

**Exhibit A: Project Description  
(Scope of Work, Special Requirements)**

**Project Title: One Medicine: Reducing the Impacts of Inflammatory and Infectious Diseases on Animal and Human Health**

**Objective 1: Reduce the impacts of inflammatory and infectious diseases on animal and human health**

The goal of the research is to address means of interrupting the course of disease through the development of therapeutics that induce a favorable immune response toward infectious diseases and chronic inflammation or autoimmunity.

- Research will address mucosal infections and associated inflammatory diseases, such as calf scours. This strategy has the potential to reduce the dependency on antibiotics, reduce the pressure on microorganisms to develop resistance to antibiotics, and ideally reduce the occurrence of this economically important problem of cow-calf operations.
- Develop immunomodulatory treatments for zoonotic diseases (i.e., diseases that can be passed between animal and human), including bacteria and viral pathogens. The potential usage of immunotherapies on bacterial pathogens such as methicillin-resistant *Staphylococcus aureus* and *Coxiella burnetii* will be investigated.
- Viral pathogens to be investigated include neuroinvasive viral infections, such as Herpes Simplex virus type 1 (HSV-1) and West Nile virus (WNV), which cause severe disease in the central nervous system (CNS). Proposed research will investigate the antiviral immune activation and viral modulation of immunity as they relate to viral spread within the nervous system.
- Chronic inflammation/autoimmunity: focus on rheumatoid arthritis (RA). RA is a chronic inflammatory arthritis marked by a dysfunctional immune response in the soft-tissue of the joints causing the immune system to destroy bone and cartilage. The team will 1) employ immunomodulation therapy to refocus the immune system to reduce or block the improper autoimmune response that is causing destruction of tissues and 2) investigate bone marrow failure and will identify immunological events that trigger the bone marrow to fail in such conditions as aplastic anemia. Both RA and bone marrow failure are the result of an immune system incorrectly responding to our own tissues.

**Objective 2: Develop opportunities to work with the private sector in translating technologies and in acquiring additional research funding to create long-term employment opportunities in Montana**

The research team includes investigators experienced in translating technologies to the private sector. Dr. Mark Jutila is a co-founder of Ligocyte pharmaceuticals (now Takeda) and Dr. Jory Baldrige (formally the Director of Discovery & Early Development, GSK Vaccines, North America) is founder of Totem BioSciences, LLC. These key personnel will focus their research efforts to move basic science to the Montana private sector. Bridging basic research with small business is a focus of our research proposal via leveraging private sector and federal programs. Milestones to be met by research include submitting Small Business Innovative Research (SBIR) and Small Business Technology Transfer (STTR) grants with Totem Biosciences LLC, and key

faculty (Drs. Voyich and Jutila) have experience with these funding mechanisms. This would keep all money in Montana, since Totem BioSciences, LLC is a Montana-based company.

**Objective 3: Creating sustainable employment and training opportunities for students through enhanced fundraising opportunities (private and federal)**

MSU researchers included on this proposal have experience directing federally-funded research programs. The projects proposed will increase the capacity for acquisition of additional research dollars from programs to bridge basic research and industry. By establishing the relationship with Totem Biosciences LLC and fostering the growth of this company, we will expand the capacity to train students and to retain these students in Montana.