Biological Pollutants in the Home

Outdoor air pollution in cities is a major health problem. Much effort and money continue to be spent cleaning up pollution in the outdoor air. But air pollution can be a problem where you least expect it, in the place you may have thought was safest -- your home. Many ordinary activities, such as cooking, heating, cooling, cleaning and redecorating, can cause the release and spread of indoor pollutants at home. Studies have shown that the air in our homes can be even more polluted than outdoor air. Many Americans spend up to 90% of their time indoors, often at home. Therefore, breathing clean indoor air can have an important impact on health. People who are inside a great deal may be at greater risk of developing health problems, or having problems made worse by indoor air pollutants. These people include infants, young children, the elderly and those with chronic illnesses. Many factors determine whether pollutants in your home will affect your health. They include the presence, use and condition of pollutant sources, the level of pollutants both indoors and out, the amount of ventilation in your home, and your overall health.

What are Biological Pollutants?

Biological pollutants are or were living organisms. They promote poor indoor air quality and may be a major cause of days lost from work and school, and of doctor and hospital visits. Some can even damage surfaces inside and outside your house. Biological pollutants can travel through the air and are often invisible. Some common indoor biological pollutants are:

- animal dander (minute scales from hair, feathers, or skin);
- dust mite and cockroach parts;
- infectious agents (bacteria and viruses); and
- pollen.

Some of these substances are in every home. It is impossible to get rid of them all. Even a spotless home may permit the growth of biological pollutants. Two conditions are essential to support biological growth: nutrients and moisture. These conditions can be found in many locations, such as bathrooms, damp or flooded basements, wet appliances (such as humidifiers and air conditioners), and even some carpets and furniture. Modern materials and construction techniques may reduce the amount of outside air brought into buildings, which may result in high moisture levels inside. Using humidifiers, unvented heaters, and air conditioners in our homes has increased the chances of moisture forming on interior surfaces. This encourages the growth of certain biological pollutants.

The Scope of the Problem

Most information about sources and health effects of biological pollutants is based on studies of large office buildings and surveys of homes in the northern U.S. and Canada. These surveys show that 30% to 50% of all structures have damp conditions which may encourage the growth and buildup of biological pollutants. This percentage is likely to be higher in warm, moist climates. Some diseases and illnesses have been linked with biological pollutants in the indoor environment. However, many of them also have causes unrelated to the indoor environment. Therefore, we do not know how many health problems relate only to poor indoor air.

Health Effects of Biological Pollutants

All of us are exposed to biological pollutants. However, the effects on our health depend on the type and amount of biological pollution and the individual person. Some people do not experience health reactions from certain biological pollutants, while others may experience one or more of the following reactions:

- allergic;
- infectious; and/or
- toxic.

Except for the spread of infections indoors, allergic reactions may be the most common health problem with indoor air quality in homes. They are often connected with animal dander (mostly from cats and dogs), with house dust mites (microscopic animals living in household dust), and with pollen. Allergic reactions can range from mildly uncomfortable to life-threatening, as in a severe asthma attack. Some common signs and symptoms are:

- watery eyes;
- runny nose and sneezing;
- nasal congestion;
- itching;
- coughing;
- wheezing and difficulty breathing;
- headache; and
- fatigue.

Health experts are especially concerned about people with asthma. These people have very sensitive airways that can react to various irritants, making breathing difficult. The number of people who have asthma has greatly increased in recent years. The number of people with asthma has gone up by 59% since 1970, to a total of 9.6 million people. Asthma in children under 15 years of age has increased 41% in the same period, to a total of 2.6 million children. The number of deaths from asthma is up by 68% since 1979, to a total of almost 4,400 deaths per year.

Talking to Your Doctor

Are you concerned about the effects on your health that may be related to biological pollutants in your home? Before you discuss your concerns with your doctor, you should know the answers to the following questions. This information can help the doctor determine whether your health problems may be related to biological pollution.

- Does anyone in the family have frequent headaches, fevers, itchy and watery eyes, a stuffy nose, dry throat, or a cough? Does anyone complain of feeling tired or dizzy all the time? Is anyone wheezing or having difficulties breathing on a regular basis?
- Did these symptoms appear after you moved into a new or different home?
- Do the symptoms disappear when you go to school or the office or go away on a trip, and return when you come back?
- Have you recently remodeled your home or done any energy-conservation work, such as installing insulation, storm windows, or weather stripping? Did your symptoms occur during or after these activities?
- Does your home feel humid? Can you see moisture on the windows or on other surfaces, such as walls and ceilings?
- What is the usual temperature in your home? Is it very hot or cold?
- Have you recently had water damage?
- Is your basement wet or damp?
- Is there any obvious mold or mildew?
- Does any part of your home have a musty or moldy odor?
- Is the air stale?
- Do you have pets?
- Do your house plants show signs of mold?
- Do you have air conditioners or humidifiers that have not been properly cleaned?
- Does your home have cockroaches or rodents?

Infectious diseases caused by bacteria and viruses, such as the flu, measles, chicken pox, and tuberculosis, may be spread indoors. Most infectious diseases pass from person to person through physical contact. Crowded conditions with poor air

circulation can promote this spread. Some bacteria and viruses thrive in buildings and circulate through indoor ventilation systems. For example, the bacterium causing Legionnaire's Disease, a serious and sometimes lethal infection, and Pontiac Fever, a flu-like illness, have circulated in some large buildings.

Toxic reactions are the least studied or understood health problem caused by some biological air pollutants in the home. Toxins can damage a variety of organs and tissues in the body, including the liver, the central nervous system, the digestive tract, and the immune system.

Checking Your Home

There is no simple or cheap way to sample the air in your home to determine the level of all biological pollutants. Experts suggest that sampling for biological pollutants is not a useful problem-solving tool. Even if you had your home tested, it is almost impossible to know which biological pollutant(s) cause various symptoms or health problems. The amount of most biological substances required to cause disease is unknown and varies from one person to the next. Does this make the problem sound hopeless? On the contrary, you can take several simple, practical actions to help remove sources of biological pollutants, to help get rid of pollutants, and to prevent their return.

Self-Inspection: A Walk Through Your Home

Begin by touring your household. Follow your nose, and use your eyes. Two major factors help create conditions for biological pollutants to grow: nutrients and constant moisture with poor air circulation.

- Dust and construction materials, such as wood, wallboard and insulation, contain nutrients that allow biological pollutants to grow. Firewood also is a source of moisture, fungi and bugs.
- Appliances, such as humidifiers, kerosene and gas heaters, washers and clothes dryers, dishwashers and gas stoves, add moisture to the air.

A musty odor, moisture on hard surfaces, and even water stains, may be caused by:

- air-conditioning units;
- basements, attics and crawlspaces;
- bathrooms;
- carpets;
- heating and air-conditioning ducts;
- humidifiers and dehumidifiers; and
- refrigerator drip pans.

What You Can Do About Biological Pollutants

Before you give away the family pet or move, there are less drastic steps you can take to reduce potential problems. Properly cleaning and maintaining your home can help reduce the problem and may avoid interrupting your normal routine. People who have health problems, such as asthma, or who are allergic, may need to do this and more. Discuss this with your doctor.

Moisture Control

Water in your home can come from many sources. Water can enter your home by leaking or by seeping through basement floors. Showers and even cooking can add moisture to the air in your home. The amount of moisture that the air in your home can hold depends on the temperature of the air. As the temperature goes down, the air is able to hold less moisture.

This is why, in cold weather, moisture condenses on cold surfaces (for example, drops of water form on the inside of a window). This moisture can encourage biological pollutants to grow.

There are many ways to control moisture in your home:

- Fix leaks and seepage. If water is entering the house from the outside, your options range from simple landscaping to extensive excavation and waterproofing. (The ground should slope away from the house.) Water in the basement can result from the lack of gutters or a water flow toward the house. Water leaks in pipes and around tubs and sinks can provide a place for biological pollutants to grow.
- Put a plastic cover over dirt crawlspaces to prevent moisture from coming in from the ground. Be sure crawlspaces are well-ventilated.
- Use exhaust fans in bathrooms and kitchens to remove moisture to the outside (not into the attic). Vent your clothes dryer to the outside.
- Turn off certain appliances (such as humidifiers and kerosene heaters) if you notice moisture on windows and other surfaces.
- Use dehumidifiers and air conditioners, especially in hot, humid climates, to reduce moisture in the air, but be sure that the appliances themselves don't become sources of biological pollutants.
- Raise the temperature of cold surfaces where moisture condenses. Use insulation and storm windows. (A storm window installed on the inside works better than one installed on the outside) Open doors between rooms (especially doors to closets which may be colder than the rooms) to increase circulation. Circulation carries heat to the cold surfaces Increase air circulation by using fans and by moving furniture from wall corners to promote air and heat circulation. Be sure that your house has a source of fresh air and can expel excessive moisture from the home.
- Pay special attention to carpet on concrete floors. Carpet can absorb moisture and serve as a place for biological pollutants to grow. Use area rugs, which can be taken up and washed often. In certain climates, if carpet is to be installed over a concrete floor, it maybe necessary to use a vapor barrier (plastic sheeting) over the concrete and cover that with sub-flooring (insulation covered with plywood) to prevent a moisture problem.
- Moisture problems and their solutions differ from one climate to another. The Northeast is cold and wet, the Southwest is hot and dry, the South is hot and wet, and the Western Mountain states are cold and dry. All of these regions can have moisture problems. For example, evaporative coolers used in the Southwest can encourage the growth of biological pollutants. In other hot regions, the use of air conditioners which cool the air too quickly may not be left running long enough to remove excess moisture from the air. The types of construction and weather for the different climates can lead to different problems and solutions.

Where Biological Pollutants May Be Found in the Home

- dirty air conditioners;
- dirty humidifiers and/or dehumidifiers;
- bathroom without vents or windows;
- kitchen without vents or windows;
- dirty refrigerator drip pans;
- laundry room with an unvented dryer;
- an unventilated attic;
- carpet on damp basement floor;
- bedding;
- closet on outside wall;
- dirty heating/air-conditioning system;
- pets; and
- water damage (around windows, the roof, the basement).

Maintain and Clean All Appliances that Come in Contact with Water

- Have major appliances, such as furnaces, heat pumps and central air conditioners, inspected regularly by a professional InterNACHI inspector. Change filters on heating and cooling systems according to manufacturer's directions. (In general, change filters monthly during use.) When first turning on the heating or air conditioner at the start of the season, consider leaving your home until it airs out.
- Have window and wall air-conditioning units cleaned and serviced regularly by a professional, especially before the cooling season. Air conditioners can help reduce the entry of allergy-causing pollen. But they may also become a source of biological pollutants if not properly maintained. Clean the coils and rinse the drain pans, according to the manufacturer's instructions, so water cannot collect in pools.
- Have furnace-attached humidifiers cleaned and serviced regularly by a professional, especially before the heating season.
- Follow the manufacturer's instructions when using any type of humidifier. Experts differ on the benefits of using humidifiers. If you do use a portable humidifier (approximately 1- to 2-gallon tanks), be sure to empty its tank every day and refill it with distilled or demineralized water, or even fresh tap water, if the other types of water are unavailable. For larger portable humidifiers, change the water as recommended by the manufacturer. Unplug the appliance before cleaning. Every third day, clean all surfaces coming in contact with water with a 3% solution of hydrogen peroxide, using a brush to loosen deposits. Some manufacturers recommend using diluted household bleach for cleaning and maintenance, generally in a solution of one-half cup bleach to 1 gallon of water. With any household chemical, rinse well to remove all traces of chemical before refilling the humidifier.
- Empty dehumidifiers daily and clean often. If possible, have the appliance drip directly into a drain. Follow manufacturer's instructions for cleaning and maintenance. Always disconnect the appliance before cleaning.
- Clean refrigerator drip pans regularly, according to manufacturer's instructions. If refrigerator and freezer doors don't seal properly, moisture may build up and mold can grow. Remove any mold on door gaskets, and replace faulty gaskets.

Clean Surfaces

- Clean moist surfaces, such as showers and kitchen counters.
- Remove mold from walls, ceilings, floors and paneling. Do not simply cover mold with paint, stain, varnish, or a moisture-proof sealer, as the mold may resurface.
- Replace moldy shower curtains, or remove them and scrub them well with a household cleaner, and rinse them before rehanging them.

Dust Control

Controlling dust is very important for people who are allergic to animal dander and mites. You cannot see mites, but you can either remove their favorite breeding grounds or keep these areas dry and clean. Dust mites can thrive in sofas, stuffed chairs, carpets and bedding. Open shelves, fabric wallpaper, knickknacks, and venetian blinds are also sources of dust mites. Dust mites live deep in the carpet and are not removed by vacuuming. Many doctors suggest that their mite-allergic patients use washable area rugs rather than wall-to-wall carpet.

- Always wash bedding in hot water (at least 130° F) to kill dust mites. Cold water won't do the job. Launder bedding at least every seven to 10 days.
- Use synthetic or foam rubber mattress pads and pillows, and plastic mattress covers, if you are allergic. Do not use fuzzy wool blankets, feather or wool-stuffed comforters, and feather pillows.
- Clean rooms and closets well. Dust and vacuum often to remove surface dust. Vacuuming and other cleaning may not remove all animal dander, dust mite material, and other biological pollutants. Some particles are so small, they can pass through vacuum bags and remain in the air. If you are allergic to dust, wear a mask when vacuuming and dusting. People who are highly allergy-prone should not perform these tasks. They may even need to leave the house when someone else is cleaning.

Before You Move

Protect yourself by hiring an InterNACHI inspector to inspect your potential new home. If you identify problems, have the landlord or seller correct them before you move in, or even consider moving elsewhere.

- Have professionals check the heating and cooling system, including humidifiers and vents. Have duct lining and insulation checked for growth.
- Check for exhaust fans in bathrooms and kitchens. If there are no vents, do the kitchen and bathrooms have at least one window in each room? Does the stovetop have a hood vented outside? Does the clothes dryer vent outside? Do all vents exhaust to the outside of the building, and not in attics or crawlspaces?
- Look for obvious mold growth throughout the house, including attics, basements and crawlspaces, and around the foundation outside. See if there are many plants close to the house, particularly if they are damp and rotting. They are a potential source of biological pollutants. Downspouts from roof gutters should route water away from the building.
- Look for stains on the walls, floor or carpet (including any carpet over concrete floors) as evidence of previous flooding or moisture problems. Is there moisture on windows and surfaces? Are there signs of leaks or seepage in the basement?
- Look for rotted building materials, which may suggest moisture or water damage.
- If you or anyone else in the family has a pet allergy, ask if any pets have lived in the home.
- Examine the design of the building. Remember that in cold climates, overhanging areas, rooms over unheated garages, and closets on outside walls may be prone to problems with biological pollutants.
- Look for signs of cockroaches. (Carefully read instructions for use and any cautionary labeling on cleaning products before beginning cleaning procedures.)
- Do not mix any chemical products. Especially, never mix cleaners containing bleach with any product (such as ammonia) which does not have instructions for such mixing. When chemicals are combined, a dangerous gas can sometimes be formed.
- Household chemicals may cause burning or irritation to skin and eyes.
- Household chemicals may be harmful if swallowed or inhaled.
- Avoid contact with skin, eyes, mucous membranes, and clothing.
- Avoid breathing vapor. Open all windows and doors, and use an exhaust fan that sends the air outside.
- Keep household chemicals out of reach of children.
- Rinse treated surface areas well to remove all traces of chemicals.

Correcting Water Damage

What if damage is already done? Follow these guidelines for correcting water damage:

- Throw out mattresses, wicker furniture, straw baskets and the like that have been water damaged or contain mold. These cannot be recovered.
- Discard any water-damaged furnishings, such as carpets, drapes, stuffed toys, upholstered furniture, and ceiling tiles, unless they can be recovered by steam cleaning or hot-water washing and thorough drying.
- Remove and replace wet insulation to prevent conditions where biological pollutants can grow.

Reducing Exposure to Biological Contaminants

General good housekeeping, and maintenance of heating and air-conditioning equipment, are very important. Adequate ventilation and good air distribution also help. The key to mold control is moisture control. If mold is a problem, clean up the mold and get rid of excess water and moisture. Maintaining the relative humidity between 30% to 60% will help control mold, dust mites and cockroaches. Employ integrated pest management to control insect and animal allergens. Cooling-tower treatment procedures exist to reduce levels of Legionella and other organisms.

Install and use exhaust fans that are vented to the outdoors in kitchens and bathrooms, and vent clothes dryers outdoors. These actions can eliminate much of the moisture that builds up from everyday activities. There are exhaust fans on the market that produce little noise, an important consideration for some people. Another benefit to using kitchen and bathroom exhaust fans is that they can reduce levels of organic pollutants that vaporize from hot water used in showers and dishwashers. Ventilate the attic and crawlspaces to prevent moisture build-up. Keeping humidity levels in these areas below 50% can prevent water condensation on building materials.

If using cool mist or ultrasonic humidifiers, clean appliances according to the manufacturer's instructions and refill with fresh water daily. Because these humidifiers can become breeding grounds for biological contaminants, they have the potential for causing diseases such as hypersensitivity pneumonitis and humidifier fever. Evaporation trays in air conditioners, dehumidifiers, and refrigerators should also be cleaned frequently.

Thoroughly clean and dry water-damaged carpets and building materials (within 24 hours, if possible), or consider removal and replacement. Water-damaged carpets and building materials can harbor mold and bacteria. It is very difficult to completely rid such materials of biological contaminants.

Keep the house clean. House dust mites, pollens, animal dander, and other allergy-causing agents can be reduced, although not eliminated, through regular cleaning. People who are allergic to these pollutants should use allergen-proof mattress encasements, wash bedding in hot water (130° F), and avoid room furnishings that accumulate dust, especially if they cannot be washed in hot water. Allergic individuals should also leave the house while it is being vacuumed because vacuuming can actually increase airborne levels of mite allergens and other biological contaminants. Using central vacuum systems that are vented to the outdoors, or vacuums with high efficiency filters may also be of help.

Take steps to minimize biological pollutants in basements. Clean and disinfect the basement floor drain regularly. Do not finish a basement below ground level unless all water leaks are patched and outdoor ventilation and adequate heat to prevent condensation are provided. Operate a dehumidifier in the basement, if needed, to keep relative humidity levels between 30% to 50%.

Health Effects From Biological Contaminants

Some biological contaminants trigger allergic reactions, including hypersensitivity pneumonitis, allergic rhinitis, and some types of asthma. Infectious illnesses, such as influenza, measles and chicken pox, are transmitted through the air. Molds and mildews release disease-causing toxins. Symptoms of health problems caused by biological pollutants include sneezing, watery eyes, coughing, shortness of breath, dizziness, lethargy, fever and digestive problems.

Allergic reactions occur only after repeated exposure to a specific biological allergen. However, that reaction may occur immediately upon re-exposure, or after multiple exposures over time. As a result, people who have noticed only mild allergic reactions, or no reactions at all, may suddenly find themselves very sensitive to particular allergens. Some diseases, such as humidifier fever, are associated with exposure to toxins from microorganisms that can grow in large buildings' ventilation systems. However, these diseases can also be traced to micro-organisms that grow in home heating and cooling systems and humidifiers. Children, elderly people, and people with breathing problems, allergies, and lung diseases are particularly susceptible to disease-causing biological agents in the indoor air. Mold, dust mites, pet dander, and pest droppings or body parts can trigger asthma. Biological contaminants, including molds and pollens, can cause allergic reactions for a significant portion of the population. Tuberculosis, measles, staphylococcus infections, Legionella and influenza are known to be transmitted by air.

Combustion Pollutants

Combustion appliances are those which burn fuels for warmth, cooking or decorative purposes. Typical fuels are gas, both natural and liquefied petroleum (LP), kerosene, oil, coal and wood. Examples of the appliances are space heaters, ranges,

ovens, stoves, furnaces, fireplaces, water heaters, and clothes dryers. These appliances are usually safe. However, under certain conditions, these appliances can produce combustion pollutants that can damage your health, or even kill you.

What are Combustion Pollutants?

Combustion pollutants are gases and particles that come from burning materials. The combustion pollutants come from burning fuels in appliances. The types and amounts of pollutants produced depend on the type of appliance, how well the appliance is installed, maintained and vented, and the kind of fuel it uses. Some of the common pollutants produced from burning these fuels are carbon monoxide, nitrogen dioxide, particles, and sulfur dioxide. Particles can have hazardous chemicals attached to them. Other pollutants that can be produced by some appliances are unburned hydrocarbons and aldehydes. Combustion always produces water vapor. Water vapor is not usually considered a pollutant, but it can act as one. It can result in high humidity and wet surfaces.

Where do Combustion Pollutants Come From?

Combustion pollutants found indoors include outdoor air, tobacco smoke, exhaust from car and lawn mower internal combustion engines, and some hobby activities, such as welding, woodburning and soldering. Combustion pollutants can also come from vented or unvented combustion appliances. These appliances include space heaters, gas ranges and ovens, furnaces, gas water heaters, gas clothes dryers, wood and coal-burning stoves, and fireplaces. As a group, these are called "combustion appliances."

Appliances

Vented appliances are appliances designed to be used with a duct, chimney, pipe, or other device that carries the combustion pollutants outside the home. These appliances can release large amounts of pollutants directly into your home if a vent is not properly installed, or is blocked or leaking. Unvented appliances do not vent to the outside, so they release combustion pollutants directly into the home. Many of these problems are hard for a homeowner to identify. A professional is needed.

What are the Health Effects of Combustion Pollutants?

The health effects of combustion pollutants range from headaches and breathing difficulties to death. The health effects may show up immediately after exposure, or occur after being exposed to the pollutants for a long time. The effects depend on the type and amount of pollutants, and the length of time of exposure to them. They also depend upon several factors related to the exposed person. These include the age and any existing health problems. There are still some questions about the level of pollutants or the period of exposure needed to produce specific health effects. Further studies to better define the release of pollutants from combustion appliances and their health effects are needed.

The sections below discuss health problems associated with some common combustion pollutants. These pollutants include carbon monoxide, nitrogen dioxide, particles, and sulfur dioxide. Even if you are healthy, high levels of carbon monoxide can kill you within a short time. The health effects of the other pollutants are generally more subtle and are more likely to affect susceptible people. It is always a good idea to reduce exposure to combustion pollutants by using and maintaining combustion appliances properly.

Carbon Monoxide:

Each year, according to CPSC, there are more than 200 carbon monoxide deaths related to the use of all types of combustion appliances in the home. Exposure to carbon monoxide reduces the blood's ability to carry oxygen. Often, a person or an entire family may not recognize that carbon monoxide is poisoning them. The chemical is odorless, and some of the symptoms are similar to common illnesses. This is particularly dangerous because carbon monoxide's deadly effects will not be recognized until it is too late to take action against them. Carbon monoxide exposures especially affect unborn

babies, infants, and people with anemia or a history of heart disease. Breathing low levels of the chemical can cause fatigue and increase chest pain in people with chronic heart disease. Breathing higher levels of carbon monoxide causes symptoms such as headaches, dizziness, and weakness in healthy people. Carbon monoxide also causes sleepiness, nausea, vomiting, confusion and disorientation. At very high levels, it causes loss of consciousness and death.

Nitrogen Dioxide:

Breathing high levels of nitrogen dioxide causes irritation of the respiratory tract and causes shortness of breath. Compared to healthy people, children, and individuals with respiratory illnesses such as asthma, may be more susceptible to the effects of nitrogen dioxide. Some studies have shown that children may have more colds and flu when exposed to low levels of nitrogen dioxide. When people with asthma inhale low levels of nitrogen dioxide while exercising, their lung airways can narrow and react more to inhaled materials.

Particles:

Particles suspended in the air can cause eye, nose, throat and lung irritation. They can increase respiratory symptoms, especially in people with chronic lung disease or heart problems. Certain chemicals attached to particles may cause lung cancer, if they are inhaled. The risk of lung cancer increases with the amount and length of exposure. The health effects from inhaling particles depend upon many factors, including the size of the particle and its chemical make-up.

Sulfur Dioxide:

Sulfur dioxide at low levels of exposure can cause eye, nose, and respiratory tract irritation. At high exposure levels, it causes the lung airways to narrow. This causes wheezing, chest tightness, and breathing problems. People with asthma are particularly susceptible to the effects of sulfur dioxide. They may have symptoms at levels that are much lower than the rest of the population.

Other Pollutants:

Combustion may release other pollutants. They include unburned hydrocarbons and aldehydes. Little is known about the levels of these pollutants in indoor air and the resulting health effects.

What do I do if I suspect that combustion pollutants are affecting my health?

If you suspect you are being subjected to carbon monoxide poisoning, get fresh air immediately. Open windows and doors for more ventilation, turn off any combustion appliances, and leave the house. You could lose consciousness and die from carbon monoxide poisoning if you do nothing. It is also important to contact a doctor immediately for a proper diagnosis. Remember to tell your doctor that you suspect carbon monoxide poisoning is causing your problems. Prompt medical attention is important. Some symptoms from combustion pollutants -- including headaches, dizziness, sleepiness, coughing, and watery eyes -- may also occur because of common medical problems. These medical problems include colds, the flu, and allergies. Similar symptoms may also occur because of other indoor air pollutants. Contact your doctor for a proper diagnosis.

How can I reduce my exposure to combustion pollutants?

Proper selection, installation, inspection and maintenance of your appliances are extremely important in reducing your exposure to these pollutants. Providing good ventilation in your home and correctly using your appliance can also reduce your exposure to these pollutants. Additionally, there are several different residential carbon monoxide detectors for sale. These detectors alert consumers to harmful carbon monoxide levels in the home. They may soon be widely available to reduce deaths from carbon monoxide poisoning.

Appliance Selection

- Choose vented appliances whenever possible.

- Buy only combustion appliances that have been tested and certified to meet current safety standards. Examples of certifying organizations are Underwriters Laboratories (UL) and the American Gas Association (AGA) Laboratories. Look for a label that clearly shows the certification.
- All currently manufactured vented gas heaters are required by industry safety standards to have a safety shut-off device. This device helps protect you from carbon monoxide poisoning by shutting off an improperly vented heater.
- Check your local and state building codes and fire ordinances to see if you can use an unvented space heater, if you are considering purchasing one. They are not allowed to be used in some communities, dwellings, and certain rooms in the house.
- If you must replace an unvented gas space heater with another, make it a new one. Heaters made after 1982 have a pilot light safety system called an oxygen depletion sensor (ODS). This system shuts off the heater when there is not enough fresh air, before the heater begins producing large amounts of carbon monoxide. Look for the label that tells you that the appliance has this safety system. Older heaters will not have this protection system.
- Consider buying gas appliances that have electronic ignitions rather than pilot lights. These appliances are usually more energy-efficient and eliminate the continuous low-level pollutants from pilot lights.
- Buy appliances that are the correct size for the area you want to heat. Using the wrong size heater may produce more pollutants in your home and is not an efficient use of energy.
- All new wood stoves are EPA-certified to limit the amounts of pollutants released into the outdoor air. For more information on selecting, installing, operating, and maintaining wood-burning stoves, write to the EPA Wood Heater Program. Before buying a wood stove, check your local laws about the installation and use of wood stoves.

Ventilation

To reduce indoor air pollution, a good supply of fresh, outdoor air is needed. The movement of air into and out of your home is very important. Normally, air comes in through cracks around doors and windows. This air helps reduce the level of pollutants indoors. This supply of fresh air is also important to help carry pollutants up the chimney, stovepipe or flue to the outside.

- Keep doors open to the rest of the house from the room where you are using an unvented gas space heater or kerosene heater, and crack open a window. This allows enough air for proper combustion, and reduces the level of pollutants, especially carbon monoxide.
- Use a hood fan if you are using a range. They reduce the level of pollutants you breathe if they exhaust to the outside. Make sure that enough air is coming into the house when you use an exhaust fan. If needed, open a door or window slightly, especially if other appliances are in use. For proper operation of most combustion appliances and their venting systems, the air pressure in the house should be greater than that outside. If not, the vented appliances could release combustion pollutants into the house rather than outdoors. If you suspect that you have this problem, you may need the help of a qualified person to solve it.
- Make sure that your vented appliance has the vent connected and that nothing is blocking it. Make sure there are no holes or cracks in the vent. Do not vent gas clothes dryers or water heaters into the house for heating. This is unsafe.
- Open the stove's damper when adding wood. This allows more air into the stove. More air helps the wood burn properly, and prevents pollutants from being drawn back into the house instead of going up the chimney. If there is isible smoke or a constant smoky odor inside the home while using a wood-burning stove, this is a sign that the stove is not working properly. Soot on furniture in the rooms where you are using the stove also tells this. Smoke and soot are signs that the stove is releasing pollutants into the indoor air.

Correct Use of Appliances

- Read and follow the instructions for all appliances so that you understand how they work. Keep the owner's manual in a convenient place to refer to when needed. Also, read and follow the warning labels because they tell you important safety information that you need to know. Reading and following the instructions and warning labels could save your life.
- Always use the correct fuel for the appliance.

- Use only water-clear ASTM 1-K kerosene for kerosene heaters. The use of kerosene other than 1-K could lead to a release of more pollutants in your home. Never use gasoline in a kerosene heater because it can cause a fire or an explosion. Using even small amounts of gasoline could cause a fire.
- Use seasoned hardwoods (elm, maple, oak) instead of softwoods (cedar, fir, pine) in wood-burning stoves and fireplaces. Hardwoods are better because they burn hotter and form less creosote, an oily, black tar that sticks to chimneys and stove pipes. Do not use green or wet woods as the primary wood because they make more creosote and smoke. Never burn painted scrap wood or wood treated with preservatives, because they could release highly toxic pollutants, such as arsenic or lead. Plastics, charcoal, and colored paper, such as comics and wrapping paper, also produce pollutants. Never burn anything that the stove or fireplace manufacturer does not recommend.
- Never use a range, oven or dryer to heat your home. When you misuse gas appliances in this way, they can produce fatal amounts of carbon monoxide. They can produce high levels of nitrogen dioxide, too.
- Never use an unvented combustion heater overnight or in a room where you are sleeping. Carbon monoxide from combustion heaters can reach dangerous levels.
- Never ignore a safety device when it shuts off an appliance. It means that something is wrong. Read your appliance instructions to find out what you should do, or have a professional check out the problem.
- Never ignore the smell of fuel. This usually indicates that the appliance is not operating properly or is leaking fuel. Leaking fuel will not always be detectable by smell. If you suspect that you have a fuel leak, have it fixed as soon as possible. In most cases, you should shut off the appliance, extinguish any other flames or pilot lights, shut off other appliances in the area, open windows and doors, call for help, and leave the area.

Inspection and Maintenance

Have your combustion appliance regularly inspected and maintained to reduce your exposure to pollutants. Appliances that are not working properly can release harmful and even fatal amounts of pollutants, especially carbon monoxide. Have chimneys and vents inspected when installing or changing vented heating appliances. Some modifications may be required. For example, if a change was made in your heating system from oil to natural gas, the flue gas produced by the gas system could be hot enough to melt accumulated oil-combustion debris in the chimney or vent. This debris could block the vent, forcing pollutants into the house. It is important to clean your chimney and vents, especially when changing heating systems. Always hire an InterNACHI inspector to perform your home inspections, as they all must pass the most comprehensive, rigorous training program available.

What are the Inspection and Maintenance Procedures?

The best advice is to follow the recommendations of the manufacturer. The same combustion appliance may have different inspection and maintenance requirements, depending on where you live. In general, check the flame in the furnace combustion chamber at the beginning of the heating season. Natural gas furnaces should have a blue flame with perhaps only a slight yellow tip. Call your appliance service representative to adjust the burner if there is a lot of yellow in the flame, or call your local utility company for this service. LP units should have a flame with a bright blue center that may have a light yellow tip. Pilot lights on gas water heaters and gas cooking appliances should also have a blue flame. Have a trained service representative adjust the pilot light if it is yellow or orange. Before each heating season, have flues and chimneys inspected before each heating season for leakage and for blockage by creosote or debris. Creosote buildup or leakage could cause black stains on the outside of the chimney or flue. These stains can mean that pollutants are leaking into the house.