



# Occupational Lung Disease Bulletin

Massachusetts Department of Public Health

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Dear Healthcare Provider,

*This Bulletin reports on hypersensitivity pneumonitis in a vocational school teacher in Massachusetts. It is based on a recent case report in Occupational Medicine.<sup>i</sup> The case was presented at Environmental and Occupational Medicine and Epidemiology grand rounds at Harvard School of Public Health October 2015.*

*This case is an example of a work-related lung disease that is now reportable under Massachusetts Department of Public Health (DPH) laws. Effective December 2013, 105 CMR 300.180 states that healthcare providers must report all occupational lung diseases that they suspect or confirm. The report must be received by DPH within ten days of identification, with information about the patient, employer, occupational exposure and diagnosis. DPH may also request additional information. "Outbreaks" or clusters of work-related diseases must also be reported. The reporting form and further information are available on our website [www.mass.gov/dph/ohsp](http://www.mass.gov/dph/ohsp)*

*Since the 1990s, the MDPH Occupational Health Surveillance Program (OHSP) has received Centers for Disease Control and Prevention (CDC) funding to conduct surveillance of work-related asthma. OHSP has recently received five years of new CDC funding to continue surveillance and prevention of work-related asthma and to expand these efforts to include other work-related lung diseases, including, for example chemical pneumonitis, silicosis, and other pneumoconioses. Reporting of patients with work-related lung disease by health care providers to OHSP is critical to this work. We welcome your input as we move forward.*

*To receive your Bulletin by e-mail, to provide comments, or to contribute an article to the Bulletin, contact us at [MDPH.OHSP@state.ma.us](mailto:MDPH.OHSP@state.ma.us)*

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## Hypersensitivity pneumonitis in a high school teacher

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### Case report

A 45-year old man presented with a one year history of cough, shortness of breath and fatigue. He was a lifelong nonsmoker, had no pets, and reported no episodes of water damage or mold at his home. He worked at a vocational school as a machine shop teacher. His symptoms showed mild improvement over the summer vacation. His pulmonary function testing was normal, with the exception of an impaired diffusion capacity (DLCO, 57% predicted).<sup>iii</sup> Bronchoalveolar lavage revealed 58% lymphocytes and 3% eosinophils; cultures for bacteria, fungi and mycobacteria were negative. A serum hypersensitivity panel was negative. Video-assisted thoracoscopic biopsies were consistent with hypersensitivity pneumonitis (HP), and he was referred to an occupational medicine specialist to confirm the diagnosis of HP.

The patient was excused from work for three months while being treated with a prednisone taper starting with prednisone 60 mg daily. His symptoms and DLCO improved. After changes described below were implemented at his school, he was able to return to work.

A private industrial hygiene company conducted an evaluation of the school machine shop. The metal working fluid (MWF), that was used to cool and lubricate the machines, was over a year old. Air samples did not detect MWF in the school machine shop air. But, a culture of the MWF showed profuse growth of *Pseudomonas pseudoalcaligenes* and it was noted that those performing maintenance on the MWF machines had opportunity for significant inhalational exposure. The industrial hygiene report recommended replacing the MWF with a fungicide/bactericide formulation and instituting a regular schedule for changing out the MWF. Personal protective equipment and student education were also recommended.

### Discussion

Hypersensitivity pneumonitis due to metal working fluids had not been reported in a vocational school prior to this

case report. This sentinel case suggests that attention should be paid to MWF practices outside of industrial settings and that physicians should consider the diagnosis of MWF HP for patients exposed to water-based MWF processes. Among the hazards associated with exposure to MWF are biological contaminants, such as *Pseudomonas pseudoalcaligenes*, the oil (straight oil, synthetic or semisynthetic), and additives such as biocides.



## Hypersensitivity Pneumonitis

Hypersensitivity pneumonitis, also known as extrinsic allergic alveolitis, is a result of immunologically induced inflammation of the lung parenchyma in response to inhalation of a variety of antigens.<sup>iv</sup> The prevalence of HP is low and it can be challenging to diagnose as symptoms overlap with other interstitial lung diseases, and laboratory and radiographic findings are non-specific. Among the more familiar HP descriptions are exposures to organic dusts, such as bird fancier's lung associated with proteins in avian droppings and on feathers, and farmer's lung, from moldy hay. A number of microbial agents have been implicated in the disease (*Penicillium* spp, *Alternaria* spp, *Aspergillus* spp, *Mycobacterium*, etc.) as have certain chemicals (e.g. isocyanates, formaldehyde, pyromellitic dianhydride).<sup>v</sup> Cases have been reported in onion and potato sorters,<sup>vi</sup> and from spray humidification systems.<sup>vii</sup> Previous research has documented HP from water-based MWF, especially in auto and aeronautical manufacturing plants.<sup>viii,ix</sup> Barber et al. noted that workers exposed to MWF are at risk of developing respiratory disease including extrinsic allergic alveolitis (HP), occupational asthma and industrial bronchitis.<sup>x</sup>

The most important recommended therapy for HP is minimizing or eliminating exposure to the causal agent.<sup>iv</sup> Treatment often involves systemic steroids.<sup>xi</sup> If patients with HP are recognized and environmental interventions are conducted, they generally improve.<sup>xii</sup>

An important lesson from this case is the vital role of primary prevention—preventing exposures before they cause disease. MWFs are commonly used in a variety of

settings to reduce heat and friction and to remove particles in industrial machining and grinding. Over 1 million workers nationwide are potentially exposed, in their work in metal working and metal forming occupations. Both OSHA and NIOSH have guidance about steps to ensure that exposure to MWF is minimized through design of the equipment and local exhaust ventilation, and to make sure that the fluids are maintained and changed properly to prevent microbiological contamination.

OSHA's website [www.osha.gov/SLTC/metalworkingfluids/](http://www.osha.gov/SLTC/metalworkingfluids/) provides guidance and links to resources from the Independent Lubricant Manufacturers Association:

[www.ilmma.org/resources/metalworkingfluids\\_quickstart.cfm](http://www.ilmma.org/resources/metalworkingfluids_quickstart.cfm)

[www.ilmma.org/resources/dermal\\_assessment\\_guide.pdf](http://www.ilmma.org/resources/dermal_assessment_guide.pdf)

NIOSH's website also recommends a limit to the concentration of MWF in the air [www.cdc.gov/niosh/topics/metalworking/](http://www.cdc.gov/niosh/topics/metalworking/)

### References

- <sup>i</sup> Moniodis A, Hamilton T, Racila E, Cockrill B, McCunney R. 2015. Hypersensitivity pneumonitis in a high school teacher. *Occup Med* <https://occmmed.oxfordjournals.org/content/early/2015/06/30/occmmed.kqv092.full.pdf+html>
- <sup>ii</sup> Brigham and Women's Hospital, Division of Pulmonary and Critical Care Medicine
- <sup>iii</sup> Diffusion capacity of the lung for carbon monoxide, is the extent to which oxygen passes from the air sacs of the lungs into the blood. (Wikipedia definition)
- <sup>iv</sup> Ribeiro-Neto M, Parambil JG. 2014. Hypersensitivity pneumonitis. *Cleveland Clinic Center for Continuing Education*. <https://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/pulmonary/hypersensitivity-pneumonitis/>
- <sup>v</sup> Seed MJ, Enoch SJ, Agius RM. 2015. Chemical determinants of occupational hypersensitivity pneumonitis. *Occup Med* <http://occmmed.oxfordjournals.org/content/early/2015/09/25/occmmed.kqv143.full.pdf+html>
- <sup>vi</sup> Merget R, Sander I et al. 2008. Occupational hypersensitivity due to molds in an onion and potato sorter. *Am J Ind Med* 51:117-9.
- <sup>vii</sup> Flaherty DK, Deck FH et al. 1984. Bacterial endotoxin isolated from a water spray air humidification system as a putative agent of occupation-related lung disease. *Infect Immun* 43:206-12. <http://iai.asm.org/content/43/1/206.full.pdf+html>
- <sup>viii</sup> Rosenman KD. 2009. Asthma, hypersensitivity pneumonitis and other respiratory diseases caused by metalworking fluids. *Curr Opin Allerg Clin Immunol* 9:97-102.
- <sup>ix</sup> Burton CM, Crook B et al. 2012. Systematic review of respiratory outbreaks associated with exposure to water-based metalworking fluids. *Ann Occup Hyg* 56:374-388.
- <sup>x</sup> Barber CM, Burton CM et al. 2012 Systematic review of respiratory case definitions in metalworking fluid outbreaks. *Occup Med* 62:337-42.
- <sup>xi</sup> Sennekamp J, Lehmann E, Joest M. 2014. Work-related extrinsic allergic alveolitis <http://www.asu-arbeitsmedizin.com/ASUInternational-2015-1/Work-related-extrinsic-allergic-alveolitis,QUIEPTYyOTQwMiZNSUQ9MTEzODIx.html>
- <sup>xii</sup> Wells AU, Hirani N, et al. 2008. Interstitial lung disease guideline: the British Thoracic Society in collaboration with the Thoracic Society of Australia and New Zealand and the Irish Thoracic Society. *Thorax* 63(Suppl V:v1-v58) [http://thorax.bmj.com/content/63/Suppl\\_5/v1.full.pdf+html](http://thorax.bmj.com/content/63/Suppl_5/v1.full.pdf+html)