EXECUTIVE SUMMARY: *(State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project for California.)*

According to the U.S. Department of Health and Human Services, we have seen an increase in the number of surgical joint replacements (artificial knees, hips, shoulders) needed among the growing and aging populations of California and the United States over the past decade. As the need for better prosthetic replacements increases, so must our understanding of possible replacement materials. Currently, materials such as stainless steel, titanium and other metal alloys are implanted into patients. There have been serious clinical issues surrounding prosthetic implants, such as prosthetic loosening. Loosening is initiated either by bacterial infection or, more prominently, by the generation of metal debris at the site of implantation as a result of wear, tear and implant corrosion. These debris particles initiate an inflammatory response that eventually erode the bone anchoring the implant, and cause the prosthetic to fail. Experimental titanium alloys developed for aviation by the United States Air Force and its contractors have been identified as potential biometals with differing properties than traditional metals from which human implants are produced. The overall goal of this project is to define any inflammatory reaction of human immune cells to these novel prosthetic alloys and to determine whether the novel alloys serve as better biomaterials to construct longer lasting implants. My group has acquired the biometals through a collaboration with Dr. Vilupanur Ravi (Dept of Chemical and Materials Engineering, Cal Poly Pomona) and will analyze their ability to induce inflammation, test their propensity to infection and investigate their influence on cells responsible for bone erosion.