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NEWS

RSNA Press Release

New Imaging Technique May Help People with Asthma

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OAK BROOK, Ill. - A new magnetic resonance (MR) imaging technique using hyperpolarized helium lights up the lungs' airways, providing, for the first time, clear resolution of even the smaller, seventh-generation airways. The technique, dynamic hyperpolarized 3He (helium) MR imaging, should help physicians better understand and treat asthma, as well as other chronic obstructive pulmonary diseases. Researchers from Brigham and Women's Hospital reported their findings in the May issue of the journal *Radiology*.

"Other non-radioactive techniques have only been able to image lung peripheries," said the study's principal investigator, Mitchell S. Albert, Ph.D., assistant professor of radiology at Harvard Medical School and director of the hyperpolarized noble gas MRI laboratory at Brigham and Women's Hospital in Boston. "Dynamic hyperpolarized helium MR imaging offers a completely noninvasive and safe method of studying the airways."

Dr. Albert collaborated with other researchers to pioneer hyperpolarized noble gas MR imaging, a technique he conceptualized in 1991 while researching the effect of anesthesia on the brain. "Our new technique provides information on ventilation, while depicting structure and function of the airways," Dr. Albert said. "Other non-radioactive imaging modalities do not provide this type of information."

For the study, researchers evaluated the degree of distal airway visualization in six healthy adult volunteers, ranging in age from 22 to 40, who inhaled one breath of hyperpolarized helium gas during MR imaging. Visualization was achieved using a fast gradient-echo pulse sequence during inhalation. The resulting images showed differential contrast of both distal airways and lung periphery. The findings offer hope for asthma research, diagnosis and treatment. Currently, models predict where asthma closure and constriction occur in the airway tree, however, the airways during an asthma attack have never been visualized, according to Dr. Albert.

"Researchers do not yet know if asthma causes a global closure and constriction of the airways, whether it happens selectively within certain parts of the bronchial tree, or if it affects one or both lungs," Dr. Albert said. "With this technique we hope to actually see

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ventilation constriction and closure of the airways in people with asthma," he said. "Symptoms can be correlated with the information from the images to assist in treatment of asthma patients."

Dr. Albert and his team also plan to study bronchodilator treatment to see where bronchodilation occurs. This type of information will be beneficial to drug development and testing, he noted.

"We are developing tools to measure and study airway diameters during constriction and dilation in people with asthma," Dr. Albert commented. "In the weeks to come we will start dynamic hyperpolarized imaging of patients with asthma at Brigham and Women's Hospital."

The new approach can easily be applied in a clinical setting. "Most hospitals have MRI machines that can be converted to image helium. Consequently, this imaging technique may soon be readily available to many more patients," Dr. Albert added.

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"Distal Airways in Humans: Dynamic Hyperpolarized 3He MR Imaging-Feasibility." Collaborating with Dr. Albert on this study were Angela C. Tooker, M. Eng., Kwan Soo Hong, Ph.D., Erin L. McKinstry, B.S., Philip Costello, M.D., and Ferenc A. Jolesz, M.D., from Brigham and Women's Hospital in Boston.

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