Under-the-tongue tablets trick immune system to fight allergies

July 18 2014, by Eric Boodman, Pittsburgh Post-Gazette

Asha Patel knows more about what goes into your lungs than you do. Every weekday at 8 a.m., the researcher climbs onto the roof of Allegheny General Hospital, in Pittsburgh, to check a machine called a Burkard Spore Trap. It looks like a cross between a praying mantis and a weather vane. As it rotates in the wind, it sucks air onto a strip of tape that Patel has painted with petroleum jelly. The particles floating through the air may be invisible to the rest of us, but when they get caught on that sticky surface, Patel looks at them under a microscope and knows exactly what they are.

She is in charge of Pittsburgh's daily pollen and spore count, which she emails out to allergists, their patients and weather channels. As many as 50 million Americans suffer from environmental allergies, according to the American College of Asthma, Allergies and Immunology, and the pollen and spores that Patel measures are among the main culprits. Avoiding these particles is impossible, so we spray steroids up our noses, take pills, squirt eye drops and go to the doctor for allergy shots. Now, we can also reshape our immune system with allergy tablets that dissolve under the tongue, with brand names Ragwitek, Grastek and Oralair. These drugs were approved by the FDA in April and May, and while they could change the landscape of allergy treatment in America, some doctors are skeptical about how useful they are in their current form.

Allergists explain that each kind of pollen or spore that Patel identifies under her microscope fits perfectly into antibodies on a patient's mast cells, a kind of white blood cell. "It's like a hand in a glove," says Andrej

Petrov, an allergist at UPMC.

Deborah Gentile, an allergist at AGH, added that these Y-shaped antibodies are called immunoglobulin-E, and that they exist to help us fight off parasites. In the developing world, bodies contain armies of IgE, all waging a war on tropical bugs.

In industrialized countries like the U.S., the relatively low concentrations of parasites should mean that our bodies have only tiny amounts of IgE. But in allergic bodies, the immune system mistakes something harmless for a parasite. When a particular species of pollen binds to that specific IgE, it creates a positive feedback loop: More IgE of that type is produced, which means that more pollen binds to it, and more histamine is released, creating an allergic reaction.

For people with mild allergies, treating the symptoms is often sufficient. By blocking receptors in the nose and throat, antihistamines prevent this chemical from inducing the reactions we associate with hay fever.

But for patients like Beth Koenig, 43, antihistamines are not enough. When she moved to Pittsburgh three years ago, she discovered that she was particularly allergic to the Steel City's allergens. Her lifelong symptoms became unbearable. Not only did she have a sore throat, itchy ears and a runny nose, but also she had trouble breathing. "Your eyes itch and burn so much that if you could just take them out and wash them, it would feel like the best thing you've ever experienced," she said.

Beyond avoidance (which was impossible) and symptom-based treatments (which did not work), there was one other option: immunotherapy. This class of treatment involves exposing the immune system to the allergen in increasing doses so that your body stops viewing it as a parasite. By slowly upping the amount of the allergen in your body, immunotherapy stimulates the production of IgG, whose

normal job is to fight off bacterial or viral infections without producing an inflammatory response.

Like a new rival gang staking out its territory, IgG competes with IgE, grabbing more of the allergens and preventing IgE from binding to mast cells and stimulating chemicals like histamine. "My holy grail is to change the immune system," said. Dr. Petrov, who prescribed these regular injections for Koenig.

His colleague, allergist Merritt Fajt, added that some people call these shots allergy vaccines because they can make environmental allergies disappear entirely.

Until now, injections were the only kind of immunotherapy approved by the FDA. Most often, shots are scheduled weekly for five to six months and then monthly for three to five years, although some, like Koenig, opt to do the first eight shots in a single day.

The new drugs Grastek, Ragwitek and Oralair are similar to allergy shots. In both cases, producers say, the allergens are soaked in secret solutions and spun in a centrifuge to extract the most allergenic proteins; both kinds of treatment require regular doses for a long time. And both have a small risk of producing allergic shock.

Here's the difference: After taking the first dose in a doctor's office, patients take these sublingual tablets at home. Once a day, for 12 weeks before and then throughout allergy season, patients slip a tablet under their tongue and wait for it to dissolve. No injections and only one appointment with the doctor.

But Grastek and Oralair combat only grass allergies, and Ragwitek helps only with ragweed, while allergy shots are a personalized cocktail of allergens prepared for each patient by a nurse or researcher, like Patel.

And most people with serious allergies are sensitive to many, from tree and grass pollen to cockroaches and dust mites.

"In Europe, they treat the principal allergy, and they see improvement overall," said Dr. Gentile at AGH. But she is worried about compliance, given that patients need to take these tablets every day for six months. "They have more than a 50 percent drop-off rate," added Dr. Petrov, of UPMC.

While Dr. Gentile thinks that these new drugs will encourage more people to seek allergy care, most of Dr. Fajt's patients at UPMC are not really eligible. "It's rare that I find a solo allergy," she said. "I don't even know if it would be safe to put multiple agents under the tongue."

It is too late for patients to begin taking these new medications for this year's grass and ragweed seasons. Drug companies are now testing sublingual tablets for other allergens; others are developing shots that take effect in fewer doses. And for the small number of people who got prescriptions for Grastek and Oralair, they should now be seeing the effects. But Ragwitek users will only see them in August when Patel's microscope slide fills with the spiky round pollen of ragweed.