

Minzhi, Z., Mingri, A., et al., Quantitative proteomic analysis of human osteoblast-like MG-63 cells in response to bioinert implant material titanium and polyetheretherketone. *SCIVERse ScienceDirect*, 1 (2012)

Abstract: Commercially pure titanium (cpTi) and polyetheretherketone (PEEK) are widely used surface-modified implant materials in orthopedics and dental therapeutics. However, there still has not been comprehensive biocompatibility evaluation of them at molecular level. By employing stable isotope labeling with amino acids in cell culture (SILAC), we profiled the dynamic protein expression changes in human osteoblast-like MG-63 cells cultured on cpTi and PEEK, respectively. About 2000 proteins were quantified and 400 proteins showed substantial alterations in expression levels upon each material treatment. Notably, the extent of alterations diminished as the contact prolonged, which suggested adaptive response to the bioinert materials. Similar patterns of expression changes were observed for both cpTi and PEEK. The representative pathways reflected the regulation of biosynthesis, metabolism and cell adhesion in the adaptive process. In addition, PEEK showed stronger inhibition on mRNA processing, which explained the lower proliferation rate of the cells cultured on PEEK. Our results indicated that the widely used bioinert materials cpTi and PEEK could individually induce a cooperative response involving a wide panel of proteins and pathways. This study has established a basis for better understanding the biocompatibility of surface-modified implant biomaterials at molecular level.