**A study of Titanium and Magnesium particle-induced oxidative stress and toxicity to human osteoblasts**

**Niyou Wang**
Department of Mechanical Engineering, National University of Singapore, Singapore

Hybrid implants combine both Titanium (Ti) and Magnesium (Mg) are prevalent nowadays. The long-term implications of Ti and Mg implants within the human body are not yet fully understood. Many implant failure cases due to inflammation, allergic responses, and aspect loosening have been reported frequently. Particles generated through daily wear and tear of implants may worsen the situation by causing acute complications. An in-depth understanding of the behavior of metal particles with human osteoblasts is necessary. In this study, a novel and systematic attempt was made to understand the effects of different Ti and Mg particle concentrations on the osteoblastic SAOS2 cell: toxicity, alterations to mitochondria, and changes to the specific gene and protein expression. Ti particles were found toxic to SAOS2 cells at different dosages, while Mg particles at lower concentrations could improve cell viability. To better understand this phenomenon, we have measured cellular reactive oxygen species (ROS) production and cell apoptosis & necrosis percentage. We also have checked the mitochondrial structure with transmission electron microscope (TEM), and mitochondrial function using Tetramethyl rhodamine, ethyl ester staining (TMRE). NDUFB6, SDHC, and ATP5F1 were the essential mitochondrial genes involved in ROS production and ATP production. Immunocytochemistry (ICC) and real-time polymerase chain reaction (qPCR) were implemented to check the regulations of these related genes.

**Biography**

Niyou WANG is currently a Ph.D. candidate at National University of Singapore. He is working on collaboration projects between Mechanical Engineering and Anatomy department. His research focus on 3D printing, cytotoxicity, particles, bone implants. He has solid mechanical background, strong biological knowledge, and rich hands-on experience. He has published multiple research and review papers in multiple reputable international journals.

e0222912@u.nus.edu