New Horizons in Health: An Integrative Approach

Committee on Future Directions for Behavioral and Social Sciences Research at the National Institutes of Health

Commission on Behavioral and Social Sciences and Education
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EXECUTIVE SUMMARY

This report identifies a broad domain of questions at the interface of social, behavioral, and biomedical sciences, whose resolution could lead to major improvements in the health of the U.S. population. In creating a vision of future directions, the committee emphasized research priorities that cut across institute boundaries at the National Institutes of Health (NIH), thereby underscoring the broad significance of behavioral and social science research for multiple disease outcomes as well as for health promotion. The background criteria guiding the development of priorities were that they should represent areas of great scientific opportunity and address pressing health problems, including health concerns of the general public. A leitmotif of the corpus of opportunities identified in this report is that they cannot be addressed successfully by either the biomedical sciences or the behavioral and social sciences acting alone. Greater integration of health research and practice across these broad domains is essential to implement the committee's recommendations.

Behavioral and social science research has a long history at the NIH. For example, the National Heart Institute, predecessor of the National Heart, Lung, and Blood Institute, was founded in 1948 and funded its first behavioral research grant in 1955, focused on psychological factors related to high blood pressure and coronary heart disease. The National Cancer Institute, established by Congress in 1937, has an extensive Behavioral Research Program emphasizing cancer prevention and control. The historical roots of this broad agenda reside in the mandates of the National Cancer Act passed by Congress in 1971. More generally, many of the institutes have longstanding and well-developed behavioral and social science programs. Trans-institute initiatives with linkages to basic biology are also appearing with increasing frequency, such as recent requests for proposals on socioeconomic status and health and the establishment of mind-body centers.

At the same time, the behavioral and social sciences have limited presence at some institutes or are seen as peripheral to primary agendas. Also when considered, behavioral, psychological, and social priorities are sometimes restricted to a narrow focus on their role as risk factors for particular disease outcomes. A central message of this report is that behavioral and psychosocial processes have broader significance and are fundamental to a comprehensive understanding of disease etiology as well as to promotion of health and well-being.

Building on recognition of these prior strengths and weaknesses, the committee on Future Directions for Behavioral and Social Sciences Research at the NIH embarked on its task. The committee was created under the Board on Behavioral, Cognitive, and Sensory Sciences of the National Research Council. It was established via a request by the Office of Behavioral and Social Sciences Research (OBSSR) to the National Research Council to evaluate the potential contributions of behavioral and social science research to the mission of the NIH and to develop research priorities that support and complement the work of the institutes.

The committee's deliberations regarding investigations that would satisfy the complementary demands of high scientific payoff and response to pressing health concerns led to identification of 10 thematic priorities. An overarching theme is a focus on multiple pathways to diverse health outcomes. Pathway characterizations integrate information from the molecular and cellular level with psychosocial and community levels and thereby represent routes to deeper understanding of disease etiology as well as resilience in the face of adversity. The mechanisms underlying racial, ethnic, and social inequalities in health also cannot be fully understood without integrated pathway characterizations. Pathway approaches also provide a comprehensive approach to health-promoting interventions. Early intervention and prevention has societal-level payoff in increasing active life expectancy and delaying the age of onset of disabilities. At the same time, the integrated pathway approach affords the knowledge base for more individualized forms of health care.

This report describes in detail the 10 thematic priorities highlighted below. Specific recommendations for research opportunities following from each of them are briefly outlined in this Executive Summary. These recommendations are elaborated at the conclusion of the individual chapters that follow. In addition to the thematic priorities, one overarching recommendation is put forth: the need to institutionalize the integrative approach at NIH.
Thematic Priorities

The committee recommends 10 priority areas for research investment to integrate the behavioral, social, and biomedical sciences at the National Institutes of Health:

- **Predisease pathways** – identify early and long-term biological, behavioral, psychological, and social precursors to disease;
- **Positive health** – identify biological, behavioral, and psychosocial factors that contribute to resilience, disease resistance, and wellness;
- **Gene expression** – understand environmentally induced gene expression and its connection to positive and negative health outcomes;
- **Personal ties** – explicate the mechanisms by which proximal social interactions influence health and disease outcomes;
- **Healthy communities** – identify the collective properties of social and physical environments that influence health and disease outcomes;
- **Inequality** – clarify the mechanisms through which socioeconomic hierarchies, racism, discrimination, and stigmatization influence health and disease outcomes;
- **Population health** – understand macro-level trends in health status and evaluate the performance of the health care system;
- **Interventions** – expand the scope and effectiveness of strategies for social and behavioral interventions to improve health;
- **Methodology** – develop new measurement techniques and study designs to link information across levels of analysis (molecular, cellular, behavioral, psychosocial, community) and across time;
- **Infrastructure** – establish ways to maintain long-term study populations and to train scientists to integrate health-related knowledge across multiple disciplines.

The scope of the priorities is expansive, with each encompassing wide areas of research. Some represent more individual-level phenomena, while others deal with macro-level (e.g., population) issues. The sections that follow describe the thematic priorities and identify the principal recommendations associated with them.

1. Predisease Pathways

We use the term “predisease pathway” to describe the biological influences (e.g., genetic factors, endocrine and immune factors) and related links to behavioral, psychological, and social influences that precede morbidity and mortality. A primary message is the need to assess precursors to disease at points more distant temporally than has been examined in most previous research. Equally important is the need to study the biological, behavioral, psychological, and social precursors to disease simultaneously. Wider time horizons are required to understand early antecedents to later risk factors as well as the long-term etiological processes involved in multiple disease outcomes. Predisease pathways thus include a broad array of factors that affect the individual from conception (or before) through development and adulthood into later life. Illustrative influences include prenatal and early risk factors, along with a diverse array of psychological factors (e.g., control and efficacy, temperament, optimism, cognitive states, emotion regulation), behavioral factors (e.g., diet, exercise, smoking, alcohol consumption, drug abuse, sexual activity), and familial and environmental influences (e.g., social ties and support, family stress, work conditions, community supports).

Building on the guiding theme of integrative research, there is need to assess physiological risk across multiple systems simultaneously. Repeated or continuous exposure to challenge or chronic underexposure and social isolation disrupts basic biological regulatory processes central to the maintenance of homeostasis and health. When exposed to challenge at vulnerable times (e.g., during early stages of pre- and postnatal development) or repeatedly during later periods of life, multiple physiological responses may operate outside of normal ranges. Over time, this exacts wear and tear “i.e., cumulative physiological risk”on humans and animals. Operationalization of culmulative risk across systems and across time is an important aspect of characterizing predisease pathways. Illustrating needed research in this direction are emerging studies of allostatic load, a preliminary formulation of cumulative physiological risk. Also critical is the need to track the unfolding interactions between genetic factors and environmental influences over time.
A basic research initiative throughout the NIH institutes should be focused on predisease pathways, including the following topics:

- identification of early markers of predisease states;
- examination of their genetic and environmental origins through animal and human studies;
- identification of behavioral risk factors in the exacerbation or amelioration of predisease pathways;
- prioritization of experimental and longitudinal research to chart these trajectories across the life span; studies should consider biological, behavioral, psychological, and social precursors to disease simultaneously;
- focus on the mechanisms by which genetic influences, early life experiences, and behavioral and psychosocial risk factors across the life span interact, leading to accumulating physiological risk and a broad range of disease outcomes.

2. Positive Health

A critical counterpoint to understanding pathways to disease is the need to advance knowledge of positive health, which includes not only the absence of illness but also the presence of wellness. Understanding the etiology and promotion of positive health outcomes requires expanded scientific agendas on resilience and resistance to disease processes as well as recovery and differential survival from illness. Greater emphasis must be given to primary prevention and positive health promotion as routes to extending disability-free years for larger segments of the population. Sustaining or regaining optimal health requires a focus on behavioral (e.g., positive health practices), psychological (e.g., optimism, purpose, mastery, positive affect, religion/spirituality), social (e.g., relational affect and intimacy, emotional support), and environmental (e.g., positive work settings, supportive community programs) factors. Explicating the biological substrates of these components and their role in delaying onset of morbidity and mortality represent major research opportunities of the future.

To advance the positive health agenda, the NIH should:

- target new research on the neurobiological mechanisms (e.g., allostasis “variation in the internal milieu to meet external demands, balance of anabolic and catabolic systems, neurogenesis and expression of neurotrophins) through which positive behavioral and psychosocial factors (e.g., exercise, enriched environments, quality social relationships, psychological well-being) influence health;
- establish new priorities focused on the etiology (at genetic, behavioral, environmental levels) of disease resistance, particularly in contexts of known risk;
- increase support for the study of the protective resources (optimism, meaning and purpose, social and emotional support, and related neurobiological mechanisms) that promote recovery and increased survival rates;
- initiate new investigations that will advance knowledge of resilience in the face of life adversity, giving particular emphasis to longitudinal studies;
- advance the science of primary prevention, giving particular attention to overcoming persistent maladaptive behaviors (e.g., drinking, smoking, sedentary lifestyles, poor stress management);
- develop new population-based initiatives, implemented at local community levels, that promote health via the teaching of positive life practices and the provision of environmental supports to sustain them.

3. Environmentally Induced Gene Expression

In-depth understanding of pathways to disease and preservation of good health necessitates the study of environmentally induced gene expression. Recent research has revealed that specific genes can be expressed at different points in an organism’s life. Whether a particular gene is expressed and the degree to which it is expressed depend strongly on the environmental conditions experienced by the organism. Such gene expression is implicated in both positive and negative health effects.

Animal studies have been and will continue to be the main route to achieving deeper understanding of the mechanisms of gene expression. Environmental influences on gene expression in animal models include short-term early life influences (e.g., release of placental growth hormone, response to maternal stress hormones) and long-term
responses to environmental conditions (e.g., physiological consequences of nurturing). The recent availability of gene chip technology provides the capability to identify changes in gene expression in response to environmental manipulations.

NIH should support integrative research aimed at understanding the role of environmentally induced gene expression in disease etiology and promotion of health. This should include:

- studies that combine environmental manipulations with physiological and molecular assessments to provide refined understanding of conditions leading to dysfunction, and concomitantly, the mechanisms that preserve allostasis; investigation of connections between personal ties, the physical environment, and gene expression are particularly important;
- studies that explore in animal models the relationships between chronic stress, interactions among intervening systems (e.g., HPA axis, autonomic nervous system, immune system and overall CNS control of these systems), gene expression, and health outcomes;
- initiation of studies using microarray chip technologies to monitor gene expression, associated with a broad range of environmental manipulations;
- development of animal housing facilities, particularly for rodents, that more closely approximate species-specific habitats.

4. Personal Ties

The preceding priorities (predisease pathways, positive health, and environmentally induced gene expression) all emphasize the importance of proximal social interactions. Survival of newborns depends on nurturance by others, and extensive lines of inquiry illustrate the centrality of social ties across the life course. A large body of epidemiological findings documents the links between social relationships and mental and physical health outcomes, including mortality. Disruption of personal ties, loneliness, and conflictual interactions are key sources of stress, while supportive social connections and intimate relations are vital sources of emotional strength.

What is not well understood, however, are the connections between these realms of personal connection and gene expression, brain structure and function, neuroimmunological activity, and ultimate disease and health outcomes. Reflecting the focus on pathways, there is a pressing need to assess cumulative, long-term relational profiles, particularly their emotional features, and link them to cumulative physiological profiles, such as allostatic load. In the extant literature, analyses also tend to focus on average responses and frequently relegate individual differences to error variance. Given the need to understand multiple pathways to diverse health outcomes, such individual differences should be treated as a crucible for theory construction and empirical testing.

NIH studies of the links between the social world and health should focus on the underlying and causal (including reciprocal) mechanisms in both animals and humans. The objective is to understand interrelationships between social interaction and correlative biological phenomena. This work should include:

- studies that explicate the links between social relationships and gene expression, brain structure and function, and neuroimmunological activity;
- investigations that assess how social ties influence health practices and behaviors;
- longitudinal studies that link cumulative social relational profiles with cumulative biological profiles;
- increased emphasis on the collection of biomarkers in epidemiological studies of social relationships and health;
- extensions of traditional laboratory studies to include experience sampling methodologies and corresponding ambulatory neurobiological assessments;
- multilevel, integrative studies working at the interface of social interaction, emotion, and brain activity and downstream endocrinological and immunological processes.

5. Healthy Communities

The preceding emphasis on social environments reflects primarily individual-level influences and processes. This report underscores the importance of conducting more extensive research on the collective properties of social environments. This requires treating the community as a unit of analysis in its own right. Neighborhoods can be
characterized by levels of poverty, unemployment, residential instability, housing characteristics, and racial/ethnic mix as well as by rates of crime, mental illness, morbidity, and mortality. Research shows that even when individual attributes and behaviors are taken into account, there are further influences on health outcomes following from collective community properties. Social processes in these collective sources of influence that require investigation include such phenomena as social cohesion, subcultures of violence, and informal social controls. Integrating collective properties into ongoing health research will also require attending to interactions between individual- and community-level variables. Future work in this area also depends on the resolution of multiple methodological challenges (e.g., dealing with nested levels of aggregation, simultaneity bias, and differential selection).

A possible model for developing standardized indicators of the health of communities is the Sustainable Seattle project. A standardized approach to assessment of community health would eventually allow cities and neighborhoods to evaluate how well they are doing in responding to their own health-related goals and in comparison with other cities and neighborhoods.

Adding contextual information to ongoing studies (e.g., Current Population Survey, Panel Study of Income Dynamics) is a relatively economical way to begin making connections between individual- and community-level variables. A particularly important opportunity associated with such data augmentation is the unprecedented change in social environments occurring across many urban communities in the United States as a result of devolving public housing. Especially in large cities, families are being relocated and entire housing projects are being dispersed. The quasi-experimental nature of these changes provides opportunities to learn about the connection between health outcomes and environmental change.

NIH-supported research on healthy communities should include the following kinds of work:

- development of a benchmark assessment (standardized approach) of the collective health of communities;
- selection of and support for longitudinal studies that target data augmentation and multilevel analysis, with a particular focus on person-environment interactions;
- investigation of contextual factors (e.g., cohesion, informal social control, physical disorder, local support networks) as mediators of health or disease outcomes;
- design of prevention strategies to promote aggregate-level health by changing social and community environments (e.g., regulation of smoking in public places, taxation policies).

6. Inequality and Health Outcomes

Human and animal studies show that position in social hierarchies influences morbidity and mortality. A recent trans-institute initiative on socioeconomic status and health seeks to understand how the inverse associations between indicators of socioeconomic position and a wide array of health outcomes come about. Further advances in this area must incorporate both individual-level variables and collective properties of community environments. In addition, programs of study are needed on the role of socioeconomic hierarchies in predisease pathways, which encompass behavioral, psychosocial, and environmental factors as well as underlying biological mechanisms.

Disparities in health following from ethnic/racial status and related experiences of discrimination, racism, and stigmatization must be key priorities under the broader rubric of social inequalities. There is also a pressing need to study cumulative experience along pathways to adverse health outcomes via long-term tracking of chronic features of economic, educational, and racial/ethnic disadvantage. It is clear that observed variations in health are not driven simply by expenditures on medical care, or by absolute levels of affluence. What is needed are systematic efforts to characterize health-relevant aspects of social environments. For example, mortality rates of blacks and whites are elevated in cities high on indices of racial residential segregation, but the possible intervening mechanisms between place of residence and health status are unknown. The concept of cumulative physiological risk provides a useful framework for tracing pathways from environmental exposures to changes in health status.

Moving beyond the current NIH initiatives on socioeconomic status and health, the committee recommends the following foci of attention:

- characterization of behavioral and environmental risks associated with educational, economic, and occupational disparities;
- elaboration of the subjective experience of racism, discrimination, and stigmatization and their effects on behavior as well as their neurobiological substrates;
• assessment of health-related impacts of large-scale societal structures (e.g., racial segregation, economic discrimination, differential access to services and medical care);
• development of integrative longitudinal studies that connect the socioeconomic-related risks factors to intervening biological systems and subsequent health outcomes;
• identification of cultural strengths and health-enhancing resources resident in racial/ethnic groups and their role in accounting for resilience vis-a-vis socioeconomic inequality

7. Population Health

Previously listed priorities on predisease pathways, positive health, and environmentally induced gene expression place strong emphasis on preventing disease, and promoting well-being at levels proximal to the individual. Collective properties of communities and social inequalities in turn address health at intermediate levels of aggregation. At the highest, macro-level is population health. This report emphasizes four population issues: (1) time trends and spatial variation in population health; (2) accounting for such trends, with particular emphasis given to social and behavioral factors; (3) understanding linkages between the macroeconomy and population health; and (4) evaluating the health care system. An important cross-cutting issue between these topics and the preceding priorities is the need for multilevel analyses that link population health dynamics to behavioral, psychosocial, and environmental factors (at both individual and intermediate levels of aggregation).

Recently documented population changes include declining rates of disability among the elderly and the growing utilization of alternative medicine. These require a broad range of in-depth studies to understand their origins, such as the role of behavioral and psychosocial factors in accounting for declining later-life disabilities. In the case of alternative therapies, what is needed is an integrated biopsychosocial characterization of their mechanisms of action and clear indications of what works, for whom, and why. With regard to children, deeper understanding of the causes of asthma, the most common chronic disease of childhood, lies in the future. Although several NIH initiatives are currently in progress to address gaps in current knowledge, investigations are needed to integrate data and findings from these studies into a unified, multilevel explanation of how asthma comes about. These examples illustrate the central challenge for population-level research, namely, to identify the most important factors that drive changes in population health and to clarify their impact on society at large.

Evaluating the health care system is also a key priority. Of central importance are studies that will clarify how health outcomes are affected by managed care and explain the many conflicting findings regarding the effectiveness of medical care. Increased support for research on reciprocal relationships between population health and the macroeconomy is also a priority.

The committee recommends that the NIH support a broad-gauged set of initiatives that include the following specific topics:

• multilevel analyses necessary to advance rigorous explanations for the observed dynamics of the health of populations, giving particular emphasis to behavioral, psychosocial, and environmental influences on aggregate-level health changes;
• development of projection methodologies to provide defensible scenarios of how health changes will affect society in the future;
• conceptual and empirical research on the value of biomedical innovations and the way they affect the health care system.

8. Interventions

Numerous preventive and therapeutic interventions have been introduced over past decades to help people to live longer and improve their quality of life. Interventions that have been widely implemented and emphasize behavioral and social factors include those designed to decrease behaviors associated with health risk (e.g., alcohol or substance abuse, smoking), or increase behaviors associated with health promotion (e.g., exercise, dietary practices). A further category receiving increased attention are interventions aimed at facilitating effective coping with chronic conditions and life-threatening diseases. Less extensive as yet are programs focused on family and social network interventions.

Historically, most studies have focused on the assessment of single interventions. However, the success of multiple-intervention programs, targeted simultaneously at different life domains and physiological systems, calls for more...
broad-gauged approaches to program development. In particular, we emphasize the need for interventions targeted at multiple levels (e.g., individual, family, organizational, population) as well as being pertinent to large segments of the population, not just high-risk groups. At the organizational level, we underscore prior success with work site and school-based programs and emphasize their inclusion in community-level intervention packages. We also emphasize the need for dynamic interventions that are adaptive over time and thereby address changing personal, social, and environmental circumstances.

We recommend that NIH support a new generation of intervention studies with the following emphases:

- development of strategies for extending successful social and behavioral interventions to more heterogeneous populations, including those focused on prevention via early identification of persons at risk;
- promote research and interventions in health-related decision making, such as how individuals understand the content of health communications as well as manage their own health needs and risks;
- expansion of implementation and dissemination activities so as to reduce the gap between research progress and practice;
- development of an overall strategy for intervention research that integrates behavioral, psychosocial, and biomedical approaches and that spans multiple levels, from the individual to the societal;
- intervention research that capitalizes on new opportunities created by technological innovation.

9. Methodological Priorities

New measurement techniques and designs for both animal and human studies are necessary to build bridges that will link behavioral, psychological, and social levels of analysis to multiple levels of biology (organ systems, cellular, molecular). This broad purview underscores the need for methodologies that are responsive to the functioning of complex dynamical systems through time. To advance priorities on predisease pathways and positive health it is critically important to conduct longitudinal studies that measure multiple domains (e.g., behavioral, psychological, social, environmental) across time (e.g., early life influences, childhood and adolescence, adulthood, and old age). Parallel longitudinal requirements pertain to the biological mechanisms through which the above factors affect health outcomes. As such, longitudinal studies will increasingly require broad-based forms of data collection, social behavioral and biomedical.

Related to this general issue, the concept of cumulative physiological risk, illustrated with allostatic load, requires further refinement to better understand the cascade of internal events from optimal functioning of multiple systems to accumulating risk. Full understanding of predisease pathways and positive health is critically important to conduct longitudinal studies that measure multiple domains (e.g., behavioral, psychological, social, environmental) across time (e.g., early life influences, childhood and adolescence, adulthood, and old age). Parallel longitudinal requirements pertain to the biological mechanisms through which the above factors affect health outcomes. As such, longitudinal studies will increasingly require broad-based forms of data collection, social behavioral and biomedical.

Specifically, we recommend that NIH support methodological initiatives in four broad areas:

- refine the operationalization of cumulative physiological risk that takes explicit account of the internal cascade of events leading to risk across multiple systems; ambulatory assessments and responses to transient challenges should be given consideration as potential components of improved measures of cumulative physiological risk;
- develop and refine instruments for measuring positive psychosocial factors; this initiative is fundamental for characterizing pathways to positive health outcomes;
- develop person-centered statistical methodologies to facilitate characterizations of predisease and positive health pathways that link behavioral, psychosocial, environmental, and biological levels of analysis;
- develop design, implementation, and analysis strategies for multiple-component interventions where allowance is made for adaptive, dynamic tuning of the interventions to obtain optimal outcomes.

10. Research Infrastructure and Training

This report makes clear the need for sustained core support of human and animal populations that can be used to
investigate integrated biopsychosocial pathways to diverse health outcomes (positive and negative). Relevant human populations include longitudinal survey and community samples. Relevant animal populations include free-ranging and laboratory colonies of numerous species. The much-needed integration of behavioral, psychological, social, and environmental conditions, along with biomedical factors, can be facilitated via additions to ongoing longitudinal studies as well as through development of new birth cohort samples. The domain of health promotion and primary disease prevention requires a selected set of communities and core populations within them to provide comprehensive multiple-level health information and to engage in complex community-wide intervention studies.

The multidisciplinary nature of all thematic priorities in this report underscores a critical and pervasive need for training initiatives to nurture, support, and sustain hybrid careers that transcend current disciplinary boundaries. The NIH has had some success in fostering such careers. However, success in the integrative studies central to this report will require a new cadre of scientists facile in working across social, behavioral, and biomedical levels of analysis.

In light of these needs, the NIH should provide core support for sustained infrastructure in two areas:

- longitudinal survey populations, human communities, laboratory animal colonies, and free-ranging animal communities;
- training initiatives to nurture and regularize the hybrid (multidisciplinary) careers of a new generation of scientists.

Any long-term plan for research should be adaptive and subject to regular reassessment. This would be most effectively accomplished with cross-institute strategic planning and trans-institute initiatives. It is our hope that this report provides NIH with the rationale to implement a wide-ranging and long-term commitment to integration of the behavioral, social, and biomedical sciences in pursuit of improving the health of the U.S. population. Our final recommendation pertains to this larger integrative task.

**The Need to Institutionalize the Integrative Approach at NIH**

The vision of research proposed in this report, with its focus on the unfolding interactions between genetic, behavioral, psychosocial, and environmental factors over time and its recurrent emphasis on multilevel analysis, highlights the need for greater cross-institute strategic planning and trans-institute research initiatives. The committee has not been asked and is in no position to make detailed recommendations regarding the structure of NIH. However, in our judgment, the success of an integrative research approach will require collaborative efforts of the entire NIH community of scientists—medical, biological, behavioral, and social. Both incentive structures and an institutional presence will greatly facilitate such collaborative strides. As a first step the committee recommends that NIH create internal mechanisms for developing consensus on the most promising research opportunities within and across the thematic priorities as well as a locus for strategic planning for future trans-institute initiatives.

**Pathways to Health: A Vision for the Future**

The committee received very useful input from the Council of Public Representatives (COPR). The COPR offers a public forum for discussing key NIH issues (e.g., priority setting, clinical trials, managed care, privacy and genetics, health disparities). COPR members review and advise on NIH priorities and thereby provide public input to NIH decisions. Its strong message to the committee was that NIH should do more to help people create and lead healthy lives. Many people perceive NIH as focused on curing disease rather than on promoting quality living, optimal families, supportive work environments, and healthy communities. The COPR also called for more information about how the general public can take more effective responsibility for its own health care. The thematic priorities in this report are very much a response to these messages from COPR. The priorities point toward multiple new directions at NIH that are intended to promote better health for ever larger segments of the U.S. population via deeper understanding of the interacting processes (biological, psychological, social, environmental) through which illness occurs or wellness is maintained. The ultimate payoff for the health of the public of the pathway focus emphasized throughout this report is prevention and health care strategies that are more effectively tailored and targeted to the set of circumstances confronting individuals, communities, and populations.