Distinguished lecture examines the rise of allergic disease

By Robin Arnette

Researchers are not sure what is behind the emergence of allergic diseases, but allergist Thomas Platts-Mills, M.D., Ph.D., has several theories about their origin. Platts-Mills has been treating allergy sufferers for more than 30 years, and believes these illnesses are the result of changes in human behavior.

During an Oct. 14 NIEHS Distinguished Lecture, "Epidemics of allergic disease 1870-2010: hay fever, asthma, peanut allergy and now delayed anaphylaxis to red meat," he discussed the possible roots of four allergic diseases that have surfaced during the modern era.

Linked Video

"Platts-Mills characterized the processes involved in food allergies in this 2013 video." (20:46)

The pollen wars

Platts-Mills *(http://med.virginia.edu/faculty/faculty-listing/tap2z/)* began his talk with Charles Blackley, M.D., the British scientist who discovered the mechanism behind hay fever. Blackley performed skin tests and calculated the rate of pollen being inhaled to prove that pollen caused hay fever. He published his findings in 1873 (see text box).

Platts-Mills said hay fever, or allergic rhinitis, occurs because the body's immune system believes pollen grains are foreign pathogens, and mounts a powerful allergic response. He speculated that the explosion of pollen could be linked to the revolution in agriculture that followed reform of the Corn Laws in 1847. Platts-Mills clarified that the British word for wheat is corn.

Pediatric asthma and the exodus indoors

While the number of hay fever cases peaked in the 1950s, Platts-Mills said childhood asthma followed a different course. He explained that doctors started seeing the first instances of childhood asthma in the 1960s, and the trend took off from there.

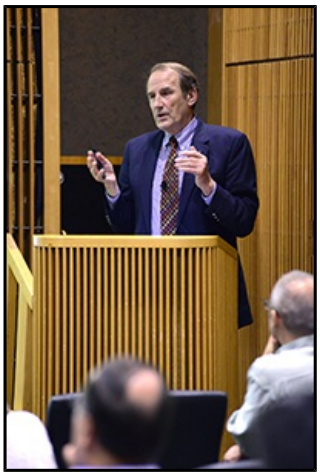
He believes two issues may be at play. The first is the hygiene hypothesis, which says the low incidence of childhood infections in developed countries contributes to an increased incidence of allergic diseases. The second implicates the advent of television.

"My wife can remember the moment in which someone said, 'I'm going in to watch television,' and that was 1954," Platts-Mills recalled. "Now, kids can't be persuaded to go outside."

He surmised that warmer homes allow mites to multiply faster, exposing occupants to more of their allergens. In addition, scientists determined that people watching a screen, such as TV or a computer, stopped sighing, or taking deep breaths, compared to people who sigh unconsciously while reading. Individuals that don't sigh regularly tend to have lungs that contract more intensely than normal to a stimulus.

The summer sneeze

Although Blackley found the connection between pollen and hay fever, another British physician was actually the first to describe the condition. John Bostock Jr., M.D., presented a study to colleagues in 1819, in which he described the nose and throat inflammation, called catarrh, he experienced every summer. Bostock coined the phrase catarrhus aestivus, or "summer catarrh," in a paper published in 1828. Some of his contemporaries thought the ailment was the result of smelling new hay — hence, the name hay fever.



Platts-Mills is a professor of medicine, allergy, and clinical immunology at the University of Virginia School of Medicine. He is also a Fellow of the Royal Society. (Photo courtesy of Steve McCaw)

Peanuts and tree nut allergies

In the 1980s, Platts-Mills and his colleagues rarely saw children with peanut allergies in their clinic, but times have changed. A 2010 study *(http://www.ncbi.nlm.nih.gov/pubmed/20462634)* published in the Journal of Allergy and Clinical Immunology indicated that the number of children with peanut allergies increased three-fold between 1997 and 2008.

Although the rise in peanut and tree nut allergies is harder to explain, Platts-Mills suggested that sensitization may occur through the skin. As an example, he mentioned that many Japanese women have developed sensitization to wheat after continued use of a skin cream that contained wheat.

Carnivores beware

Members of the Platts-Mills group began research on red meat allergies after hearing about two incidents — a hunter reporting a severe allergic reaction, known as anaphylaxis, after eating red meat, and a patient dying after receiving cetuximab *(http://www.nlm.nih.gov/medlineplus/druginfo/meds/a607041.html)*, a medicine made of monoclonal antibodies used to treat head and neck cancers.

They knew that meat from mammals contained a carbohydrate called galactose-alpha-1,3-galactose, also known as alpha gal, but they didn't understand why certain people were developing allergic immunoglobulin E (IgE) antibodies to it. Another scientist noticed that the pattern of cetuximab anaphylaxis in the United States resembled the pattern of Rocky Mountain spotted fever, which is spread by a tick.

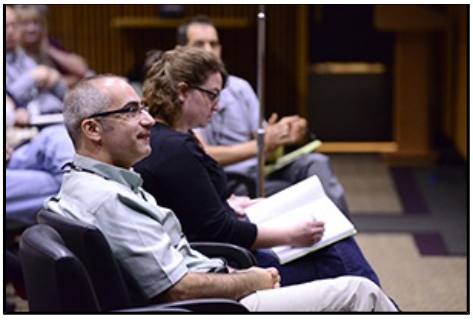
"After we developed an assay for IgE antibodies to cetuximab, we realized that someone who has never been allergic before can receive a Lone Star tick bite and become highly allergic to red meat," Platts-Mills said. "The reaction happens 2 1/2 to six hours after the bite."

Platts-Mills added that the expanding deer population, which carries ticks, is responsible for the upsurge in meat allergies. Changes in hunting patterns and leash laws, which prevent packs of dogs from roaming neighborhoods, no longer keep deer numbers in check.

He concluded by saying, although humans can't predict the diseases that our actions generate, we should think more carefully about how we are impacting our environment.

"It was a real pleasure to bring Dr. Platts-Mills to NIEHS," said Geoffrey Mueller, Ph.D., staff scientist in the NIEHS Nuclear Magnetic Resonance Group and host of the presentation. "He was a member of my Ph.D. thesis committee at the University of Virginia." (Photo courtesy of Steve McCaw)

Serena Dudek, Ph.D., standing, is head of the NIEHS Synaptic and Developmental Plasticity Group. She asked Platts-Mills whether the women that became sensitized to wheat were actually sensitive to gluten. (Photo courtesy of Steve McCaw)



Asthma specialist Stavros Garantziotis, M.D., is acting chief of the NIEHS Clinical Research Branch and leads the Matrix Biology Group. He wondered if there was a connection between red meat allergy and angioedema, or swelling of the skin around the mouth and lining of the throat, after a tick bite. (Photo courtesy of Steve McCaw)

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