

Something in the Air | Gauging Pollution's Impact on Health

By Tara Hulen

Forty years after the passage of federal clean-air laws and changes in Birmingham's industrial economy, the skies above the city are no longer full of black smoke.

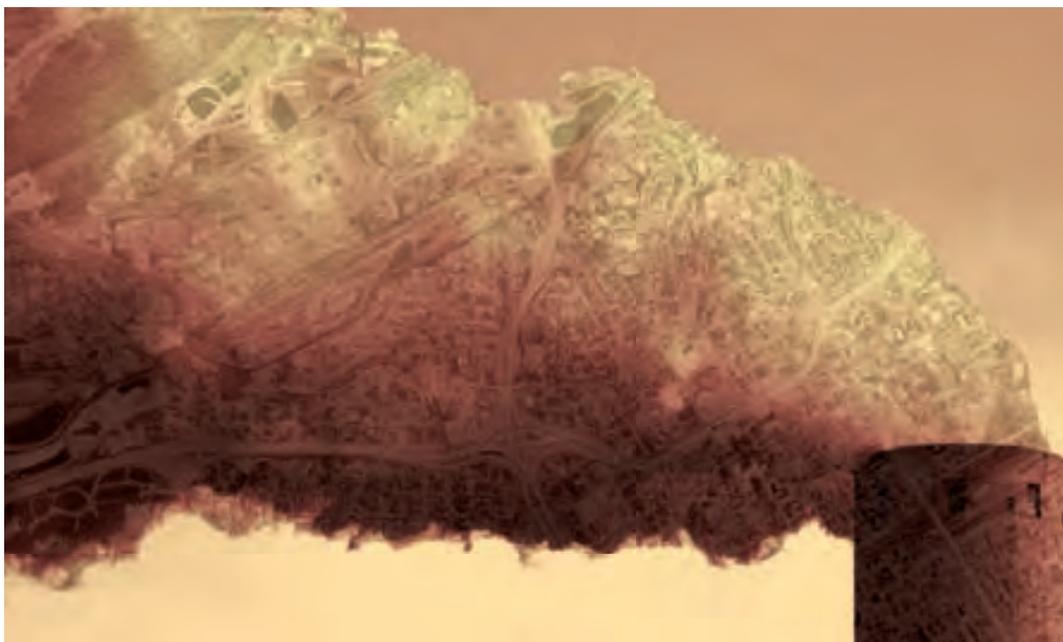
But the region still ranks as the 12th worst in the nation for year-round particle pollution, according to a new American Lung Association report. It's a problem that concerns both UAB clinicians and researchers.

"The environment affects our health in ways that we don't fully recognize and may not even know," says Victor Thannickal, M.D., director of the UAB Division of Pulmonary, Allergy, and Critical Care Medicine and the Ben Vaughan Branscomb Chair of Medicine in Respiratory Disease. "Its broad influence on health extends beyond the lung to cardiovascular health and even metabolic diseases such as diabetes."

Clean Air Initiative

The School of Medicine has joined with the UAB School of Public Health and other campus departments to launch the Birmingham Clean Air Initiative, which also includes the Jefferson County Public Health Department, the Southern Environmental Law Center, and the advocacy group GASP (Greater Birmingham Alliance to Stop Pollution). The united front aims to improve the region's air quality while ameliorating the health effects of environmental stressors through research, the assessment and reduction of exposures, and community education about air pollution's impact.

Lung disease has become a major public health crisis: Chronic obstructive pulmonary disease (COPD) is the nation's third most common cause of death. Lung diseases' systemic effects on other organs and diseases make them a logical focal point for research into environmental stressors, Thannickal says. "These complex diseases are usually related to environmental stressors, genetic susceptibility, and age, which produce a perfect storm. Chronic lung disease is becoming more of an epidemic because our air pollution is worse than decades ago, and because of our aging population."



As a leader in the research and treatment of asthma, COPD, and idiopathic/interstitial lung disease, UAB "should be a leader in solving chronic lung disease linked to environmental exposures," he says.

A Nose for Disease

One arm of the initiative, the Program for Environmental and Translational Medicine (P-ETM), will look for new methods of preventing, diagnosing, and treating diseases caused or accelerated by air pollution. P-ETM director Veena Antony, M.D., a professor of medicine and environmental health sciences, says a new specialty clinic at The Kirklin Clinic already is accepting referrals for patients with pulmonary, dermatological, neurological, or other medical conditions related to environmental exposures.

On the research side, investigators plan to develop an environmental "nose"—sort of a breathalyzer that can reveal recent and past exposures to health-threatening environmental pollutants. "It can tell you if there are ongoing problems in the lungs," Antony says, describ-

ing how the tool samples exhaled breath condensate and uses metabolomics—products of cellular processes—to find early biomarkers of lung disease and signs of inflammation. While lung disease usually is discovered after tissues are damaged, the "nose" could "define early disease before anatomical changes are indicated on a pulmonary function test."

Patients' results can help identify and compare environmental stressors by ZIP code, which will aid in discovering and targeting pollution sources. They also could help researchers tailor interventions to prevent or improve related health problems in those neighborhoods.

Along with cleaner air, the initiative's allied approach should lead to other long-lasting benefits, including new treatments for lung disease. The ideal outcome is to use metabolomics and stem cell biology to understand how the lung responds to environmental stressors, Thannickal says. "The holy grail is to be able to regenerate lung tissue even after damage has been done."

Breathing Uneasy | What's in Birmingham's Air?

Soot (particle pollution) • Smog (ozone pollution) • Carbon monoxide
Lead • Mercury • Arsenic • Benzene • Formaldehyde • Acid gases