

Nano-chemical exposures implicated in workplace deaths



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A study from Chinese scientists [just out today](#) reports on seven workers in a paint factory that were exposed to nanoparticles along with many other hazardous chemicals during their toxic workday. Two have already died of their diseases. All suffered shortness of breath, fluid in the lungs and around the heart, non-specific inflammation of lung tissue, and fibrosis in the lungs. Nanoparticles about 30 nm in size were co-located in the diseased areas of the lungs.

Experts are pointing out that the chemical nature and source of the nanoparticles are unknown, along with their contribution, if any, to the diseases of the workers. (see [ICON blog](#), and [2020 Science](#) blog)

The tragedy is that these deaths were preventable. The factory workers were in a poorly ventilated room, exposed to a toxic suite of chemicals, and with nothing more than cotton gauze masks to cover their faces.

Unfortunately, this describes the working conditions of many factories in China and around the world. Moreover, the chemical industry in China and other Asian countries is rapidly growing. (The China chemical market represents 10% of its Gross Domestic Product, according to [one report](#)).

If nano-scale chemicals represent the future of the chemical industry, then I sure hope that our current failures to protect workers and prevent toxic environmental releases don't also represent the future. Unfortunately, without some dramatic overhaul of chemical regulations and workplace protections, it seems like the future is now. And, it doesn't look safe from where I stand!

http://switchboard.nrdc.org/blogs/jsass/a_study_from_china_just.html

Nanoparticle safety in doubt

Lung damage in Chinese factory workers sparks health fears.

[Natasha Gilbert](#)



Could nanoparticles cause some lung damage? *C. Juste/Miami Herald/Newscom*

Claims that seven Chinese factory workers developed severe lung damage from inhaling nanoparticles are stoking the debate over the environmental-health effects of nanotechnology.

A paper published in the *European Respiratory Journal* claims to be the first to document cases of ill health caused by nanoparticles in humans ([Y. Song, X. Li and X. Du *Eur. Respir. J.* 34, 559–567; 2009](#)). Other experts are sceptical as to whether nanoparticles are actually to blame, but the paper has triggered lively discussions.

"The study raises the bar for doing appropriate research as fast as possible to find out where the dangers might lie when working with nanomaterials," says Andrew Maynard, a nanotechnology expert at the Woodrow Wilson International Center for Scholars in Washington DC.

The study describes seven women, aged 18–47 years, who worked in an unidentified printing factory in China; two of them later died. They all had pleural granulomas — ball-like collections of immune cells in the lining of the lung that form when the immune system is unable to remove a foreign body. They also had excessive, discoloured fluid in the lung lining. Particles around 30 nanometres in diameter were found in lung fluid and tissue.

The study says that the symptoms were caused by inhaling fumes produced when the workers heated polystyrene boards to 75–100°C. The boards had previously been sprayed with a 'paste material' made from a plastic identified as a polyacrylate ester.

"We can't say what the link is or if there are other exacerbating circumstances."

The workroom, of around 70 square metres, had one door and no windows. The ventilation unit had broken down five months before symptoms started to

manifest, and the door had been kept closed to keep the room warm. The workers wore cotton gauze masks only on an "occasional basis".

Electron microscopy found nanoparticles around 30 nanometres in diameter in the paste and in dust particles that had collected at the inlet of the broken ventilation unit. Lead author Yuguo Song, a clinical toxicologist at Beijing Chaoyang Hospital, says "it is obvious the disease is not due to microparticles or vapours, because the pulmonary epithelial cells are full of nanoparticles".

Maynard says the symptoms seen in the patients are "similar" to those seen in animals exposed to nanoparticles. He adds that damage to the areas surrounding the lungs suggests that larger particles are not to blame, as these tend to be constrained within the lungs. But because the study does not identify what nanoparticles were involved or their concentration, he says, "we can't say what the link is or if there are other exacerbating circumstances".

Ken Donaldson, a respiratory toxicologist at the University of Edinburgh, UK, doubts that nanoparticles are to blame. He says the symptoms are more typical of chemical exposure. "I don't doubt that nanoparticles were present, but that does not mean they were the main arbiters," he says.

Donaldson says that the plastic material the patients worked with is the more likely culprit — as it would have been highly toxic at the levels they were probably exposed to given the size of the room they worked in and its lack of ventilation. Anthony Seaton, an emeritus professor in environmental and occupational medicine at the University of Aberdeen, UK, agrees that the study does not pin down nanoparticles as the cause of the ill health. Rather than an insight into the toxicology of nanoparticles, he says, the study is an example of a "total failure in health and safety procedures".

<http://www.nature.com/news/2009/090818/full/460937a.html>