Fine Particle Pollution Is a Risk Factor for Cardiovascular and Respiratory Diseases

The Environmental Protection Agency or EPA came out In June of 2012 with very strong statements about the quality of our air, how it needs to be further protected and improved and what exposure to pollution does to our bodies (especially to the bodies of the elderly). They did not mix metaphors when they stated clearly:

"An extensive body of scientific evidence indicates that long- and short-term exposures to PM2.5 cause premature death and adverse cardiovascular effects, including increased hospitalizations and emergency department visits for heart attacks and strokes. The evidence also links PM2.5 exposure to harmful respiratory effects."

Although pollution affects the elderly much more than other populations, the truth is that pollution and poor general air quality affect all age groups and all genders and races. The most vulnerable besides the elderly include newborns, pregnant women, asthmatics, children, poor people, obese people, and people with diabetes.

Short-term Exposure Effects

Even short-term exposure (acute) to very fine particulate matter (particles that are 2.5 microns or smaller, PM2.5) cause a much greater risk of cardiovascular disease and respiratory disease. In addition, hospitals see a huge uptick in hospital and emergency room admissions. Patients often come in presenting with asthma attacks or cardiac dysfunction.

Long-term Exposure Effects

Long-term exposure both decreases lung function (which decreases available oxygen delivered to the rest of the body) and essentially starves the other organs of oxygen. In addition, the inflammatory response in the lungs causes functionality in the lungs to get even worse than before. Patients who come into the hospital with long-term exposure usually come because they are in cardiac failure or are having a stroke.

In addition, when very small particles lodge in the lungs of the very young, lung development is impeded. Children exposed to chronic pollution also have more developmental deficiencies and mortality. If a pregnant woman is exposed to chronic pollution, they tend to give birth to children with a low birth rate and also tend to have reproductive problems later.

But Exposure to what?

Up to this point, this article has implied that outdoor pollution is the main subject and storyline. But this is not true. Indoor pollution can be much worse than outdoor pollution, especially if there is a smoker in the house. Indoor pollution can also include particulate matter from mold spores, bacteria, fungi, dust, pet dander and dust mites. It is sometimes unfortunate that elderly

people cannot keep their house clean enough to avoid a dense population of this particulate matter.

Outdoor pollution is pretty difficult for any of use to control, but indoor pollution is much more controllable. The best way to control levels of particulate matter, both coarse and fine, is for a patient to own and use a good, medical grade HEPA filter. Medical grade HEPA filters will capture particulate matter down to 0.3 microns in diameter.

The ‘dangerous’ particulate matter is much larger than the rating on these HEPA filters (2.5 microns). Coarse particulate matter is usually taken care of by using a prefilter in front of the more expensive HEPA filter screen. HEPA filters should be large enough to recycle the air in a given room at least 4-5 times and should have a good efficiency rating. The higher end HEPA air purifiers will have digital readout on the state of the filters and how efficiently they are functioning.

In addition, if patients are worried about microbes, spores and viruses (i.e. elderly and newborn), higher end units will have the newest technology tacked on to the other filters: Titanium oxide. Titanium oxide when combined with a UV light can filter out particles down to 0.01 microns in diameter…. smaller than the size of common viruses.