Seasonal and Environmental ALLERGIES

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Home heating
considerations for allergic families

Dr Liang continues his look at the impact of the seasons on people with allergy and asthma. With winter well and truly here, we look at the options for heating our homes and the important factors those with allergies and asthma should review and consider. Before you light your fire, whip out and buy a new heater or invest in one of the many new heating systems available, consider the following pointers!

Human beings differ from animals through our ability to manipulate temperature to improve our environment. The fire near the entrance of primitive caves or at the centre of camps served not only to ward off marauding beasts but also to warm our environment in the cold seasons. As technology advances, we now have at our disposal liquid fuels, electricity, stored energy and the old fuels of wood and coal.

Families with allergic members need to think about what these various forms of heating might do to their tendency to react to both specific allergens as well as non-specific irritants. Home heating is often a big ticket expenditure, not only for the initial installation, but also the on-going costs as well, and needs proper consideration before a decision is made.

The traditional log or coal-burning fireplace, with chimney, is often looked upon as a low efficiency (but romantic) heating arrangement. It contributes significantly to external environmental pollution and also internal pollution, at least in the starting of the fire. We now realise that such a heating arrangement actually has one major benefit that is not found in others - the forced air freshening effect. The heated air going up the chimney draws fresh air inside from door and window cracks. At the same time, particulate matter (including allergens) is removed through the chimney stream.

The wood stove (with many variations on the theme) significantly increases heating efficiency and reduces pollution, but does little in the air-refreshing department. The flued natural gas heater works in a similar manner.

Unflued portable gas heating may be a low cost method of heating a confined area in the home, but has a distinct disadvantage. The burning of these hydrocarbons is never 100% efficient, resulting in the release of a variety of partially combusted or uncombusted hydrocarbons, which play a major role as an adjuvant in the allergy process. The burning also contributes to the generation of carbon monoxide into the environment (rather than disposed of up the chimney). Inhaled carbon monoxide competes with oxygen in our bloodstream, and compromises the patient who is already deficient in this area. Also, for every two molecules of hydrogen burnt, a molecule of water is generated. A normal gas heater can generate as much as one litre of water per hour.

A warm room, waterlogged in this way, is a haven for house dust mites and the mould family to prosper. A dehumidifier becomes a necessity when gas heating is employed.

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Another major product of combustion is carbon dioxide. In the well-insulated houses of modern age, with reduced air exchanges, the carbon dioxide levels can build up to levels which can affect health. In a study two years ago, increased carbon dioxide inhalation was related to an increase in anxiety sensitivity and increased panic attacks such as hyperventilation asthma attacks.

Electricity remains the best (though more costly) method for warming a room, yet it also has its own problems to consider:

• The bar heater (with radiant element) and the convection heater (with fan and element) are quick spot heaters. They produce a fairly localised area of heat in the room initially, though eventually the whole room may be warmed up. The localised spot of heated air can produce a strong convection current, up-lifting light particulate matter into the room in a localised vortex. This is particularly important when heat is directed against soft furnishings - the reservoir of particulate matter such as house dust mite particles, animal dander and mould spores. Only after the room is warmed and the dynamic convection currents have settled can the heavier particulate matters settle down to below human nostril level. The shape of the room, position of furniture and location of the heating source may produce situations

where part of the room may have very large concentrations of dust (and dust mite particles, pollen particles etc). It is about time studies were done to map out these areas in the bedroom so that one can avoid putting one's head there!

• Oil-filled column heaters and storage heaters (which utilise electricity at off-peak, rates) produce a steady stream of heat and provide background warmth. The vortex effect is less of a problem, though heating is slower.

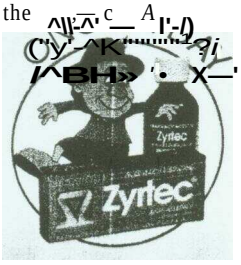
» Central heating is now popular in houses designed by the more affluent. Heated air can be pumped into various rooms, often through ducts delivering the heated air from floor level. Let us consider possible problems:

The heated air can be the directly heated air from combustion. This suffers all the drawbacks of gas heating, with products of partial combustion, carbon dioxide, carbon monoxide, water vapour and particulate matter. A better option is to use a heat exchanger, with the combustion process indirectly heating recirculating air. The occupants in households using these systems would not directly breathe in the spent air of combustion. These systems are also fairly costly for the initial installation. The heated air might bring in chemicals inadvertently present in the ducting itself. Famous cases of these are ductings made of treated material, which may contain insecticides and other preserving chemicals.

When central heating is started up in early winter, the sensitive individual may be affected by the initial release of chemicals into the warmed rooms.

Even without the water generated by combustion, human occupants, pot plants etc all contribute water vapour to the environment being heated. When there is a cold interface present (such as a window pane), condensation occurs. This creates an excellent environment for mould growth. Mould spores can be very powerful allergens for those who are sensitised. Condensation on windows can be significantly reduced by double-glazing. Double-glazing reduces the temperature differences between the outside and inside of the house.

Given the choice, I would prefer to move to warmer climates where I could leave the windows open all year round, Pity about the mozzies...



What about Ventilation?

A new commercially available domestic ventilation **system** significantly reduces high moisture levels in homes, a breeding ground for environmental allergens:

New Zealand's high rainfall and temperate climate, coupled with a lifestyle of detached houses that are often inadequately heated and insulated, contribute to dwellings being overly damp and mouldy in winter, by world standards.

Massey University Institute of Technology and Engineering lecturers Robyn Phipps and Marie Fleming and honours student Hayden Kennedy recently investigated whether domestic trickle ventilators fixed the problem. They measured moisture, fungi and ventilation levels in 15 houses in the Manawatu-Wanaanui area, over eight weeks during winter, before and after the installation of the DVS® domestic ventilation system, a commercially available trickle ventilation unit.

Trickle ventilation works by having a small fan feed filtered air from the roof space, which is frequently warmer and drier, into the living areas of the house. It partially pressurises the living spaces, forcing out damp air. Another side benefit is that dry air takes less energy to heat than damp air.

Human occupation - water vapour exhaled by breathing, steam generated by baths and showers, unflued gas heaters and clothes driers - all contribute to houses having up to 70 litres of water in the inside air, every day. Houses left closed up and unheated each day have problems, as do houses with

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inadequate sealing between the ground and the floor. In winter this results in **condensation on windows and** uninsulated walls.

All these factors can contribute to increased ill health. Ms Phipps says up to 15 percent of the population is allergic to moulds (spores and their toxic bi-productsj, which grow in most households. The allergies manifest as asthma, headaches eczema and sneezing fits.

They found that in the majority of the 15 houses in the study, the DVS® increased air circulation, and reduced humidity and fungi. The improvement in air quality that occurred in only eight weeks was impressive.

"Overall, the indoor air quality was better, with occupants experiencing fewer headaches, sneezing and eye irritation," MS Fleming says.

The same houses were further assessed one year after the initial research to check the longer term changes in conditions and it was found that fungi levels had reduced even further as hidden moisture was dragged out of building materials.

Further expansion of the research is also planned on houses in the Auckland region.

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