Metal-on-metal resurfacing: Questions & Answers

What are 'metal-ions'? Where do they come from?
Metal ions are the soluble (in solution) form of a metal and can be released from wear and/or corrosion of any metallic implant within the body. Metal ions are present as trace elements within the human body and are essential for life.

What is ALVAL?
ALVAL or 'Aseptic Lymphocytic Vasculitis and Associated Lesions' is thought to be a localized lymphocytic driven hypersensitivity immune response to particulate or metal ion/protein complexes produced from metallic implants. Exact incidence is thought to be extremely rare but does not appear to correlate to basic preoperative metal sensitivity tests.

What is the cause and incidence of 'pseudotumour’s' in total hip replacements?
‘Pseudotumours’ have been reported in the literature irrelevant of bearing type as an inflammatory response to foreign material within the body resulting in a collection of fluid or soft tissue mass. The incidence has been shown to correlate to implants wearing at a significantly higher rate than expected.

Figure 1 - Histological sections showing perivascular agglomerated infiltrates of CD3 and activated T Lymphocytes (stained brown) in retrieved capsular tissue of a patient with metal sensitivity post metal-on-metal hip replacement

Figure 2 - CT scan of a pelvis in a conventional metal-on-polyethylene total hip showing a space occupying mass. Biopsy needle can be seen on the top left.

Figure 3 - AP X-Ray of the pelvis in conventional metal-on-polyethylene hip showing eccentric wear of the liner.
Does the BHR™ device release more metal ions than other resurfacing devices?
Most of the wear of any metal-on-metal device has been shown to occur during the ‘run in’ period in the first 6-12 months after implantation.18,19 After the run in period there is a lower steady state of metal ion release. Variation in metal ion release has been primarily related to acetabular component position.18,19,20 The recommended acetabular component position for the BHR device is between 40-45 deg inclination and 20-25 deg anteverision for longevity of the bearing.

What effect does clearance, head size and activity have on metal ion release?
Head size and patient activity have been shown to have no statistical effect on metal ion output.21,22,23

Low clearance has been shown to induce wear of a metal-on-metal device in laboratory studies but has produced no proven benefit clinically, with variables such as cup design and cup deflection appearing to play a larger role.24,25

References