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## ALLERGIES AND CHEMICAL REACTIONS

Allergies have been defined by physicians as reactions to substances by formation of rapid-acting antibodies known as IgE, which is immunoglobulin E. Persons who have allergies to substances like mold, pollen, dander, or dust often have this form of reaction. Molds release volatile organic compounds that are similar to those found in sick buildings and these can also cause reactions to molds that are not what physicians describe as a true allergy. Molds can also release mycotoxins, causing a toxic type of reaction, which is not an allergy. Of course, an individual can react to mold with a combination of these types of reactions. There are also certain chemicals that induce the production of IgE antibodies and these are considered chemical allergens. Examples include formaldehyde, isocyanates, and a limited number of other chemicals. Formaldehyde and isocyanates are also potent irritants and can irritate the respiratory tract without a true allergy reaction, in other words, without the presence of IgE antibodies. IgE antibodies are typically formed to a particular substance or group of substances. For example, there are many isocyanates that have a very similar chemical structure to each other, and a person who has developed IgE antibodies to one isocyanate may also have an IgE reaction to other isocyanates.

Many chemical reactions however, do not involve the production of IgE antibodies and therefore are not strictly speaking an allergy. Individuals who have become chronically ill or who have frequent symptoms in the presence of various chemical pollutants often have increased inflammation of their respiratory tract. Chemicals that are irritants can exacerbate this inflammation, causing a chemical reaction of illness symptoms, which is not an allergy because it does not involve the production of antibodies. This does not make it less serious or less real, but simply means that the body is reacting in a different manner. Virtually all petrochemical substances are irritants. There are other chemicals, which are not derived from petroleum or coal, which are also irritants. Chlorine, products containing chlorine, and ammonia are examples of potent irritants, which are not derived from petroleum or coal but are still irritating to the respiratory tract. It is important to remember that there is no barrier between the nose and the brain. This is because the nerve involved in detecting smell, the olfactory nerve, is actually a direct extension of the brain with nerve endings in the lining of the nose. Studies have documented that chemicals and even toxic metals are capable of entering the brain by passing along the olfactory nerve. Thus, the concept of a blood brain barrier that helps to limit substances

entering the brain does not apply when chemicals are breathed into the nose. This is one reason that reactions to chemicals can occur so rapidly. There are other ways in which an individual can react to chemicals. The detoxification system may be impaired, occasionally genetically but more commonly because of past toxic exposure, and the individual may have more difficulty detoxifying. This can cause them to have reactions at dosage levels that would be less of a problem for healthy individuals with normal detoxification. It is important to recall that the vast majority of pharmaceutical agents are derived from petrochemicals and must be detoxified by the body using the detoxification system. Therefore, an individual who has impaired detoxification may have more difficulty tolerating medications, particularly those that share a detoxification pathway that has become deficient (for example, from a past significant chemical exposure). Toxic exposure of certain chemicals can cause a delayed immune reaction, which is not referred to as an allergy since it does not involve IgE, but does involve the immune system. This is another mechanism of chemical intolerance. Another mechanism, which has been scientifically documented, is a sensitizing process that involves the brain, referred to as neural sensitization. This renders the brain more susceptible to toxic exposure. Some individuals may also have brain changes referred to by scientists as kindling or near kindling. This involves a brain response in which the person has seizures or seizure-like activity following exposure to chemicals. It has also been demonstrated that individuals who have toxic exposure can have reduced blood supply to the brain. When this is present, the individuals may have chronic difficulty with thinking, memory, concentrating, and other brain functions. Challenge studies show that individuals like this have a significant further drop in the blood supply to their brain when they have even modest exposures such as a whiff of perfume, air fresheners, and other substances which by history are known to affect individuals with chemical intolerance, sometimes referred to as heightened sensitivity to chemicals. The mechanisms of chemical intolerance can cause relatively rapid reaction to pollutants, sometimes only delayed reactions, and often reactions which have certain symptoms present more quickly and other symptoms developing later. For example, an individual may experience headache and/or irritation of the nose, throat, or chest as a more prompt symptom. This inflammation can then cause release into the blood stream of substances which increase fatigue and aching, which are often more delayed effects of an exposure. It is important that people understand that chemical intolerances are a real medical problem, which has been supported by a significant amount of research and scientific study. Multiple studies confirm that reducing exposure in the environment, which includes but is not limited to leaving an area when symptoms occur, is important for long term well being. There are four studies in the medical literature which confirm that reduced exposure is a major factor in the long-term outcome of patients who have become chemically sensitive: Dr. Michael

Lax,<sup>1</sup> an occupational medicine physician, found that his patients who had environmental controls did much better than patients without adequate environmental controls. A survey of 305 persons with chemical sensitivity by DePaul University<sup>2</sup> found that they experienced much greater relief from environmental controls and reducing exposure than with any form of treatment, and that the use of tranquilizing agents was actually less effective than meditation and prayer. The third study was conducted by Dr. Leonard Jason<sup>3</sup> who found that individuals who were chemically sensitive who had relatively nontoxic housing had much better long term health than those that did not have adequate environmental controls in their housing. This is because once chemical sensitivity is induced, it can be exacerbated by exposures at work, at home, or elsewhere. A fourth study of 206 chemically hypersensitive patients by Dr. Miller and colleagues<sup>4</sup> found that reducing exposure to chemicals was very helpful for 71 %, but only 17% of the patients who used psychological or psychiatric services/treatment found those to be very helpful.

1 MB Lax, PK Henneberger, "Patients with Multiple Chemical Sensitivities in an Occupational Health Clinic: Presentation and Followup", *Archiv. Env. Health* 50:425-431, 1995.

2 Treatment efficacy, a survey of 305 MCS patients," *The CFIDS Chronicle*-Winter 1996, pp. 52-53.

3 T.H. Davis, L.A. Jason, and M.A. Danghart, "The Effect of Housing on Individuals With Multiple Chemical Sensitivities," *Archiv. Environ. Health*. 50:425-431, 1995.

4 C.S. Miller, "Multiple Chemical Sensitivity Syndrome", *J. Occup. Env. Med.*. 37:1323, 1995.