

RESEARCH OPPORTUNITIES

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"Research Opportunities" is a regular feature of this journal that transmits information regarding sources of support for basic and applied research in spine and musculoskeletal rehabilitation. In the previous issue, this feature provided a historical and legislative overview of the National Center for Medical Rehabilitation Research (NCMRR), a newly created unit of the National Institutes of Health. In this issue, we provide additional information on the NCMRR, including the types of grants available through the center, possible research topics, and filing deadlines.

NATIONAL CENTER FOR MEDICAL REHABILITATION RESEARCH: TYPES OF GRANTS AVAILABLE

The NCMRR was established as a component of the National Institute of Child Health and Human Development by the National Institutes of Health (NIH) Amendments (P.L. 101-613). The center is intended to conduct and support basic and clinical research dealing with the rehabilitation of individuals with physical disabilities resulting from diseases or disorders of the neurological, musculoskeletal, cardiovascular, pulmonary, or any other physiological system. Emphasis is placed on the development of new medical and behavioral treatments, including laboratory, clinical, and applied (home care) studies designed to affect multiple body systems.

The NCMRR uses a number of different NIH mechanisms to fund research. *Directed research* funds are targeted to specific research topics. Directed research competitions are described in the *NIH Guide to Grants and Contracts* (discussed in "Research Opportunities," *Journal of Back and Musculoskeletal Rehabilitation*, Vol. 1, No. 3, Fall 1991).

Investigator Initiated Research Awards, the most frequently used NIH funding mechanism, are awarded to universities through a structured, detailed application process. Other funding mechanisms include *Institutional Training Awards*, which support research training, and the *Small Business Innovative Research Grants* program. The latter

program directs funds toward for-profit small businesses, but often with the support and involvement of scientists from the university community. The filing deadlines for the key programs funded by the NCMRR are as follows:

Investigator Initiated Research Awards: February 1, June 1, October 1, annually
Institutional Training Awards: January 10, May 10, September 10, annually
Small Business Innovation Research Grants: April 15, August 15, December 15, annually

Illustrative Research Topics

The following list of research topics has been prepared and disseminated by the NCMRR to illustrate the type and range of activities supported. It is not intended to in any way restrict the efforts of any individual investigator. Rather, it is expected to stimulate the wide range of relevant research activity.

Investigator Initiated Research

- Develop quantitative measures of impairments, disabilities and handicaps, and of the outcome of rehabilitative interventions.
- Rehabilitation of neurophysiological dysfunction—investigate pharmacological agents and therapies that might reduce the extent of neuronal damage or death caused by disease or injury and induce functional plasticity.
- Rehabilitation of musculoskeletal disorders—functional assessment/control of movement, joint mechanics and pathophysiology, musculoskeletal physiology and plasticity, orthotics and prosthetics, interaction of musculoskeletal impairments, and the biology of pain.
- Characterize electrical impulses, hormones, and other physiological signals that regulate the structure and function of the musculoskeletal system.
- Develop rehabilitation interventions to optimize musculoskeletal function following injury, disease, or invasive procedures.
- Characterize the psychosocial and personality factors, physical problems, and societal factors that influence rehabilitation outcomes for patients who undergo limb-sparing surgery.

- Investigate new approaches for preventing or alleviating pain in individuals with physical disabilities.
- Study the psychosocial and vocational adjustments required to enhance the rehabilitation of children and adults with physical disabilities.
- Identify and define the problems of sexual dysfunction caused by physical impairments that limit mobility.
- Evaluate the effectiveness of existing interventions for people with physical impairments that limit mobility, including methods for managing pain, repairing bones, controlling side effects, and easing psychosocial adjustments.
- Conduct epidemiological studies to determine the relationship between aging and disabling conditions; identify factors that influence the progression or regression of functional limitations that commonly occur in individuals with disabilities as they age.
- Investigate the neuroplasticity of the nervous and muscular systems of children and adults and thus determine whether interventions might improve the functioning of children and adults with cognitive and neuromotor deficits.
- Identify the factors responsible for the often-found differential between the functional capacity of disabled children and adults and their actual level of performance.
- Develop valid, reliable measures of daily function for use in clinical and residential settings.
- Study the influence of social support mechanisms on rehabilitation outcomes.
- Conduct basic research on hormonal, neurochemical, and potential pharmacological agents (such as growth hormone) that might improve the cognitive and physical functioning of children and adults with physical disabilities.
- Conduct long term, multifactorial studies of the changing nature of impairments, disabilities, and handicaps over the life span.
- Conduct multivariate studies to determine how interactions among biological, psychological and sociological, and environmental risk factors influence the occurrence and course of impairments, disabilities, and handicaps.
- Evaluate the effectiveness of psychological and social support strategies intended to facilitate the psychosocial adjustment of children and adults to permanent impairments and disabilities; identify the most important elements in this process.
- Conduct controlled clinical trials to evaluate the short and long term efficacy of multivariate treatments (such as the combination of surgical and pharmacological interventions and assistive devices) to reduce impairment and disability.
- Determine the factors that contribute to successful prevocational and career development programs for children with disabilities (i.e., programs that have been shown to be effective in helping these children become independent, self-sufficient adults).
- Optimize the performance properties and biocompatibility of materials used in implanted devices such as artificial ligaments, tendons, bones, mechanical and fluid conduits; and chronic sensing and stimulation electrodes.
- Develop the data collection and surveillance systems necessary to generate epidemiologically sound evidence of the incidence and prevalence of impairments, disabilities, and handicaps.
- Study the long term sequelae of severe burn, including tissue regeneration; tissue transfer; prosthetic devices development and use; reintegration into family, work, and social events; reproductive issues.
- Examine chronic pain subsequent to a traumatic injury, including neural pathway studies to localize pain (phantom) in individuals with paralysis or with limb loss for both the peripheral and central nervous systems, central nervous system neurotransmission between nerve cells and within the cellular environment of pain signals; develop and test therapies for reducing pain (pharmaceutical, physical, and behavioral).
- Assess the long term physical, behavioral, and social effects of asthma in children.
- Determine the long term effects of kidney transplantation: multiple organ effects, behavioral changes, vocational and social effects.
- Plan a research program for intensively studying reproductive issues for individuals with physical disabilities: gender identity for early and late onset physical disabilities, reproductive

organ functioning, obstetric issues in pregnancy of women with physical disabilities, parenting and physical disabilities, sibling relationships for individuals with physical disabilities, peer and friendship relationships for individuals with physical disabilities.

- Develop studies in sports medicine for individuals with disabilities: shoulder girdle abnormalities in those who use wheelchairs for mobility, exercise programs for individuals with physical disabilities, joint mobility and pain reduction in water-related therapies, motivational and behavioral changes in individuals with disabilities who participate in sports.

Small Business Innovation Research

- Develop mechanical and electrical devices that can assist individuals with physical disabilities to control their environment, including prosthetic and orthotic equipment, mobility enhancement (wheelchairs, walkers, safety equipment for transportation vehicles), remote control of home and workplace appliances or tools, and recreational equipment for use in family, school, and community settings.
- Develop skill-training and educational program products, and therapeutic techniques that supplement, replace, or restore the functional social, cognitive, adaptive, and motor abilities of individuals who are physically disabled.
- Develop and test software programs for computer-assisted instruction, measurement,

and assessment of cognitive, vocational, and social skills acquisition for children and adults with physical disabilities.

- Develop behavioral techniques, drugs, and/or medical regimens for improvement of cognitive function (e.g., academic training) and motor skills (e.g., mobility difficulties, bowel and bladder control, feeding, and dressing) and the decrease or elimination of destructive behaviors (e.g., self-abuse, rumination, aggression, hyperactivity) for individuals with physical disabilities.
- Develop and test devices and/or techniques designed to teach, supplement, replace, or restore communicative and language functions (e.g., gesturing, listening, speaking, reading, and writing) of individuals with physical disabilities, including alternative forms of communication (e.g., computer-assisted speech output, speech recognition, assistive planning, memory enhancement or substitution) and environmental control systems for home, school, and work.

Again, it is important to note that this listing of potential topical areas for research is not meant to be definitive or inclusive. The NCMRR plans to issue a formal program announcement in the fall of 1992. For further information, or to apply for NCMRR grants, contact Dr. David Gray, Acting Deputy Director, NCMRR/NICHD/NIH, 6120 Executive Boulevard, Room 450W, Rockville, MD 20852; (301) 402-2242.