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# Analysis of the titanium-induced pro- and anti-inflammatory factors in monocyte-derived and tissue macrophages of patients with orthopedic implants

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One of the major problems associated with titanium grafts is implant failure due to aseptic inflammation. This study applied an in vitro test system based on human primary monocyte-derived macrophages developed in our laboratory to examine the response of monocytes isolated from orthopedic patients to the titanium surface to identify novel biomarkers of deleterious macrophage responses previously directed against titanium. These biomarkers were used to identify pathological macrophage subpopulations located near the surface of implants in the same orthopedic patients. The results of this study indicate that titanium induces a mixed inflammatory/tissue remodeling phenotype in both patient macrophages cultured in vitro and in macrophages accumulated in tissues near titanium implants, and that the associated titanium-inducible factors, can be used as biomarkers to predict individual patient immune responses to titanium implants.