The MELISA® test

A revolutionary blood test used to diagnose adverse health effects caused by implants

The MELISA® test may be used in two ways for orthopaedic patients. First, prior to surgery, patients whose clinical history suggests metal allergy may be pre-tested to ensure that they receive the most suitable implant. Second, post-surgery, MELISA® can be used to identify if metal allergy is responsible for any of the symptoms that have developed after surgery.

Patients suffering from metal hypersensitivity may have numerous symptoms associated with an overactive immune system, including chronic fatigue, joint and muscle pain, implant failure, recurrent infections around the operation site, cognitive impairment, depression, headaches, fibromyalgia and skin rashes.

MELISA® is the only scientifically proven and clinically validated blood test that detects type-IV allergy to multiple metals at the same time (1).

Metal allergy and orthopaedics

Metal allergy is a well-documented factor in the failure of implants, and the need for allergy testing in sensitive patients is well recognized by both implant manufacturers (3) and by surgeons (4,8) alike.

The prevalence of metal hypersensitivity in patients with implants is significantly higher than in the general population, with an even higher prevalence rate among patients with failed implanted devices. (2)

In one of the earliest investigations of this phenomenon, Evans et al., in 1974, studied the cases of thirty-eight patients with a metal-on-metal implant. Two years postoperatively, fourteen (37%) of the implants were loose and twenty-four (63%) were well-fixed. Nine of the fourteen patients with a loose implant were found to be sensitive to metal on dermal patch testing, whereas none of the twenty-four patients with a well-fixed implant showed evidence of metal sensitivity.

“Overall, the prevalence of metal sensitivity in patients with a failed or failing implant is approximately six times that of the general population” (2).
Why use MELISA® testing?

Studies show that lymphocyte transformation tests are better suited for diagnosing possible metal sensitivity than traditional patch testing. Implant-related hypersensitivity reactions are generally type-IV delayed hypersensitivity (2).

Adverse effects after implantation can start a few days after the operation, but in some cases it may take years for symptoms to develop.

Exposure to metals in dental implants, fillings, joint prostheses, pacemakers, vaccines, environmental pollutants and jewellery can lead to health problems in sensitive individuals as they may be causing an allergic reaction. MELISA® is a blood test which identifies those individuals who may suffer side effects from metal exposure and those who will not.

Allergy vs. toxicity

Metal-on-metal implants, particularly cobalt-chromium implants, are linked to raised levels of metal debris in the blood of affected patients. All implants release metal ions, but some metal-on-metal prostheses release many more ions than previously thought (5). The ions may leak into the surrounding tissue and cause reactions that destroy both bone and muscle and may leave those affected with permanent disabilities (6).

There are no guidelines on what constitutes an unacceptably high level of, for instance, cobalt ions in blood for patients receiving orthopaedic implants (5). MELISA® does not show the levels of metals in a patient’s body; instead it measures whether the patient’s immune system reacts to specific metals. Other tests may show that levels are acceptable but for hypersensitive individuals, there is no such thing as a “safe” level; even trace amounts are likely to cause harm if the substance triggers an allergic reaction.

Cell mediated allergy occurs when metals bind to enzymes and proteins in the body. These modified structures may be considered foreign and can activate the immune system leading to inflammation. The inflammation will be ongoing unless the source of exposure is removed or avoided.

High success rates

76% of patients in a clinical trial involving over 200 people experienced health improvements after removing dental materials highlighted as problematic in their MELISA® test. (9) An additional study of allergic patients with autoimmune diseases showed that 71% improved after having metals replaced, with all multiple sclerosis patients showing objective long-term health improvement.
What’s in my implant?

Your surgeon should be able to provide you with an exact breakdown, which includes trace amounts of metals present, but below is a guideline. Metals commonly found in common medical grade alloys include:

<table>
<thead>
<tr>
<th>Alloy Type</th>
<th>Metals Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt Chrome</td>
<td>Cobalt, Chromium, Nickel, Molybdenum</td>
</tr>
<tr>
<td>Stainless Steel</td>
<td>Nickel, Chromium, Molybdenum</td>
</tr>
<tr>
<td>Titanium alloy I</td>
<td>Titanium, Vanadium, Aluminium, Nickel traces</td>
</tr>
<tr>
<td>Titanium alloy II</td>
<td>Titanium, Aluminium, Niobium, Tantalum</td>
</tr>
</tbody>
</table>

Recently, cases of titanium allergy have also been described in the literature. Titanium is a transition metal and thus may function as a hapten and trigger cellular hypersensitivity. Since titanium is used as white pigment in toothpaste, cosmetics and medicaments, the latent sensitization of susceptible individuals is possible.

MELISA® test procedure

MELISA® tests the patient’s white blood cells (lymphocytes) against a panel of suspected allergens. For testing prior to implantation we provide a panel of the 20 most commonly founds metals in orthopaedic surgery, to help provide the best possible match. Alternatively, if it is suspected that your symptoms have been caused by an allergy to an existing implant, MELISA® can test for the specific metals to which you are currently exposed.

The lymphocyte reaction is measured by two separate methods: uptake of radioisotope by dividing lymphocytes and evaluation by microscope. The test report shows the strength of the reaction to the metal as a Simulation Index and lists the most common sources of exposure.

How to get tested

A blood sample can be sent to any licensed MELISA® laboratory, as long as it arrives within 48 hours – ideally within 24 hours. The blood should be kept at room temperature and sent in special tubes, which can be provided. Each laboratory offers different testing panels depending on metal exposure and costs vary between countries. The amount of blood needed depends on how many antigens are to be tested. For a screening of 20 metals, 54 ml blood, or 6 x 9ml tubes of blood, is needed.

Steroids or other immunosuppressant drugs may affect the test result.

To find your local laboratory or clinic see: www.melisa.org/melisa-laboratories.php or www.melisa.org/melisa-clinics.php
References


5) Cohen D. How safe are metal-on-metal hip implants? BMJ 2012;344:e1410


