NAMHC Workgroup: "Setting Priorities for the Basic Sciences of Mental Health"

Final Report to NAMHC – May 14, 2004

The Context

- The years of exceptional budget growth are over
  - Expecting very small increases over the coming years
- Commitment base is quite high
  - Reduces success rates
  - Limits opportunities for new initiatives

Fundamental task:

- Help NIMH set priorities for the basic behavioral and neurosciences

Domains of Basic Science in Mental Health

- Molecular, Cellular, and Genomic Neuroscience
- Behavioral Neuroscience
- Basic Behavioral Science

Organizations Contacted

- American College of Neuropsychopharmacology (ACNP)
- American Neuroendocrinology Society
- American Psychological Association
- American Psychological Society
- American Society for Pharmacology and Experimental Therapeutics (ASPET)
- Cognitive Development Society
- Cognitive Neuroscience Society
- Cognitive Science Society
- Comparative Cognition Society
- Consortium of Social Science Associations
- Federation of Behavioral, Psychological, and Cognitive Sciences
- Genetics Society of America
- International Behavioral Neuroscience Society
- International Brain Research Organization
- International Neural Network Society
- International Society for Developmental Neuroscience
- International Society for Developmental Psychobiology
- International Society for Infant Studies

Organizations Contacted

- International Society for Research in Emotion
- International Society of Developmental Psychobiology
- International Society for Psychoneuroendocrinology (ISPNE)
- Linguistic Society of America
- Psychonomic Society
- Sleep Research Society
- Society for Behavioral Neuroendocrinology
- Society for Developmental Biology
- Society for Experimental Social Psychology
- Society for Neuroscience
- Society for Personality and Social Psychology
- Society for Psychophysiological Research
- Society for Research in Child Development
- Society for Research on Biological Rhythms

Members of the Workgroup

- Thomas Carew (Irvine)
- Jeffrey Conn (Vanderbilt)
- Richard Davidson (Wisconsin)
- Michael Davis (Emory)
- Geoffrey Duyk (Exelixis, Inc.)
- Megan Gunnar (Minn.)**
- Myron Hofer (Columbia)
- Richard Huganir (Johns Hopkins)
- James Jackson (Mich.)
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- James McNulty (NAMI)**
- Eric Nestler (Univ. Tex. SW Med. School)**
- Hal Pashler (UCSD)
- Donald Pfaff (Rockefeller)
- Peter Salovey (Yale)**
- Paul Sawchenko (Salk)
- Larry Squire (UCSD)**
- Helen Tager-Flusberg (Boston Univ.)

** Council members

The Task

- Review the existing NIMH basic science portfolio
  - Highlight greatest opportunities
  - Identify redundancies
  - Identify areas better served by other institutes
- Scan the broader basic behavioral and neurosciences
  - Identify greatest opportunities
  - Suggest approaches to filling the gaps

Criteria:

- Relevance – NIMH mission
- Traction – current opportunities
- Innovation – what is new

Relevance + Traction + Innovation = IMPACT

Process

- Full group meeting – January 13
  - Charge
  - Formed two subgroups
    - Molecular and cellular – Eric Nestler, Chair
    - Behavioral and behavioral neuroscience – Richard Davidson, Chair
- Subgroups reviewed portfolios, submitted suggestions, met – February 3, March 3
- Full group meeting – March 31
  - Formalized recommendations, discussed report
- Email review
- Present final recommendations to NAMHC May 14

The report

Organization of the report

- Over-arching principles
- Cross-cutting themes
- Areas for increased emphasis
- New and improved research tools
- Areas ready for refocus
- Areas better served by other institutes

Core conclusions:

- Basic behavioral science and neuroscience are critical to achieving NIMH mission
  - Mission should drive portfolio
  - Musn't overplan – need a wide ranging portfolio
- Current portfolio is quite strong and serves the mission well
  - All things can be improved!

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Some over-arching principles

- Basic research that integrates or translates across levels of analysis should be given high priority
- Research and training that are interdisciplinary in nature should be more heavily emphasized
- More work needs to be done on the effects of environments on behavior that includes studying both the molecular and integrative (biological) systems levels

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Areas for increased emphasis

- Emotion
  - Neurobiology of emotion, mood and motivation
  - Interaction of emotion and cognition

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Areas for increased emphasis

- Development
  - Periods of rapid neurobiological development in humans
  - How neural activity and gene-environment interactions regulate late prenatal development
  - Intersection of social and cognitive functioning with neurobiological development

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Areas for increased emphasis

- Social interactions
  - "Mental illness relevant" social behaviors and processes
  - Integration of social processes/behaviors with brain functioning

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Areas for increased emphasis

- Neural circuitry
  - Take advantage of cellular imaging tools
  - Psychotropic drug action and complex behaviors
  - Synaptic mechanisms
  - Neuronal replacement

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Areas for increased emphasis

- Sex and gender differences and mechanisms

Areas for increased emphasis

- Intracellular signal integration
  - How multiple signal transduction pathways interact to produce integrated cellular responses
  - Use of non-mammalian models to delineate intracellular pathways relevant to mammals

New and improved research tools

- More appropriate animal models
  - Mouse behavior
  - Genetic tools for the rat
  - Non-human primate research
  - Non-mammalian model organisms

New and improved research tools

- Ligand development
- Computational models
- Standardization of behavioral tools
- Neuroimaging
  - Emphasis on “what is being measured” and its relevance

Areas ready for refocus

- Aspects of learning and memory
  - Integrate across levels of analysis
  - Integrate across domains within cognitive area

Areas ready for refocus

- Sleep
  - Reduce efforts at simply phenotyping sleep problems in psychiatric disorders
  - Emphasize mechanistic studies of sleep and relationship to waking behaviors
  - Emphasize molecular neurobiology and circuitry of sleep, arousal, attentional states, and sleep’s influence on cognitive and affective processes

Areas ready for refocus

- Circadian phenomena
  - Shift emphasis from studies focusing *only* on molecular, behavioral or sensory circadian phenomena to those that relate to higher brain function and behaviors relevant to NIMH mission

Areas ready for refocus

- Stress
  - Shift from acute to chronic stress
  - Compare mechanisms and consequences of different types of stress
  - Resilience

Areas ready for refocus

- Neurotransmitter-signaling systems
  - Shift from extensively studied to less well understood systems

Areas ready for refocus

- Prejudice and stereotyping
  - Move to studies with more transparent relevance to mental health issues
    - Prejudice and discrimination as chronic stressors
    - Interventions for targets of discrimination

Areas better served by other institutes

- Visual and other primary sensory perception and motor processes
- Metabolic thermoregulation
- Characterization of the processes of normal development or aging without a compelling argument for the relevance to mental illness of behavioral disorders

Concluding comments

- NIMH program staff should continuously scrutinize the portfolio to identify areas that may become overly subscribed or saturated
- Work with CSR to re-examine the focus and composition of study sections to better serve NIMH interests
- NIMH should create ways to foster and support translational research and training
- Training programs for basic scientists could include education on the clinical phenomena of mental illness (and the reverse)

The bottom line

- The NIMH basic behavioral and neuroscience research portfolio is already in superb shape and serves the mission extremely well
  - *Caveat:* All things can be improved
- In the context of current budgetary realities, the portfolio can benefit from some shifts in emphasis and priority

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