



CONTACT DERMATITIS AND OCCUPATIONAL DERMATOSES

METAL HYPERSENSITIVITY TO HIP AND KNEE ORTHOPEDIC IMPLANTS: A COMPOSITION ANALYSIS

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Background: Patients who experience metal hypersensitivity reactions (MHRs) to the total joint arthroplasty they receive present with peri-prosthetic synovitis, burning, stiffness, swelling, and long-term morbidity. Nickel, cobalt, and chromium are common allergenic metals and are associated with metal hypersensitivity reactions in patients who receive orthopedic implants.

Objective: The aim of the current study was to measure the composition of common hip and knee metal joint implants through X-ray fluorescence (XRF) microscopy and compare this result with the manufacturer's reported composition list. This was done to detect metals not otherwise specified that may contribute to metal hypersensitivity reactions and implant related adverse events.

Materials and Methods: Hip and knee joint implant samples were obtained by Zimmer® Biomet. X-ray fluorescence composition analysis was conducted on one Zimmer® M/L Taper metal hip implant and one Zimmer® NextGen LPS-Flex knee implant. This method allowed for the detection of all transition metals, metalloids, and metals found in the implant.

Results: The knee implant was reported to be composed of cobalt, chromium, molybdenum, silicon, iron, and aluminum. The XRF analysis of this knee implant detected Cobalt (51.4%), chromium (30.3%), molybdenum (6.5%), silicon (1.4%), iron (2.1%), and aluminum (7.4%). The XRF analysis also detected calcium (0.4%), bismuth (0.3%), and zirconium (0.2%). The hip prosthesis was reported to be composed of titanium, aluminum and vanadium. The XRF analysis detected titanium (92.7%), and aluminum (7.2%). Trace amounts of chromium (0.4%) and silicon (0.3%) and were detected by XRF but not found in the manufacturer's composition list.

Conclusions: This analysis demonstrated that the elements in implants were generally concordant with the manufacturer's reported list. The analysis found trace amounts of chromium (0.41% by weight) in the hip implant, which was not otherwise reported. This study brings attention to the potential for metal allergens in implants that are considered



ABSTRACT BOOK

ABSTRACTS



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