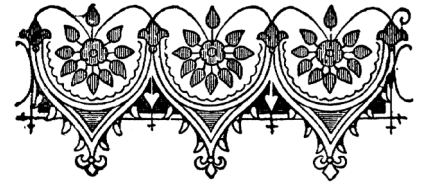


Health & Wellness



Indoor Air Pollution



Dr. Kate Thomsen and Silky

We have been witnessing the tragedy of out of control wildfires too often. Since 1984 the forest area burned by wildfires in our western US states has doubled due to climate change. These fires have also been increasing in number, size, and duration all over the globe. The smoke produced by these wildfires is hazardous to human health containing a mixture of small particles (soot, ash, and condensed tar), water vapor (usually acidic due to acidic nitrogen and sulfur compounds released by the fire) and gases (carbon monoxide, carbon dioxide, nitrogen oxide and volatile organic compounds). This toxic soup has short term effects that can be irritating (eyes, nose, throat, breathing) and potentially deadly (acute asthma/lung disease exacerbation, heart attack, stroke, arrhythmias, heart failure...). It can also produce long term effects in the respiratory and cardiac systems as well as systemic inflammation, immune dysregulation and neurological damage after exposures. Wildland firefighters are required to use NIOSH approved respirators to minimize inhalation of these toxic materials for prevention of the adverse health effects.

Unplanned and uncontrolled fires impact agriculture, transportation, power and gas services, water supplies, and the health of humans, animals and ecosystems. When wildfires spread into human communities, the smoke produced is even more toxic to human health as it also contains the particulates, gases, solvents, metals, pesticides, plastics and forever chemicals produced from burned buildings, industries, and cars. This is typical exposure for our community firefighters who also wear protective equipment. Understanding how to protect yourself from wildfire or community fire smoke and being prepared for potential exposure is a consideration for all of us. We can start by understanding more about our everyday indoor air pollution.

The quality of air in your home, school, office or other building environment is probably worse than you suspect. Indoor air has been estimated to be 2 – 10 times more toxic than outdoor air due to our energy efficient “air tight” buildings and increased use of the products of modern living. Most Americans spend about 90% of their time indoors making this a significant health issue. Categories of indoor air pollutants include: combustion products (carbon monoxide, particulate matter, environmental tobacco smoke), biological agents such as molds and their mycotoxins, other substances of natural origin (radon, pollen, and pet dander), ozone (from some air cleaners), pesticides, lead, asbestos, and volatile organic compounds (VOCs) from a variety of materials. Most of these pollutants come from our products or activities inside the building but outdoor pollutants can enter through open windows/doors and ventilation systems (e.g., neighborhood chimney smoke), via cracks in the structure (radon), through the water (VOCs released during your shower or cooking), and by dragging them inside attached to the dusts/dirt on your shoes.

Smoking: Cigarette smoking is the leading cause of lung cancer. The Surgeon General issued the first warning on the link between lung cancer and smoking in 1964. Similar to wildfire smoke, the combination of vaporized chemicals with combustible tobacco will injure cells, tissues and organs. Particulates in cigarette smoke include: nicotine, tar, benzene and benzo(a)pyrene. Gases in cigarette smoke include carbon monoxide, ammonia, dimethylnitrosamine, formaldehyde, hydrogen cyanide, acrolein, arsenic, acetone, toluene, methylamine, lead... Actually there are too many chemicals to list (over 7,000) in burning cigarettes.

Second hand smoke is the third leading cause of lung cancer. Smoking marijuana and vaping with electronic cigarettes and similar devices also release myriads of dangerous chemicals into the smoker's body as well as into the air. These chemicals can build up on hard surfaces (walls, tables and floors) and embed into soft surfaces (clothing, upholstery, drapes, bedding and carpets). Third hand exposure occurs when these surfaces are touched or when the chemicals are re-released into the air. Smoking and vaping should be prohibited indoors (including in vehicles), near air intakes, and in entry ways to enclosed spaces.

Radon is the number one cause

of lung cancer among non-smokers and the second leading cause of lung cancer overall. Radon is a naturally occurring invisible, odorless, tasteless, and colorless inert radioactive gas produced by the natural breakdown of uranium in the earth's crust. The alpha particle from radon decay products travels through soil and enters homes, schools and other buildings through the foundation. Inhaling radon causes physical and chemical damage to the DNA of cells in the lungs. Elevated levels of radon are found in every state and it is estimated that 1 in every 15 homes will have elevated levels on testing. Lung cancer risk increases with concentration and length of exposure and although there is no safe level of radon, the EPA recommends radon levels be kept consistently below 4pCi/L. (The average annual outdoor exposure level is 0.4pCi/L.) Testing is inexpensive but since levels fluctuate, it must be done for at least a 2 day average. Testing is typically done over the short term (2 – 7 days) in closed house conditions or long term (more than 90 days). There are many test devices including digital radon monitors available to the consumer. Mitigation of radon is done through Active Soil Depressurization where a vacuum is created carrying the radon through pipes out of the building. The fan should be checked weekly or monthly and the radon level checked every 2 years.

VOCs and Solvents: Volatile Organic Compounds are part of our modern life. Most are human made chemicals derived from fossil fuel sources. They are released from their solid or liquid state as a gas and are ubiquitous in indoor air. Examples include cleaning products, off gassing from mattresses/furniture/carpeting, dry wall, spray foam insulation, new vinyl flooring, new cabinetry, paint, dry cleaned clothes, nail polishes/products, air fresheners, scented candles, gas stoves/fireplaces, gas powered vehicles stored in attached garages, exposure to heavy traffic or airports, decaffeinated coffee and pollutants in drinking water. These chemicals can be carcinogenic and toxic to the immune system, the liver, kidney, brain, bone marrow, and the endocrine system. Indoor air contains 10 times or more the concentrations found in outdoor air. Avoidance of exposures is the best health strategy and in the case where it may seem unavoidable, one should increase ventilation, filter the indoor air and increase your body's ability to detox these chemicals with foods and supplements.

Protect yourself from indoor and outdoor pollution. Please visit my website for more information.

Monitoring:

- AQI: www.epa.gov/airnow; Purple Air App for local monitoring - Check local outdoor air quality (AQI) and keep windows closed when outdoor pollutants (like PM2.5 and ozone) are high.
- AQI: 0 – 50 is Good, 51 – 100 is Moderate, 101 – 300 Unhealthy
- In-home monitors: AirKnight 9-in-1, IQAir Air Visual Pro

Water:

- Check water for VOCs and other pollutants: www.mytapscore.com; www.watercheck.com; www.ewg.org/tapwater/
- Reverse osmosis filter for drinking and cooking water; carbon filter for your shower water

Air:

- Install high efficiency filters (MERV 13+) in your heating, ventilation and air conditioning system; have HVAC systems checked annually
- Check your house for radon and mitigate if needed
- Use high quality portable Air Purifiers. The best ones have HEPA filters (for particulates) and Activated Carbon Filters (for VOCs – need 3 pounds or more); Austin Air or IQ Air are good brands
- Home made: YouTube Corsi Rosenthal Box Filter Fan

Wildfire Smoke:

When around wildfire smoke or other heavy pollution, use a respirator when outside. Use 3M Respirators 6000, 6500 or 7500 series with 3M 60926 filters



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Additional articles on holistic health topics can be found on the website

Pesticides: A 1999/2000 study by the CDC tested over 9,000 people for 34 pesticides and 100% of the people had at least 23 pesticides found in their bodies!!! Most of this exposure comes from eating sprayed non-organic food but consider that you may be exposed from chemical sprays you are using around your home for deterring rodents and insects. Living near crop dusting farms increases exposure due to chemical drift.

Molds/Mycotoxins: Mycotoxins are produced by and released from molds/fungi to protect their food source from other fungi. Their toxicity is well known as they have been implicated as chemical warfare agents. They are found on foods and in water damaged buildings. Molds are often hidden behind walls and wall coverings or in attics and crawl spaces. There is a myriad of symptoms and health problems that can occur in some people with certain mold exposures. To deter mold growth in the home, it is recommended to keep indoor humidity low (between 30 – 50%), to use fans when showering, and clean up leaks or spills within 24 – 48 hours of occurring.

Particulate Matter (PM): Indoor particulate matter includes particles that come in from outdoors and particles generated indoors. Indoor air particles are generated from cooking, cleaning, combustion (use of fireplaces, kerosene heaters, unvented space heaters, candles, tobacco), natural

sources (animals, pests, plants, mold), hobbies, printers and indoor chemical reactions. Adverse health effects from particulate matter depends on the size of the particulates. Beach sand blowing against your face may be irritating but it's size (diameter of 90 micrometers) makes it too large to easily enter your body. Health concerns are known to occur with PM 10 or less. PM10 are coarse particles that can enter the respiratory tract. PM2.5 are fine particles, not visible to the naked eye that can enter the lower respiratory tract. PM1 particles are very fine and can enter the lungs air sacs (alveoli) and ultrafine particles PM 0.1 can enter the blood from the lungs and cause system-wide effects: oxidative stress and inflammation in the body via damage to the lungs and vascular system. The EPA monitors outdoor air across the country for PM2.5 (includes 2.5 and smaller) and reports this continually as part of the AQI (air quality index).

Dr. Kate Thomsen's office for holistic health care is located in Pennington, NJ. She is trained in Family Medicine, and Board Certified in Integrative Medicine. She is an Institute for Functional Medicine Certified Practitioner.

She has been practicing Functional Medicine for 26 years. For more information see www.drkatethomsen.com or call the office at 609-818-9700.