



THE AD HOC GROUP FOR MEDICAL RESEARCH

Examples of Research That Could Be Supported Through Additional Investments in NIH

The National Institutes of Health (NIH) is the world's premier medical research agency. Every day, researchers supported by NIH across the country make progress in their efforts to give patients and families the hope of a healthier future. Below are examples of promising research opportunities that could transform into new and better preventions, diagnostics, treatments, and cures as a result of sustained, robust funding growth for the NIH.

ALLERGY AND INFECTIOUS DISEASE

Emerging Infectious Diseases

- There has been a significant uptick in the number of infectious diseases that have jumped from animals to humans over the past 25 years. The recent emergence of a novel coronavirus in humans highlights how advances in sequencing, surveillance and phenotypic characterization is allowing scientists to gain a deep understanding of the potential risk of animal viruses to the human population. Additional investments in to identify animal viruses that pose a risk to humans will improve our ability to respond to these emerging viral diseases and resulting pandemics.¹

Antimicrobial resistance

- Every year, an estimated 700,000 people worldwide die from drug-resistant infections, and by 2050, this number is predicted to rise to 10 million. Thanks to NIH funding, we have mapped the genomes of countless microbes and developed ways to target those that cause disease, but addressing a complex problem like AMR requires a continued investment in basic, translational and clinical research to better understand mechanisms of microbial resistance to drugs, and to develop more precise clinical diagnostics, novel and effective therapeutics, and lifesaving vaccines.²

IMPROVING CANCER OUTCOMES

Cancer Death Rates

- Every breakthrough in the diagnosing, preventing and treating of cancer over the last 50 years is due to federal investment at the NIH and the NCI. Among the advances are new therapies for patients based on specific genetic mutations, regardless of the site of the tumor. These targeted therapies are highly effective in certain patients and are changing the way we approach cancer treatment.^{3,4}
- From 1991 to 2017, the cancer death rate has declined by 29%, including a 2.2% drop from 2016 to 2017 - the largest single-year drop in cancer mortality ever reported. Despite the steady 26-year decline in overall cancer mortality, cancer is still the second leading cause of death in the US, and continued investment in research is essential to saving the lives of cancer patients both today and in the future.⁴

New immunotherapies

- Discoveries related to immunotherapy (using a person's own immune system to fight disease) were recognized in 2018 by the Nobel Prize in Physiology or Medicine as a "landmark in our fight against cancer."⁵ These and other basic research discoveries, largely funded by NIH, have contributed to the FDA approval of immunotherapies to treat several solid tumors and blood cancers, and offer real hope of new treatments and cures for both cancer and numerous other diseases.⁶

- Researchers are working to develop new approaches to CAR-T immunotherapy that target cancer cells more effectively and reduce re-occurrence of deadly cancers after treatment. Additional NIH funding will enable NIH grantees to continue to develop the new treatments and improved public health efforts that are contributing to an almost 30% drop in cancer deaths nation-wide since 1991.⁴
- CAR T-cell therapy is an innovative and transformative cancer therapy. There are currently two approved products – one for diffuse b-cell lymphoma and the other for acute lymphoblastic leukemia – which have proven to be life saving for certain patients who have exhausted all other therapies. CAR-T therapy would not be available to patients without NIH research support. Currently, two products for multiple myeloma, one of which was developed with NIH support, are awaiting FDA approval. CAR-T and other immunotherapies hold enormous promise for treating multiple forms of cancer and additional NIH support is necessary for these innovative therapies to be translated from the bench to the bedside.⁷
- Progress in the development of new systemic cancer therapies, like immunotherapies, have not only improved patient survival and quality of life, but are now beginning to transform surgical approaches to cancer treatment. Recent strides have been seen in the effectiveness of these treatments in reducing the amount of surgery and the success of surgery, especially when these targeted therapies are administered pre-surgery. In fact, pre-surgery systemic therapies have paved the way for more successful, less invasive surgery for advanced melanoma, have proven an alternative to immediate surgery in treatment of renal cell carcinoma, and pre-surgery use of them have led to more successful surgeries for pancreatic cancer patients. These advances would not have been possible without robust funding from the NIH.⁸

Supporting Cancer Research

- Cancer is the second leading cause of death in the United States. While funding for cancer research through the National Cancer Institute (NCI) is high in absolute terms relative to other institutes, it actually has the lowest payline, with only the top 10% of applications being funded. Thus, we urge increases in NCI funding to enable advances in cancer research to reduce deaths from cancer.⁹

Lung Cancer

- Thanks to prevention research funded by NIH, the ability to screen for and potentially detect lung cancer early, when it may be more treatable, was achieved for public health. The US Preventive Services Task Force recommendation to screen for lung cancer with low dose CT scan (LDCT) has influenced the care of millions of Americans. We hope NIH and its Office of Disease Prevention (ODP) will continue to fund important research in primary prevention and early detection across the lifespan, to lessen the burden of chronic diseases, catch cancers when they are in the treatable stages, and improve the quality of life of countless Americans and their loved ones.¹⁰
- According the American Cancer Society's Cancer Facts & Figures 2020, the death rate from cancer in the U.S. declined by 29 percent from 1991 to 2017, including a 2.2% drop from 2016 to 2017, the largest single-year drop ever recorded.” The decline in deaths from lung cancer drove the record drop. However, it should be noted that the absolute number of lung cancer cases and deaths from 2016 to 2017 actually still went up, making lung cancer the leading cause of cancer death in the U.S.⁴

Image-Guided Cancer Therapies

- Funding from the National Cancer Institute (NCI) has opened new horizons in minimally invasive therapies for cancer and we are just beginning to unravel the whole-body biologic effects of local interventions. There is now wide appreciation that image-guided therapies have powerful and lasting effects on the immune system, effects that were completely unexpected just a few years ago. With additional support this knowledge can be leveraged to train the immune system to better fight and perhaps even prevent cancer.^{11,12,13}

Cancer Survivorship and Secondary Cancers

- With the number of cancer survivors projected to rise to 20.3 million by 2026, there has never been more of a need for interventions designed to decrease risk of recurrence and secondary cancers in cancer survivors. Thanks to research done over the past decade, we know that there is a link between increased physical activity and improved longevity of cancer survivors for at least three of the most common types of cancer (breast, colon and prostate). Additional research is needed on best practices for implementation of this important tool into traditional cancer care.¹⁴

Deadliest Cancers

- NIH and NCI research has contributed to the recently reported decline in cancer-related deaths. However, this year, nearly one-half of all cancer-related deaths will be caused by one of the deadliest cancers, which were defined by the Recalcitrant Cancer Research Act as those with a five-year survival rate below 50 percent and include cancers of the brain, esophagus, liver, lung, ovaries, pancreas, and stomach. Continued investment in the NIH is critical to developing the effective treatments and early detection tools that are currently lacking for these diseases.⁴

Women’s Cancer Treatments

- Of the five leading causes of cancer mortality for men and women, mortality rates are on the rise for pancreatic, liver, and ovarian cancers. These three cancers are estimated to account for almost 16% of cancer-related deaths in 2020. Challenges remain in the prevention, detection, and treatment of these cancers. Early detection is not yet possible for all of these cancers, and there are not yet sufficient treatment options for pancreatic and liver cancers. Development of effective screening tests and treatments is critical to decrease the mortality from these cancers, and such development is only made possible through research. Funding from the NIH is critical to advance research in prevention, early detection, and treatment for these and other cancers to ensure the cancer death rate continues to decline in the years to come.^{15,16,17}

DIABETES, DIGESTIVE AND KIDNEY DISEASES

Acute Kidney Injury

- Acute kidney injury (AKI) is a sudden shut-down of kidney function that can occur when patients are hospitalized for various conditions. AKI can lead to kidney damage and even kidney failure if not treated promptly. Because there are no drugs to treat AKI, patients are frequently put on dialysis to clear waste products from their blood until their kidneys can recover. Finding biomarkers that signal the beginning of AKI would allow physicians to identify and treat at-risk patients more quickly. Further research is also needed to understand the prevalence of AKI and develop new strategies including drugs to treat it.¹⁸

Type 1 Diabetes

- Thanks to research funded by NIDDK, clinical trials have determined that patients with Type I diabetes are better able to control blood glucose levels through a technology known as the artificial pancreas, an “all-in-one” diabetes management system that tracks blood glucose levels using a continuous glucose monitor (CGM) and automatically delivers the

hormone insulin when needed using an insulin pump. The FDA approved system frees people from testing their blood sugar levels multiple times a day by fingerstick, and from delivery of insulin by multiple daily injections. By making management of type 1 diabetes easier and more precise, this technology could reduce the daily burden of this disease, while also potentially reducing diabetes complications including eye, nerve, and kidney diseases.¹⁹

Chronic Kidney Disease

- Chronic kidney disease affects over 37 million people in the U.S. and one in every three U.S. adult is at risk of developing chronic kidney disease during their lifetime. Kidney disease accelerates cardiovascular disease and premature mortality and is associated with high out of pocket costs for healthcare. Despite the high financial and personal burden, research investment in kidney disease lags behind all other chronic diseases. Currently, almost three-quarter of a million people in U.S. have kidney failure which is managed with a kidney transplant or dialysis and costs for treatment exceed 68 billion dollars annually. Without increased investment in prevention, the total number of patients with kidney failure will likely exceed 1 million by 2030.²⁰

HEART, LUNG, AND BLOOD DISORDERS

Cardiovascular health

- With the increase in life expectancy, deaths attributable to diseases of the heart or cardiovascular disease increased steadily from the early 1900's until 1980. Research into treatment and prevention of cardiovascular disease funded in large part by the National Heart, Lung, and Blood Institute (NHLBI) and other federal agencies led to the sharp decline in CVD-linked mortality rates observed in the last twenty years.²¹

Pulmonary Fibrosis

- Funding for basic research from NHLBI helped spur the development of two approved therapies for certain types of pulmonary fibrosis (PF), a deadly group of lung diseases affecting over 100,000 Americans. However, neither drug provides a cure and further research is needed to better understand issues like the causes of PF and genetic variants that play a role in some forms of PF.²²

Peripheral Arterial Disease

- Peripheral Arterial Disease (PAD) is a common circulatory problem in which one or more arteries supplying blood to the legs, arms, or abdomen become blocked. PAD affects 200 million patients worldwide and has a higher prevalence than all cancers combined, but the disease is substantially underdiagnosed since most experience few symptoms until irreversible damage is done and may result in amputation. Investments in researching best practices for screening and awareness of PAD will reduce unnecessary amputations and save lives.²³

Hemophilia

- Developing an inhibitor (an immune response to treatment) is an extremely costly, life-threatening complication of hemophilia that significantly increases morbidity and mortality for the roughly 1/3 of individuals with hemophilia and an inhibitor. Thanks to current studies funded by NHLBI, NICHD, and NIGMS, scientists better understand the underlying mechanism that causes inhibitor development and how best to mediate its impact. Continued funding is necessary to better understand the clinical significance of long-term inhibitors and to develop novel therapies and technologies to circumvent their development.²⁴

MEDICAL IMAGING AND BIOENGINEERING

Imaging

- Heart disease is the leading cause of death in the US and doctors need better ways to detect it. Through research into sophisticated imaging techniques funded by the National Institute of Biomedical Imaging and Bioengineering (NIBIB), doctors can now peer into the human body with pinpoint accuracy and even eliminate or repair unhealthy tissue. A first-in-human pilot imaging study using an improved optical imaging technique shows improved heart attack prediction.²⁵
- Scientists propose a network of imaging centers to drive innovation in biological research that would provide collaborative, interdisciplinary spaces need for the design, development, application, and teaching of advancing biological imaging techniques with real-world biological applications. For the proposed centers to optimally succeed, they will need expert staff scientists who engage in and catalyze collaborations among the major players in the imaging ecosystem.²⁶

MULTIDISCIPLINARY RESEARCH

Prevention Research

- Interventions to prevent diseases can yield large and sustained reductions in morbidity and mortality. Collaborative efforts bringing together clinicians and researchers from multiple disciplines will be needed to develop and test novel approaches to prevention. Interventions that enhance prevention for medically underserved populations and that can be disseminated and implemented at scale will be especially impactful.^{27,28}

Understanding the “Whole Person”

- To truly improve health and eliminate suffering from disease, research must consider the “whole person,” from the molecular and cellular level, to the social, environmental, behavioral, and biobehavioral factors impacting human life. A frontier in health research yet to be conquered is understanding the critical interplay of all factors; investments in behavioral and social science research prevent us from having only a partial picture of health and disease.²⁹

MUSCULOSKELETAL DISORDERS

New Targets for Tissue Engineering and Drug Development

- Research on the extracellular matrix will lead to better tissue replacements and novel drug targets. Understanding new extracellular matrix targets will be important for fracture healing, construction of artificial blood vessels and heart tissues, and for new treatments aimed at cancer, inflammatory diseases, genetic diseases like muscular dystrophies, aortopathies, and kidney diseases, and for diseases of aging (for example, osteoporosis, glaucoma and sarcopenia).³⁰

Spinal Muscular Atrophy

- Thanks to basic research funded by NINDS, two approved medications are now available to help control symptoms of patients with Spinal Muscular Atrophy (SMA), the most common genetic disorder linked to infant death worldwide. Clinical trials have recovered motor movements in infants with SMA, improving their head control, crawling, walking, and sitting, and this therapy will likely also benefit patients suffering from other motor dysfunctions, such as Parkinson’s, Lou Gehrig’s, and Huntington’s diseases.³¹

Musculoskeletal Illness

- The burden of musculoskeletal illness is ever increasing and represents the single largest cause of missed days from work and compromise in labor productivity from any illness. Collectively, neck and low back pain account for nearly 25% of all people changing jobs, and osteoarthritis is the main cause of general activity limitations accounting for 22% of

walking difficulties. In addition to mechanistic science to better understand the biologic underpinnings of disease, pragmatic comparative effectiveness trials are essential to better improve quality of life and optimize function of the general population.³²

COMMUNICATION DISORDERS

Speech Disabilities

- Thanks to the support by the National Institutes of Health’s Brain Research through Advancing Innovative Technologies (BRAIN) Initiative, a study was done could improve quality of life for those who are speech disabled. Down with Dystonia is excited to move forward with a clinical trial that will unearth more discovery into speech function, which is still not very well understood.³³

EYE DISEASE

Stem Cell-based Therapy to Treat Vision Loss

- In late 2019, the National Eye Institute launched a first-in-human clinical trial to test the safety of a novel patient-specific stem cell-based therapy to treat the “dry” form of Age-related Macular Degeneration (AMD), the most common form of the disease and the leading cause of vision loss in the age 65+ population. The therapy takes a patient’s blood cells and converts them into induced pluripotent stem cells, which are programmed to become retinal pigment epithelial (RPE) cells, the type that dies in early AMD. The therapy “shores up” the remaining RPE cells, which are necessary to nurture the light-sensing photoreceptor cells in the retina responsible for vision.³⁴

Vision Loss

- Vascular endothelial growth factor (VEGF) is a protein produced by cells in the body, which when overproduced, can cause abnormal blood vessels to grow in the eye, causing damage to the eye and low vision or blindness. Thanks for funding from the National Eye Institute (NEI) researchers developed a treatment called anti-VEGF to help stop the overproduction of VEGF.) Initially studied as a possible cancer treatment, anti-VEGF was shown to slows the development of blood vessels in the eye by blocking VEGF from developing new cells. This also delays vision loss and may improve vision for patients with several conditions including wet age-related macular degeneration, retina swelling (i.e., macular edema), diabetic retinopathy and retinal vein occlusion.^{35,36,37,38}

ENVIRONMENTAL HEALTH

Adolescent E-Cigarette Use

- Over 5 million youth report current use of an e-cigarette, and a significant proportion report regular use indicative of nicotine dependence. Despite these troubling numbers—which represent a 135% increase since 2017—there is virtually no data on how to treat an adolescent with e-cigarette dependence. Additional NIH funding is urgently needed to support research on the most effective tobacco cessation modalities for adolescents.³⁹

NEUROLOGICAL DISORDERS

Parkinson’s Disease

- Deep brain stimulation (DBS) is a therapy for Parkinson’s disease patients in which electrodes are implanted into specific areas of the brain to treat tremors, loosen muscles, ease motion, and allow patients to reduce their dosage of medication. More than 100,000 Parkinson’s patients have undergone the procedure since 2002. In 2009, DBS was approved to treat obsessive compulsive-disorder, and researchers are currently looking at how it can be used for patients with Tourette syndrome and dementia.⁴⁰

Seizures

- Every year 150,000 people in the US will experience new onset seizures, and about 45,000 of them will continue to have seizures that continue unchecked despite best medical therapy. Public investment in research has led to an explosion in identifying many of the causes of those epilepsies, particularly in genetics. Expanded investment by the NIH will allow those initial discoveries to translate into meaningful understanding of how epilepsy arises, how seizures change from treatable to poorly responsive, and how to intervene in these many different patient populations to prevent or treat their epilepsy and improve quality of life.^{41,42}

Epilepsy

- NIH is funding the first preventative clinical trial for epilepsy in the US, the PREVeNT (Preventing Epilepsy Using Vigabatrin In Infants With Tuberous Sclerosis Complex [TSC]) trial.⁴³ While this groundbreaking trial could change the course of TSC for future generations, two-thirds of those living with epilepsy due to TSC are not controlled with existing anti-seizure therapies. More NIH funding would enable additional clinical trials to find new treatments – or optimize use of existing treatments – to fully control epilepsy in the approximately 50,000 Americans living with TSC today.
- There are 3.4 million Americans living with epilepsy. Advancements have been made in understanding and treating epilepsy, but therapeutic options that address the outward symptoms do not treat the underlying cause. Further investment in the NIH will help advance disease modifying or even prevention strategies for the epilepsies, as well as to pilot new trial designs that such interventions would require in order for these therapies to reach the community. More research is also needed to develop and validate biomarkers of epilepsy severity, progression, and treatment response.⁴⁴

Migraine

- Migraine is the 2nd leading cause of global disability (YLDs), and the 2nd leading cause of global neurological disease burden (DALYs). Headache disorders remain the most underfunded NIH research area among the nation's most burdensome diseases in NIH analyses (i.e. diseases yielding >500,000 DALYs/year). Enhanced funding for migraine research is essential and offers the possibility to inform research in other pain disorders, including opioid-induced paradoxical pain.⁴⁵

Perioperative Brain Health and Influence on Long-term Cognitive Outcomes

- Post-surgery delirium and delayed cognitive recovery are complications of significance to the elderly surgical population. The incidence of post-surgery delirium ranges from 5 to 15 percent, however, with certain high-risk groups such as patients with hip fracture, the range can be between 16 to 62 percent. There are currently few good preventative or treatment strategies for these conditions.⁴⁶

Understanding the Human Brain

- This increased support will accelerate advances in the technology to analyze human brain activity in patients. This will open new opportunities to understand, prevent and treat neurodegenerative and neuropsychiatric disorders including dementia, Parkinson's, major depression and traumatic brain injury.^{47,48}

AGING DISORDERS

Alzheimer's Disease

- Alzheimer's disease (AD) is the leading cause of dementia, affecting an estimated 5.2 million Americans. The prevalence of AD is increasing with the aging population and is expected to reach 13.8 million Americans by 2050. Between 2000 and 2017, deaths

resulting from stroke, heart disease, and prostate cancer decreased, whereas reported deaths from AD increased 145%. AD is now the sixth leading cause of death in the United States and the fifth leading cause of death in Americans 65 years or older. Medicare payments for beneficiaries with AD and other dementia are three times higher than for beneficiaries without these conditions, and total U.S. health care expenses associated with dementia are estimated to be \$290 billion dollars in 2019. Continued investment will allow researchers to proceed with investigating early detection and diagnosis methodologies as well as potential disease modifying therapies.⁴⁹

Neurodegenerative Disease

- Robust funding for NIH supports fundamental research into the cure and mitigation of neurodegenerative diseases, such as Parkinson's disease and Alzheimer's Disease. Michigan State University investigators have a keen focus on this and other critical areas for the ageing U.S. population.^{50,51}

Healthy Aging

- It is well known that the prenatal and early life of a human have profound, lasting impacts on their life. Researchers at Florida State University are studying specific traits that lead to healthier lives so that we can better identify when these factors are not being met in the adolescent stage and intervene to facilitate proper growth. The Florida State researchers are focusing on two key personality traits, conscientiousness and neuroticism, as they are known to have connections to diseases like Alzheimer's later in life. This research has the potential to significantly improve health and aging and would not be possible without a grant from NIH and appropriations from Congress.⁵²

GENETICS, ETHICS, AND PRECISION MEDICINE

Molecular Basis for Precision Medicine

- Precision Medicine encompasses a multitude of research and interventional strategies to better identify and deliver effective therapies to patients. Despite advances in big data analyses and therapeutics for some monogenic orphan diseases and some cancers, there exists many gaps in our understanding of the genetic and molecular basis of drug response, resistance and drug metabolism and safety. Additional investment is also needed to increase the utilization of artificial intelligence in basic biomedical science, enabling drug discovery research for neglected and orphan diseases and advancing new translational medicine strategies.⁵³

Bioethics

- As new technologies are developed that have the potential to improve health, research on the bioethical aspects of biomedical research can improve the design of research, how participants are engaged and how findings are implemented. For illustration, NHGRI has facilitated the integration of bioethics scholarship with clinical research to learn about the ethical, legal and social implications of advances in genomic research and clinical practice. Further, the NIH office of science policy coordinated the funding of 30 bioethics project across the NIH in 2019 to address emerging issues in research and science policy.^{54,55}

UNDERSTANDING BASIC BIOLOGY

Mitochondrial Disease

- A large number of diseases, including many that are fatal, are caused by mutations of mitochondrial ATP synthase. But our ability to treat these diseases is hindered by absence of key information. Studies funded by the National Institute on General Medical Sciences (NIGMS) have made large strides towards uncovering the structure of this protein, which is a necessary step to make new medications to target these fatal diseases.⁵⁶

SUBSTANCE USE, ADDICTION, AND PAIN

Pain Management

- More than half of office-based physicians recommend at least one complementary health approach to their patients, according to a new analysis of data from a nationally representative survey, with massage therapy the most commonly recommended approach. Research conducted through the NIH and ongoing/needed research contribute to further recognition of the cost effectiveness, value and efficacy of massage therapy as a non-opioid alternative therapy for pain management in a variety of acute and chronic conditions, including low back pain, neck and shoulder pain, headache, cancer, fibromyalgia, HIV and infant care.⁵⁷

Chronic Pain

- Pain is a subjective experience with sensory, cognitive and affective components. The neurophysiological mechanisms underlying the transition between acute and chronic pain states remain largely unknown. Many peripheral sensory mechanisms involved in nociception have been investigated over the last three decades, but this knowledge has not translated into effective new pain relief. New investigations into the cognitive and affective components of the chronic pain experience will necessarily complement a comprehensive understanding of the chronic pain experience.⁵⁸

HEALTH SYSTEMS RESEARCH

Palliative Care

- While medical advances have transformed previously fatal conditions such as cancer and heart disease into illnesses that people can live with for many years, they have not been accompanied by corresponding improvements in quality of life for these patients and their families – particularly in late stage disease. Fewer than 0.3% of all grants awarded by the NIH address pain and other symptom, communication, and health services research for persons living with serious illness and their families. These percentages have remained unchanged for over 15 years. Further efforts are needed to develop the evidence base for palliative medicine.⁵⁹

NUTRITION

Role of Diet in Immunity and Disease

- The patient community is encouraged by the NIH focus on precision nutrition as evidenced by the latest Common Fund initiative and the NIH Nutrition Strategic Plan. One of the most common questions patients ask is what they should eat to improve their condition. With additional funding, NIH could expand nutrition research to consider how food translates to disease activity, including the impact of diet/nutrition on mucosal immunity, the impact of nutrition on the mind-gut relationship, and the role of the gut in underlying mechanisms of disease.⁶⁰

NURSING RESEARCH

- From data science to genomics and precision health to palliative care, the National Institute of Nursing Research (NINR) is essential to ensuring that nurse scientists can continue their groundbreaking research. In fact, NINR funds 80% of training grants and more than 70% of Center grants that supports research-focused educational programs and infrastructure at Schools of Nursing alone.⁶¹

MENTAL HEALTH

Mood Disorders

- Patients living with mood disorders are seeking treatment outcomes beyond symptom reduction. The Depression and Bipolar Support Alliance (DBSA) has surveyed the patient community and received direct feedback during an externally-led patient focused drug development meeting. The Voice of the Patient Report from that meeting provides insights into areas of research.⁶²

Reducing the Rate of Suicide in Black Adolescent Teens

- From 1991-2017, the rate of reported suicide attempts by Black teens rose while suicide attempts by teens in other racial and ethnic groups fell. Further, the suicide rate among black children between the ages of five and 12 has increased substantially since 1993. This growing disparity in suicide rates among black children and adolescents point to the need for cooperative action among HHS agencies. Research shows that mental disorders, genetics, and availability of means of committing suicide are key risk factors in youth suicide. For Black youth, additional structural issues may be involved, such as the lack of readily available, culturally appropriate, and evidence-based suicide prevention interventions, coupled with a severe shortage of diverse and trained mental health professionals.^{63,64}

WOMEN’S HEALTH, MINORITY HEALTH, AND HEALTH DISPARITIES

Reducing and Eliminating Racial/Ethnic Health Disparities More Effectively

- Health disparities result from the complex interaction of multiple factors including individual, genetic, and environmental risk factors. These disparities may exist even when minorities are highly educated and have adequate access to care, along with a higher socioeconomic status. Accordingly, complex analyses are needed to reveal the impact of multiple interacting health determinants on health disparities. The scientific understanding of these factors may lead to needed “complex interventions designed to improve racial and minority health and to reduce or eliminate health disparities more effectively.”⁶⁵

Women’s Health and Health Equity

- NIH funding could be vital in helping us determine why certain populations of women present with more advanced breast cancer, breast cancers with more intrinsically aggressive features even when they present at the same stage, and why some women (specifically black women) show poorer outcomes when diagnosed with cancer of the same stage and tumor profile as white women. These disparities are not restricted to race and also adversely affect rural, urban poor and uninsured women in ways that are not simply attributable to screening access. Identification of addressable factors could improve mortality and morbidity statistics for American women across a wide socioeconomic range.^{66,67,68}

Women’s Health

- NIH has made great progress in advancing women’s health through new policies to ensure that sex as a biological variable is appropriately considered in basic biomedical research and that women are included in clinical trials. Additional funding across the NIH will help researchers better understand the sex and gender influences and differences in endocrine conditions such as thyroid disease, sarcopenia, or diabetes, ensuring that future prevention and treatment options are personalized for both men and women.⁶⁹

MATERNAL AND CHILD HEALTH AND HUMAN DEVELOPMENT

Maternal Health

- The Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) has articulated goals to address maternal health and mortality and has identified a number of areas where research is needed. A sample of these areas includes the disparities in rates of pregnancy complications, treatment success, and short- and long-

term outcomes; appropriate and safe use of medication during pregnancy; and effects of pregnancy and childbirth on women's health across the lifespan. Despite research already underway at NIH, maternal mortality rates in the United States are rising and more work is needed to reverse this trend. Increased funding for the efforts of NIH and NICHD is critical to developing solutions that improve outcomes in women's health.⁷⁰

Maternal Mortality

- Maternal mortality has been rising markedly over the last decade. The level of maternal mortality in the US exceeds that in most developed countries. Recent data from the National Center for Health Statistics indicates that maternal mortality is not the only cause of death that has risen among middle aged Americans in this century. NIH recently released a request for information on a proposed, trans-NIH initiative to decrease maternal mortality, focusing on community-based participation by health care, government, and community stakeholders and research opportunities to address risk factors and identify biomarkers of maternal mortality.^{71,72}

Unintentional Injury

- In the US, unintentional injury is the leading cause of death in those ages 1 – 44 years and medical expenditures and monetary loss from trauma more than double the loss from cancer, diabetes and heart disease. Despite calls from the Institute of Medicine and a New England Journal of Medicine report demonstrating injury being severely underfunded in relation to its burden of disease, injury remains the most underfunded disease based on its measured burden. Additional funds to the NIH could resolve this unfortunate funding discrepancy and improve the care of numerous injured children and adults.⁷³

FOSTERING TOMORROW'S MEDICAL RESEARCH WORKFORCE

Support for Early Stage Investigators

- To allow more of the best and brightest young scientists to pursue biomedical research and ensure that our nation has a diverse and inclusive biomedical workforce, NIH has committed to funding more Early Stage Investigators (ESIs) through its Next Generation Researchers Initiative. The agency has ramped up its support for ESIs and is now aiming to fund approximately 1,000 early-career investigators each year.⁷⁴

Promoting Diversity in the Research Workforce

- Despite efforts to promote diversity in the biomedical research workforce, minority scientists have a lower rate of success in receiving R01 funding from the National Institutes of Health compared to white scientists. A recent study to identify causes of this funding gap found that disparate funding rates arise at three steps in the application process: decision to discuss, impact score assignment, and topic choice. African American applicants tended to propose research on topics with lower award rates. These topics include research at the community and population level, as opposed to more fundamental and mechanistic investigations.^{9, 10, 75}

DATA SCIENCE AND COMPUTATION FOR HEALTH

- The biomedical and life sciences research supported by NIH has generated massive volumes of fundamental, translational, and clinical research data. New technologies like artificial intelligence, machine learning, and associated computational approaches can accelerate the pace of biomedical research and innovation.⁷⁶ NIH investment in data science, infrastructure, and computational approaches will usher in a new era in biomedicine where big data and cutting edge analytical approaches are harnessed to significantly improve our ability to understand, prevent, and treat many of the diseases and conditions that impact human health and well-being.⁷⁷

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