Metal Allergy in Joint Replacement: Fact or Fiction?

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Fact: Metal sensitivity is very common
- 10-15% of general population
Typically reported as sensitivity to inexpensive jewelry
By far the most common allergy is to nickel, followed by cobalt.
Nickel and cobalt are common in modern orthopaedic implants
- Cobalt chrome (TKA) contains ~1% nickel
- ~65% cobalt

It follows then that metal allergy after TKA should be very common.

EXCEPT . . .
Metal Allergy

- IT’S NOT!
- Incidence is unknown but estimated to be <<1%
- Even when 22% of female and 2% of male TKA patients report metal sensitivity²
- Why???
Metal ions (molecules) are ubiquitous and present in human serum at small concentrations.

“Naked” metal ions do not cause allergic response.

When patients react to a molecule (ion), they are actually reacting to a hapten-carrier complex.
Dermal metal ions are processed and presented by Langerhans cells, generating a Type IV allergic response.

These complexes are different on the skin than in the serum.

Dermal reaction and systemic reaction to a metal antigen are likely different.
Metal allergy?

- Is metal allergy to joint implants real?
- Yes
- But, it is very, very rare
- Most surgeons will go their entire careers without seeing a true case of metal allergy to a joint implant
Fiction:

- Metal allergy to an implant primarily presents as pain
- Most case reports describe a rash and stiffness as the primary complaint
- Most reactions are localized, but some are systemic
Case report

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How do you know?

- Patch testing
Patch testing

- Widely available and inexpensive
- Almost any antigen can be tested
- Many consider it to be the gold standard for determining sensitivity to metal prior to surgery
- 85% of patients who report a history of metal sensitivity will have + patch test

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The problem

- Patch testing accuracy is questionable
- Cutaneous reaction is NOT the same as serum reaction
- Nearly all patients with positive patch tests have no signs of allergic response to metal implants
- Pre-operative patch testing has no correlation or predictive ability for implant reaction

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Lymphocyte Transformation Test (LTT)
- Thought to be more accurate than patch testing
- Unlike patch testing, is quantifiable
- Is the gold standard for metal sensitivity AFTER joint replacement
LTT is not widely available
Not covered by most insurance plans ($500)

LTT: However
Most of the literature describing metal allergy to joint implants are case reports (and of questionable quality).

There is increasing public interest in the topic.
Pre-op:
- Patch testing is of little to no value (patient history is almost as accurate)
- LTT is unrealistic and of little value
What I do?

- If patient reports a strong history of metal allergy (I don’t ask) I do use a ceramic-metal implant.
Post-op:
- I would advise against writing a case report if you do find a patient
- When working up a painful total joint, metal sensitivity should be the LAST item on your list
- I do all testing (including LTT) before revising
- Typically is a diagnosis of exclusion
- Be wary of the patient with positive testing, but pain is only symptom
Thank you