
RSNA Press Release

Even with Medication, Asthma Patients Show Chronic Airflow Changes in Lungs

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OAK BROOK, Ill. — Using a special MRI technique, researchers have determined that the location and degree of airway narrowing in the lungs of asthma sufferers can be markedly persistent over time. The findings will be published in the February issue of *Radiology*.

"A considerable number of airways appeared to be consistently narrowed over time," said the study's lead author, Eduard E. de Lange, M.D., professor of radiology at the University of Virginia Health Sciences Center. "This finding was irrespective of disease severity or the use of medication."

Asthma is a chronic inflammatory disorder in which the small and medium-sized airways of the lungs become obstructed. Narrowing or closure in the passages can be caused by swelling in the walls or changes in the structure of the airways as a result of the chronic condition.

For the study, researchers used hyperpolarized helium 3 (³He) MRI to visualize areas of airflow obstruction in the lungs called ventilation defects. To perform the imaging test, patients inhaled the helium gas prior to undergoing MRI.

In order to measure the changes in the location and size of airway defects over time, researchers performed consecutive ³He MRI studies on 43 asthma patients between 18 and 40 years old.

Twenty-six patients underwent two imaging studies on the same day (up to 82 minutes apart), and 17 underwent ³He MRI on three occasions separated by an average of 51 days. In addition to each ³He MRI exam, patients also underwent spirometry, a test that measures the amount of air exhaled from the lungs.

At A Glance

- Using ³He MRI, researchers have found that airway narrowing in the lungs of asthma patients is significant and remains persistent over time, regardless of disease severity or use of asthma medication.
- Three months after initial imaging, repeat ³He MRI revealed that more than one-third of airway defects were in the same location and approximately one-half of those defects were the same size.
- For a ³He MRI exam, patients inhale hyperpolarized helium before undergoing MRI.

In the same-day examinations, 75 percent of the lung defects identified by 3He MRI remained in the same location for both imaging studies. The majority of those defects, or 71 percent, remained the same size. In the multi-day examinations, 67 percent of defects were still present in studies that were repeated with a median interval of 31 days; in studies with a median interval of 85 days, 38 percent of defects remained in the same location. The findings were not affected by disease severity or by use of asthma medication.

"Most of the change in overall defect number was caused by variability between patients rather than within patients, indicating that 3He MRI provides a reliable means for visualizing airflow impediment within the lungs of patients with asthma," Dr. de Lange said.

After an interval of about three months, repeat 3He MRI revealed that more than one-third of airway defects were in the same location and approximately one-half of those defects were the same size.

"A considerable number of airways appeared to be consistently narrowed over time, which helps us understand that asthma is largely a focal disease of the lung," Dr. de Lange said.

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"Changes in Regional Airflow Obstruction over Time in Lungs of Patients with Asthma: Evaluation with 3He MR Imaging." Collaborating with Dr. de Lange were Talissa A. Altes, M.D., James T. Patrie, M.S., John J. Battiston, M.D., Ph.D., Adam P. Juersivich, M.S., John P. Mugler III, Ph.D., and Thomas A. Platts-Mills, M.D., Ph.D. Journal attribution requested. Journal attribution requested.

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Dr. de Lange discusses this study on the Hear What We Think podcast available for download at: <http://radiology.rsna.org/content/vol250/issue2/images/data/DC1/Feb09.mp3>