable the development of an interdisciplinary workforce by ensuring that pre- and postdoctoral students receive the didactic and research experience necessary to engage in integrative and team approaches to learn how to solve

complex biomedical problems in the lung. Reward at the institutional level individual trainees that participate in this effort.

- Identify multiple outlets for new clinical investigators, like participation in already established clinical networks and program project grants.
- Increase the collaboration with private societies to improve training opportunities and cross fertilization.
- Recognize, value, and support collaboration between basic and clinical researchers. Innovative approaches such as allowing for multiple PIs are encouraged.
- Improve the quality and number of available mentors and promote a global approach to mentoring that includes science and career development. Financial rewards for mentors should be considered.

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