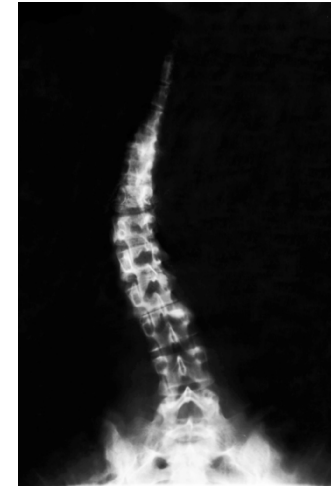


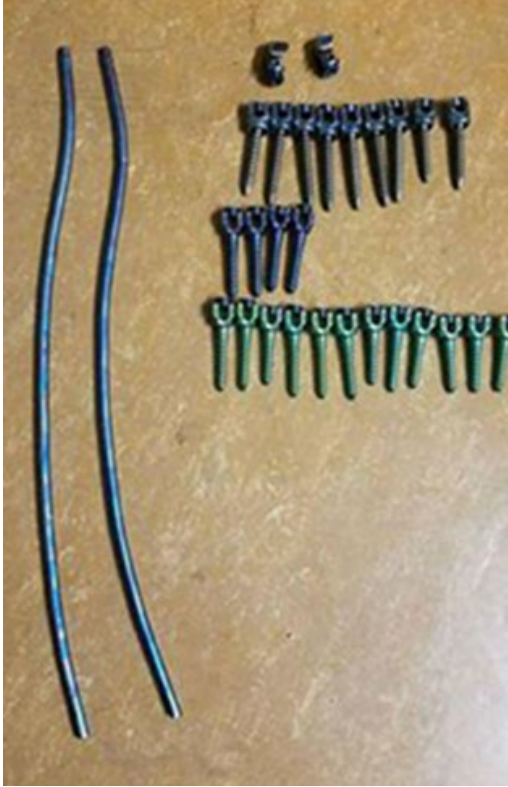
Scoliosis, Spinal Surgery and Metal Allergy



Rebecca Dutton
23rd June 2023

Friday Mosaic of Autoimmunity International online Meeting

Spinal Implants and Metal Allergy



Warning on Material Composition Insert

“If hypersensitivity to metal or allergies is suspected, it is recommended that the patient sensitivity be confirmed via a blood test prior to using any metal implants.”

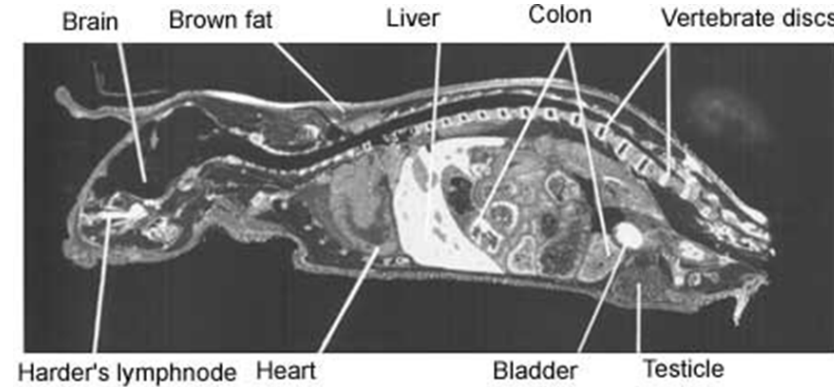
This rarely happens!



Radiological signs of corrosion in the proximal end of the rod (a) (arrows). Macroscopic corrosion of the implant was evident during surgery (b) and in the examination of the retrieved instrumentation (c)

Example of hypersensitivity reaction to spinal hardware

Genetic or Epigenetic



Marine biologists recognise spinal deformities in fish metal exposure

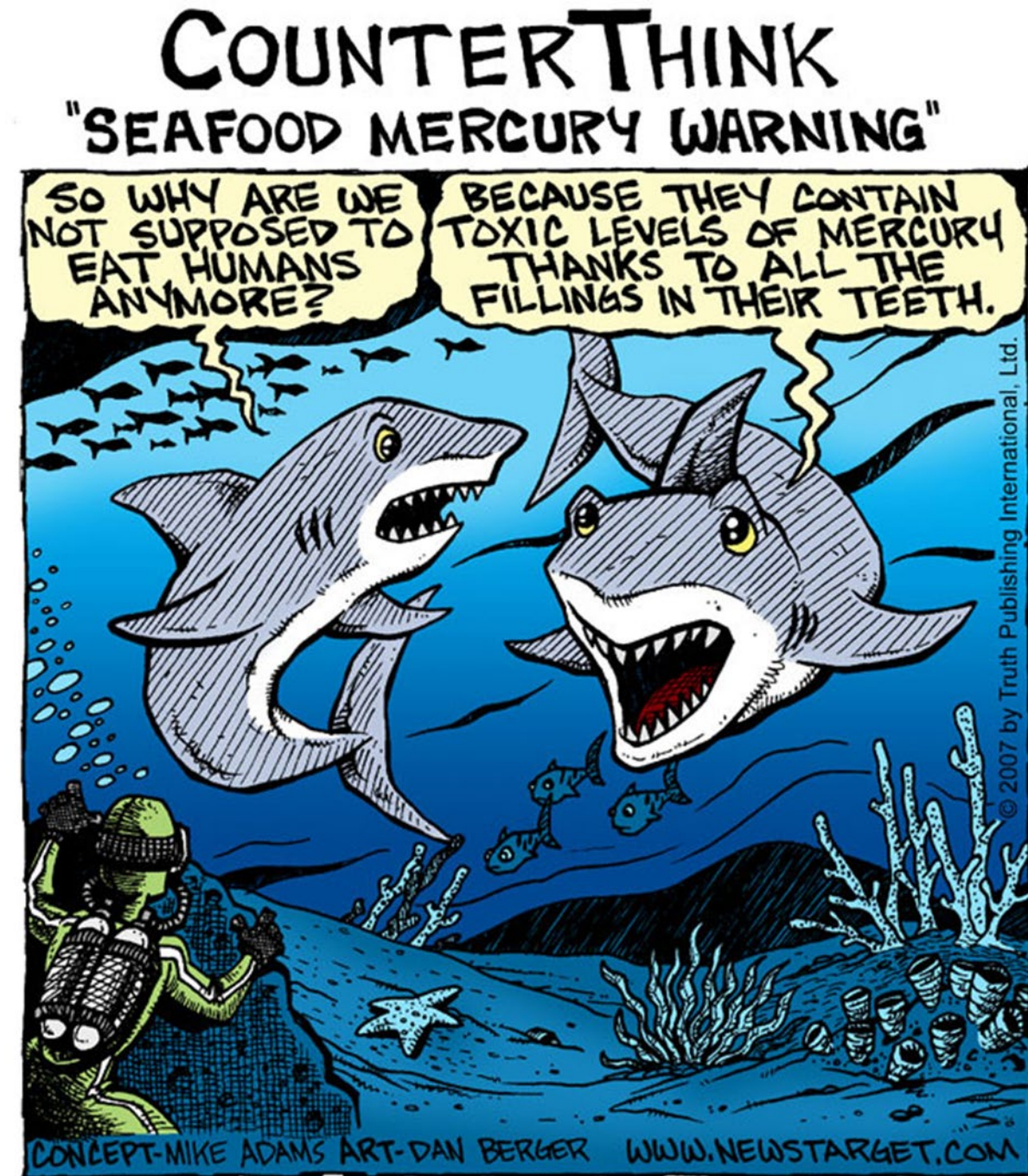
- **Fourhorn Sculpin, exposed to heavy metal-containing effluent, including mercury, displayed severe spinal curvatures and increased frequency of vertebral deformities.** Bengtsson et al, 1988, *Journal of Fish Biology*
- **Bluegill Sunfish exposed to mercury showed higher levels of anatomical asymmetry.** Ames et al : *Fish Deformities and Pollution in Some Swedish Waters.* *Ambio Journal*

Teratogenic effects of injected methylmercury on avian embryos

- **Data from 25 species with mercury treatment showed an 8.2% rate of spinal deformity; Lordosis, scoliosis, misshapen heads, shortened or twisted neck and wing deformities were more common in Hg treated birds** Heinz et al *Environ Toxicol Chem*, 2011

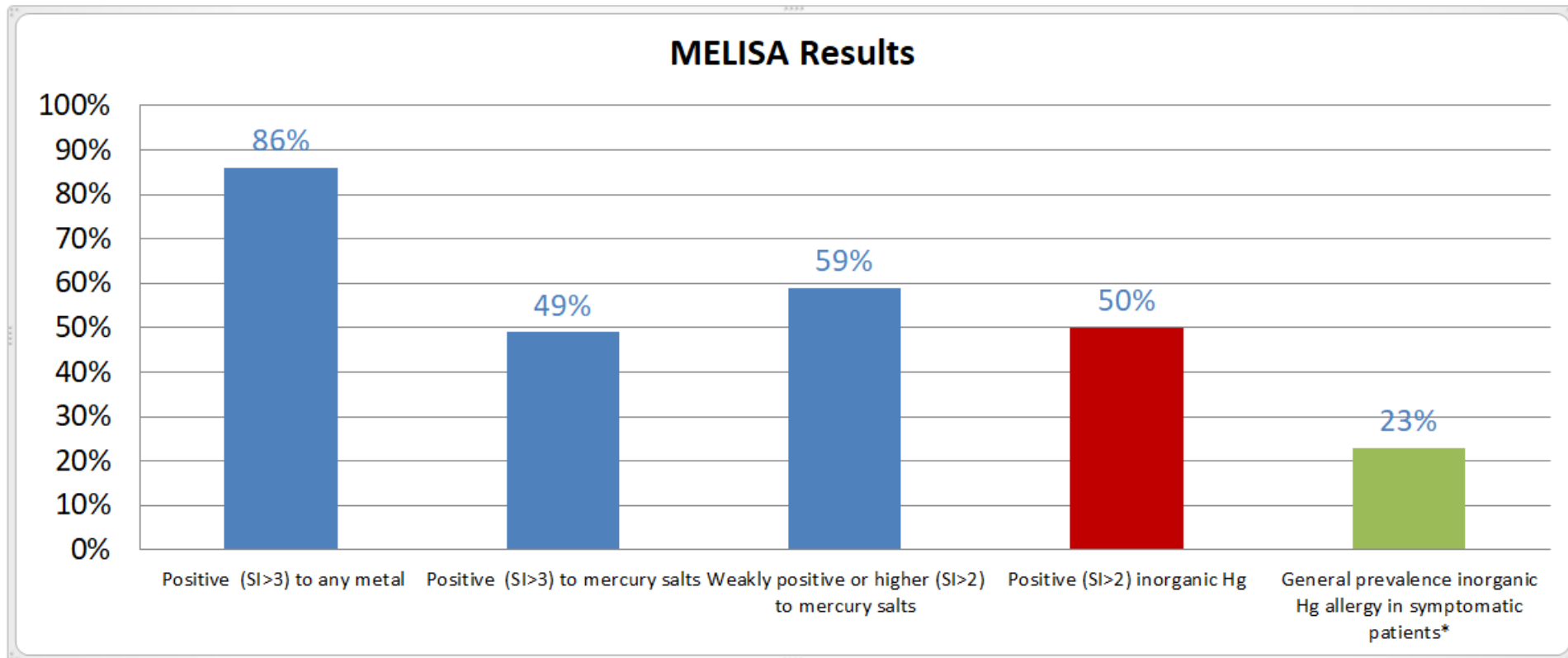
Sources, Routes and Pathogenesis of Mercury Exposure in Scoliosis

- Thimerosal, in childhood vaccines
- Mercury in breast milk from amalgam fillings and diet. Drexler et al 1998
- Collagen is rich in Sulfhydryl groups thus highly susceptible to Hg binding; distorts protein 3D structure
- Cell membrane histochemical changes indicate probable cell membrane defects due to Hg binding on its thiol sites, impacting trans-membrane channels and disrupting transport of critical minerals for normal muscle, connective tissue and nerve formation and function.
- Abnormal platelet function due to cell membrane structure in IS Kindsfater et al 1994
- Platelets in IS patients more 'metallophilic' with cation binding and transport defects and higher negative surface charge compared with normal Yarom et al 1982



Audit of 37 Scoliosis Patients MELISA Results

- Scoliosis questionnaire based on the MELISA laboratory protocols
- A database of blood results of blood including MELISA
- Data collected on 66 participants ; 15 excluded due to previous treatment



*V Stejskal et al, *Metal-specific lymphocytes: biomarkers of sensitivity in man*. Neuroendocrinology Letters 1999

Blood Groups and Scoliosis

- O-negative blood group is rare with a prevalence of 5% worldwide
- **51%** of subjects or their mothers had rhesus negative blood type
- **41%** were blood group “O”
- **10 %** were blood group “A”
- Thimerosal, a mercury based preservative, was added to the Anti D Immunoglobulin vaccine, from 1968 to 2001 and administered to Rh-pregnant and nursing women. (25 mcg in each vaccine x 2)
- **14** participants or their mothers (28%) had received this vaccine.

Beyond Surgery and Metal Spinal Hardware

Mechanical/Surgical Approach

- Screening for risk factors for metal exposure and allergy using detailed questionnaire
- Testing for metal allergy e.g. Lymphocyte transformation testing
- Carbon-coated hardware as a rule especially in presence of pre-existing metal materials or sensitisation to metals
- Avoid different metal mixes to prevent chronic local and systemic inflammation
- Physiological support pre- and post-op

Physiological Approach Brooks et al Scoliosis 2009

- Early detection of deformity
- Specialist centres for physiological training and exercise
- Assess mineral and nutrient status and treat deficiencies
- Avoid metal exposure
- Assess and identify any metal exposure and remove and replace with biologically compatible materials
- Reduce burden of sensitising and toxic metals

Case History of Non-Surgical Reversal of Scoliosis in an Adolescent

Test report
0016938

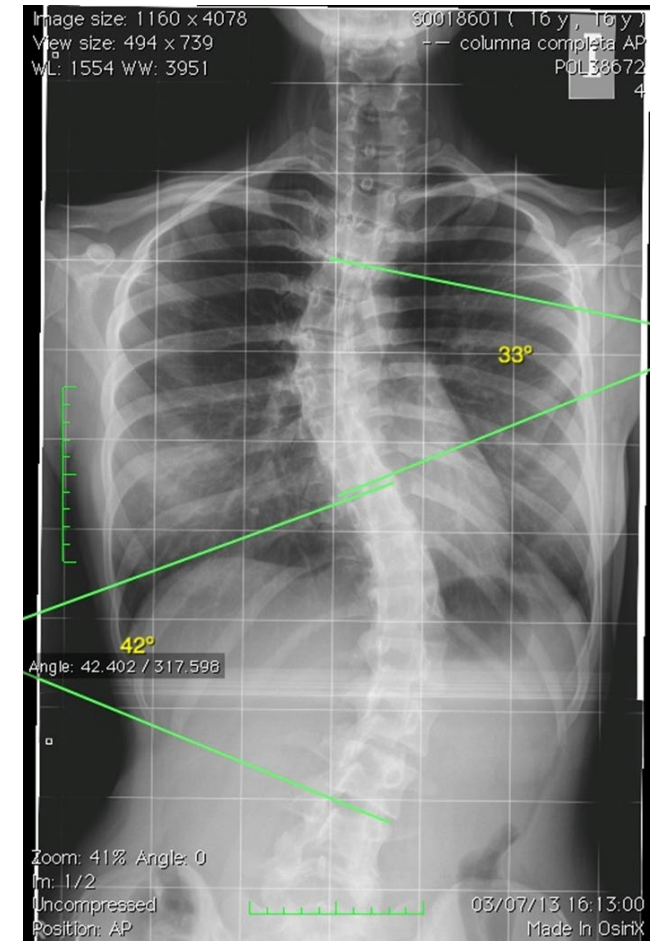
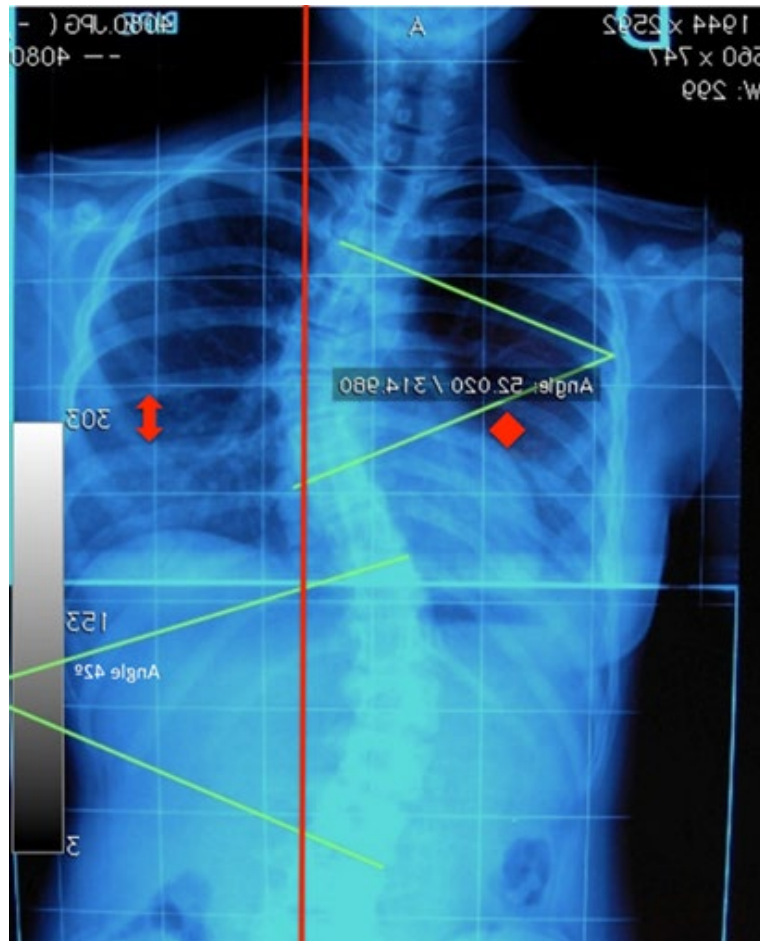


Test report for Neg. control 4.918 Test date 18-Jul-11 Referred by Patient

Code	Substance (in order of reaction)	Stimulation Index	Comments
PWM	Pokeweed	54,8	Positive control
1	ColHHg Collagen Human-Inorganic Mercury I	5,3	Positive
	Collagen Human-Inorganic Mercury II	1,2	
	Collagen Human-Inorganic Mercury III	0,9	
2	Hg Inorganic Mercury I	4,0	Positive
	Inorganic Mercury II	1,0	
	Inorganic Mercury III	0,9	
3	ColH Collagen Human I	1,2	
	Ni Nickel I	1,0	
	Nickel II	1,1	
5	ColHT Collagen Human-Thimerosal I	1,0	
	Collagen Human-Thimerosal II	0,9	
	Collagen Human-Thimerosal III	1,0	
6	ColBT Collagen Bovine-Thimerosal I	0,9	
	Collagen Bovine-Thimerosal II	1,0	
	Collagen Bovine-Thimerosal III	1,0	
7	Cd Cadmium I	0,9	
	Thim Thimerosal I	0,9	
	Thimerosal II	0,8	
8	Thimerosal III	0,6	
	ColB Collagen Bovine I	0,9	

Evaluation of test results

Positive to: Collagen Human-Inorganic Mercury, Inorganic Mercury. No reaction to the remaining antigens.



Scoliosis: NOT Just a Mechanical Problem

1. Awareness of wider aetiological factors in scoliosis
2. Establishing clinical risk factors for metal induced pathology through meticulous history, examination and testing for metals and hypersensitivity due to pre-existing exposure prior to intervention
3. Non-surgical physiological therapies: avoid 'corrective' surgery and all its risks
4. Avoiding metals especially metal mixes in patients with pre-existing sensitisations to limit lifetime of severe disabling complications
5. Greater availability of carbon coated implants
6. Further research to clarify the biological role of metals and blood groups in cell membrane defects

