

# Notes from Fresh Air For Life

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(These categories are my own, and are not taken from the book. They are just here to help organize the information.)

## Chapter One

### 1. Breathing

- Constant breathing is our most intimate interaction of any kind

### 2. Importance of Breathing and Evolution of Contaminants

- ABCs of urgent care: Airway, Breathing, Circulation
- Auto exhaust, smog, congested commuter traffic ->our grandparents lived much simpler lives, closer to nature and more in harmony.

### 3. Population Moves Indoors

- Despite our good intentions, we seem to have had our priorities misplaced
- US census shows 80% of population lived on farms in 1930. By 1950, 80% live in cities
- Today, 90% of people in industrialized countries spend more than 90% of their lives inside buildings ~ to over 65 years of the average life.
- Fulltime homemakers & small children may spend over 21 hours per day inside homes, with 2.5 additional hours inside other buildings.
- Employed city workers still spend 90% of their time indoors. 63% are at home, and 28% are at work, according to US EPA reporting (-1989 *Report to Congress on Indoor Air Quality*), and confirmed by the American Lung Association (ALA) in May of 1999. (P 6)

### 4. Children, And Tighter Homes

- Children are especially vulnerable to toxic vapors due to higher metabolic rates. They breathe in more than 2 times as much oxygen as adults, relative to body size.
- Due to the energy crisis in the 1970's, architects and builders designed more airtight buildings that enclose airborne toxins that have nowhere to go but to be breathed in by you and me.
- "A tighter home is good from the standpoint of conserving energy, but bad in terms of occupants inside" -Robert Corsi, Director of Indoor Environment at U of Texas, Austin.

### 5. Stats & Studies Of Insulation, Toxins, And Illness

- A recent study found that the allergen level in 'super-insulated' homes is 200% higher than in more 'ordinary' homes.
- "Carpeting, poorly ventilated fireplaces, mold, bacterial toxins, dust mites...an almost endless collection of highly allergenic products has invaded our homes, and we have sealed them in with deadly precision." *Wall Street Journal*, 12/98
- "Tight building syndrome"
- EPA ranks indoor air pollution among the top five most significant environmental dangers to the American Public. -1989 *Report to Congress on Indoor Air Quality*
- According to the American College of Allergists, 50% of all illnesses are either caused or aggravated by polluted indoor air.

- 2002 published study in Amer. Journal of Public Health estimated that each week, 35-60 million US workers have symptoms of illness related to their workplace. That is at least 40% of the 90 million non-industrial indoor workers. –Jul 20, 2003 *Atlanta Journal-Constitution*, “Bad Air Breeds Ailments in Homes, Schools, Offices”

## **6.Homeowner Responses**

- 90% of homeowners questioned in that same ALA study of 1999 were not aware that indoor air quality could be a problem, though 95% felt that indoor air quality was either important or somewhat important.

## **7.Costs & Spending**

- US EPA spends ten (10) times as much money on ‘clean our outdoors’ than on clean air indoors. –Jul 20, 2003 *Atlanta Journal-Constitution*, “Bad Air Breeds Ailments in Homes, Schools, Offices”
- The 1989 EPA report to Congress estimated that aggregate costs from indoor air pollution would amount to tens of billions of dollars per year. -1989 *Report to Congress on Indoor Air Quality*
- Medical costs related to indoor air quality far exceed the costs of those related to outdoor air, with estimated annual costs & productivity losses at \$1-4 billion for allergies and asthma, \$6-19 billion for respiratory disease, and \$10-20 billion related to symptoms of ‘sick-building syndrome’. –1998 “Potential Nationwide Improvements In Productivity and Health from Better Indoor Environments,” *Proc. Of ACEEE Summer Study* 8:85-97 Fish WJ and Rosenfeld AH
- A 2000 *Business Week* report suggested that US companies could save \$58 billion annually by preventing “sick-building syndrome”, and an additional \$200 billion in worker performance improvements by creating offices with better indoor air. –Conlin M and Carey J, “The Business Case for Better IAQ” *Business Week*, (2000) 5:114
- In 1989, the World Health Organization (WHO) estimated that 30% of all modern buildings nationwide had indoor air pollution problems. – WHO, “IAQ: Organic Pollutants” Euro Reports & Studies, 111. (1989)
- In 1994, OSHA estimated that there were more than 1.3 million buildings with poor indoor air quality in the US, potentially affecting more than 21 million employees. –59 Fed Reg. 15, 968, 16, 006, (April 5, 1994)

## **Chapter Two**

1. The American Lung Association has been emphasizing that air pollution contributes significantly to lung disease, including respiratory tract infections, asthma, and lung cancer. –ALA State of the Air 2005 report
2. All forms of lung disease taken together claim almost 355,000 lives in America each year, and is the third leading cause of death.
3. In the past decade, the death rate from lung disease has risen faster than for almost any other major disease, despite the decline in smoking and improved medical management of respiratory illness.
4. The American Heart Association suggests that air pollution in the US cities may even now cause twice as many deaths from heart disease as it does from lung cancer. – Brook RD, et al “Air Pollution and Cardiovascular Disease” *Circulation* 2004, An AHA Scientific Statement
5. 5/8/00 – US News & World Report labeled the recent trend as “An Allergy Explosion”

6. 09/26/04 – The Chicago Tribune published a comprehensive article on the astounding 86% increase in asthma cases between 1980 and 1996. Asthma cases have more than doubled in the past 20 years.
7. 2001 – National Health Interview Study reported to the National Center for Health Studies that more than 7.6 million children of 5-17 years and more than 12.7 million children of 18-44 years in the US suffer from asthma. ~6 percent of the US population has asthma overall, and about 11 percent of children have asthma. Asthma is the leading cause of school absenteeism and pediatric hospital admissions.
8. Life Magazine – 50 million American suffer from breathing difficulty
9. 09/30/04 – USA Today reported that household chemicals are linked to the increasing incidence of childhood asthma. The American Academy of Pediatrics points out that children are more vulnerable to these and other airborne contaminants than adults, due to cellular immaturity and ongoing growth. Even minor irritants that produce only a slight response in adults can result in a dangerous level of swelling in a child's narrow airways. Increased exposure to the pollutants during childhood increases the risk of long-term damage to a child's lungs
10. Oprah Winfrey dedicated an entire show to the problem of indoor air pollution in public schools and how it may contribute to learning disabilities and other health problems.
11. Approximately 5600 people actually die each year in America from asthma and it's complications.
12. Asthma appears to have developed at the turn of the last century
13. In some countries, where the population still lives on the land and is removed from "sick buildings" and toxic emissions from industrialization, asthma is a relatively rare condition. The rapid rise of asthma is seen to parallel the worsening of indoor air quality, pointing out an environmental cause, and not to a dramatic change in genetics.

## **Pollutants**

1. **Biological** – mold, bacteria, viruses, pollen, dust mites, dander
  - Leads to breathing problems, allergic reactions, some forms of infectious diseases, and more. Some molds are identified with upper respiratory infection and pulmonary hemorrhage in infants.
  - Airborne bacteria can lead to Legionnaires disease or Pontiac fever. Viruses can cause the 'common cold' or systemic influenza, or may give rise to more aggressive conditions like SARS (sudden acute respiratory syndrome). Airborne infectious diseases can pose a worldwide pandemic threat.
2. **Microorganisms** – present in the air continually as a result of normal coughing and sneezing, or breathing. Our immune system protects us naturally, until something more virulent comes along, or until our healthy defense systems become inadequate for one reason or another.
3. **Radon** – a naturally occurring gas derived from radioactive decay in soil can enter your home through possible cracks in the foundation and walls, drains, or other openings. An estimated 1 out of 15 homes in the US has radon levels above the EPA's recommended action level. Indoor radon exposure is estimated to be the second leading factor in the cause of lung cancer, after cigarette smoking. The National Research Council has estimated that radon is responsible for between 15,000 and 21,000 lung cancer deaths in the United States each year.
4. **Environmental tobacco smoke (ETS)**, known as 'second-hand-smoke', is another major indoor pollutant. ETS is a fine particulate, along with household dust and fibers, which can trigger airway reactions. Some are also able to penetrate deep inside the lung and cause serious damage to lung tissue, including cancer. Tobacco smoke also contains thousands of chemicals, including 200 known poisons such as formaldehyde and carbon monoxide. ETS causes an estimated 3,000 lung cancer deaths in America each year, 35,000-50,000 heart disease deaths in non-smokers, and 150,000 to

300,000 cases of lower respiratory tract infections in children less than 18 months of age. In such an environment, there is hardly any stronger case for indoor air purification.

5. **Volatile Organic compounds (VOC's)** are the many chemicals used in the manufacture of building materials, interior furnishings, textiles, office equipment, cleaners, personal care supplies, and pesticides. They are called volatile due to the chemicals evaporating into the air at normal room temperatures. VOC's are found at levels ten to thousands of times higher than outside, according to "A Review of Emission VOC's from polymeric materials used in building" in 1998 Building and Environment. They contain carbon, which is flammable. We can inhale and also exhale VOC's, and research shows that patients with lung cancer exhale more VOC's than those without that condition. 22 identified VOC's are used to help in the detection of lung cancer today. Health consequences of exposure to VOC's have been increasingly documented in recent years. Many are now known to be irritants and can result in throat irritation, headaches, difficult breathing, skin reactions, dizziness, fatigue, and more. Effects could include cancer, heart, liver, kidney or CNS damage.
6. **Gases** from wood or coal stoves, gas range appliances, space heaters, furnaces, and fireplaces often include carbon monoxide (which may cause asphyxiation and even death), nitrogen dioxide, and sulfur dioxide (respiratory irritants).
7. **Dust Mites** – millions of these are found in our beds, furniture, carpets, and other fabrics, creating a world of allergens that affect millions of people and animals.
8. **Pets** – are a major source of indoor air pollution

## **Outdoor Air**

Following the 1966 "killer fog" comprised of soot and black particle pollution in cities and acid rain as a result of the industrial age and mining, we saw

1. Clean Air Act – 1967
2. Development of the EPA – 1968, by presidential order

The ALA released its *State of the Air 2005 Report*, which gave "good" and "bad" grades to the nation. It negligently focused on only the air outdoors. That report focuses on what they consider to be the two most pervasive air pollutants: high levels of ozone (a major component/indicator of 'smog') and particle pollution (otherwise experienced as 'soot'). While not the only pollutants outside, they are perceived to be the most dangerous due to presumed toxicity and prevalence. Of the two, particle pollution is the more deadly.

Particle pollution is a particularly widespread problem in California and Texas. A key defining characteristic of airborne particles is their size. Some are so fine they can only be seen with an electron microscope. Others you can see in a beam of sunlight or as a haze outside. Anything smaller than 10 microns, about the size of a human hair, gets past airway defenses and ends up trapped in the lungs. The smallest particles go further and pass into the lung, and end up in the bloodstream like oxygen does.

Some are solid particles, but others are truly liquid or solids suspended in liquid, aka aerosols. Larger particles are formed mechanically, as materials are broken into bits and dispersed. Most fine and ultra fine particles are the result of chemical processes, such as fossil fuels in factories, power plants, steel mills, smelters, diesel and gas powered vehicles, wood burning in fireplaces, fields, and forest fires. Health consequences range from increased respiratory symptoms to increased emergency room visits and hospitalizations, increased mortality from respiratory and cardiovascular disease. Tens of thousands of Americans die prematurely due to exposure to particulates each year, and pathologists report that chronic lung damage from particle pollution is unlike that found in autopsied lungs of cigarette smokers.

The most definitive epidemiological evidence that long-term exposure to air pollution is associated with life-threatening diseases was provided by a team of researchers from Canada, NY, and Utah. They followed about 500,000 adults for 16 years in 156 cities and found people living in hazy cities across America were more likely to die of lung cancer, heart attacks, and respiratory failure than people in communities with cleaner air. The effect is comparable in scope to the hazard posed by exposure to secondhand smoke (ETS).