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Discovery opens door to 'personalized' asthma therapy

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In the last few years, “personalized medicine”— using genetic or other molecular biology-based diagnostic tests to customize treatment for a particular patient — has emerged as a powerful new tool for health care.

Therapy guided by genetic testing has proven highly successful in treating some types of leukemia and breast and lung cancer. Similar “personalized” therapies are on the horizon for other types of cancer, as well as diabetes, heart disease and other deadly disorders.

Now, University of Texas Medical Branch at Galveston (UTMB) researchers and their colleagues elsewhere have taken the first steps toward bringing the methods of personalized medicine to asthma.

Applying state-of-the-art protein screening techniques to samples taken from 84 asthmatic volunteers, they’ve made the first identification of different subtypes of asthma based on distinct “protein profiles,” unique combinations of 10 or more proteins with which they are associated.

One of these profiles corresponds to a variety of severe, treatment-resistant asthma that, while rare, is responsible for 40 to 50 percent of the total health care costs associated with the disease.

“We know that in asthma some people respond to very specific types of therapies and others don’t,” said Dr. Allan Brasier, director of UTMB’s Sealy Center for Molecular Medicine and a senior author of a paper on the study appearing in the just-published January issue of the Journal of

Allergy and Clinical Immunology (online at journals.elsevierhealth.com/periodicals/ymai). “Being able to discover different asthma subtypes should allow us to tailor our treatments to increase the odds of a positive response,” Brasier added.

To obtain their samples, researchers squirted a small amount of saline solution through tiny tubes into the anesthetized volunteers’ lungs. They then sucked the saline back out, bringing with it proteins washed free from walls of the network of air passages and sacs in the lungs (which swell closed when they are inflamed during an asthma attack).

“In each sample, we measured 25 different cytokines, inflammatory signaling proteins that play a very important role in asthma,” Brasier said. “We found that our samples fell into one group associated with severe asthma, another group that looks like it represents less severe disease, and two additional groups whose significance we don’t yet understand.”

The unknown protein profiles, Brasier said, could be produced by types of asthma that respond differently to treatment, or that are generated by different genetic or environmental sources. These and other as-yet-undiscovered protein patterns may eventually be used to diagnose types of asthma aggravated by cigarette smoke, for example, or that cause a steady decline in lung function over a number of years.

“Until now, all we knew was that asthma was a disease that manifested itself in many different ways,” Brasier said. “By using these patterns of multiple different proteins, we can start defining those different subtypes much more accurately — which is very useful for trying to identify which ones will respond to which treatments.”

According to Brasier, clinical applications of asthma protein profiling will have to await the discovery of additional protein patterns to match

with other subtypes of asthma, as well as more sensitive tests that would allow for less invasive sampling techniques—a blood test, for example, or an analysis of exhaled breath.

“We’re still a little bit away from treating people, but that’s coming,” Brasier said. “This is the proof of principle that you can apply proteomic patterns to personalized medicine in asthma.”

Source: University of Texas Medical Branch at Galveston