Failure of total hip implants: metals and metal release in 52 cases

Background. The pathogenesis of total joint replacement failure is multifactorial. One hypothesis suggests that corrosion and wear of alloys result in metal ion release, which may then cause sensitization and even implant failure, owing to the acquired immune reactivity.

Objectives. To assess cobalt, nickel and chromium(VI) release from, and the metal composition of, failed metal-on-ethylene total hip replacements. Materials/methods. Implant components from 52 revision cases were evaluated with spot tests for free nickel, cobalt, and chromium (VI) ions. Implant composition was determined with X-ray fluorescence spectroscopy, and information on the reason for revision and complications in relation to surgery was collected from the medical charts when possible (72%). For 10 implants, corrosion was further characterized with scanning electron microscopy.

Results. We detected cobalt release from three of 38 removed femoral heads and from one of 24 femoral stems. Nickel release was detected from one of 24 femoral stems. No chromium(VI) release was detected.

Conclusions. We found that cobalt and nickel were released from some failed total hip arthroplasties, and corrosion was frequently observed. Metal ions and particles corroded from metal-on-polyethylene may play a role in the complex aetiopathology of implant failure.

General information
State: Published
Organisations: Department of Mechanical Engineering, Materials and Surface Engineering, Stockholm University, Copenhagen University Hospital
Authors: Jakobsen, S. S. (Ekstern), Lidén, C. (Ekstern), Saballe, K. (Ekstern), Johansen, J. D. (Ekstern), Menné, T. (Ekstern), Lundgren, L. (Ekstern), Bregnbak, D. (Ekstern), Møller, P. (Intern), Jellesen, M. S. (Intern), Thyssen, J. P. (Ekstern)
Pages: 319–325
Publication date: 2014
Main Research Area: Technical/natural sciences

Publication information
Journal: Contact Dermatitis
Volume: 71
ISSN (Print): 0105-1873
Ratings:
BFI (2017): BFI-level 2
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.01 SNIP 1.401
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 0.839 SNIP 1.637
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 0.788 SNIP 1.41
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 0.866 SNIP 1.366
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.018 SNIP 1.146
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 0.797 SNIP 1.175
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.778 SNIP 1.182
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.645 SNIP 1.274
Scopus rating (2007): SJR 0.663 SNIP 1.336
Scopus rating (2006): SJR 0.561 SNIP 1.111
Scopus rating (2005): SJR 0.543 SNIP 1.029
Scopus rating (2004): SJR 0.532 SNIP 0.866
Scopus rating (2003): SJR 0.57 SNIP 1.027
Scopus rating (2002): SJR 0.635 SNIP 1.006