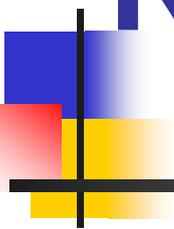


# NIH Trainee Workshop



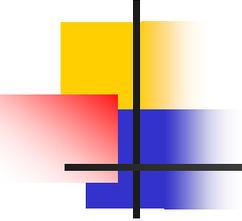
Ralph Nitkin, Ph.D.

National Center for Medical  
Rehabilitation Research (NCMRR)

National Institute of Child Health and  
Human Development (NICHD)

National Institutes of Health (NIH)





# NIH is made up of 27 Institutes and Centers

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***Including:***

**NINDS (Neurological Disorders & Stroke) e.g., spinal cord & brain injury, cerebral palsy**

**NIAMS (Arthritis & Musculoskeletal & Skin) e.g., muscle physiology, bone & skin**

**NIA (Aging) e.g., geriatric populations**

**NINR (Nursing Research)**

**NCI (Cancer)**

**NHLBI (Heart, Lung & Blood) e.g., exercise, cardiovascular**

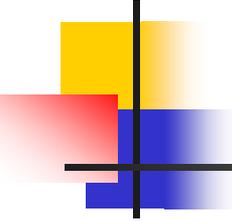
**NIMH (Mental Health) e.g., behavioral, social, emotional disorders**

**NIDCD (Deafness & Communication Disorders) e.g., speech, balance**

**NIDDK (Diabetes, Digestive and Kidney) e.g., urinary track, diabetic complications**

**NCCAM (Complementary and Alternative Medicine)**

**NIBIB (Biomedical Imaging and Bioengineering)**



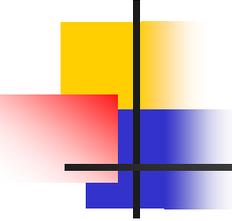
... and the **NICHD**

(Child Health and Human Development)

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Which has the **National Center for Medical Rehabilitation Research (NCMRR)**

- Established 1990 by Public Law 101-613
- **MISSION:** To foster development of scientific knowledge needed to enhance the health, productivity, independence, and quality of life of persons with disabilities



# What's Hot in Medical Rehab?

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Disorders and Conditions

Clinical Issues

Secondary Complications

Cognitive and Behavioral issues

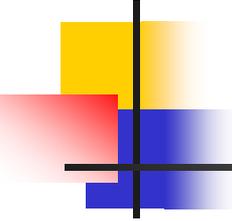
Neurological Strategies and Mechanisms

Therapeutic Approaches

Children and the Developing Brain

Bioengineering

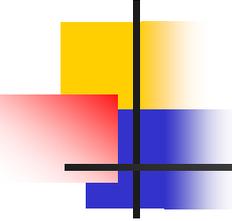
Assessment and Outcomes



# Disorders and Conditions

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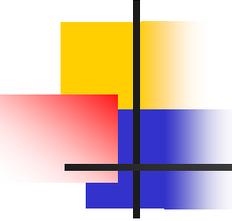
- Neurotrauma (e.g., traumatic brain injury, spinal cord injury, amputation)
- Stroke and other hypoxic/ischemic insults
- Neurodevelopmental disorders (e.g., cerebral palsy, post-polio)
- Neurodegenerative Disorders (e.g., multiple sclerosis, parkinson, muscular dystrophy)
- Non-neuromuscular disorders (e.g., arthritis, cancer, diabetes)



# Clinical issues

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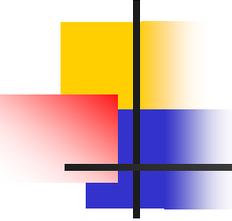
- Weakness and paralysis, spasticity, tremors
- Movement disorders: balance, coordination, gait
- Pain and sensory dysfunction
- Autonomic dysreflexia
- Bowel and bladder dysfunction



# Secondary Complications

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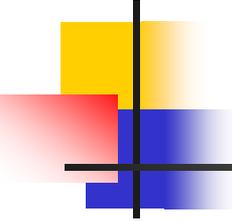
- Musculoskeletal changes: muscle atrophy, osteoporosis
- Skin ulceration and breakdown
- Connective tissue dysfunction
- Increased susceptibility to infection
- Increased morbidity and mortality
- Recurrence risk



# Cognitive and Behavioral Issues (especially head injury)

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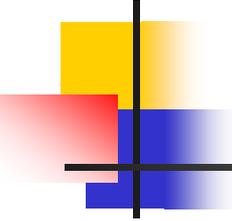
- Executive function (decision making)
- Attention (both temporal and spatial)
- Cognition and memory
- Visuospatial perception
- Communication disorders: speech, language, hearing
- Aggression
- Depression
- Drug addiction and alcoholism



# Neurological Strategies and Mechanisms

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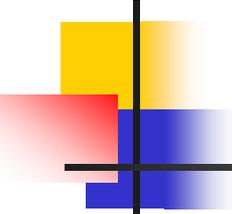
- Prevention and reducing recurrence
- Improved diagnosis and prognosis
- Reducing initial pathology
- Minimizing collateral damage
- Reducing inflammation and scarring
- Promoting regeneration and neuroplasticity
- Adaptation and activity-mediated changes



# Therapeutic Approaches

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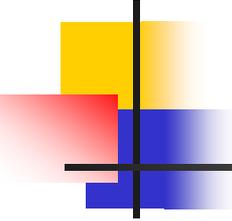
- Addition of exogenous genes, cells, tissues
- Trophic factors and pharmacological agents
- Activity-mediated changes
- Promoting angiogenesis
- Therapeutic exercise and cardiovascular fitness
- Gender differences and role of hormonal factors



# Children and the Developing Brain

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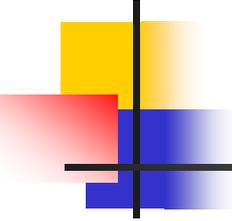
- Increased vulnerability, but also increased potential for plasticity and recovery
- Growth trajectory: rapidly changing physical and behavioral repertoire
- Disorder can impede future development; concept of “Critical periods”
- Children react differently to trauma: physically, psychologically, emotionally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



# Bioengineering Research

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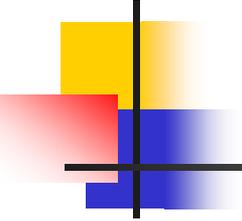
- Orthotics, prosthetics, and other assistive devices
- Neuroprosthetic devices
- Functional electrical stimulation (FES) and transcranial magnetic stimulation
- Brain imaging (fMRI and PET)
- Robotics to provide therapy or improve diagnosis
- Wheelchairs and other mobility aids
- Control of environment
- Speech, language and communication aids



# Assessment and Outcome issues

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- Importance of working across the domains of pathology, function, disability
- Improved diagnostic and prognostic measures
- Assessment of function and disability
- Participation (family, community, employment, education, recreation)
- Quality of life measures
- Goals of patient may differ from those of family, caretaker, and/or clinician
- Goals and expectations may change over time
- Health care constraints



# NCMRR Model for Disability Research

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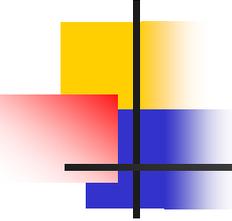
Pathophysiology

Impairment

Functional Limitation

Disability

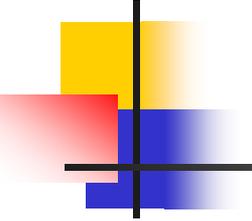
Societal Limitation



# Pathophysiology:

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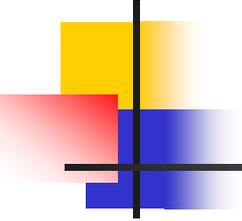
Interruption of or interference with normal physiological and developmental processes



# Impairment:

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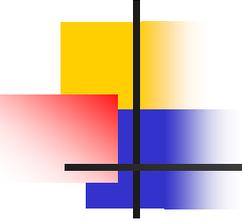
Loss or abnormality of cognitive, emotional, physiological, or anatomical structure or function -- including **all losses or abnormalities**, not just those attributable to the initial pathophysiology



# Functional Limitation:

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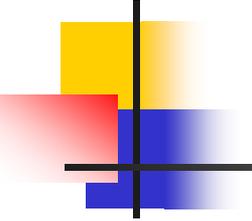
Restriction or lack of ability to perform an action in the manner within the range consistent with the purpose of an organ or organ system



# Disability:

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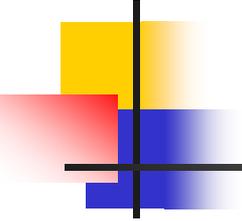
Inability or limitation in performing tasks, activities, and roles to levels expected within physical and social contexts



# Societal Limitation:

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Restriction, attributable to social policy or barriers (structural or attitudinal), which **limits fulfillment of roles** or **denies access** to services and opportunities that are associated with full participation in society



# NCMRR Model for Disability Research

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Pathophysiology

Impairment

Functional Limitation

Disability

Societal Limitation

# Tuesday Night Poster Session

