# Human Health Sciences:

***From Cells to Society to Improve the Health of the People in the San Joaquin Valley***

**Principal Authors**

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1. **Executive Summary**

'Human health sciences' is currently a major research and education area at UC Merced. This Strategic Focusing Initiative (SFI) outlines how four proposals from the first round—Healthy Development (Psychological Sciences), Public Health, Health Sciences Research Institute (HSRI), and Molecular and Cell Biology (MCB)—have been combined into a single joint vision how to achieve excellence in research and education related to human health sciences at UC Merced by 2020. We have linked this proposal to other concurrent proposals, thus demonstrating the relevance of human health sciences to many areas on campus and the potential for human health sciences to expand in the future. Our goal is for UC Merced to be world renown in human health sciences research and education by 2020, and this proposal describes what is needed to consolidate and build on upon our achievements to date. We propose to achieve this goal by i) focusing our research and teaching on health issues pertinent to the underserved populations in San Joaquin Valley (SJV), a focus that will bring us national recognition, utilize the existing strengths in the region and at UC Merced, and fulfill our unique mission within the UC system, ii) achieving greater coordination, efficiency, and effectiveness in the development of human health sciences by advancing leadership and establishing a structure for making decisions regarding the future of human health sciences research and teaching, and iii) identifying the high priority health research facilities that will be needed to achieve this goal.

1. **Succinct Definition of Thematic Area**

Our proposal consolidates human health sciences research and education at UC Merced, representing an inter-disciplinary collaboration among several existing and emerging faculty groups and programs. In the first phase of the strategic planning initiative, 10 proposals were classified as relevant to health, with four having human health as their central focus: Psychological Sciences/Healthy Development, Public Health, HSRI, and MCB. This proposal combines these four key proposals, but also identifies the pathway in which other groups and programs on campus can join in the development of human health sciences research and education.

Human Health Sciences

Biomedical sciences

Medical

Education

Other Social Sciences

Public Health Sciences

Psychological Sciences

Human health is represented across a broad range of systems from cells to society, including genes, organ systems, behavior patterns, human relationships, and environmental context. Therefore the human health sciences include scientists from a multitude of disciplines who typically collaborate in multidisciplinary teams. At UC Merced at present, most health scientists are located in the Molecular and Cell Biology, Psychological Sciences, and Public Health groups, but are also present in other units in all three schools (e.g., Sociology, Economics, Biological Engineering, Life and Environmental Sciences). In this sense, human health sciences is likely the largest shared interest by the faculty on our campus, as also evidenced by HSRI having over 75 enrolled faculty (>40% of total faculty), a large portion of students at UC Merced pursuing education based on the health sciences (Biology and Psychology are the two largest undergraduate majors by far), and by the significant financial opportunities for external funding in the health sciences. The Psychological Sciences and Quantitative System Biology (QSB) graduate groups also engage a significant portion of the graduate students currently enrolled at UC Merced (which will be added to with the addition of MCB and Public Health Graduate Groups in the near future). The group of health sciences faculty are responsible for a large portion of grant submissions and awards, with HSRI providing the infrastructure for promoting multidisciplinary research in human health research across all three schools.

1. **Intellectual components of the strategic initiative**

Given that health is fundamental to the existence and prosperity of humans, and that health is the largest single sector in the US economy (accounting for nearly 1 out of every 5 dollars spent), it is not surprising health has been recognized as being central to UC Merced's mission from early in the development of our campus. The 2009 Strategic Academic Vision established “Human Health” as a major theme with 3 objectives: (1) to establish the Health Sciences Research Institute (HSRI), (2) establish a School of Medicine, and (3) evaluate the potential for a School of Public Health. While the campus has moved on from some of these initial recommendations, the factors that led to these recommendations are as valid now as they were five years ago. The future of our nation and especially that of the SJV requires advanced biomedical and behavioral-health sciences, spanning from basic and fundamental to practical, translational research to identify the processes and practices that can support healthy, positive human development. One focus of human health sciences at UC Merced is to promote healthy development in the underserved and diverse (e.g., genetics, ethnicity, language, economic resources, migration history, environmental exposures) populations in the SJV. We are located in a distinct natural laboratory, which provides us a unique opportunity for both advancing fundamental knowledge and benefitting society and distinguishes us importantly from the other UCs. Thus, human health sciences has become a significant theme on campus because a significant percentage of the faculty have an interest in human health research, in part due to the recognition that i) we are located in a region with significant disparities in health and a large, at-risk population and have a community that wants UC Merced to take an active role in improving the health of the people of the region, ii) there are significant opportunities to obtain support from external sources to fund and promote health research and education, and iii) there is strong demand by undergraduate and graduate students interested in careers in health related fields.

There are many examples of how human health sciences research on campus is helping to address the needs of the region. The MCB Unit includes faculty with an interest in Infectious Disease and Immunity, Brain and Behavior and Stem Cell Biology and Regenerative Medicine. Several model organisms (fruit flies, planarians, mice, rats) and human cell lines are utilized for this research, which help to reveal the biological mechanisms that drive human disease and promote human health. We currently have strengths in studying the basic biology, immune response and prevention of viral pathogens such as hepatitis C virus and HIV, and microbial pathogens such as Chlamydia, Porphomonas, and the evolution of bacterial resistance. Potential areas of expansion would be studies of pathogens to which immune response is not well understood, such as the fungi that causes Valley Fever, the parasite that causes toxoplasmosis, and other infectious diseases. Psychological Sciences currently has nationally recognized strengths in research on child health and development, social, emotional, and cognitive processes in illness and health care, health disparities, and advanced quantitative methods with applicability to health sciences (the development of the Center for Statistical And Quantitative Research [CeQR] would enhance this). For example, the Health Psychology faculty group is already among the largest in the nation. Future developments will complement and add depth in these areas. Public Health currently has strengths in health disparities, prevention sciences, environmental health, and health services research. We are particularly interested understanding the health needs of vulnerable populations, the causes and determinants of poor health, and ways to improve the public health system and the health of the population.

Researchers from these areas are currently working on a number of multidisciplinary research collaborations, including:

* Promoting our understanding, detection, and treatment of Valley Fever in the San Joaquin Valley;
* Identifying the genetic and environmental influences on the health of people in the region;
* Improving our understanding of how diabetes and other chronic conditions develop;
* Promoting child health and development by working with parents of at-risk children;
* Improving detection and treatment of cancers and chronic conditions in the region, especially for at-risk populations;
* Working with local health providers and public health departments to help implement the Affordable Care Act in the region; and
* Developing new interventions that are culturally competent to promote health and utilize new technologies.

More generally, faculty have made a significant start in developing a coordinated vision for human health sciences research at UC Merced. Since its inception in July 2012, HSRI has worked with faculty to identify the areas of human health sciences research areas (termed clusters) for which UC Merced would have a competitive advantage when compared with other UCs and universities. The criteria that HSRI has used to identify these areas include:

* Existing faculty strengths on campus;
* Student interest, especially among prospective graduate students to grow our research capacity;
* Track record or potential for research funding;
* Unique opportunities due to our location in the SJV; and
* Potential to be internationally recognized in the area.

This iterative process led to the following more specific health research areas being identified for significant growth on campus:

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| **AREA** | **DESCRIPTION** |
| ***Health disparities*** | Understanding the causes of health disparities and developing interventions that reduce or eliminate disparities in access to health care services or promoting healthy behaviors and lifestyles |
| ***Infectious diseases and immunology*** | Research designed to identify the fundamental aspects of host defenses against infectious diseases, including diseases prevalent in the region such as hepatitis C virus and HIV, and microbial pathogens such as Chlamydia, Porphomonas, and Valley Fever. |
| ***Brain and behavioral plasticity*** | Examines phenomena such as memory, addiction, recovery of function by understanding how these factors influence brain organization and function. |
| ***Cancer and other chronic conditions*** | Research examining the biomedical, social, and cultural aspects of cancer and other chronic diseases such as diabetes, heart disease, and diseases of an aging population |
| ***Health communication and decision making*** | Basic behavioral medicine and health communication theories are used to determine the best practices for communicating health information to patients, providers, and the public. Research includes medical decision making and interdisciplinary collaborations among researchers interested in supporting patient involvement in medical care. |
| ***Public health systems research and policy evaluation*** | Multidisciplinary scientific field that examines how people get access to health care, the cost of care and whether the services are worth the expense, the quality and appropriateness of care provided to patients, and how research discoveries translate into practice and policy (translational research). |
| ***Environmental health and a healthy environment*** | Gauging the impacts of the environment on the public's health, finding ways to mitigate the harm caused to vulnerable populations, understanding the population dynamics and genetics of reservoir species, hosts, pathogens and their interactions, as well as the cultural, social, behavioral, and economic dimensions of healthy ecosystems. |
| ***Health Genetics and Epigenetics*** | Examines the role of genetic factors in determining health and disease in families and in populations, and the interplay of such genetic factors with environmental factors. |

The development of these research areas will be an on-going process, thus allowing human health sciences research to adapt as new opportunities arise. Going into the future, UC Merced will need to identify new areas of human health sciences that have the potential to be C*enters of Excellence* at UC Merced and where we can make significant, even unique, impacts. Human health sciences is broad, and while funding in health sciences remains the largest single area of research expenditure in the country, some areas will see reductions in the coming years. Thus, UC Merced must be strategic in identifying which areas of human health sciences to strive for excellence by 2020.

1. **UCM’s role in this Theme**

Since the 2009 Strategic Academic Vision, human health sciences research and education has become a central part of UC Merced's development. By 2014, faculty had established the Health Sciences Research Institute (with 75 affiliated faculty members), participated in the development of the San Joaquin Prime Program and developed initial recommendations for moving forward with Medical Education on campus, formed a Public Health group with an undergraduate major and minor, and a proposed graduate program, in Public Health. Coupled with the developments in other areas, particularly the establishment of strong programs in Psychological Sciences and MCB, significant gains have been made in developing teaching and research programs in human health sciences on campus.

Despite these advances since 2009, there is significant scope to increase the scope of human health sciences through greater involvement by other groups on campus. As this Strategic Focusing Initiative process has made clear, there are a number of other proposals that include human health sciences as a component or express an interest in expanding into this area. This includes (as indicated in their Strategic Focusing Initiative proposals) Sociology, Economics and Management, Environmental Systems, ReCESS and the Blum Center, Philosophy, Bioengineering, Chemistry, and Cognitive Sciences. So while human health sciences is a significant research and teaching area on campus, there is a need to expand the scope and involvement of other groups.

Expanding the scope of human health sciences on campus would have significant benefits for UC Merced. For instance, while faculty currently collaborate frequently on research projects (both through HSRI and independently), there remain significant untapped opportunities. One of the strengths of UC Merced is that we have fewer silos than other places, thus making it possible to engage in truly multidisciplinary research teams. The research program around Valley Fever is an example of a successful collaboration, demonstrating what can be achieve by a coordinated approach to engage researchers from many disciplines around a common theme. There are many other areas that could also be developed using this model. And while members from many different areas (including Public Health, Psychological Sciences, MCB, Sociology, and Economics) frequently meet to discuss our respective teaching and training needs, there have been relatively few attempts to develop multidisciplinary proposals that would utilize our position as a Hispanic Serving Institution to secure external funding for graduate and undergraduate training programs. Thus, if human health sciences is to continue to develop so as to take advantage of these opportunities, we need greater coordination, leadership, and a structure to facilitate faculty working together to help human health sciences become world renown by 2020.

The need for coordination and leadership is also evident in the current state of Medical Education on campus. UC Merced's involvement with medical education goes back to the very beginning of the university, in part due to expectations in the community. While we remain nominally involved with the SJV Prime Program, there is a consensus among faculty that this program is not sustainable nor is it meeting the needs of the people in the region. The recommendations from a Chancellor-appointed group of faculty were that the campus explores an alternative model of medical education based on the UCSF-UC Berkeley Joint Medical Program. There are several reasons why this is an appropriate time to move forward with medical education: maturation of UC Merced as a campus, closer ties between UC Merced and UCSF-Fresno, critical mass of health research on campus, and change of attitudes among some UC Merced faculty. In addition, as evident by recent events (such as legislation aimed at funding a UC Merced Medical School), the advocates in the community for Medical Education are looking for us to develop a course of action. However, UC Merced is suffering from a lack of faculty leadership in regards to Medical Education, particularly when it comes to being able to represent our views to external stakeholders and partners, and in being able to plan for the future of medical education at UC Merced.

Taken together, this suggests that human health sciences is already a significant area at UC Merced, but additional efforts are needed to realize our goal of achieving excellence in human health sciences research and education by 2020. In part F below, we describe the specific steps and resources. However, central to this proposal is a recommendation that UC Merced hire or appoint a leader in human health sciences on campus. This leader would work with faculty to create a structure that allows for cross-disciplinary and cross–school programs, be a recognized campus leader with the authority to influence developments in health sciences, and lead the further development of Medical Education. Whereas the exact title (e.g., Vice Chancellor of Health Sciences) and responsibilities would need to be determined in consultation with the administration and Academic Senate, duties might include:

* + Strategic planning of human health sciences research on campus;
  + Strategic planning and organization of human health sciences education across graduate groups and Bylaw Units;
  + Responsibility for Medical Education, including representing UC Merced on the SJV Prime Program, working with partners to explore alternative models of medical education, and representing UC Merced in discussions with politicians and the public; and
  + Fund raising and grant development efforts;

1. **What bylaw units/grad groups might participate, and how would they participate?**

As noted we have defined several Strategic Focusing Initiatives with links to human health sciences. Although Psychological Sciences, MCB, and Public Health are the primary groups participating in this proposal, other Bylaw Units, Graduate Groups, and undergraduate programs already contribute to the of Human Health Sciences, as indicated here:

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| --- | --- | --- | --- |
| **Area of Focus** | **Bylaw Units** | **Graduate Groups** | **Undergraduate** |
| Health disparities | Public Health  Psychology  Sociology  Anthropology  Philosophy | Public Health  Psychology  Sociology | Public Health  Psychology  Sociology  Philosophy |
| Infectious diseases and immunology | MCB  Public Health  Psychology | MCB  Public Health  Psychology | Public Health  MCB |
| Brain and behavioral plasticity | Psychology  MCB | Psychology  MCB | Psychology  MCB |
| Cancer and chronic  conditions | MCB  Public Health  Psychology | MCB  Public Health  Psychology | Public Health  Psychology  MCB |
| Public health systems research and policy evaluation | Public Health  Economics and Management | Public Health  Economics and Management | Public Health |
| Health communication and  decision making | Cognitive Sciences  Psychology | Cognitive Sciences  Psychology | Cognitive Sciences  Psychology |
| Environmental health and a healthy environment | Environmental Systems  Public Health | Environmental Systems  Public Health | Public Health |
| Health Genetics and Epigenetics | MCB  Public Health  Psychology | MCB  Public Health  Psychology | Public Health  MCB |

1. **General description of special programmatic needs.**

The importance of health as a research area for the region, the strong demand by undergraduate and graduate students, the potential for significant research funding, and the research interests of faculty already on campus ensures that human health sciences will be a central theme for years to come. The question facing the university is whether it is to grow in a coordinated fashion that allows us to take advantage of the opportunities that exist, or whether growth will be haphazard. We feel strongly that greater coordination will allow UC Merced to tap into the significant external funding opportunities and become world renowned in health research and education by 2020.

From a resource standpoint, some of the resources that human health sciences will require to grow, including new faculty lines, expansion of existing research cores, and development of new research core facilitates, would follow naturally from the expansion of human health sciences graduate teaching and research on campus. For instance, the expected influx of new graduate students in Public Health and MCB will give rise to a need for additional faculty lines, and these new faculty will have research programs that require new or expanded research cores.

The significance of this proposal is to advocate that the development of human health sciences to occur in an organized and coordinated manner that builds upon existing strengths, takes into account student interest (especially among prospective graduate students), is based on a track record or potential for research funding, takes advantage of our unique position in the SJV, and has the potential to be internationally recognized. We propose to achieve these through the following:

* Leadership for human health sciences
  + Appoint or hire a campus-wide leader for the development of these initiatives, which require cross-school collaborations (e.g., Vice Chancellor for Health Sciences).
  + This position could be partially funded through an existing endowment given to HSRI.
* Faculty growth across the disciplines central to human health sciences
  + Develop a formal structure that would allow the graduate groups and bylaw units with an interest in human health sciences to participate in decisions regarding the growth of human health sciences
* Research infrastructure
  + Develop research infrastructures that will allow efficient use of resources. Based on our initial conversations, this might include:
    - Translational Research Center that includes survey research capabilities and mobile community research lab to provide access to patients and providers in the region;
    - Behavioral research labs located in central Merced and other regions for local population studies.
    - Biostatistics, Bioinformatics, and Biobehavioral statistics labs and consultation/support services (done in conjunction with the Center for Statistical And Quantitative Research)
    - Standalone BSL2+ to BSL3 facilities;
    - Genomics core facilities expansion and histology core
* Graduate education
  + MCB introducing an interdisciplinary PhD degree focused upon: (1) Infectious Disease and Immunity; (2) Brain and Behavior, and (3) Stem Cell Biology and Regenerative Medicine
  + Psychology expanding PhD training focused on healthy development through synergies among Developmental, Health, and Quantitative), and collaborations with MCB and Public Health;
  + Public Health introduce an MS and PhD program focused on: (1) Prevention Sciences (in collaboration with Psychology); (2) Environmental Health (in collaboration with Environmental Systems); and (3) Health Services Research (in collaboration with Economics);
  + Introduce a general health sciences curriculum that can be completed by graduate students in other groups who are interested in health sciences;
* Undergraduate education
  + Promote approved BA in Public Health;
  + Introduce a BS in Public Health focused on infectious disease and environmental health
  + Continue offering the BS in Human Biology and BA in Psychological Sciences, but increase the opportunities for students to take courses in other human health-related fields;
  + Collaborate with other programs to develop joint Minor in Health Sciences, including Blum Center and ReCCES;
* Medical Education
  + Continue to support the SJV Prime Program
  + Explore the introduction of the Joint Medical Program (JMP) modeled on the joint UCB-UCSF program

**Conclusion:**

Since being identified in the 2009 Strategic Academic Vision, human health sciences research and education has grown tremendously on campus. For human health sciences to realize its potential by 2020, UC Merced must take a more coordinated approach to its development going into the future. Through better coordination and oversight, UC Merced can make more efficient use of resources (e.g., coordinating hiring to create more efficiencies in the use of shared resources, coordinate teaching so as to avoid duplications of course offerings and maximize the number of graduate students in each course, coordinate research priorities so as to maximize the chance of success in obtaining research funding), identify and secure new funding sources (e.g., multidisciplinary health training programs, support from federal, state, and foundations for research), and have a more coherent approach to projecting UC Merced's image both locally and nationally.

Furthermore, the allocation of these resources, especially new faculty lines, will greatly benefit from additional coordination. Given the large number of faculty (75) and Graduate Groups that are associated with health sciences, there is a need to identify areas where joint hires may promote more than one discipline and create synergies among them. This means that rather than pursuing a siloed model whereby health research and education develops in only 2 or 3 selected areas, human health sciences need to be coordinated so that UC Merced can realize its vision of creating truly multidisciplinary and diverse research and education programs that span many graduate groups and bylaw units focused on critical health issues.