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IN-STENT RESTENOSIS: THE POTENTIAL ROLE OF TRIBOCORROSION

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In the aftermath of the metal hip resurfacing scandal, the role of tribocorrosion products in pathological processes has been scrutinised. Recently, studies have shown that stents undergo corrosion and fatigue-based fracture in vivo, releasing metal ions and particulates into surrounding tissues; however the processes are not fully understood. Despite advances in biomaterials and stent design, in-stent restenosis remains a significant clinical problem, accounting for an approximate 20% failure rate. The aim of this study is to generate physiologically comparable tribocorrosion products and investigate their possible role in restenosis. Smooth muscle cells (SMCs) were explanted from saphenous vein tissue from patients undergoing coronary artery bypass surgery. Concentrations of heavy metal chloride salts representing corrosion products of common stent alloys (Co, Cr, Mo, Ni) were prepared to determine their effect on cell viability (MTT assay). Concentrations of chloride salt solutions were confirmed with ICP-MS. Cobalt ions induced a reduction in cell viability in a concentration-dependent manner by 50% at 300 ppm ($p < 0.001$), chromium ions at 5000 ppm ($p < 0.001$) and nickel ions at 1000 ppm ($p < 0.01$). pH was not controlled and concentrations of chromium over 5000 ppm lowered the pH significantly ($p < 0.001$). All evaluations $n = 6$. Galvanostatic potentiometry tests can be used to generate heavy metal ions electrochemically with corrosive processes. This study aims to compare the current approach of metal ion standards to tribocorrosion debris. A fretting wear rig will generate these and be tested using neo-intimal formation in an organ culture of human saphenous vein to investigate their potential effects on instent restenosis.