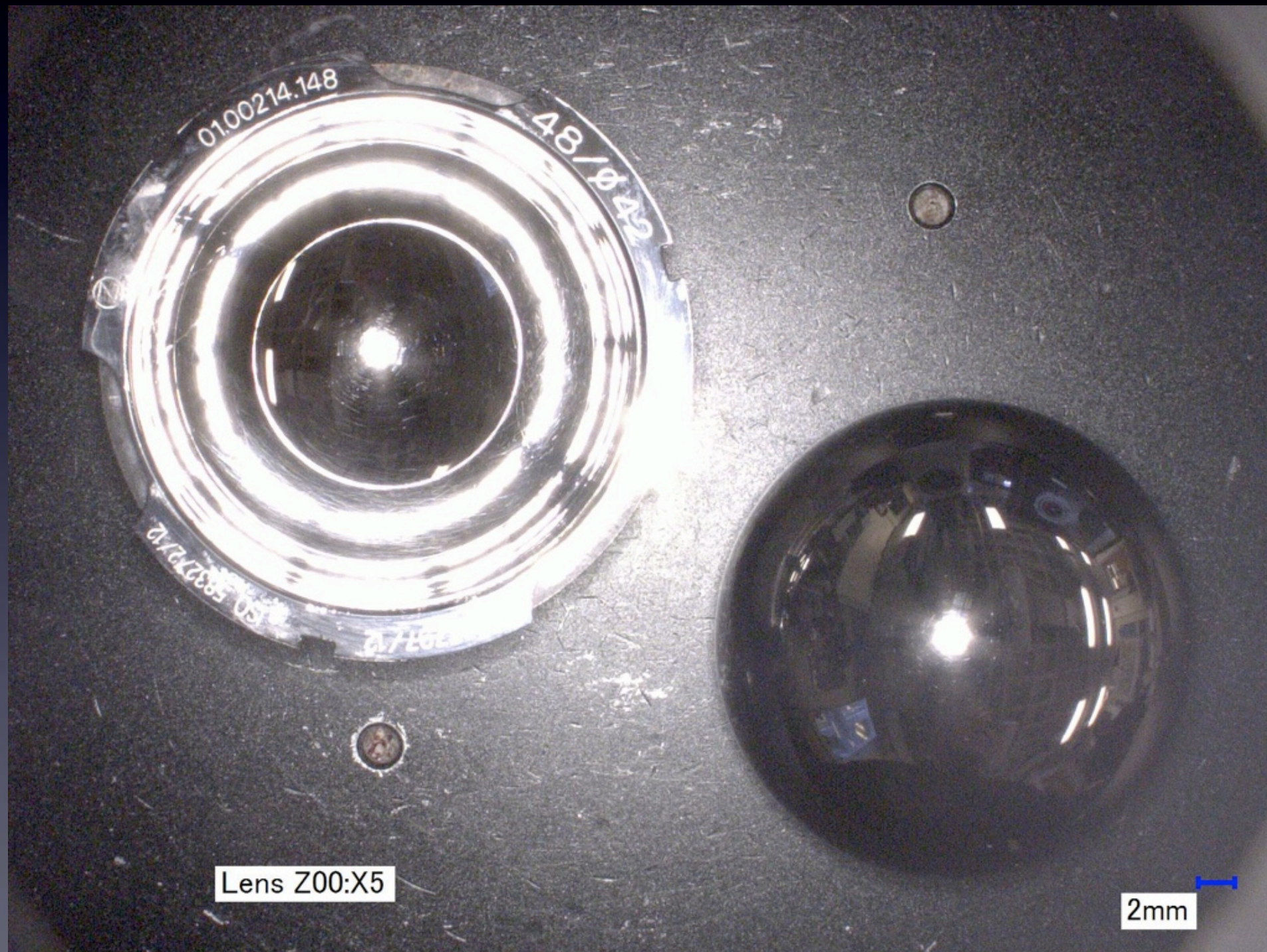


**All Patients with Chrome-Cobalt
Hip Implants are at risk for:
Hypercobaltemia
Pseudotumors
Cobaltism**

***Stephen S. Tower, M.D.
Orthopedic Surgeon, Anchorage
Affiliated Professor University of Alaska***

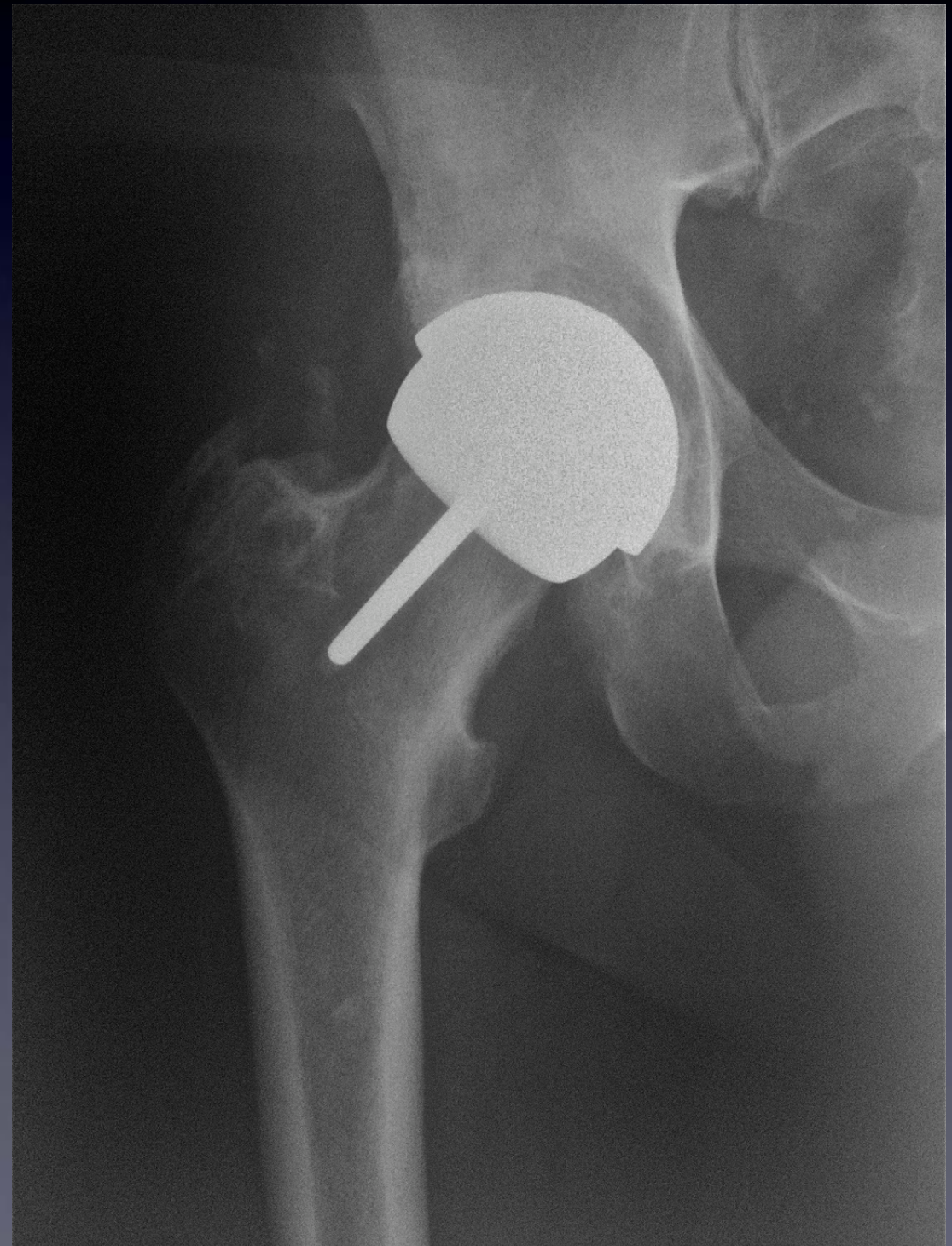
A 56 mm Metal (CrCo) Ball on a Metal (CrCo) Socket



Stemmed MoM Hip

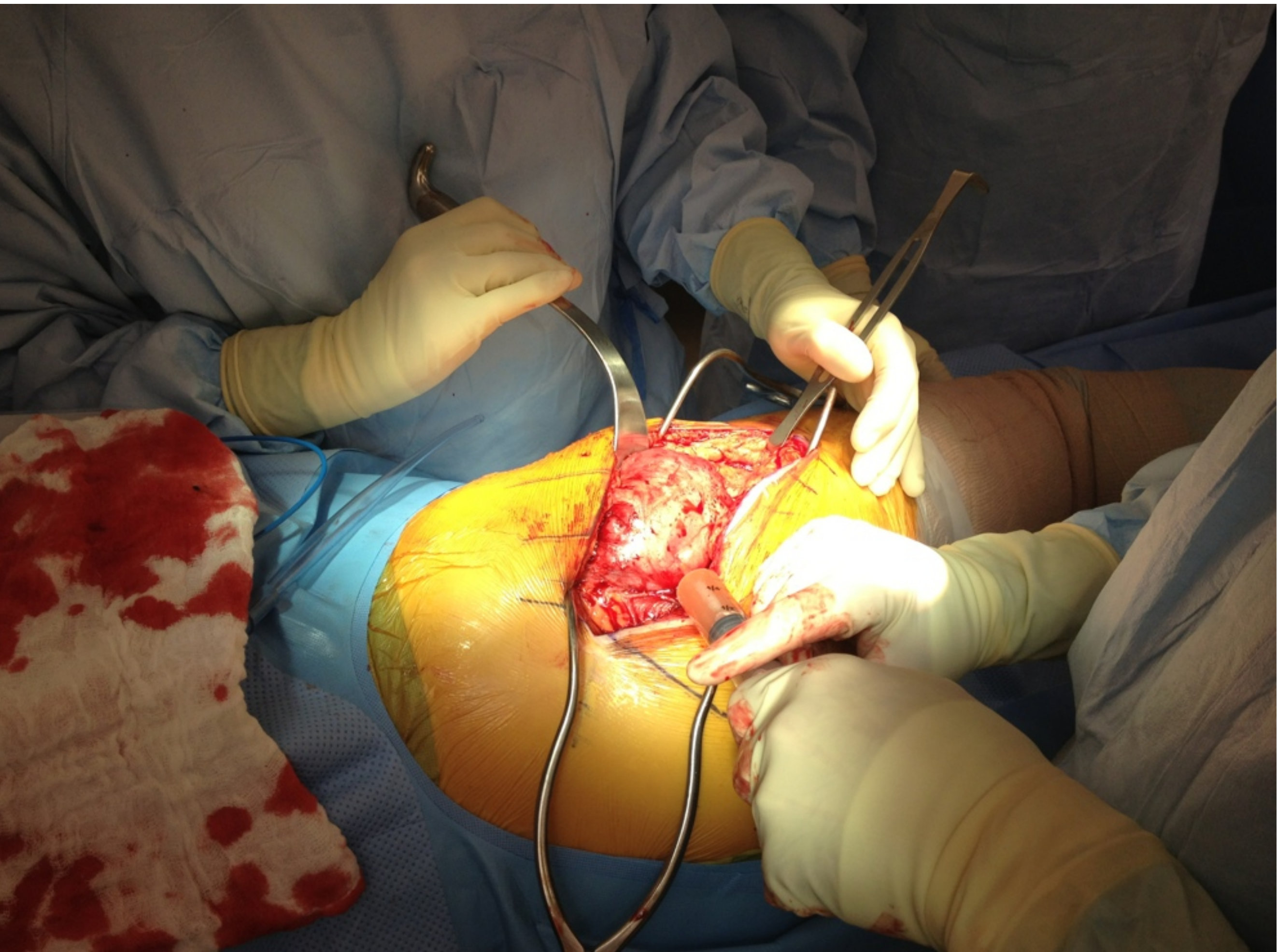


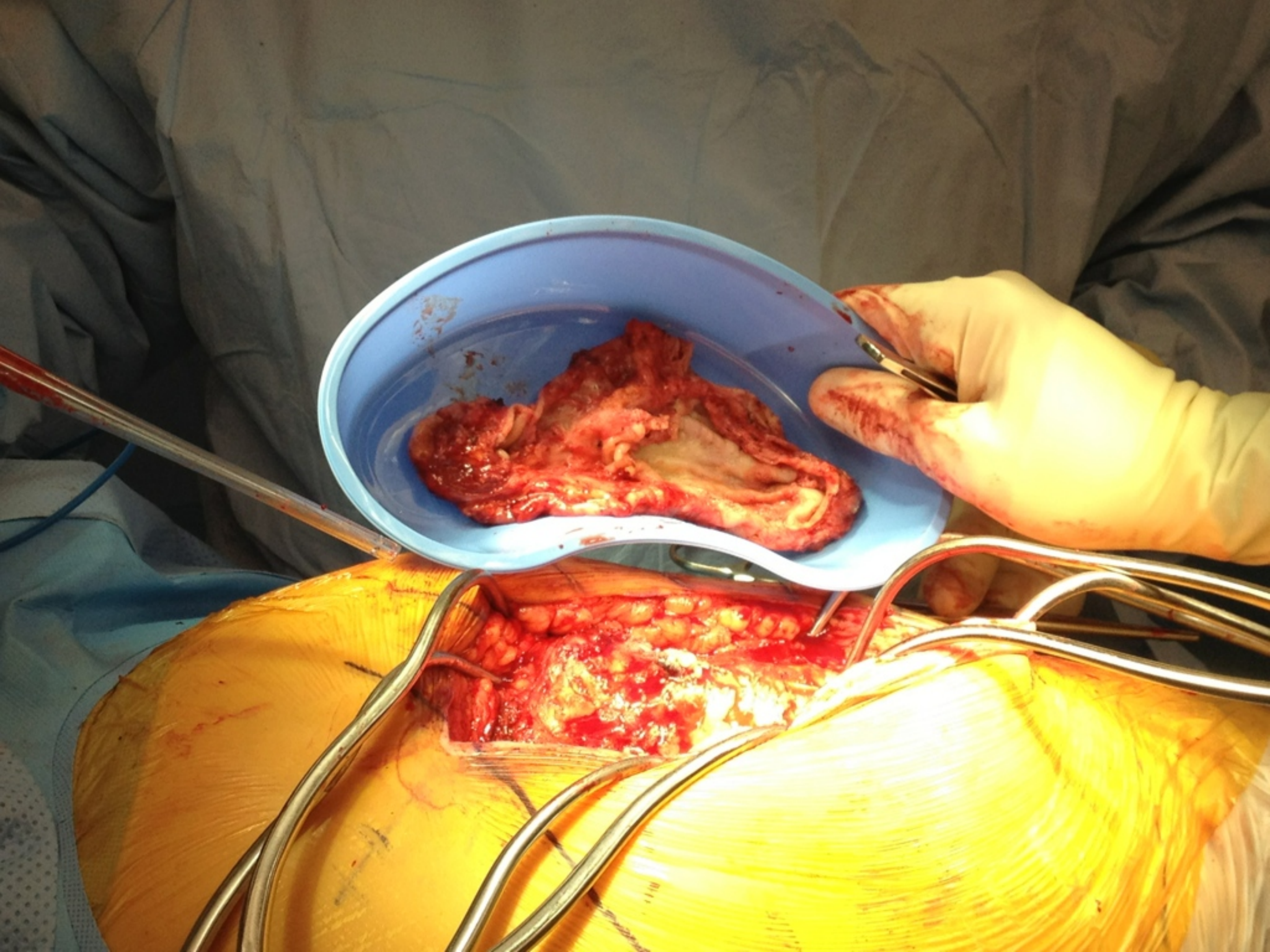
Resurfacing MoM Hip



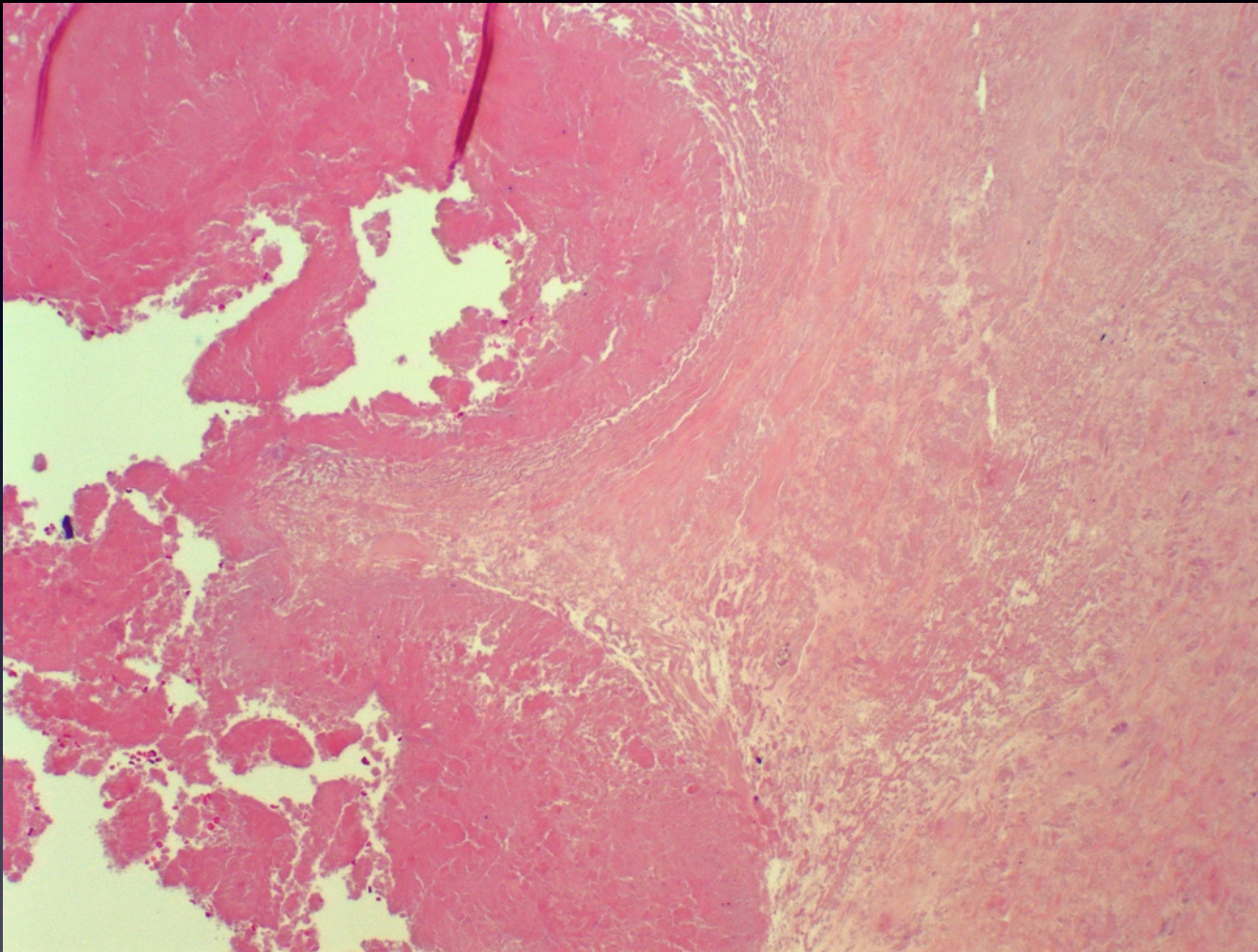
MoM Risks 2013: Periprosthetic Metallosis

- **Present in most all MoMs**
- **Cumulative**
- **Drives increased failure rate**

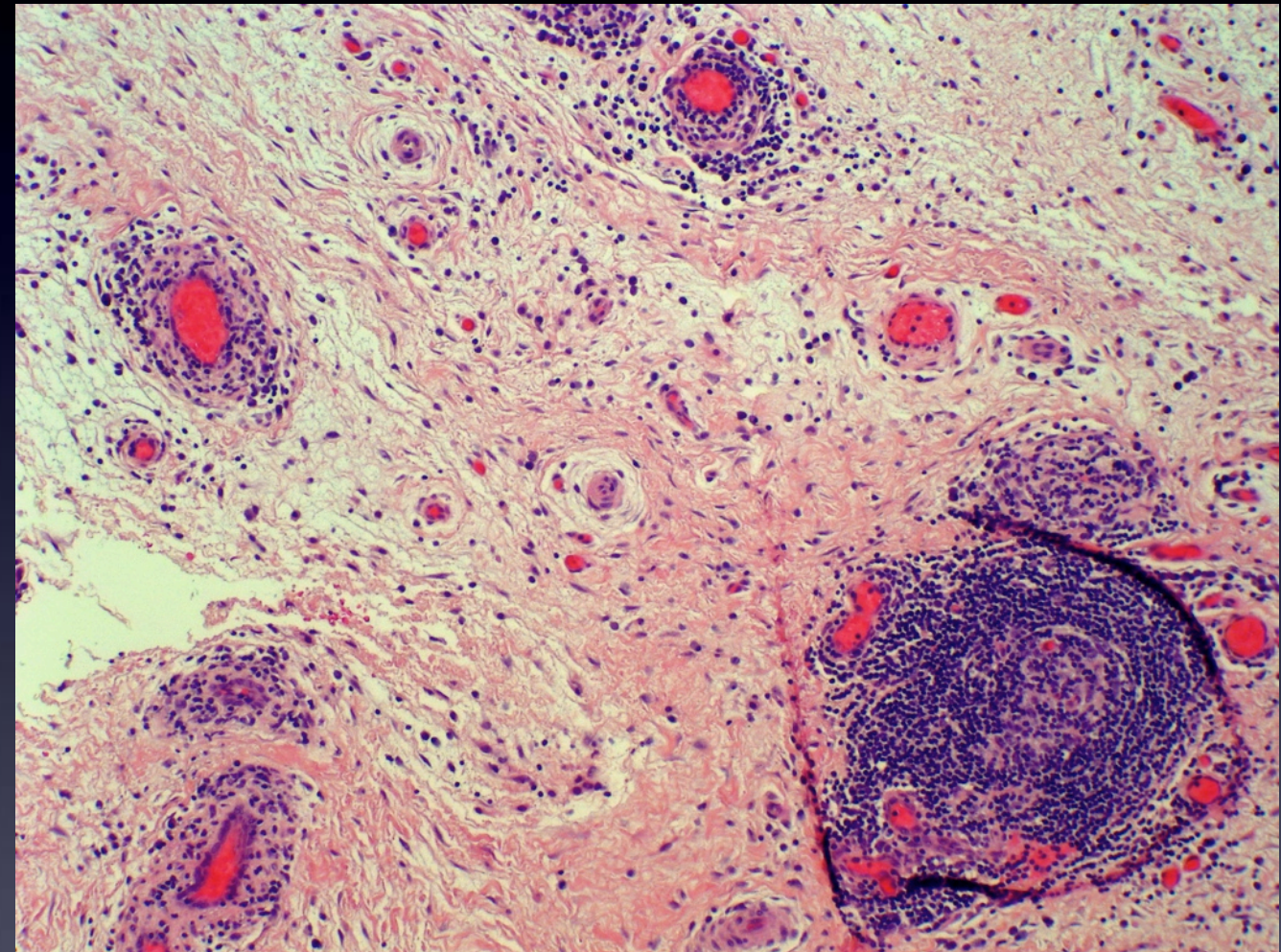




Pseudo-Tumor



Tissue “Necrosis”



“Chronic” Inflammation

Incidence [Co] >20 mcg/L

- **Common in painful MoMs**
- **Common in MoMs with steep shells**
- **Common in ASRs**

De Haan R, Campbell PA, Su EP, De Smet KA. Revision of metal-on-metal re-surfacing arthroplasty of the hip: the influence of malpositioning of the components. J Bone Joint Surg Br. 2008;90:1158-63

De Haan R, Pattyn C, Gill HS, Murray DW, Campbell PA, De Smet K. Correlation between inclination of the acetabular component and metal ion levels in metal-on-metal hip resurfacing replacement. J Bone Joint Surg Br. 2008;90: 1291-7.

Langton DJ, Sprowson AP, Joyce TJ, Reed M, Carlisle I, Partington P, Nargol AV. Blood metal ion concentrations after hip resurfacing arthroplasty: a comparative study of articular surface replacement and Birmingham Hip Resurfacing arthroplasties. J Bone Joint Surg Br. 2009;91:1287-95.

JBJS Paper October - December 2010



This is an enhanced PDF from The Journal of Bone and Joint Surgery

The PDF of the article you requested follows this cover page.

Arthroprosthetic Cobaltism: Neurological and Cardiac Manifestations in Two Patients with Metal-on-Metal Arthroplasty: A Case Report

Stephen S. Tower

J Bone Joint Surg Am. published online Oct 29, 2010

Access the most recent version at doi:[10.2106/JBJS.J.00125](https://doi.org/10.2106/JBJS.J.00125)

Disclosure: The author did not receive any outside funding or grants in support of his research for or preparation of this work. Neither he nor a member of his immediate family received payments or other benefits or a commitment or agreement to provide such benefits from a commercial entity.

***EDITOR'S NOTE:** It should be noted that one of the patients in the present study (Case 1) is the author of the report (S.S.T.).

MoM Risks: Cobaltism

- **sub-clinical [Co] 1-20 mcg/L**
- **clinically uncommon [Co] 10-20 mcg/L**
- **clinically frequent [Co] > 20 mcg/L**

Arthroprosthetic Cobaltism: Neurological and Cardiac Manifestations in Two Patients with Metal-on-Metal Arthroplasty: A Case Report

Stephen S. Tower, M.D.

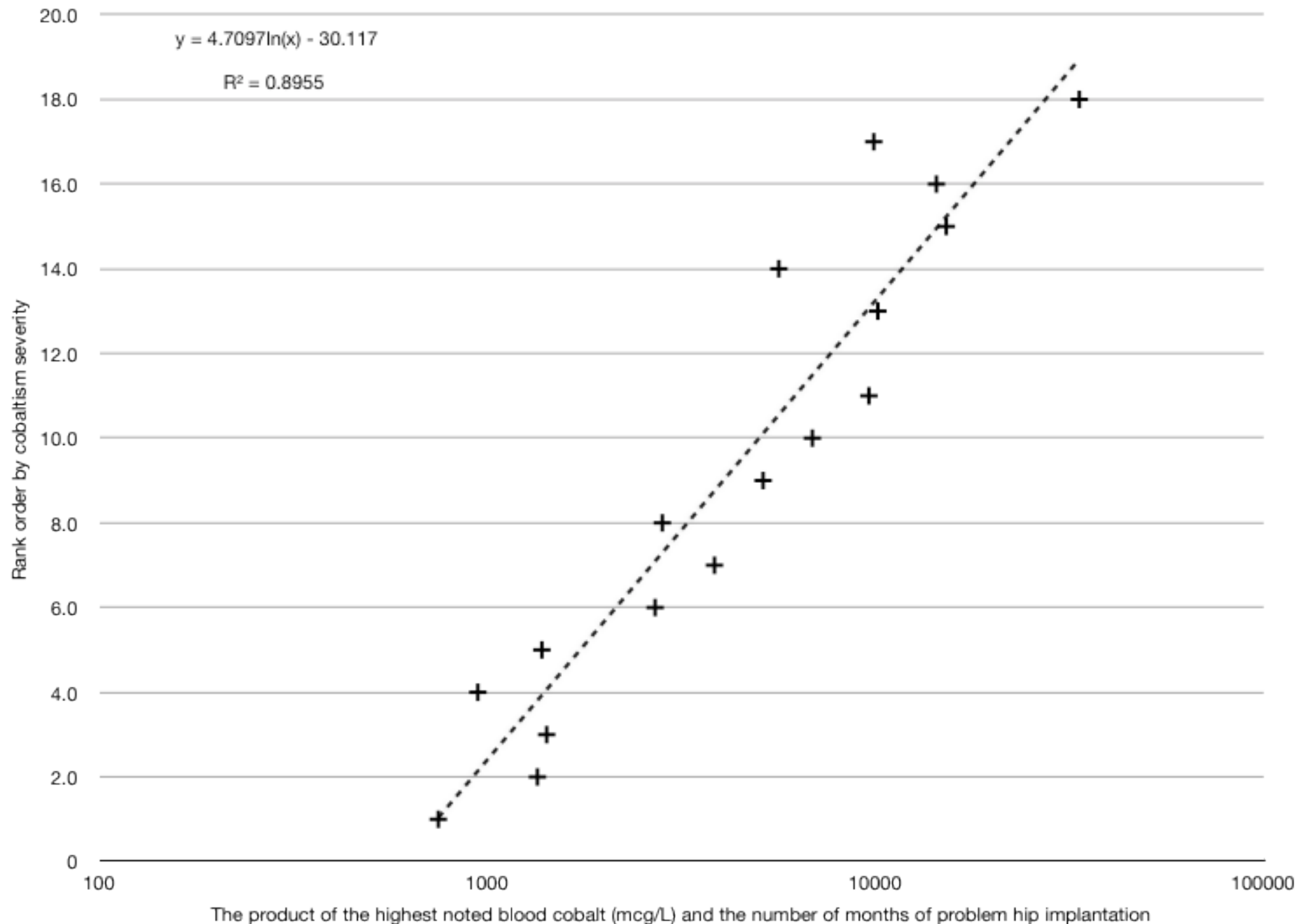
J Bone Joint Surg Am. published online Oct 29, 2010 doi:10.2106/JBJS.J.00125

Cobaltism stratification by nature and severity of Manifestations

Table 1: Classification of the manifestations of cobaltism by category and severity.

	Prodromal	Mild	Moderate	Severe	Potentially Fatal
Constitutional	New malaise. Deterioration in sleep quality.	New fatigue. New headaches not resulting in diagnostic tests or treatment. New disordered sleep resulting in hypnotic prescriptions. New notable unusual rashes.	New generalized weakness and pain. Ten to twenty pound unintentional weight loss. New or altered headaches resulting in diagnostic workup or prescription medications.	New listlessness. Greater than twenty pound unintentional weight loss.	Cachexia.
Psychological	New anxiety, irritability, increased or depressed mood that does not result in medical consultation.	New mood symptoms for which medications are prescribed. New minor difficulties with memory or learning.	Diagnosis and treatment of new major mood or thought disorder. Notable new problems with memory or learning.	Dementia or hospital admission for new psychiatric diagnosis.	New involuntary psychiatric inpatient admission. New suicide attempt.
Neurological	New transient numbness hands or feet. New tinnitus.	New high frequency hearing loss. New problems with balance. New sensory neuropathy by electro-diagnostics. Minor non-refractive visual changes. Changes in taste or smell.	New motor-sensory polyneuropathy by electro-diagnostics. New major deafness. New minor blindness from optic neuropathy or retinopathy. New tremor.	New major blindness. New rampant Parkinsonism. New requirement of ambulatory aides because of motor-sensory neuropathy. Hospitalized for new neurologic diagnosis other than CVA.	New seizures.
Cardiovascular	Elevation of resting heart rate. Relative exercise intolerance. New altitude intolerance. New diagnosis of hypertension.	New breathlessness that results in cardiopulmonary work-up.	New non-CAD cardiomyopathy, pericardial effusion, or pericarditis.	New non-CAD cardiomyopathy, pericardial effusion, or pericarditis requiring treatment.	New non-CAD cardiomyopathy, pericardial effusion, or pericarditis requiring intensive care.
Thyroid	New elevations in thyroid antibodies.	New rising TSH, thyroid supplementation not yet indicated.	New symptomatic hypothyroidism, thyroid supplementation indicated.	New profound hypothyroidism or goiter.	Goiter with airway compromise.
	CAD Coronary Artery Disease, CVA Cerebral Vascular Accident				

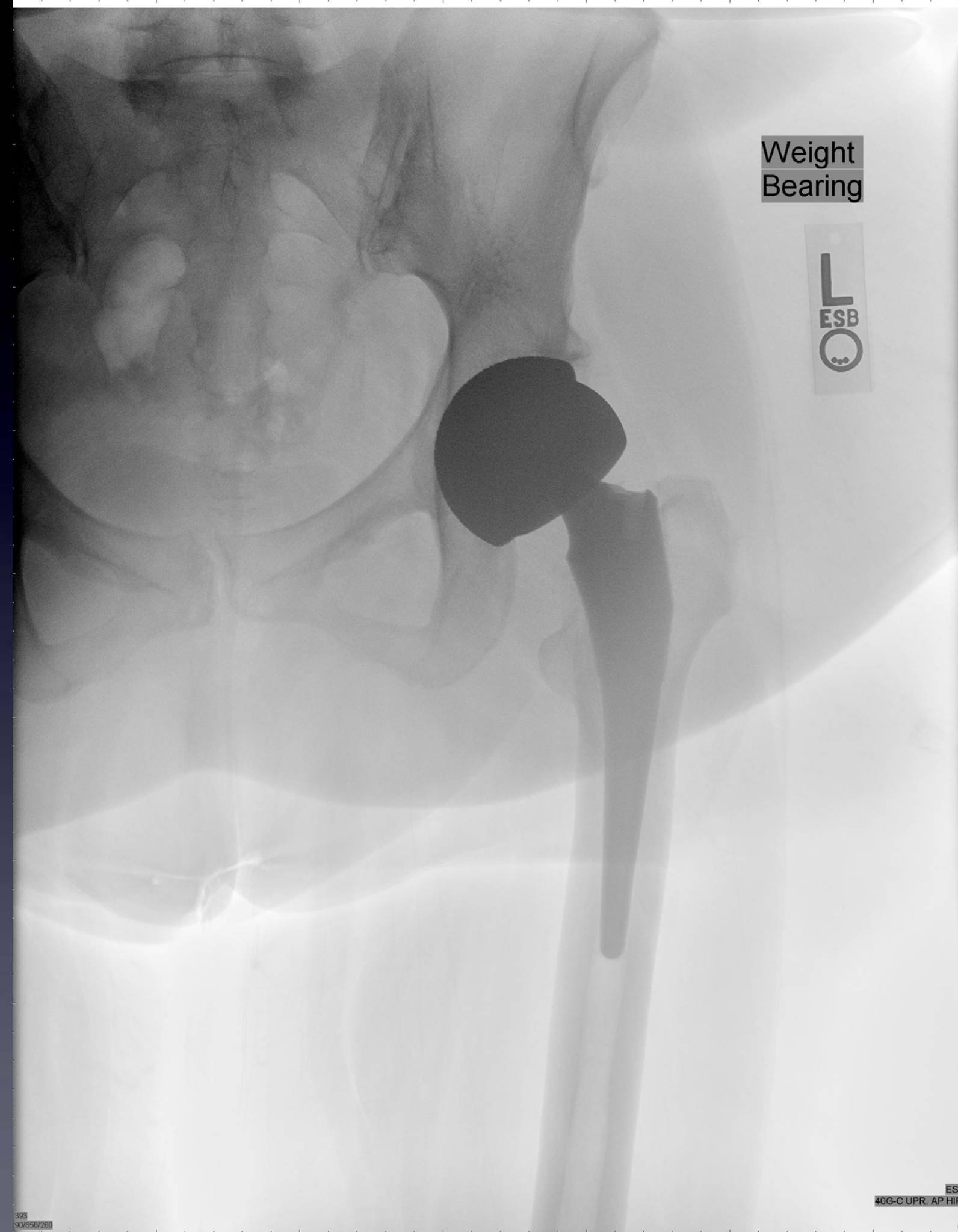
Cobaltism: Severity relates to the degree and duration of cobaltemia



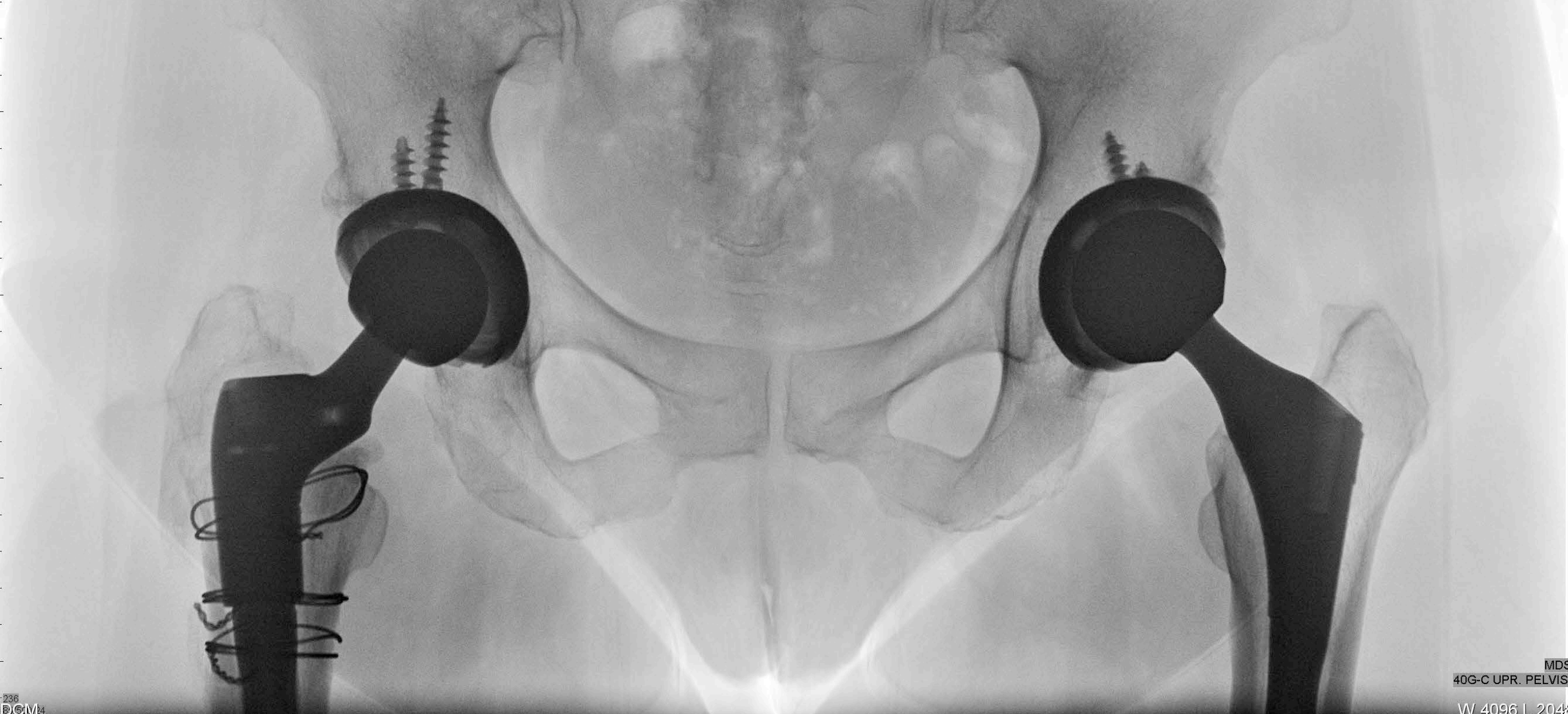
***Alaska series failed MoM
about 35 revised of ? at risk
Median [BCo] > 40 mcg/L
about a third have cobaltism***

Metal-Metal Hips Blood Cobalt mcg/L (Parts per Billion)

- **0.20 mean normal, > 1.0 excess exposure**
- **1.0 mean 28 mm Metasul**
- **2.0 mean resurfacing (BHR)**
- **>5 considered toxic**
- **“teens” some APC reports (long exposure)**
- **> 20 APC case reports**
- **Cost \$270**



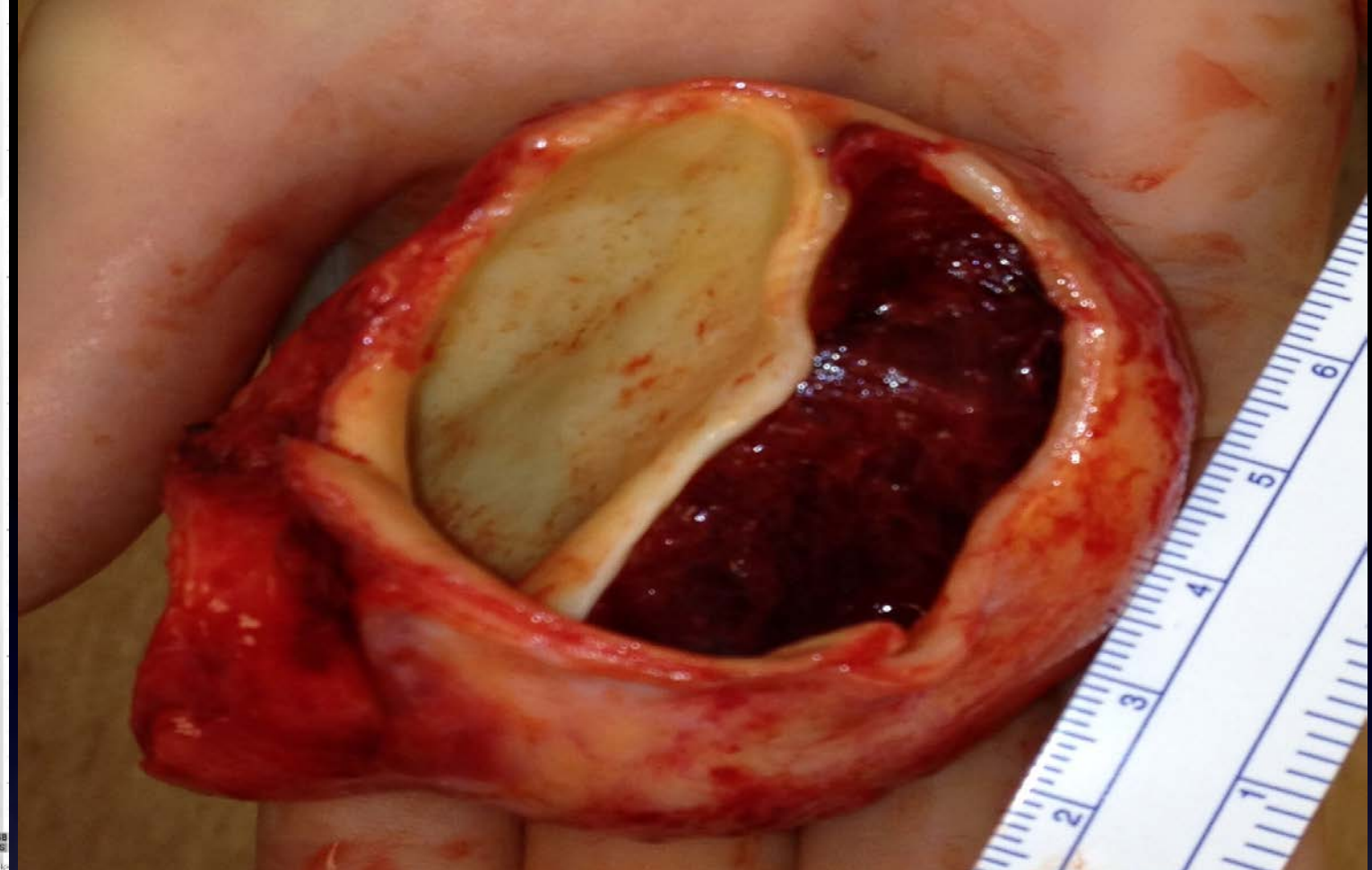
*Young RN
BHR "BH" late 2008
Missed 2 annual follow-
ups but saw surgeon 1-
2 times a week at work
[BCo] > 40
Neurocobaltism with 48
months of surplus
morbidity*



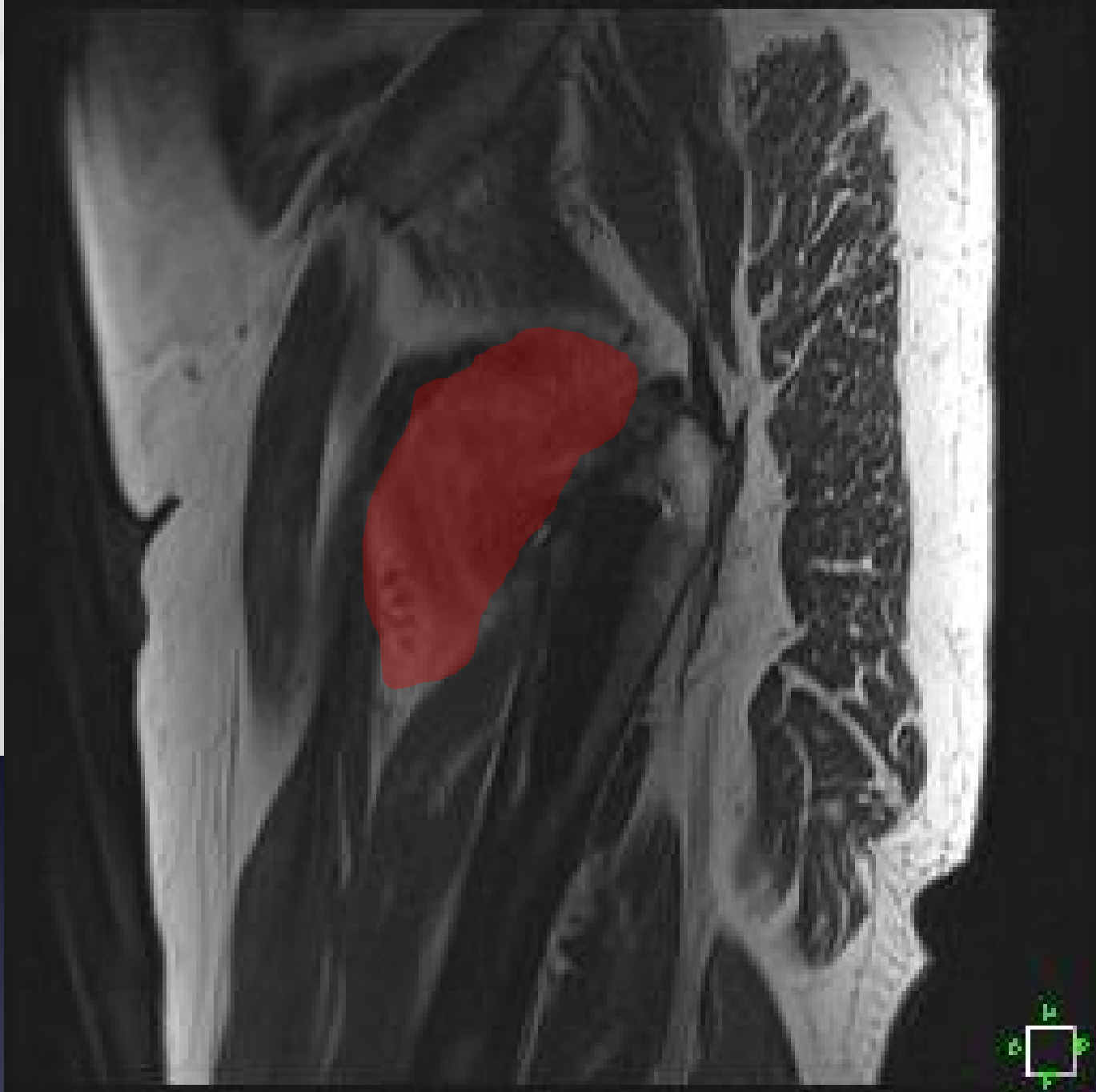
R Rejuvenate 8/2010

L V 40 CrCo head 9/2012

Summer 2012 progressive fatigue, poor sleep, nausea, weight loss 140-120 pounds, deafness, myalgia, cognitive decline, [BCo] 11 mcg/L and new A fib and EDD 4/2013



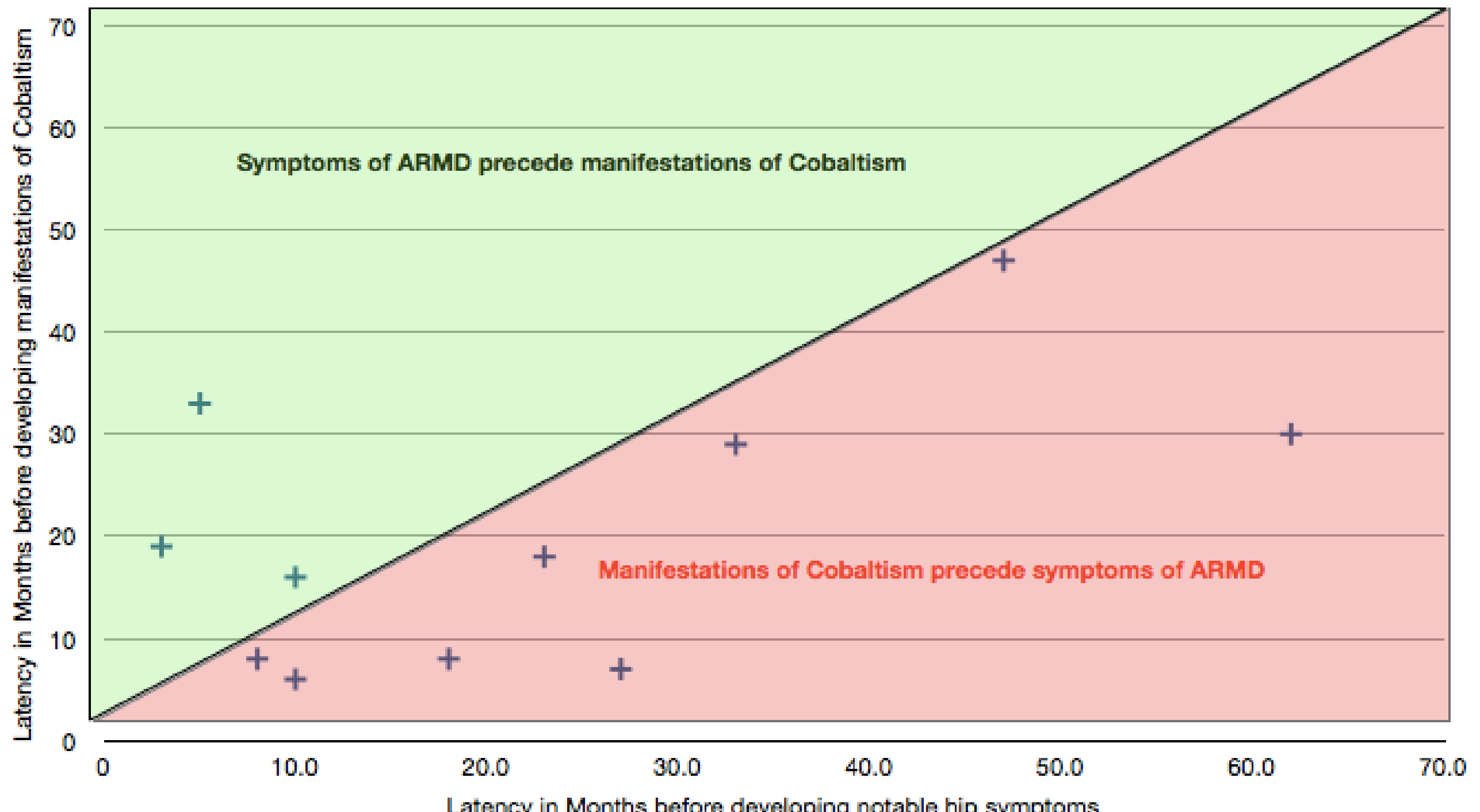
56 YO well male
 3 years s/p L. V40 32 mm
 MoP
 6 years post R. V40 32 mm
 MoP
 Several months L. HFT
 [BCo] of 4
 Admit CCU post ECHO



66 year-old med-mal lawyer with 4 months of HFT left hip

Bilateral Zimmer MLT 32 mm CrCo THA in 2006
[BCo] of 4 mcg/L

Systemic toxicity may proceed Hip Symptoms



Known Arthroprosthetic Cobaltism Cases are Escalating

#1 Megaterino 2001 CoM

#2 Steens 2006 CoM

#3 Oldenberg 2009 CoM

#4 Rizzetti 2009 CoM

#5 Ikeda 2010 CoM

#7 Tower 2010 MoM

#9 Mao 2011 MoM

#10 Machado 2012 MoM

14 Gent 2013 MoM

#15 Pechlova CoM

#15 Gilbert 2012 CoM

23 Tower 2013 MoM

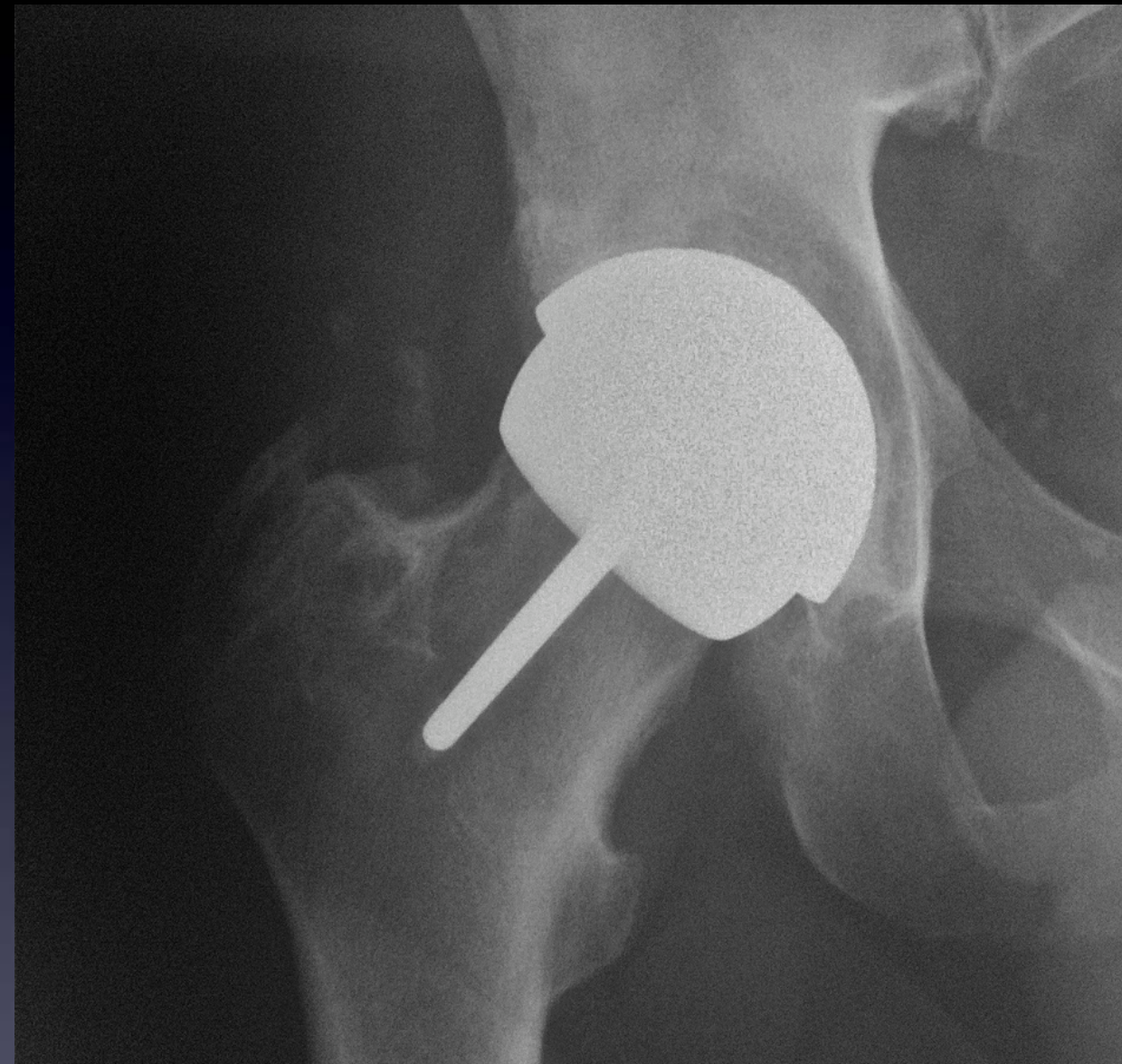
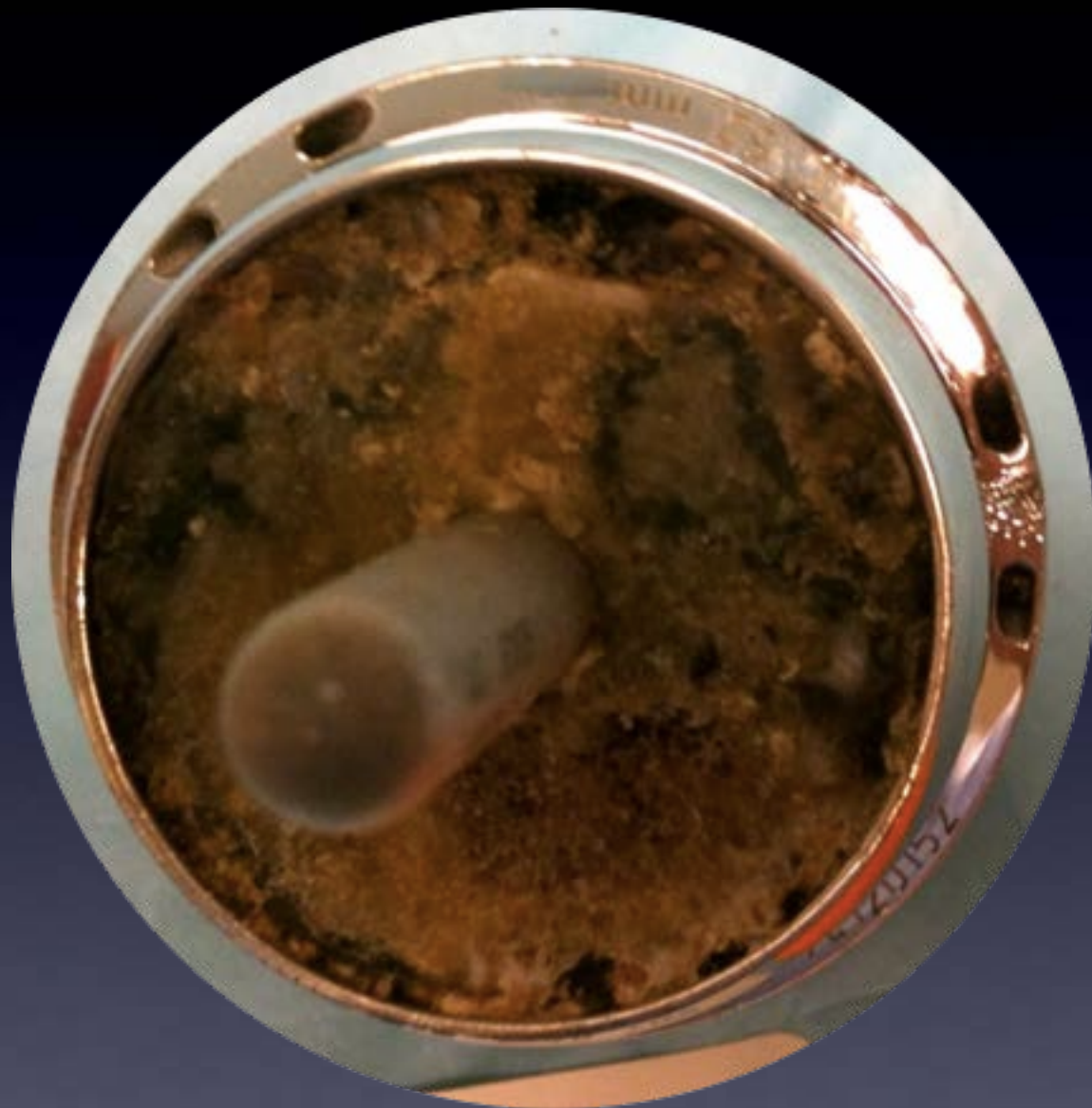
> 40 Ghent 2013 MoM

? > 100 by 2014 MoM

? > 1000 by 2015

Three million + US Hips at risk!

AkAPC #4 BHR S&N



Implanted for 36 Months
Blood Cobalt Level 322 mcg/L
Same as NEJM case that need heart transplant

AAOS and NPS Criteria as of 1/2014 (MoM)

Any hip with Chrome-Cobalt Components!

- Annual [BCo] > 1 mcg/L are Hypercobaltemic
- Cross-sectional imaging
- Consider Revision
 - [BCo] > 10
 - Any Systemic Toxicity c/w cobaltism
 - Hip symptoms and pseudo-tumor
 - “Destructive” pseudo-tumor with or without symptoms

