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Tobacco smoke, cotton dust targeted

Major lung disease study to examine mineral hazards

Tobacco, cotton and grains will come under close scrutiny here over the next few years as scientists attempt to pin down the causes of certain lung diseases.

Supported by two grants totaling \$873,114 from the National Institute of Environmental Health Sciences (NIEHS), the Duke researchers are beginning a major study of naturally occurring minerals that stick to crops in the field and later may lead to lung disease when inhaled in dust or smoke.

"Our concern is lessening the danger of exposure to things that we expect people will be exposed to for some time," said Dr. William Gutknecht, assistant professor of chemistry and co-director of the project. "The goal is not to put down these products or the industries they support, but rather to make them safer if possible."

Multidisciplinary effort

The study is a multidisciplinary effort involving pulmonary physicians, physiologists, analytic and organic

chemists, pathologists, biochemists and pediatricians, Gutknecht said.

Eleven Duke scientists will be involved directly in the research, while others from Duke, NIEHS and the Research Triangle Institute will serve as consultants.

Gutknecht said the project has been divided into four related parts.

The first will involve patients referred to Duke and the Durham VA Hospital by industries that generate dust from such

natural products as clays, coal, tobacco, cotton and wheat.

After a thorough evaluation on Duke's Clinical Research Unit, selected patients will be treated by lung lavage, a process using a sterile salt solution to wash hardened secretions and foreign materials from the airways to improve breathing.

Material to be evaluated

In the second part of the study, scientists will evaluate the material

obtained from the lavages with electron and light microscopes and a technique known as X-ray microanalysis. They also will evaluate secretions from experimental animals exposed to aerosols and drugs in an effort to develop practical animal models for the lung diseases humans contract from air pollution.

"One of the goals is to determine how useful analysis of lung lavage materials is in the diagnosis of certain illnesses," Gutknecht said.

Unique opportunity for study

In the third series of experiments, chemists will identify inorganic particles washed from the patients' lungs and collected from the air where they worked before getting sick.

The fourth part will include biochemical evaluation of materials secreted by lung disease patients and also by rats, chickens and rabbits that have been exposed to mineral pollutants.

"The scientific literature abounds with reports of the effects of inorganic material on the pulmonary system, but most of these studies have been performed using autopsy materials and cell cultures," Gutknecht said.

"The availability of lavage samples
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Medical detective work combats illnesses on CRU

By David Williamson

For eight years Betty McDaniel, a 43-year-old homemaker from Rock Hill, S.C., suffered from an extremely rare disease that prevented her body from using vitamin D.

Her bones became progressively softer, and nothing her doctors did seemed to help.

"At home I was getting more and more crippled every day," she said. "I thought I would never walk again, and every bone in my body hurt. I could break one of them just by bending over."

Detective work

After being referred to Duke, McDaniel was admitted to the Clinical Research Unit (CRU) where some highly sophisticated medical detective work began.

Her physician, Dr. Marc K. Drezner, said he and his colleagues found that a benign tumor in her hip about the size of a cantaloupe was secreting a chemical factor that blocked her vitamin D metabolism. Drezner, an assistant professor of medicine who specializes in endocrinology, called McDaniel's condition "tumor-induced osteomalacia."

"We felt that we could probably cure the osteomalacia if we took the tumor out," he said, "but since giant cell tumors of bone are notorious for regrowth, that meant there was an odds-on chance that her illness would come back."

Two years later, she feels fine

Drezner said that after extensive tests and laboratory work, the scientists pinpointed the chemical stage at which vitamin D was being affected. They also found that an experimental drug that is an activated form of the vitamin could prevent her painful symptoms should the tumor grow back later.

Now, almost two years after her

operation, McDaniel said she walks several miles a day and feels fine. Body casts and crutches are no longer a part of her life.

"I was there (at the CRU) six times altogether, and they did everything they could to make me comfortable. There's no way I could have paid for all those studies," she said.

Not all endings happy

Not all tales of illness and treatment have happy endings like the one McDaniel tells. And most medical scientists would be the first to admit that they have only begun to understand the complexities of health and disease.

When breakthroughs do come, however, many of them will be associated with the 80 clinical research centers that the National Institutes of Health supports through its Division of Research Resources, according to Dr. Samuel Wells Jr., professor of surgery and director of Duke's unit.

"I don't think there is any place in the federal government where citizens get more for their tax dollars," Wells said. "Since 1960, the large majority of clinical research at Duke has been performed on the CRU."

Investigators take advances from basic medical science or experimental animal research and apply them to patients, attempting to prevent, treat and hopefully cure illnesses, he explained.

Two committees

Wells said that any medical center physician who wants to admit patients to the unit for research purposes may do so but first must secure the approval of two committees.

The Clinical Investigations Committee, composed of physicians and laymen alike, determines whether the potential benefits outweigh the risks to a patient, whether the individual's rights and

welfare are protected and whether he or she will be able to understand fully what will be done.

The Clinical Research Unit Advisory
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NOT JUST COUNTING CALORIES—Sharon Polisson, who begins a new job with the National Institutes of Health in Maryland this month, served as research dietician on the Clinical Research Unit for the past seven years. Here she demonstrates how food for certain patients must be weighed on an electronic balance so that exact duplicates of meals can be analyzed for their mineral content. (Photo by Jim Wallace)