

## Metal Fume Fever

Metal fume fever is a clinical syndrome caused by inhalation of metal-containing fumes generated by welding, galvanizing or smelting. Zinc oxide is the most common metal responsible for this syndrome. Metal fume fever is an occupational disease with 1,500 to 2,500 cases reported annually in the U.S. A review of national poison center data from 2006-2012 found between 460-727 cases per year with 25-30% treated in a health care facility. There were no deaths (*Clinical Toxicology 2015; 53(4):195-203*).

Metal fume fever is described as a recurrent influenza-like syndrome. Patients with metal fume fever develop nonspecific complaints including fever, chills, arthralgia, myalgia, headache and malaise. Fever is usually between 38° and 39°C. Leukocytosis occurs with white counts of 12,000-16,000/mm<sup>3</sup>. Tachycardia can occur and hypoxia is occasionally reported. Chest x-ray findings are normal. Symptoms develop within 4 to 10 hours of exposure and duration is usually 12-48 hours. Daily exposure results in progressively milder clinical effects as the worker develops tolerance to the fumes. If the exposure stops and then resumes, the original intensity of effects recurs. Thus, symptoms will improve over the workweek but then recur on Monday after a weekend when the worker has been off. This is termed 'Monday morning fever'. Metal fume fever is usually benign and self-limited. Respiratory failure and death are extremely rare.

The mechanism of metal fume fever has not been completely determined. It is believed that pro-inflammatory cytokines such as TNF- $\alpha$  are involved. Other pathophysiology includes neutrophil activation and formation of oxygen free radicals. A direct toxic effect on the lungs may also be involved since workers can develop metal fume fever the first time they are exposed.

There are no specific laboratory tests to diagnose metal fume fever. The diagnosis is usually made on the basis of occupational history and the constellation of signs and symptoms usually associated with metal fume fever. CBC can be obtained to document leukocytosis. Chest x-ray and oximetry are performed if other causes of acute lung injury are suspected (*Poisoning and Drug Overdose, 7<sup>th</sup> edition, McGraw-Hill Education, New York, 2018*).

Treatment is largely symptomatic and supportive. Antipyretics such as acetaminophen can be given for fever. Hydration and rest may be beneficial. In patients with underlying diseases such as COPD or emphysema, other treatments including oxygen and bronchodilators may be necessary.

Strategies to prevent or minimize exposure to fumes in the workplace include use of administrative controls, engineering controls and personal protective equipment (*Clinical Toxicology 2015; 53(4):195-203*).



### Did you know?

**Polymer fume fever is a similar syndrome to metal fume fever but is not usually related to occupational exposure.**

Polymer fume fever occurs from inhaling fumes from fluorinated polymer decomposition products. One of the most common causes is overheating Teflon (polytetrafluoroethylene) which is used as a coating on cookware. Clinical effects, onset, and duration of effects are similar to those of metal fume fever. The diagnosis is based on history of exposure to fumes of Teflon or other similar fluorinated polymers. Treatment is supportive.

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