

Chemical Allergies / Chemical Sensitivities

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Abstract

A short introduction to allergy with reference to causes and allergens is followed by a description of chemical allergies or multiple chemical sensitivities (MCS). Some MCS symptoms, breathing problems, nausea, lethargy, joint and muscle pains, burning in the mouth and throat, severe headaches, inability to concentrate and disorientation are mentioned.

Smell from the following can trigger an allergic reaction: soap powders, fabric conditioners, new carpet, furniture, paints, plastics, air fresheners and deodorants. Certain foods and food additives affect some people. Air pollution; gas, oil, or coal fumes; formaldehyde; chlorine; phenol; carbolic acid; insecticides; disinfectants; paint; hairsprays; household cleaning products; and metals such as nickel, mercury, chrome, and beryllium are listed as frequent environmental contaminants. A list of common environmental chemicals is presented.

The two general categories of allergy risk factors host and environmental are mentioned. Sex, race, age and heredity are identified as host factors; the last being the most significant. Early childhood exposure to infectious disease, environmental pollution, allergen levels, and dietary changes are the four major environmental factors. Allergen avoidance, use of anti-histamines, steroids or other oral medications, immunotherapy desensitizing allergen response, and targeted therapy are allergy treatments.

Keywords: Allergy, allergens, genetic cause, hygiene hypothesis, MCS.

Introduction

In this modern world, environment pollution by chemicals is prevalent. We all live in a cloud of chemicals. Various reactions such as rashes, swollen face, runny nose, etc. occur in some of us as a result of being overly sensitive to some specific chemical. There are no real causes but the suffering is real and can induce much anxiety. These are chemical allergies or chemical sensitivities and are very common. Since we are engulfed in an atmosphere of chemicals wherever we are, chemical allergies are very significant.

In the last century many workers were daily exposed to poisonous chemicals. It was a part of their life. But gradual understanding of the dangers led to banning of hazardous processes or enforcing of appropriate precautions.

Today chemicals are in the air that we breathe, both indoors and out of doors; in our food as colors, flavor enhancers and preservatives; in our drinks, and even in our drinking water. Without knowing we are exposed to increasing numbers of chemicals.

Chemicals are in our workplaces and in our homes. We cannot avoid them. They affect our health but fortunately our immune systems are capable of neutralizing most of them.

Overload is the main problem. The body will not have learned to deal with it if the overload is very great or if the chemical is unusual. Sensitivities develop in such situations (Harrison 2005).

Multiple Chemical Sensitivity (MCS) is often thought of as the 21st Century disease. The health hazards of traffic or gas fumes and cigarette smoke are well known. But there are many other chemicals in our lives, at work or at home that we do not realize are there.

Pollution, chemical fumes given off by modern furnishing such as carpets, furniture, paints and wood treatment, even newspapers and magazines can trigger severe allergic reactions (Anon. 2008). Without being aware of it we even go as far as harming ourselves and poisoning our immediate environment by using personal “necessities” such as perfumes, hair sprays, etc.

On 14 November 2008, AP news reported a UN statement titled “*Clouds of pollution threaten glaciers, health*” that describes brown clouds over vast areas of the earth (Tran and Heilprin 2008). A photograph is shown in Fig. 1.

“A dirty brown haze sometimes more than a mile thick is darkening skies not only over vast areas of Asia, but also in the Middle East, southern Africa and the Amazon Basin, changing weather patterns around the world and threatening health and food supplies, the U.N. reported.” (Tran and Heilprin 2008).

“The huge smog-like plumes, caused mainly by the burning of fossil fuels and firewood, are known as “atmospheric brown clouds”.

When mixed with emissions of carbon dioxide and other gases (greenhouse gases) blamed for warming the earth’s atmosphere like a greenhouse, they are the newest threat to the global environment, according to a report commissioned by the UNEP, United Nations Environment Programme.” (Tran and Heilprin 2008).

“Brown clouds are caused by an unhealthy mix of particles, ozone and other chemicals that come from cars, coal-fired power plants, burning fields and wood-burning stoves. First identified by the report’s lead researcher in 1990, the clouds were depicted as being more widespread and causing more environmental damage than previously known.” (Tran and Heilprin 2008).

Allergy therapists deal with chemical allergy effects. They are familiar with the potential hazards of chemicals.

Allergy

Normally, the immune system protects the body against foreign invaders.

Environmental substances (allergens) cause immune system disorders or allergic reactions. Such allergy or atopy is acquired, predictable and rapid. Allergy is *type I (immediate)* hypersensitivity, one of four forms of hypersensitivity. It is characterized by excessive activation of certain white blood cells called mast cells and basophils by IgE (immunoglobulin E, a type of antibody) resulting in an extreme inflammatory response. Common allergic reactions include eczema, hives, hay fever, asthma, food allergies, and reactions to the venom of insect stings such as wasp and bee stings (Kay 2000).

Mild allergies like hay fever cause symptoms such as allergic conjunctivitis, itchiness, and runny nose and are highly prevalent in humans. But some people react violently to environmental or dietary allergens or to medication, resulting in life-threatening anaphylactic reactions and potentially death.

A variety of tests are now available to diagnose allergic conditions. Such tests include testing the skin for responses to known allergens or analyzing the blood for the presence and levels of allergen specific antibody (IgE) class immunoglobulin E.

Treatments involve allergen avoidance, use of anti-histamines, steroids or other oral medications, immunotherapy to desensitize allergen response, and targeted therapy.

A major breakthrough on allergy mechanisms was the discovery of IgE (Ishizaka *et al.* 1966).

Allergens

Many airborne particles such as dust or pollen are allergens. They produce symptoms in areas that are in contact with air, such as eyes, nose and lungs. Allergic rhinitis, also known as hay fever, is an example. It causes irritation of the nose, sneezing, and itching and redness of the eyes (Rakel and Bope 2005). Inhaled allergens can induce asthmatic symptoms due to narrowing of the airways (broncho-constriction) and increased mucus production in the lungs, shortness of breath (dyspnea), coughing and wheezing (Holgate 1998).

In addition to these ambient allergens, foods, insect stings and medications like aspirin and antibiotics can cause allergic reactions. Abdominal pain, bloating, vomiting, diarrhea, itchy skin, and swelling of the skin are some symptoms of food allergy. Food allergies rarely cause respiratory (asthmatic) reactions, or rhinitis (Rusznak and Davies 1998).

A systemic allergic response, anaphylaxis, can occur from insect stings, antibiotics, and certain medicines. Multiple organ systems can be affected, including the digestive system, the respiratory system and the circulatory system (Golden 2007).

Cutaneous reactions, bronchoconstriction, edema, hypotension, coma and even death can happen depending on severity. Instantaneous or delayed triggering is possible. This allergic response type often requires injections of epinephrine, sometimes via Epi-Pen, an auto-injector. Even if anaphylaxis reaction is subsiding, it may recur over a prolonged time (Tang 2003).

Allergic reactions like contact dermatitis or eczema are commonly caused by substances, such as latex, that come into contact with the skin (Brehler and Kütting 2001). Skin allergies induce rashes, or swelling and inflammation (Muller 2004).

Causes

The two general categories of allergy risk factors are host and environmental. Host factors include sex, race, age and heredity (most significant). However genetic factors alone cannot explain some allergic disorders.

Exposure to infectious diseases during early childhood, environmental pollution, allergen levels, and dietary changes are the four major environmental factors.

Genetic Basis

For identical twins the same allergic disease can occur about 70% of the time; this drops to about 40% in non-identical twins (Galli 2000). The probability of having allergic children is greater for allergic parents than for non-allergic parents.

But not all allergies go along genealogies; parents allergic to peanuts may have ragweed allergic children. Thus the probability of allergy development is inherited. It is related to immune system irregularity, but the specific allergen is not related (De Swert 1999).

“The risk of allergic sensitization and the development of allergies vary with age; young children are most at risk. Ethnicity may play a role in some allergies, however racial factors have been difficult to separate from environmental influences and changes due to migration” (De Swert 1999). Different genetic loci may be responsible for asthma in people of Caucasian, Hispanic, Asian, and African origins (Barnes *et al.* 2007).

Hygiene Hypothesis

The hygiene hypothesis says “allergic diseases are caused by inappropriate immunological responses to harmless antigens driven by a TH2-mediated immune response” (Folkerts *et al.* 2000). Many bacteria and viruses use a TH1 - mediated immune response; and TH2 responses are down regulated. Insufficient stimulation of the TH1 part of the immune system leads to an overactive TH2 part, resulting in an allergic disease.

Individuals living in an overly sterile environment are not exposed to sufficient pathogens. The immune system is not active enough.

Our bodies are designed to deal with a certain level of such pathogens. If it is not exposed to this level, the immune system attacks harmless antigens, and benign microbial objects (like pollen) can trigger an immune response.

Multiple Chemical Sensitivity

Multiple Chemical Sensitivity (MCS) usually occurs in response to a chemical exposure and is a chronic condition affecting different parts of the body. The MCS mechanism is not understood. But certain features are common: it tends to occur in people with an allergic tendency. Chemical

allergies often manifest themselves as skin reactions (Vitabase 2008).

Until exposed to certain chemicals people are generally well. The exposure may either be in one large dose, like coming into contact with pesticides used for crop spraying, or in repeated small doses for example sitting next to a running office photocopier. Almost any chemical can trigger adverse reactions, but some like formaldehyde, pesticides, disinfectants such as gluteraldehyde, glues, solvents and paints are more common (Anon. 2008).

"The MCS symptoms can be extreme, like breathing problems, nausea, sickness lethargy, joint and muscle pains, burning in the mouth and throat, severe headaches even feelings of not being able to concentrate and disorientation" (Anon 2008). Table 1 lists some common allergic symptoms (Wikipedia 2008).

The smell from soap powders and fabric conditioners, new carpet or furniture, paints, plastics, air fresheners and deodorants are examples that can trigger a reaction. Some people are also affected by certain foods and food additives. Most frequent environmental contaminants that cause problems include, air pollution; gas, oil, or coal fumes; formaldehyde; chlorine; phenol; carbolic acid; insecticides; disinfectants; paint; hairsprays; household cleaning products; and metals such as nickel, mercury, chrome, and beryllium (Vitabase 2008).

"Whilst avoidance of these common materials is the best way to deal with them, desensitization is often the only option open to us in order to stay healthy" (Anon. 2008).

Most allergy tests and treatment programs consider a number of chemical substances. Many of these are listed below:

Common Environmental Chemicals

Formaldehyde (HCHO)

Aerosol sprays, Air fresheners, Antibiotics, Antiperspirants, Antiseptics, Butter, Cavity wall insulation, Cements, Cheese, Chipboard flooring, Concrete Detergents, Diesel fuel, Disinfectants, Dyes, Fabric conditioners, Fertilizers, Foam-backed carpets,

curtains, Foam rubber, Furniture, Glues, Hair setting lotion, Insecticides, Kitchen units, Manufacture of Vitamins A and E, Matches, Mattresses, Mildew proofing, Milk products, Moth proofing, Mouth washes, Nail polishes, Newspaper and newsprint, Orthopedic casts, Paper manufacture, Permanent-press treatment, Petrol, Photography and photographs, Pillows, Plaster, Shampoos, Shrink-proofing, Smog, Soaps, Soft plastics, Stretch fabrics, Synthetic resins, Tanning of animal skins, Toothpastes, Traffic fumes, Wallboard, Waste incineration, Water-repellant treatment, Wood preservatives, Wood veneer, Wrinkle-resisting treatment.

Hydrocarbons

Air fresheners, Coal fires, Coal-tar soap, Cleaning fluids, Cosmetics, Deodorants, Detergents, Disinfectants, Heating oil, Lighter fuel, Liquid paraffin, North Sea and Propane Gas, Ointments, Paints, Perfumes, Petrol and Diesel fumes, Polishes, Propellants in aerosol sprays, Solvents, Sponge rubber, Varnishes, Vaseline, Wax candles.

Phenols (C₆H₅OH)

Aspirin and other drugs, Bakelite, Carbolic Dyes, Electrical insulation and wiring, Epoxy resins, Fireworks, Hard molded plastics, Herbicides, Nylon, Perfumes, Pesticides, Petrol, Photographic solutions, Polyurethane, Medicine and injection preservatives. Synthetic detergents.

Helpful Nutrients (Vitabase 2008)

High Important Items

Vitamin A. Free radical scavenger. oosts immune system.

Vitamin E. Free radical scavenger. Boosts immune system.

Vitamin B complex. Provides necessary B vitamins that are lacking.

Vitamin B6 (pyridoxine) plus.

Antihistamine. Takes toxins out of foreign substances and gets rid of them through the kidneys.

Niacinamide. Enhances circulation. Caution: Do not substitute niacin for niacinamide as toxicity may result.

Vitamin C with bioflavonoids. Prevents allergens from harming the body.

Moderate Importance Items

Coenzyme Q10. Antihistamine. Prevents allergic reactions.

Selenium. Enhances immune system. Cell safety.

Superoxide dismutase (SOD). Free radical scavenger.

Zinc plus. Enhances immune system. Zinc gluconate or OptiZinc are recommended.

Copper. Balances zinc. Make up for copper deficiencies (due to high vitamin C doses).

Helpful Herbs and Supplements (Vitabase 2008).

Calendula Ointment.

Type: External

Purposes: A cream containing calendula has been beneficial in relieving skin rashes that develop from allergy to metal (such as watches, bracelets, necklaces, etc).

Calendula, Chamomile, Elder Flower & Tea Tree Oil

Type: External

Purposes: soothing effect as a rinse or wash on rashes.

Conclusion

In present times the global environment is polluted by many chemicals and hence chemical allergy or multiple chemical sensitivity (MCS) is inevitable.

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Table 1. Signs and symptoms.

Affected organ	Symptom
Nose	Swelling of the nasal mucosa (allergic rhinitis)
Sinuses	Allergic sinusitis
Eyes	Redness and itching of the conjunctiva (allergic conjunctivitis)
Airways	Sneezing, coughing, broncho-constriction, wheezing and dyspnea, sometimes outright attacks of asthma, in severe cases the airway constricts due to swelling known as angioedema
Ears	Feeling of fullness, possibly pain, and impaired hearing due to the lack of Eustachian tube drainage

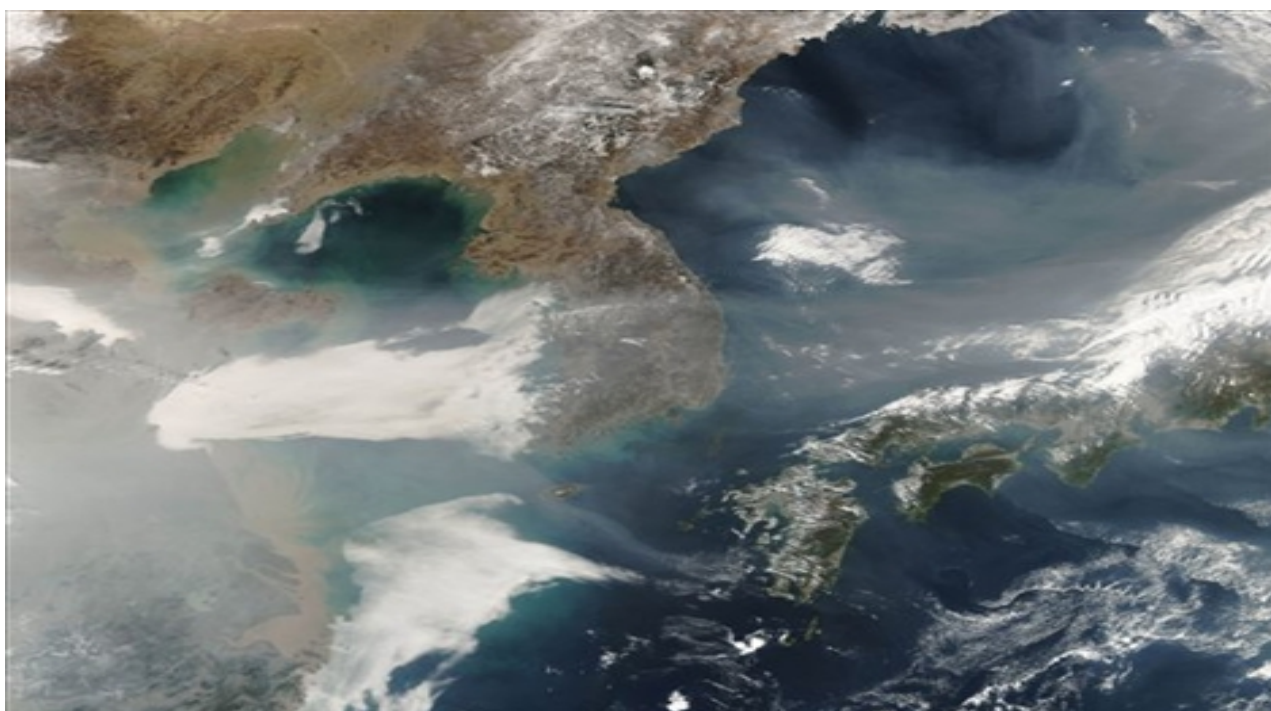


Fig. 1. Brown clouds over vast areas of the Earth.