MEMO

March 9, 2011

To: Jane Knodell, Provost

From: Rae Nishi, PhD, Chair, NBH Steering Committee

Re: NBH Description and Accomplishments to Date

The Neuroscience, Behavior, and Health (NBH) spire will marshal existing strengths in neuroscience, psychology, rehabilitation sciences, and medicine together with other units at UVM to investigate personal behavior as a major risk factor for disease and disability. Behavior patterns such as substance abuse, sedentary lifestyle, unhealthy diet, and lack of adherence to medical regimens contribute to many diseases, including cardiovascular disease, site-specific cancers, obesity, type-2 diabetes, fetal alcohol syndrome, and other chronic health problems. NBH will promote transdisciplinary research collaborations that seek a deeper understanding of the fundamental processes underlying these behaviors with the goal of designing effective strategies for promoting health. By doing so, we will raise the visibility of the research and training programs at UVM. For more information about NBH and NBH events, see http://www.uvm.edu/~nbhspire/.

To date, the NBH Spire has promoted the following activities at UVM:

• An NBH Forum Jan 21-22 at the Davis Center that presented research through oral presentations and posters from neuroscience, behavior, and health. There were 235 attendees, including 11 high school students, 24 undergraduates, 57 grad students, and many members of the university community curious about the spire. The exposure to the breadth and depth of neuroscience and behavior research at UVM stimulated many conversations about future collaborations. For more info, see http://www.uvm.edu/%7Euvmpr/?Page=news&storyID=11516

• A Vermont Brain Bee on Feb 12 in the Medical Education Center, with 29 high school age participants accompanied by their parents and teachers. Students
competed on the basis of their knowledge of the brain and were also treated to “brain tours”, a keynote talk on neuropsychological assessment of traumatic brain injuries such as sports related concussions, and a panel of undergrad and grad students at UVM who talked about their research in neuroscience. The winner of the Bee will be sent to the National Brain Bee in Baltimore, MD. For more info, see http://www.uvm.edu/~uvmpr/?Page=news&storyID=11579&category=comall

- An application to the National Institutes of Health for a Center of Biomedical Research Excellence (COBRE) in “Behavior, Neurobiology, and Health,” submitted by Dr. Stephen Higgins, Dept. of Psychiatry and Vice Chair of the NBH Steering Committee. The proposed center will focus on investigating relationships between personal behavior and risk for chronic disease and premature death. It establishes a mentoring network for junior faculty, creates research cores in Behavioral Economics and Intervention Science, Behavioral Genetics, and Neuroimaging, develops a visiting scholars seminar series and an annual retreat in NBH, and supports the efforts of four junior faculty members.

In addition to the above activities, Dr. Stephen Higgins organized a conference on Incentives and Health funded by a contract from the U.S. Navy on Feb 23 & 24 in College Park, MD. The conference was well attended by members of the U.S. military and invited officials from various NIH agencies. Several UVM faculty gave invited presentations: Drs. Phil Ades (Dept. Medicine), Hugh Garavan (Depts. Psychiatry & Psychology), Stephen Higgins (Dept. Psychiatry), Sarah Heil (Dept. Psychiatry), and Stacey Sigmon (Dept. Psychiatry). A copy of the program is at http://www.incentivesinmilitaryhealth.org/agenda/agenda.htm. A supplemental issue of Preventive Medicine will be published on this same topic with invited articles from most of the presenters in the conference.

The following are notable examples of NBH-spire related research collaborations that are currently ongoing:

- A high profile study published 2/24/2011 in the prestigious journal Nature that identified the molecule PACAP and its receptor PAC1 as markers associated with post-traumatic stress disorder was the result of collaborations between molecular neurobiologist Drs. Victor May and Karen Braas (Dept of Anatomy and Neurobiology, COM) with behavioral scientists Drs. Jom Hammack and Donna Toufexis (Dept. of Psychology, CAS). These scientists are seeking NIH funding for this project, so this publication and the publicity surrounding it will enhance chances for funding. This collaboration complements other ongoing work in the Dept. of Psychology that focuses on the role of exercise in alleviating stress and anxiety and is likely to seed larger collaborations across the university. For more info, see http://www.uvm.edu/~uvmpr/?Page=news&storyID=11631&category=ucommfeatureb

- An ARRA funded NIH Challenge Grant to study effects of nicotine on adolescent brains ($1 million for two years) was awarded to an interdisciplinary team of investigators (developmental neurobiologist Dr. Rae Nishi (Dept of Anatomy and Neurobiology, COM), molecular neurobiologist Dr. Felix Eckenstein (Dept of Neurology, COM), clinical neuroscience director Dr. Paul Newhouse (Dept. of
Psychiatry, COM), experimental psychologist Dr. Alexandra Potter (Depts of Psychiatry (COM) and Psychology (CAS)), and behavioral neuroscientist Dr. Donna Toufexis (Dept. of Psychology, CAS). This grant hired three UVM students as research assistants shortly after they received their baccalaureate degrees and employs a number of undergraduates and grad students who assist part time in these studies. This work complements the strengths of ongoing research on smoking prevention in Psychiatry and Psychology and will seed future collaborations.

- Dr. Magdalena Naylor, Professor of Psychiatry, member of the NGP, and Director of the Mind Body Medicine Clinic, works together with John Mantegna, Adjunct Lecturer in the UVM Dept. of Music on an NIH funded project entitled, “fMRI to Investigate the Effects of Chill-Inducing, Pleasant Music on Acute Pain in Healthy Volunteers”. As part of this project, Mr. Mantegna uses his skills in music and computer science. He modifies subject-provided 3-4 min musical tracts with the "chill inducing" music into 1-minute clips with the "chill moment" occurring at the mid-point of the tract. To improve the quality of the provided music he implements his own protocols for music equalization, addition of appropriate gain, dynamic range compression, and spectral masking of fMRI gradient coil noises. As a computer scientist he has made significant intellectual contributions to experimental design, fMRI paradigm design, computer programming of fMRI protocols and for operation of pain machine software. Finally, he has also become the lab expert on FSL data analysis software (which he has helped teach to research assistants, PhD student, and a post-doc associate), is used for structural and functional brain analyses. This collaboration serves to illustrate how individuals from behavior, neuroscience, computer science and the arts can form an interdisciplinary research team.

- Dr. Diane Jaworski, Associate Professor of Anatomy and Neurobiology, is collaborating with Drs. Richard E. Pratley, (Director, Diabetes & Metabolism Translational Medicine Unit), Mina Peshavaria (Res. Asst. Prof. Medicine-Endocrinology) and Thomas L. Jetton (Assoc. Prof. Medicine-Endocrinology) to determine the how fat and insulin secretion may protect females of a special strain of mouse (TIMP2-KO) from developing Type-2 diabetes when they are morbidly obese. In the human population, Type-2 diabetes is a health risk of obesity, so it is important to determine how a person’s physiology contributes to the development of this disease. Dr. Jaworski was assisted in these studies by a UVM undergraduate, Ms. Holly Stradecki, who was supported by a URECA grant and Neuroscience COBRE Summer Neuroscience Undergraduate Research Fellowship. Holly’s research led to a job as a research assistant in Dr. Jaworski’s lab and a research publication in the Journal of Neuroendocrinology. Holly was also very active in K-12 outreach efforts with Neuroscience Grad program students and was instrumental in organizing the first Vermont Brain Bee. She has been accepted into several MD/PhD training programs.

- Research emphasizing transdisciplinary links among behavior, neuroscience, public health, and juvenile justice is being led by UVM Associate Professor of Psychology Timothy Stickle with George Leibowitz, UVM Assistant Professor of Social Work and David Burton, Associate Professor, Smith College. This study will compare two groups of juvenile offenders, adolescent sexual offenders with other delinquent
youth, to determine whether the lack of behavioral control that caused the respective offenses is a result of differences in the history of abuse and neglect that reinforced specific changes in brain circuitry that led to the criminal act. Examples of changes in brain function that could be caused by abuse are a lack of empathy or a loss of the fear of punishment. The finding of such associations will lead to further studies to determine how the circuitry of the brain changes with specific forms of abuse and how these changes affect behavior. The goal of these studies is to develop interventions for youth that can be implemented after the abuse is discovered in order to prevent future criminal behavior.