Interdisciplinary research at NIH and NINR

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Opportunities for Interdisciplinary Research

Exploring the ever-deepening mysteries of human health is an enormous and exciting pursuit. Biomedical and health research, encompassing the study of human behavior and human physiology, attracts investigators from across the range of science disciplines, including biology, chemistry, physics, psychology, genetics, medicine, allied health, and, of course, nursing.

The traditional academic model of science has been to group trainees and scientists of similar disciplines, backgrounds, and interests into discrete departments to work together within one well-defined area. The strength of this model is that it can allow like-minded individuals to develop close relationships and a common culture of understanding, facilitating scientific progress in their specialty. However, it can also result in compartmentalization, imposing barriers to the growth of new science areas that cut across traditional disciplines.

The complexity of health research increasingly demands a blending of different ideas and strategies. This has led to increased efforts to establish interdisciplinary models of research. On an interdisciplinary research team, members come together to examine a problem and share with each other the benefits, strengths, assumptions, and limits of each discipline. Then, they work to design a study in a way that bridges their differences, integrates their analytical strengths, and creates a new, and often innovative, scientific approach.

The NIH Roadmap and Interdisciplinary Research

The National Institutes of Health (NIH) has led the call for interdisciplinary research. In 2002, NIH Director Dr. Elias Zerhouni convened a series of meetings to chart a “Roadmap” for the research supported by NIH into the 21st century. This Roadmap is ongoing, and its purpose is “to identify major opportunities and gaps in biomedical research that no single institute at NIH could tackle alone but that the agency as a whole must address, to make the biggest impact on the progress of medical research.”

Implementation Group for Interdisciplinary Research

One theme of the Roadmap is the development of “Research Teams of the Future,” through which NIH looks to combine skills and disciplines in the physical, biological, and life sciences to enhance the promise of science. Under this theme, NIH established the Interdisciplinary Research Working Group, which I co-chair with my colleague, Dr. Lawrence Tabak, Director of the National Institute of Dental and Craniofacial Research (NIDCR). Dr. Tabak likes to share a cartoon in which one scientist laments to another, “I’m on the verge of a major breakthrough, but I’m also at that point where chemistry leaves off and physics begins, so I’ll have to drop the whole thing.”

The work of our committee is to overcome this condition of scientific isolationism. We are charged not only with developing initiatives to promote interdisciplinary projects, but also with changing NIH culture, policies, and procedures to facilitate collaborative and interdisciplinary research efforts. As an initial step, NIH is moving from a system that recognizes a single Principal Investigator (PI) for every grant to one that allows multiple PIs, a critical element to promote team science. The multiple PI format provides appropriate recognition to key scientists for their leadership on a research study. For this to work, the process to review grant applications must evolve to accommodate shared responsibilities among PIs and integrated research methods. We are truly breaking new ground.

NIH Interdisciplinary Research Consortia

Also as part of the Roadmap, last year NIH launched 9 interdisciplinary research consortia at university research centers across the country, covering a range of topics that include obesity, geriatric science, genome engineering, and infertility. Initially developed by a trans-NIH team under the oversight of the National Center for Research Resources (NCRR), and now coordinated by the NIDCR, these consortia consist of multiple research projects with multiple PIs working in concert. At NIH, the management of these consortia involves staff from 15 NIH Institutes and Centers (ICs), representing a new mechanism for collaboration on scientific areas of interest to multiple ICs. Within academic research settings, it is hoped that they will stimulate new approaches to challenging biomedical problems and help institutionalize interdisciplinary col-

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laboration. More information about these consortia is available on the NCRR web site: www.ncrr.nih.gov.

NURSING SCIENCE AND INTERDISCIPLINARY RESEARCH

The focus of nursing always has been on the whole person in both illness and health, as contained within the larger social, cultural, and environmental context. Nursing science by its very nature is interdisciplinary, and the National Institute of Nursing Research (NINR) is well-positioned to assume leadership in the drive to stimulate interdisciplinary research.

In the NINR Strategic Plan, one of our 4 principal Strategies to Advance Nursing Science involves the integration of biology and behavior, emphasizing the role of interdisciplinary research teams. In addition, under the strategic goal of Improving Research Methods, we recognize that refining the methods used in translating research findings into clinical practice requires the close collaboration of researchers and clinicians in interdisciplinary teams.

The NINR works within several trans-NIH initiatives to leverage the impact of nursing science in common areas of interest across the health sciences. These initiatives include the NIH Pain Consortium, which seeks to improve research into the causes and management of both acute and chronic pain, and the NIH Blueprint for Neuroscience Research, which provides a framework to enhance opportunities among the 16 NIH ICs and Offices that support research on the nervous system.

The NINR has also collaborated with other ICs at NIH to develop additional Program Announcements, including:

- PA-06-400, Developmental Projects in Complementary Approaches to Cancer Care (with the National Cancer Institute).
- PAR-06-532, Translational Research for the Prevention and Control of Diabetes and Obesity (with the National Institute of Diabetes and Digestive and Kidney Diseases).
- PAR-07-425, Data Ontologies for Biomedical Research (with NCRR).

The NINR’s involvement in the NIH Roadmap and interdisciplinary research has been extremely beneficial. Collaborations between nurse scientists with experts from other fields have increased the visibility of NINR and the awareness of the scientific contributions of nursing research in areas such as health promotion, symptom management, quality of life, and palliative and end-of-life care. In addition, NINR-funded investigators have gained insights into different research methods, allowing them to expand their own work into new areas.

Interdisciplinary Research Results

In recent years, nurse scientists have worked on clinical and laboratory research teams in an ever-widening range of fields. A review of research articles by NINR-funded investigators found that roughly half were published in journals devoted to interdisciplinary fields such as genetics, geriatrics, health disparities, infectious diseases, neurobiology, and palliative care. Some examples include:

- Nurse investigators worked with surgeons to test a radiofrequency identification (RFID) tag system, similar to theft-deterrent systems in stores, to detect the retention of surgical sponges after an operative procedure.2
- A nurse scientist led a team that developed genetic techniques to study nerve cell death in neurodegenerative conditions.3
- A team involving scientists from nursing and pharmacology was the first to find evidence of dopamine receptor expression in the cells of the diaphragm in rats.4
- A nurse researcher was involved in a study that indicated depression may suppress activation of specific immune responses.5

Looking to the Future

The advancement of interdisciplinary science will depend on increasing the cross-training of investigators in related areas of science and providing relevant research opportunities. Our goal in fostering interdisciplinary teams is to promote science in ways that would otherwise not happen or would happen more slowly; to infuse our field with techniques and strategies that will help us move our science; and to leverage the intellectual and material resources from other disciplines to help catalyze our scientific enterprise. The NINR funds projects devoted to fostering interdisciplinary research and research training, many through our Institutional Training (T32) and Centers (P20 and P30) grant mechanisms. In addition, in 2007 NINR launched our Research Program Project awards, funded through the P01 grant mechanism. These awards support shared resources and collaborative research efforts among innovative, high-impact studies at schools of nursing with established research programs, with an initial focus on collaborative research into chronic illness. We anticipate that these Center and Program Project awards will build strong interdisciplinary research and training environments.

Also, the NINR Intramural Research Program (IRP) supports a variety of internships and fellowships for promising students and early career scientists providing opportunities for interdisciplinary collaborations. The IRP sponsors the Summer Genetics Institute, an intense 2-month program in clinical and research genetics, and the Graduate Partnerships Program, allowing doctoral
students to complete part of their research training with mentors across NIH.

CONCLUSION

The need for interdisciplinary research arises from the increasing complexity of health research. The traditional model of science based on employing the approaches of a single discipline for a single project has its strengths, but in some cases it may impose barriers that impede scientific progress. The NIH Roadmap was created in part to address the areas of science that fell outside of the boundaries of a single institute. As nursing science is inherently interdisciplinary, NINR’s experience in this area is allowing the Institute to lead the development of interdisciplinary teams at NIH. The NINR is already participating in several trans-NIH initiatives and planning collaborative research and training programs for the future. The team model of interdisciplinary research holds great promise for extending our insights into human physiology and behavior, and improving the health and quality of life for all.

REFERENCES