THE FUTURE OF HEALTH

WHERE WE'RE GOING TO HAVE AN IMPACT

Global challenges that affect human health and well-being are rooted in a complex and ever-evolving web of sociodemographic and biospheric systems. These challenges are broad and pervasive in Oklahoma, as evidenced by the state’s unenviable position at or near the bottom of the national rankings in most health indicators. Oklahoma scores poorly in overall health, healthcare system performance, and population health disparities. Building on existing strengths across its three campuses, OU is poised to be at the forefront of transdisciplinary convergent research endeavors that will drive fundamental discoveries related to: clarifying mechanisms and cellular processes to develop new therapies and technologies to combat and eradicate deadly diseases, such as diabetes and cancer, that intersect with clinical and translational research at OU Health; monitoring, predicting, and responding to pathogenic threats, including drug-resistant bacteria, rapidly evolving viral pathogens, environmental risk factors and the geographical expansion of vector-borne and zoonotic diseases; and addressing growing health-related disparities by partnering OU expertise with industry and Oklahoma’s diverse communities.

Eliminating Health Disparities

The U.S. exhibits striking disparities across groups and regions in health outcomes including chronic conditions, disease states, and life expectancy. These disparities are shaped by structural processes of inequality, discrimination, and an economic system that limits access to needed resources in the built, natural, and social environment. The lack of resources, as well as experiences of adversity, lead to biological processes that impact all levels of organismal functioning including gene expression, neurological structure and function, the microbiome, and metabolic processes. Reduced access to resources and increased adversity also shape health behaviors, which combine with biological processes to perpetuate and exacerbate demographic and socioeconomic disparities that negatively impact health outcomes. These poor and disparate health outcomes are an urgent societal challenge, with
billions of dollars in economic costs for the U.S. each year, as well as immeasurable costs for humanity.

Addressing the grand challenge of health disparities requires a dynamic and innovative approach essential to provide resources and build individual and systemic resilience in partnership with affected communities. Large-scale, transdisciplinary and multi-method data collection and analysis is needed to identify existing patterns and the societal and biological mechanisms that drive health disparities. Micro-processes shaping health outcomes can be unpacked by leveraging laboratory-based cellular and animal research. Together, these efforts will converge to identify and implement interventions to reduce health disparities and improve health outcomes for all.

Uncovering and addressing mechanisms driving poor outcomes, particularly for marginalized populations, will lay the foundation for important policy and public health initiatives to increase opportunity and reduce the impacts of adversity. Providing improved resources and opportunities will support the adoption of positive health behaviors and facilitate healthy development across the human lifespan. Together, these interventions will shore up the health of all people and reduce increased risk of morbidity and premature mortality for marginalized populations.

OU’s disciplinary strengths in social and natural sciences and engineering, combined with expertise in disease state prevention and treatment, provide a strong foundation for this strategic investment. Vibrant existing community partnerships with urban, rural, and tribal communities offer unique opportunities to connect converging disciplinary expertise to communities and frontline staff to ensure the feasibility of efforts to intervene on health disparities. As promising interventions are identified, OU experts in public policy and business are poised to partner with translational scientists at OU Health to design, advocate for, implement and scale up promising new strategies. Oklahoma is a state with persistent poor health rankings, and some of its communities are living examples of worse outcomes for minoritized and impoverished groups. We will harness the expertise across our university, from the humanities and social sciences, to the biological and health sciences and other STEM areas, to better determine and address the health needs of these populations. As disciplines from across OU converge to address these grand and persistent challenges, we all win as we support the health of all Oklahomans and provide a model for the nation.

**Molecules to Medicine: discoveries transforming therapeutics and diagnostics**

The molecular identification, characterization, and manipulation of cellular pathways that lead to disease is a global grand challenge in the life sciences. Additionally, the development of advanced technologies for the accurate detection and diagnosis of chronic diseases is critical, especially in Oklahoma, as it has one of the nation’s highest cancer mortality rates and ranks in the top five states for diabetes and obesity. Furthermore, Oklahoma’s Native American population has a higher risk of developing diabetes and are almost twice as likely as non-Hispanic whites to die from diabetes. Research in molecular and cell sciences, technology development, and technology transfer will enable
OU to translate fundamental discoveries into new leads for drug development, new and improved diagnostic capabilities, and ultimately disease treatment.

We will leverage OU expertise in: the development of basic natural and physical sciences, data science and engineering; the Office of Technology Commercialization and strengths in product management through the business college; and partnerships across the university's campuses. Fundamental disease-oriented research on the Norman campus significantly complements clinical research trials and patient care provided at the Stephenson Cancer Center and Harold Hamm Diabetes Center. Other areas of cross-campus research strengths include neuroscience, infectious diseases, antibiotic resistance, the gut microbiome and natural medicines. These areas also support a strategic focus on fundamental research that will pave the way to improved health outcomes. An important component of this approach is the determination of how social, economic, and environmental factors affect drug efficacy at the molecular level and, in turn, impact pathophysiology and patient responses.

It is well known that early detection and treatment of cancer, diabetes and many other diseases decrease the mortality rate by allowing earlier therapeutic intervention. The translation of fundamental research to products and services that may be deployed in the marketplace is well supported by the applied research and capabilities of OU's top-25 business college, including the Center for the Business of Healthcare and the Tom Love Innovation Hub. For example, understanding fundamental mechanisms whereby nutritional interventions impact our gut microbiome has a direct clinical translation for preventing and treating diabetes and obesity risk, as well as cancer therapeutics. Our goal is to develop disease-focused research at OU into a nationally recognized powerhouse in both the basic science and the translation of that science into products and services that will improve the lives of people in Oklahoma and beyond.

OU-Norman researchers are uniquely positioned to focus on the rational development of new drugs and technologies that improve the human condition, particularly in areas of emphasis that align with the OU Health Sciences and OU-Tulsa campuses, such as cancer and diabetes. Our research strengths are focused on understanding the molecular basis of disease to identify druggable cellular targets, develop drug leads and advance technology for disease diagnosis and treatment. Our vision is to join forces with our entrepreneurial colleagues to leverage new insights into diabetes, cancer, and infectious diseases along with the tools to invent and launch revolutionary new diagnostics and treatments for these diseases.

**Predicting, Preventing and Responding to Emergent Pathogenic Threats**

Human population growth, urbanization, societal behaviors, and climate change are accelerating the emergence and migration of pathogenic threats. Such drug-resistant and rapidly evolving pathogens and expanding vector-borne and zoonotic diseases will have significant impacts on planetary health in the coming decades. Understanding and addressing these grand challenges requires innovation at microscopic to global scales in systems ranging from molecules
to the biosphere. The COVID-19 pandemic has demonstrated how the lack of timely and accurate information prevents effective response to an emerging disease, and the impact this can have on vulnerable human populations in both rural and urban areas. There is a need to extend our knowledge of the pathogens that pose the greatest threats, mechanisms that produce them, locations where they will emerge, specific triggers that lead to outbreaks, dynamics of spread, patterns of human vulnerability, and resulting health risks. Convergence research is needed to prevent future pandemics and to ensure a more effective response when new pathogens emerge.

OU will accelerate the development of methods to predict, prevent, and respond to emerging health threats to provide benefits that have broad global impact. A major barrier to addressing such threats lies in the need to clarify the dynamic and ever-evolving interactions between environmental, socioeconomic, and epidemiological factors through convergence across disciplines. To better understand emerging pathogens, we will engage in bold, coordinated, transdisciplinary efforts. This endeavor requires diverse expertise ranging from biologists who study the characteristics and evolution of viruses and microorganisms, ecologists who study the habitat associations of vector and host species, climatologists and geographers who study how environments will change in the future, social scientists who study human behavioral responses and identify populations at greatest risk, and data scientists who apply cutting-edge data analytics to understand complex interconnections.

Specific outcomes will include predictive models that direct disease surveillance toward high-risk locations and times, new informatics tools that can track rapid changes in transmission risk during a disease outbreak, and robust diagnostics and treatments that are quickly adapted and applied in response to novel pathogenic threats. Through transdisciplinary research, OU is well-positioned to develop new datasets and models that will significantly advance our capabilities for predicting environmental risk factors associated with disease emergence and spread, providing critical data for pandemic interventions, and advancing our understanding of microbial resistance and the development of novel therapeutic compounds.

OU has foundational expertise for convergence and applied research on pathogens, including integrative studies of infectious diseases and zoonoses, pathogen invasion and persistence, ecosystem and community resilience, social sciences and human health disparities, and environmental monitoring systems with disease applications. By combining strong expertise in climate research with strengths in evolutionary biology, microbiology, geography, ecology, and social science, we have built a foundation that uniquely positions OU to become a leader in addressing emerging pathogenic challenges that face Oklahoma, the nation, and the world.
MISSION

We will advance positive health outcomes through convergence research to create new therapies, policies and practices that will enable recognition of and response to continuing and emerging disease threats and address social and environmental risk factors to promote health equity in Oklahoma, America, and globally.

VISION

Using innovative approaches, concepts, and applications, we will positively transform the health of all peoples and the biosphere in which we exist.
STRATEGY 1
Organizational Structure

Establish a Future of Health (FH) Institute with effective administrative and research infrastructure, including physical space dedicated to FH convergence research and affiliated shared core facilities, that integrates all three OU campuses, our community and the world.

TACTIC 1.1 Recruit, hire, and integrate an FH Institute Director by Yr1, Q1 and campus-specific Associate Directors with a broad vision to integrate the objectives of the institute by Yr1, Q3.

TACTIC 1.2 Recruit, hire, and integrate administrative FH Institute staff in the areas of financial accounting, managing directorship, marketing and communication, diversity and inclusion, IT, and advancement and identify space for the administrative office(s) in Yr1, Q2.

TACTIC 1.3 Conduct a gap analysis to determine need for contiguous space infrastructure and/or affiliated spaces.

TACTIC 1.4 Work with university officials to identify administrative barriers, resources and strategic plans that will enable convergence research through the alignment of processes and platforms across campuses by Yr1, Q4.

TACTIC 1.5 Identify existing university shared research core facilities that align with the FH institute mission and establish partnerships with the FH institute by Yr1, Q3.

TACTIC 1.6 Establish top-tier infrastructure for drug discovery, including high-throughput screening facility, chemical synthesis, and computational modeling by Yrs2-3.

TACTIC 1.7 Establish top-tier infrastructure for biomedical engineering, including immunoengineering, bioimaging, and biosensor development by Yrs2-3.

TACTIC 1.8 Establish university-level shared infrastructure and safety protocols for working with emerging pathogens or vectors by Yr3.

TACTIC 1.9 Build a plan to coordinate and collaborate with cross-institute and cross-campus infrastructure needs related to health equity, social and environmental risk factors, data integration and analysis by Yrs1-3.
STRATEGY 2

Talent
Incentivize, develop, and sustain transdisciplinary research teams of faculty, staff, postdocs and students in areas of strategic importance to the Future of Health.

**TACTIC 2.1** Identify and recruit existing faculty across campuses to build synergies in FH Institute areas of research by Yr1, Q3.

**TACTIC 2.2** Working with College Deans, Provost, and VPRP offices, build a plan to identify potential transdisciplinary cluster hire opportunities in order to recruit and hire 15-20 new faculty aligned with the FH strategic research areas. (Yrs1-5 with 3-4 new hires per year)

**TACTIC 2.3** Identify resources to help recruit postdoctoral researchers and graduate students in areas of strategic importance to the FH Institute by end of Yr2.

**TACTIC 2.4** Identify resources to help support recruitment and retention of research support staff at a level competitive with national averages and aspirational institutions. (Yrs3-5)

**TACTIC 2.5** Provide incentives in the form of a seed grant program for innovative FH-related convergence research. (Yrs2-5)
STRATEGY 3

Finance
Build a robust and sustainable financial portfolio of dedicated internal and extramural funding for the operational costs of the FH Institute and in support of its convergence research mission.

TACTIC 3.1 Establish five-year pro forma budget, which includes confirmed internal, multi-year investment plan, long-term expectations and external funding needs. (Year 1, Q1)

TACTIC 3.2 Increase federal funding of FH research, particularly from the NIH, by 20% each year. (Yrs1-5)

TACTIC 3.3 Secure funding from foundation and philanthropic sources for funding of FH research projects, endowed chairs (5-10), and core infrastructure. (Yrs1-5)

TACTIC 3.4 Develop stable and sustainable funding streams for filling gaps in equipment and other research needs. (Yrs 4-5)

TACTIC 3.5 Provide seed funding to incentivize FH convergence research teams. (Yrs2-5)

TACTIC 3.6 Establish 3 or more centers of excellence in FH Institute focus areas by Yr5.

TACTIC 3.7 Build a plan to attract industrial and business funding that will lead to development of and licensing of IP. (Yrs 2-5)
STRATEGY 4

Culture

Create diverse, equitable and inclusive transdisciplinary initiatives to support the FH institute and broaden the participation of under-represented groups in health-related convergence research.

**TACTIC 4.1** Create diverse, equitable and inclusive training programs to broaden the participation of underrepresented groups in transdisciplinary health research. (Yrs1-5)

**TACTIC 4.2** Create infrastructure for institutional promotion and dissemination of convergence research. (Yrs1-2)

**TACTIC 4.3** Develop infrastructure to be incubator of FH convergence research from initial ideas to completed projects. (Yrs1-5)

**TACTIC 4.4** Develop a reward system that encourages rather than discourages the risk-taking that is needed to engage in novel transdisciplinary research. (Yrs2-5)

**TACTIC 4.5** Create effective cross-campus collaboration on health equity while strengthening involved colleges and departments. (Yrs1-5)

**TACTIC 4.6** Enhance and promote undergraduate research, leading to promising candidates for graduate students. (Yrs1-5)

**TACTIC 4.7** Build a robust plan to increase the participation of undergraduate research by students from underrepresented groups. (Yrs1-5)
STRATEGY 5

Partnerships
Develop dynamic collaborations with cross-sector community partners that further the FH institute's convergence research and educational mission.

TACTIC 5.1 Conduct an asset mapping exercise of community engagement activities and offices across all three OU campuses and include best practices from peer Universities and Institutes. (Yr1, Q4)

TACTIC 5.2 Develop a list of possible partners (private, NGO, governmental) external to OU and identify opportunities for integrating and co-producing knowledge with communities currently working to improve their own health equity. (Yr1, Q4)

TACTIC 5.3 Identify strategies for leveraging community partnerships to achieve other institute goals, particularly the financing (Goal 3) and culture goals (Tactic 4). (Yr2, Q2)
STRATEGY 6

Marketing

Produce targeted and creative marketing and communication strategies that promote the FH Institute’s mission, initiatives and successes to generate convergence research opportunities and funding and to effect research-based community impact.

TACTIC 6.1 Develop a strategic marketing and communications plan, including identifying target audience, and a selection process, with the FH institute’s leadership and OU’s Marketing & Communication. (Yr1, Q1)

TACTIC 6.2 Establish a FH institute website and social media presence. (Yr1, Q2)

TACTIC 6.3 Establish monthly newsletters to highlight achievements, announce initiatives, feature research groups. (Yr1, Q3)

TACTIC 6.4 Produce news stories that highlight the FH institute’s initiatives and achievements. (Yrs1-5)

TACTIC 6.5 Work with FH institute leadership to produce reports and other publicly available documents. (Yrs1-5)

TACTIC 6.6 Establish a monthly seminar/webinar series on the future of health with internal and external presenters. (Yr1, Q3)