**Chronic Sinus Infection & Fungi**

Mayo Clinic scientists have found a connection between chronic rhinosinusitis (CRS) and a person's response to common airborne fungal spores. Their research is shifting attention away from the bacterial infections that characterize CRS and towards underlying inflammation. The scientists found spores from *Alternaria, Aspergillus, Penicillium*, and *Cladosporium* in the upper airway secretions belonging to healthy people as well as those with chronic sinusitis. People with CRS, however, "show exaggerated humoral and cellular responses...to common airborne fungi, particularly *Alternaria.*" *Alternaria*, whose spore is larger than the other fungi, has been associated with asthma in several countries.

In a December 2004 study, scientists took blood samples from 18 patients with CRS and 15 normal individuals and looked for cellular and humoral immune responses to airborne fungi. Although all serum samples had IgG antibodies to the fungi, people with CRS had higher levels: "The median serum IgG antibody level to *Alternaria* was about 5-fold higher for patients with CRS." IgE antibodies to the fungi, however, appeared in less than 30% of those with CRS. Cell cultures showed that about 90% of people with CRS produced the cytokines IL-5 and IL-13 when exposed to *Alternaria*. In addition, cells from people with CRS responded to *Alternaria* with significantly more IFN-γ than cells from normal people did. The scientists also collected nasal secretions from nine additional patients and nine controls and checked the samples for fungal proteins and inflammatory mediators. All of the samples from the CRS group showed "markedly elevated levels of eosinophil [major basic protein] (4093 ± 878 pg/mL, mean ± SEM) and IL-5 (226 ± 69 pg/mL) compared with the undetectable levels in secretions from 9 other normal individuals (P = .0003 and .0092, respectively)."

In a later study, published in *Journal of Allergy and Clinical Immunology* (August 2005), Mayo Clinic scientists reported that the nasal and sinus mucus taken from people with CRS contains activated white blood cells (eosinophils) that produce a toxic protein (Major Basic Protein). Although Major Basic Protein was not found in the tissue itself, levels in the mucus "far exceeded that needed to damage the nasal and sinus membranes and make them more susceptible to infections such as chronic sinus infection." Mayo Clinic ear, nose and throat specialist Jens Ponikau, MD, stated in a Mayo Clinic news release that "some surgeons have already started to change the way they do surgery for patients with chronic sinus infections, focusing now on removing the mucus, which is loaded with toxins from the inflammatory cells, rather than the tissue during surgery."

**Guaifenesin & Sinusitis**

Guaifenesin, an expectorant found in OTC cold medications like Robitussin, may be helpful for people with chronic sinusitis. An article by Wellington S. Tichenor, MD, refers to the Mayo Clinic findings that Major Basic Protein (MBP) found in the nasal mucus of people with chronic sinusitis injures the sinus lining, making the epithelium susceptible to bacterial infection. Major Basic Protein comes from activated eosinophils and kills common airborne fungi lodged in the airways. When openings from the sinus into the nasal passage become obstructed from inflammation, viruses, allergic rhinitis, foreign bodies, and polyps, mucus stagnates and MBP levels increase. In addition, less oxygen enters the sinuses, promoting bacterial overgrowth. Tichenor says, "Guaifenesin in high doses is often helpful in increasing clearance of secretions as well as thinning secretions. Efficacy has not clearly been proven, but most practitioners find that it is helpful."

Mark Konlee of Keep Hope Alive reported in his *Journal of Immunity* (July-Sept. 2003) that upon taking 400 mg of guaifenesin twice daily and eliminating milk, cheese, and ice cream from his diet, he became "completely free" of sinusitis after...
many years of suffering. Information from the US National Library of Medicine reports that "guaiifenesin appears to be effective in managing HIV-infected patients with symptomatic rhinosinusitis." The 23 patients in that study received 2400 mg/day of guaiifenesin or a placebo for three weeks. Those in the guaiifenesin group reported less nasal congestion and thinner postnasal drainage. Konlee says that the standard dose of guaiifenesin in cold medicine is about 1200 mg per day, a dosage that appears to be safe for long-term use. He says guaiifenesin has been taken at doses of 3600 mg daily without toxic effects. Tichenor says that guaiifenesin can cause nausea and other GI problems and suggests beginning with a low dose and gradually increasing to an effective dose. As an aside, Konlee says that his internet search found that guaiifenesin is helpful for people with fibromyalgia. He wonders if guaiifenesin increases IgA mucosal levels.


Environmental Tobacco Smoke & African-Americans

Environmental tobacco smoke contributes to low birth weight, SIDS, and asthma in children. A new study published by the National Institute of Environmental Health Sciences investigates the relationship between African-American children with asthma and their reported exposure to environmental tobacco smoke (ETS). Other studies have shown that, although black Americans use fewer tobacco products than whites, they have a higher incidence of tobacco-related problems. For instance, African-American smokers have a greater risk of developing smoking-related cancers than whites, even though they smoke fewer cigarettes a day.

The 2005 study from University of Cincinnati measured serum and hair cotinine levels in 222 children (52% black, 45% white, 3% biracial). The children had been diagnosed with asthma and were exposed to five or more cigarettes each day in or around their home. Cotinine, a biomarker for tobacco exposure, is a product of nicotine metabolism. Cotinine levels in the blood indicate short-term exposure (3-4 days) to ETS while hair samples indicated ETS exposure during the previous month. The researchers found that African-American children, like adults, show significantly higher levels of both serum and hair cotinine even though their exposure to tobacco smoke is lower.

Differences in metabolism of tobacco-related products may be one reason that African-Americans have a greater response to cigarette smoke. This article says that laboratory experiments show that African-Americans display 32-45% more serum cotinine than whites who are exposed to the same amount of tobacco smoke. Tobacco smoke in the home may be even more damaging because of the type of cigarette commonly smoked by African-Americans. About 80% use mentholated cigarettes, which tend to have higher amounts of nicotine and tar. The Cincinnati researchers say more studies are needed to identify specific factors that contribute to the elevated levels of cotinine: "Race is not a biological construct, but an imprecise categorization that is a proxy for environmental, cultural socioeconomic and biologic differences."

Wilson, Stephen E. et al. Racial Differences in Exposure to Environmental Tobacco Smoke among Children. Environmental Health Perspectives March 2005