IBRAF Grant recipients present findings at conferences, meetings around country

Working to encourage partnerships among the state's higher education institutions and other health providers or entities, the Health Sciences System (HSS) awarded a round of grants to support collaborative research in the area of health and biomedical research.

The Inter-institutional Biomedical Research Activities Fund (IBRAF) grants funded pilot studies that awardees could use to develop full-scale grant proposals based on the research results. The criteria for the awards reflect the mission of the HSS which is to increase collaboration within the health training and health care industry. In order to be eligible, proposals were required to have two or more designated co-principal investigators from separate institutions from within the state's public universities and colleges or in partnership with outside health-related entities such as the Nevada Cancer Institute, the Southern Nevada Health District and the Whittemore Peterson Institute for Neuroimmune Disease.

Grant submissions were peer reviewed by content experts from around the country. Awards were given to projects that had the most potential for further research discovery with the specific area of interest and for additional outside grant funding.

A total of five grants were awarded to collaborative teams including researchers from UNLV, UNR, the Nevada Cancer Institute and the Whittemore-Peterson Institute. Funding for the grants was provided by public-private partnership donations. The IBRAF grants provided researchers with a much better chance of obtaining larger grants. Additionally, the collaborative, multi-institutional approach allowed researchers to develop biomedical research in directions that individuals may not have been able to, thus promoting additional research capability and funding to individual institutions.

Of the four completed projects (the fifth project has been extended until later this fall), all have applied for external funding to organizations such as the NIH and the National Science Foundation. Each team of researchers presented their findings at a total of 11 scientific meetings and conferences throughout the country. Findings were also submitted to and published in a total of 7 scientific journals. Additional grant and journal submissions are currently in process.

The main goal of the IBRAF grant project was to increase collaboration and synergy within sister NSHE institutions and outside health partners. The process of submitting an application and meeting the collaborative requirements accomplished the goal of increasing partnerships with researchers from different institutions and fields of study.

Description of each IBRAF project:

1. **Point-of-Care Immuno-Biosensor for Multiple Cardiac Biomarkers Detection**

   Dr. Zhu (UNR-Dept. of Electrical & Biomedical Engineering), Dr. Duan, (UNSOM), and Dr. Madsen (UNLV-Dept. of Health Physics)
Drs. Zhu, Duan and Madsen proposed to develop a point-of-care biosensor device that would provide rapid diagnostic and differential information to help evaluate risk and to provide information about the benefits of future treatments.

Each researcher contributed his own expertise to a multi-investigator, multi-institutional effort to develop a rapid cardiac biomarker detection chip. Each biomarker tells something unique about the state of health of the patient's cardiovascular system. These markers include CRP (C-reactive protein), c-TNI (troponin I) and BNP (B-type natriuretic peptide). All three markers together reveal important information about the diagnosis and prognosis of CHD in each patient. The biomarker tests will be antibody-based and will be able to be run rapidly and simultaneously. This research involves advancing biochemical procedures to be more reliable and sensitive, developing microfluidics-based analysis platform, and configuring a fiber-based optical detector.

2. **A refreshable and portable e-braille system for the blind and visually impaired**

Drs. Yantao Shen (UNR), M. Sami Fadali (UNR), Wei Yang (UNR), Mohamed Trabia (UNLV), Biswajit Das (UNLV)

In this project, we (Both UNR and UNLV teams) have preliminarily developed a portable and scanning-style electrotactile based Braille display (called *E-Braille*) for assisting the Blind and Visually Impaired (BVI). The developed *E-Braille* technology will allow the BVI to perform common tasks such as reading, writing, typing in Braille, printing text, browsing the Internet, engaging in on-line conversations, and perceiving graphics. Combined with Cyber-Infrastructure network technology, *E-Braille* will further allow the BVI to conveniently access more text, books and libraries any time and anywhere. Additionally, the developed *E-Braille* system will provide a tool for collaborative research in the biomedical field involving psychophysicists, neurocytologists, electrochemists, and cognitive scientists.

3. **Therapeutic activation of NK lymphocytes to alleviate chronic fatigue syndrome**

Dr. Judy Mikovits (WPI), Dr. Dorothy Hudig (UNR/UNSOM)

Chronic Fatigue Syndrome (CFS) is a debilitating disease of unknown etiology that affects ~17 million people worldwide. Patients with CFS display immunologic abnormalities and experience both cancer and neurological pathology, all of which may be associated to persistent viral infections. We recently identified a new infectious retrovirus, Xenotropic murine leukemia virus-related virus (XMRV), in the blood of patients with CFS. Natural Killer (NK) cells are the first line of immunological defense against viruses and cancer, and NK cell function is deficient in CFS patients. Ampligen, also known as poly (I:C12U) is an immunomodulatory synthetic dsRNA drug with antiviral activity. This drug has been tested as a treatment for CFS, and several patients in CFS trials have reported abate of disease symptoms after receiving the drug. In this study,
we have investigated the in vitro effects of Ampligen™ on the activation of NK cells from XMRV-positive CFS patients.

4. **Potential causes for the development of metabolic syndrome**

Dr. Patricia Berninsone (UNR), Dr. Hong Sun (NVCI)

This project is aimed at exploring the potential causes for the development of metabolic syndrome: a group of risk factors that occur together and increase the risk for cardiovascular disease, stroke and type 2 diabetes. These risk factors include abnormalities in the way the human body metabolizes fat and sugar. Dr. Berninsone from UNR and Dr. Sun from the Nevada Cancer Institute are conducting experiments on a type of worm with similar cellular mechanisms to those which are involved in the regulation of insulin in humans. Their research will explore causes and risk factors at the cellular level in an effort to reduce heart disease and diabetes.

5. **Macrophage-mediated delivery of nanoparticles for photothermal ablation of malignant gliomas**

Dr. Steen Madsen (UNLV), H. Michael Gach (NVCI), Henry Hirschberg (University of California, Irvine) *project end date, September, 2011*

The primary goal of the project is to develop a new type of therapy for the most severe form of malignant brain tumors which are incurable with current treatment techniques. Specifically, the project addresses a fundamental limitation of current therapies, namely the inability to deliver anti-cancer agents to the brain tumor. To do this, we have proposed using a type of immune cell (called macrophages) as a delivery vehicle for anti-cancer agents. We believe this is possible since brain tumor cells produce chemicals that attract immune cells to brain tumors. The anti-cancer agent we will deliver is a metallic nanoparticle that absorbs laser light and, in turn, emits heat. Macrophages loaded with nanoparticles will be injected into rats with brain tumors. Magnetic resonance imaging will be used to determine the concentration of nanoparticle-loaded macrophages in the rat brain. Once the macrophages have reached the brain tumor, laser light will be aimed at the tumor and the resultant heat generated from the nanoparticles will destroy the brain tumor while surrounding normal brain will be unaffected.