Silica Dust Concerns Among Museum and Conservation Managers and Professionals

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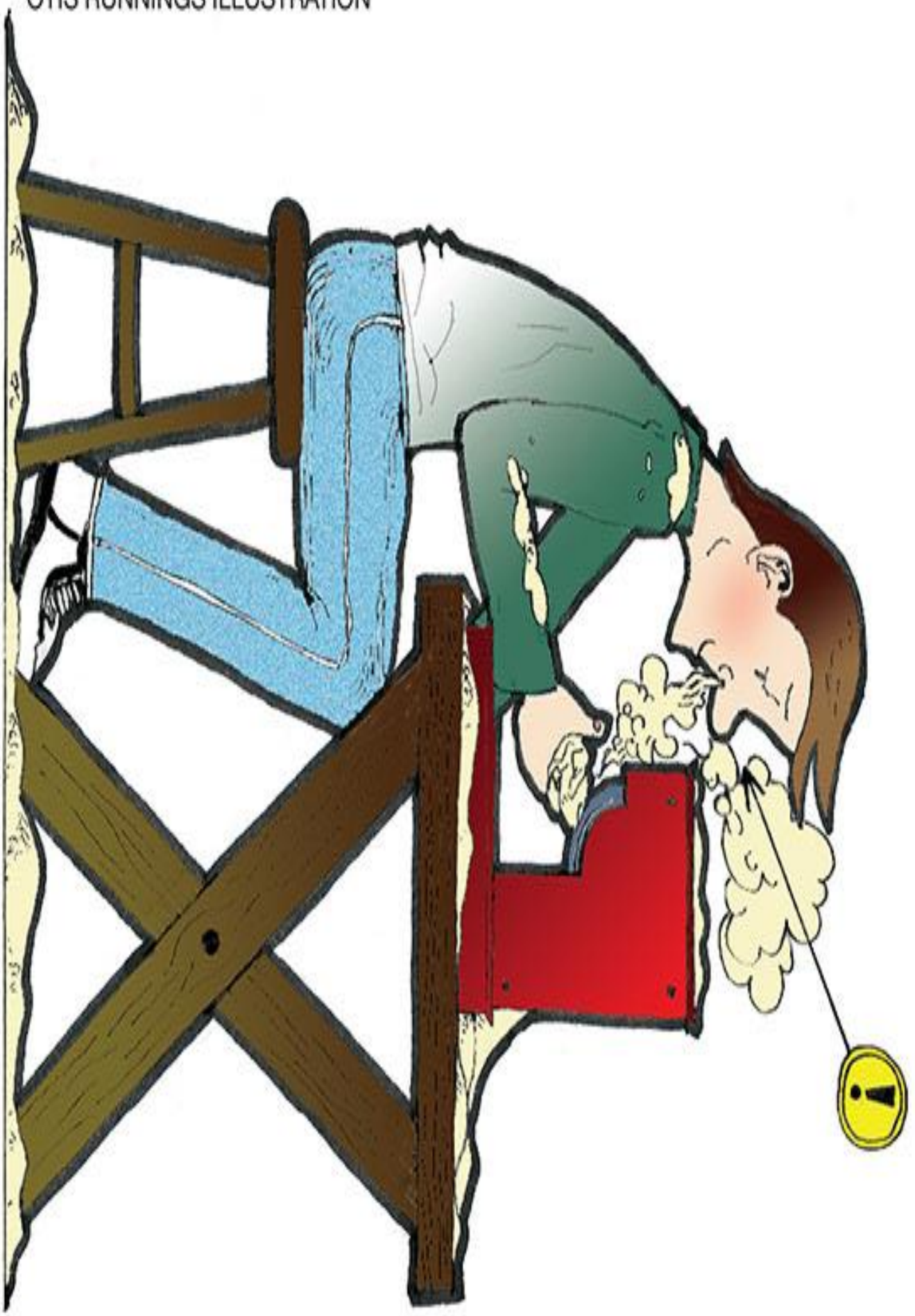
Email: dgoldsmi@gwu.edu; October 30, 2019

Objectives for this Talk

- Review museum settings where silica exposure is concern
- Describe the regulatory and industrial hygiene environments where leadership and knowledge is needed—Thomas Galassi
- Some sorts of illnesses with silica exposure
- Possible research collaborations with and for museum professionals

OTIS RUNNINGS ILLUSTRATION




BOSCH


Exterior restoration in progress

Introduction

- Inhalation of crystalline silica (Si02) exposure causes silicosis, silico-TB, and *cor pulmonale*; ~300 deaths per year, though seriously underestimated in U.S.
- Current estimates 2-3 million U.S. workers, ~100+ million workers world-wide exposed to SiO2 mining, coal mining, construction, metallurgy, ceramics, agriculture, sandblasting
- There is evidence since mid 1980s that workplace silica exposure leads to increased risk for multiple diseases, thus joining smoking, & asbestos as multipotential health hazards

Introduction--2

- On March 24, 2016 OSHA/DoL issued new rules for silica dust exposure permitted exposures to silica in construction *&* general industry at 50 ug/m3 of air over 8 hr workday—1/2 of the 100 ug/m3 under the old standard. [NOTE—not for mining.]
- https://www.federalregister.gov/documents/2016/03/25/2016-04800/occupational-exposure-to-respirable-crystalline-silica
- OSHA is now labeling silica a known human carcinogen, as it has been judged by IARC since 1996; reaffirmed by IARC in 2012
- In addition OSHA recognized that exposure to silica also causes auto-immune diseases and nephritis (kidney disease) as well as COPD and silicosis.
- Museum professionals need to be aware of silica hazards, especially in the field, during construction/repairs of buildings, and globally

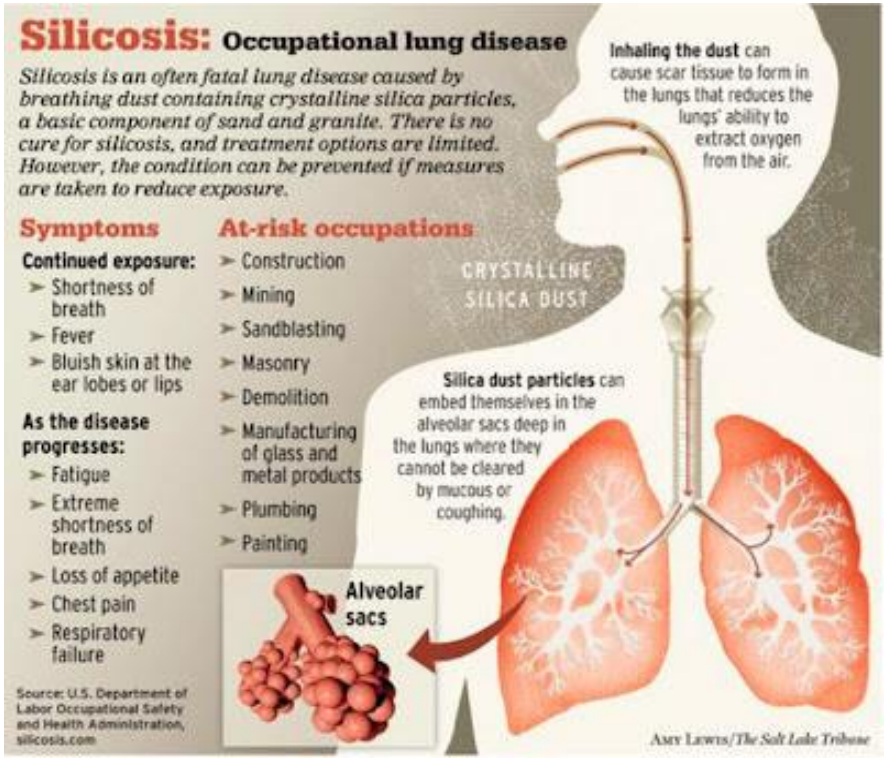
Recent Rise in Silicosis/CWP

- Laney et al (2010) reported a higher frequency of r-type small opacities from 2000-2008, consistent with silicosis among underground coal miners from KY, WV, and VA compared with 1990 and 1980s.
- The same study also found 3.8 to 4.4 times prevalence of PMF compared to 1990 and 1980s
- Blackley et al. (2016) discussed a resurgent spike of PMF, including silicosis in coal miners in Eastern KY
- We are aware of recent spikes in silicosis diagnosed among synthetic stonecounter polishers in U.S., Australia and Israel and among sandblasters in Turkey.

Subsequent risks after diagnosis of Silicosis/CWP

- Yin et al. 2018 found excess rates of latent TB among Chinese patients with CWP; this has been reported by many authors
- Tomaskova et al. (2017) studies Czech Republic CWP patients and found a lung cancer SMR of 1.70 (95% CI 1.41, 2.04). Patients with CWP were exposed to coal dust and to silica as well
- Museum H&S professionals must recognize the overlap between creative stone work, excavating fossils in confined spaces, stone repair, compliance with silica standards, and the risk of silica-related diseases

Silicosis and SilicoTB, Especially in South Africa



Goldsmith et al. 1995 studied 590 silicotic (Non CWP) claimants from California from 1946 to 1991—Noncancer causes of death

Cause of death	Obs	SMR	95% CI
Tuberculosis	45	56.4	41.1, 75.4
Cerebvasc Dis	16	0.6	0.3. 0.9
All heart Dis	97	0.7	0.5, 0.8
NMRD	105	3.8	3.1, 4.6
Emphysema	18	3.4	2.0, 5.4
Silicosis/other NMRD	68	6.8	5.3, 8.6
All causes of death	421	1.3	1.2, 1.4

Malignant Neoplasms SMRs from Goldsmith et al., 1995 Follow-up from 1946-1991

Causes of death	Obs	SMR	95% CI
All malig Neoplasms (MN)	81	1.22	0.9, 1.5
MN Digestive organs	23	1.24	0.8, 1.9
MN Large intestine	14	2.08	1.1, 3.5
MN Respiratory System	43	2.0	1.4, 2.7
MN Lung	39	1.9	1.3, 2.6
MN Prostate	2	0.3	0.03, 0.9
All other MN	5	1.1	0.3, 2.5

Other cancer follow-up studies of silicosis patients and registries of silicosis

- Pulmonary and lung cancer excesses have been found repeatedly since the initial studies by Finkelstein et al. in Canada, 1982 and by Westerholm in Sweden, 1980
- There are several meta-analyses showing ~doubling of lung cancer risk for workers with silicosis
- There is epidemiology evidence for elevated risk for skin, lymphatic and kidney cancers among groups with silicosis

Follow-up study of 790 MI silicotics by Makol et al (2010) for Connective Tissue Disease—1985-2006

- 33 cases of Rheumatoid arthritis (RA), producing RR 6.96, 95% CI 2.93, 16.53
- 1 case of lupus (SLE), producing RR 2.53, 95% CI 0.3, 216.4
- 2 cases of scleroderma, producing RR 28.3, 95% CI 6.09, 129.98
- 2 cases of Sjogrens syndrome, producing RR 0.42, 95% CI 0.09, 2.08
- 6 cases of ANCA-associated vasculitis, producing RR of25.3, 95% CI 6.34, 101.04

Figure 1: Brick Kiln in Kathmandu Valley, Nepal. Photo by: Sushil Thapa [7].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WHWB-US is a vehicle for students to collaborate with OH professionals, including museum H&S staff

- Get involved with and contribute to ‘real world’ problem-solving
- WHWB-US can mentor students for their practicum and research projects (required for MPH students)
- Museums can provide superb internship opportunities that can lead to hiring young talent after completing their degrees
- Please contact Dr. Goldsmith if you want to start a WHWB chapter

A Couple More Items

- Fulbright Program at the US State Department is an excellent means for museum H&S leaders to further their careers in OSH. Example might be to see the adoption of workplace safety and health perception programs in other countries.
- https://www.cies.org/program/fulbright-us-scholar-program

- In 2020 ISEE will meet in Washington DC (GWU will be host) and I urge museum H&S leaders to submit abstracts

Thank you very much

- Any Questions?