

Building a Research Career in Rehabilitation

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- Developing a Research Focus
- Unique issues in Rehabilitation Research
- Rehabilitation Research Priorities
- Support for Training and Career Development
- Grantsmanship

Self Assessment

- ◆ What is your skill set?
- ◆ Record of productivity?
- ◆ Do you have passion and persistence?
- ◆ What is (will be) your research identity?
- ◆ What do you "like" doing?

Building a Research Career

- ◆ Start with an area where you care about the outcomes and are interested in the techniques
- ◆ Preferably an under-occupied niche that has research potential
- ◆ Differentiate yourself from your mentor
- ◆ Build a theme, with a balance between low-risk and high-risk projects

Practical Considerations

- ◆ Think realistically about productivity (i.e., publications), especially early in your career
- ◆ Develop mixed portfolio: mostly sure-fire studies with a few high-risk excursions
- ◆ Develop a stable base of grant funding
- ◆ Guard your time; collaborate effectively

Choosing your Mentor(s)

- ◆ Background complementary but not completely overlapping
- ◆ Research status: has publications, grants
- ◆ Committed to mentoring in general and you in particular
- ◆ Understands your goals and expectations
- ◆ Personal compatibility
- ◆ Later, you hold up your side of the bargain
- ◆ Consider scientific as well as career mentors

Developing a Research Application

- ◆ Review current literature and ideas with mentors and colleagues
- ◆ Define and refine the problem under study
- ◆ Develop hypotheses and likely outcomes
- ◆ What are the most direct methods or approaches to achieve your goals?
- ◆ Consider alternative approaches
- ◆ Will your approach be conclusive?
- ◆ What will be the impact on the field?

Importance of Preliminary Studies

- ◆ Demonstrate your competence, commitment, and standards
- ◆ Demonstrate feasibility of approach
- ◆ Address potential theoretical hurdles
- ◆ Document success with particularly difficult or highly specialized techniques
- ◆ Personal mastery: cite past publications, show preliminary data, writing style
- ◆ Recruit from collaborators with appropriate documented expertise

Why Rehab Clinicians make good Researchers

- ◆ Treat 'function' and 'disability' rather than a specific disease or organ system
- ◆ Integrate material from basic, clinical, and psychosocial fields
- ◆ Understand the physiological, psychological, and behavioral basis of rehab approaches
- ◆ Account for role of environmental factors - as supports or barriers to goals of rehab
- ◆ Focus on clinically-significant and ecologically-relevant goals
- ◆ Bright, motivated, collaborative, and persistent

Goals of Rehabilitation Research

- ◆ Understand mechanisms of rehabilitation and recovery
- ◆ Promote new diagnostic and therapeutic approaches
- ◆ Modify and optimize current therapies to improve specificity or dosing regimens
- ◆ Adapt therapies to novel patient populations and extend to chronic phase
- ◆ Challenge assumptions of current practice

Goals of Rehab Research, cont.

- ◆ Demonstrate safety and efficacy
- ◆ Extend clinical findings from the lab into real-world settings
- ◆ Explore potential secondary effects
- ◆ Longitudinal follow-up and lasting effects
- ◆ Evidence-based medicine to drive health-care management and policy

Unique Issues in Rehab Research

- ◆ Focus on *individual* rather than on cell, tissue, or organ
- ◆ Addresses longer time-frame
- ◆ Considers functional outcomes, participation, and quality-of-life
- ◆ Involves more complex relationships that cross several levels of conceptual analysis: pathology, impairment, function, disability
- ◆ Need to initiate collaborations among several professional disciplines

Unique Research Issues, cont.

- ◆ Conflicting goals among person with disabilities, family, caretaker, and clinician
- ◆ Goals and expectations evolve over time
- ◆ Should subjects be grouped by condition or functional limitations?
- ◆ Account for resources and environmental support [factors can be positive or negative]
- ◆ Ecological validity: translating treatments to "real-world" settings (e.g., home, community)

Current NCMRR Priority areas include:

- ◆ Improving functional **mobility**
- ◆ Promoting **behavioral adaptation** to functional losses
- ◆ Assessing the **efficacy and outcomes** to medical rehabilitation therapies and practices
- ◆ Developing improved **assistive technology**

Current NCMRR Priority areas include:

- ◆ Understanding **whole body system responses** to physical impairments and functional changes
- ◆ **Secondary conditions** relating to medical rehabilitation
- ◆ Developing **more precise** methods of **measuring** impairments, disabilities, and societal and functional limitations
- ◆ **Training** research scientists in the field of rehabilitation

What's Hot in Medical Rehab?

Clinical Issues

Secondary Complications

Strategies and Mechanisms

Cognitive and Behavioral issues

Children and the Developing Brain

Bioengineering

Assessment and Outcomes

Clinical issues

- Weakness, paralysis, spasticity, tremors
- Movement disorders:
balance, coordination, gait
- Pain and sensory dysfunction
- Autonomic dysreflexia
- Bowel and bladder dysfunction
- Exercise and cardiovascular function

Secondary Complications

- Musculoskeletal changes: muscle atrophy, osteoporosis
- Obesity, inactivity, reduced fitness
- Skin ulceration and connective tissue dysfunction
- Increased susceptibility to infection
- Behavioral and psychosocial decline
- Accessibility and participation
- Increased morbidity and mortality
- Recurrence risk

Strategies and Mechanisms

- Prevention and reducing recurrence
- Improved diagnosis and prognosis
- Reducing initial pathology
- Minimizing collateral damage
- Reducing inflammation and scarring
- Promoting regeneration and neuroplasticity
- Adaptation and activity-mediated changes
- Developing alternative strategies

Cognitive and Behavioral Issues

- Executive function (decision-making)
- Attention
- Cognition and memory
- Visuospatial perception and neglect
- Communication disorders
- Aggression
- Depression
- Drug addiction and alcoholism

Children and the Developing Brain

- Increased vulnerability, but also increased potential for plasticity and recovery
- Growth trajectory: rapidly changing physical and behavioral repertoire
- Disorder can impede future development; interfere with "critical periods"
- Children react differently to trauma: physically, psychologically, emotionally
- Unique sensitivity to pharmacological and other therapeutic approaches

Bioengineering Research

- Orthotics, prosthetics, other assistive devices
- Neuroprosthetic interfaces
- Functional electrical stimulation (FES) and transcranial magnetic stimulation (TEM)
- Brain imaging (fMRI, DTI, PET, MEG, EEG)
- Robotics to provide therapy and improve diagnosis
- Wheelchairs and other mobility aids
- Improving control of the environment
- Speech, language and communication aids

Assessment and Outcome issues

- Importance of working across the domains of pathology, function, and/or disability
- Improving diagnostic & prognostic measures
- Assessment of "function", "disability", and "participation" in various environments (such as family, community, employment, education, recreation)
- Quality-of-life measures
- Reconciling needs of patient with those of family, caretaker, and/or clinician
- Goals/expectations may change over time
- Health-care constraints and policy issues

Progression of Funding (NIH model)

- Training grants and fellowships
- Career development awards (K awards)
- Smaller foundation grants and pilot studies
- Co-investigator on major grants (eg, R01)
- Principal investigator on major grant (R01)
- Involvement in larger collaborative studies

Training and Career Development

- ◆ Individual Fellowships
 - Graduate student (F31) or Postdoc (F32)
- ◆ Institutional Training Grants (T32)
 - Department support for PhD graduate students and/or Postdocs
- ◆ Career Development Mechanisms
 - New investigator in specific fields or clinician getting into research
 - Mentored: 3-5 yrs @ 75% effort
 - Processes may vary across NIH Institutes

Career Development (K award) Application is like an Autobiography

- Show that you are a good candidate:
 - Focus - Productivity – Experiences
- Articulate your Career Goals, both short-term and long-term
- Do a needs assessment: strengths/weaknesses
- Discuss appropriateness and commitment of mentor(s)
- Propose other didactic experiences, as needed: courses, workshops, sabbaticals
- Research Project (developed with mentor) to get you needed skills, training, credibility, and publications

Mentored Research Scientist Development Award (K01)

Clinical trained in targeted area*
and have advanced degree (e.g., PhD)

*NICHD is currently targeting:
Medical Rehabilitation
Population research
Child abuse and neglect

www.grants.nih.gov/grants/guide/pa-files/PA-06-001.html

NICHD-specific info at:
<http://grants.nih.gov/grants/guide/notice-files/not96-301.html>

Mentored Clinical Researcher

Clinically trained individual (e.g., MD):

seeking training in basic research = K08

<http://grants.nih.gov/grants/guide/pa-files/PA-06-512.html>

seeking training in patient-oriented research = K23

<http://grants.nih.gov/grants/guide/pa-files/PA-05-143.html>

Mentored Quantitative Research Career Development Award (K25)

Someone with a quantitative or
engineering background getting into
biomedical research

<http://grants.nih.gov/grants/guide/pa-files/PA-06-087.html>

National Career Development Networks

Allied health professionals (e.g., PT, OT):

Ken Ottenbacher, Univ of Texas, Galveston

<http://www.sahs.utmb.edu/k12/>

Michael Mueller, Wash University, St Louis

<http://www.corrt.pitt.edu/index.asp>

Physiatrists:

John Whyte, Moss Rehab Institute, Philadelphia

http://www.physiatry.org/Research_RMSTP_K12.cfm

Pathway to Independence Award (K99/R00)

Two phase award:

- ◆ 1-2 yrs years mentored support as postdoc (<\$90,000/yr)
- ◆ Then up to 3 yrs support as beginning faculty (<\$249,000/year)
- ◆ Open to non-US citizens

http://grants.nih.gov/grants/new_investigators/pathway_independence.htm

Supplements to already-funded NIH research grants

To add qualified individuals at any level (high school through investigator) who:

- are from under-represented minorities
- come from disadvantaged backgrounds
- have disabilities
- re-entering research after family obligations

Contact NIH program director of funded grant

<http://grants1.nih.gov/grants/guide/pa-files/PA-05-015.html>

NIH Loan Repayment Program

To repay educational debt (up to \$35,000/yr)

Requires up to a two-year commitment to research

Five Loan Repayment programs:

- Clinical Research
- Pediatric Research
- Health Disparities Research
- Clinical Researchers from Disadvantaged Bkgs
- Contraception and Infertility Research

<http://www.lrp.nih.gov/>

Research Project Award: R01

- ◆ Investigator-initiated applications (majority of basic & clinical NIH funding)
- ◆ Focus on specific set of aims
- ◆ Budget: no boundaries but typically \$200-300,000 per year
- ◆ May request up to 5 years;
- ◆ If funded, can later apply for competitive renewal

Small Grants: R03 and R21

- ◆ Pilot studies (feasibility); innovative research; high-risk; new methodology or technology
- ◆ New investigators especially encouraged
- ◆ Budgets \$100,000 / \$275,000, respectively, (direct costs) over two years
- ◆ Not renewable; may not be used to supplement already-funded projects

Grantsmanship

"There is no amount of grantsmanship that will turn a bad idea into a good one, but there are many ways to disguise a good one."

■ William Raub, former Deputy Director, NIH

Winning over Reviewers, part 1

Develop a focused application, with explicit goals

Raise an interesting question (basic or clinical) and propose a direct response

Discuss likely outcomes and interpretations

When possible, use the most direct, appropriate, and current techniques to critically address the issues at hand

Provide a logical defense of your approaches and choices with alternatives

Winning over Reviewers, part 2

Briefly introduce the research field and cite the relevant literature (especially the papers of your likely peer-reviewers); but do not write a scholarly treatise

Discuss why hasn't this been done before and what is your unique angle

Include sufficient detail on techniques, outcome measures, plans for analysis

Describe collaborations (if appropriate); include appropriate statistical expertise

Discuss your subject and control populations

Winning over Reviewers, part 3

Write to your likely peer-review audience in a style that is logical and interesting

To make it more readable include diagrams, pictures, and tables (with adequate labels and legends)

Make sure your application is neat, accurate, and complete (show your standards)

Prepare for electronic submission and follow guidelines for page limits and appendices

Reviewers are not required to read appendices

Winning over Reviewers, part 4

Don't submit until it is your *best effort*

Respect your reviewers' time and efforts

You are starting a dialogue with reviewers and you only get three total chances

Useful NIH Websites

NIH Home page: www.nih.gov

CRISP (searchable database of all NIH-funded grants): www.commonscit.nih.gov/crisp/

Video on the Grant review process:
<http://www.csr.nih.gov/Video/Video.asp>

Sample NIH Applications

NHBLI has put a sample Career Development application on their website:

<http://www.nhlbi.nih.gov/funding/training/redbook/k08.pdf>

NIAID has an annotated R01 and summary statement at

www.niaid.nih.gov/ncn/grants/app/default.htm