V/Q Scans for Embolism

A new position paper (*RadioGraphics*. 2000; 20:99–105) advocates recategorizing some of the indeterminate findings on ventilation-perfusion (V/Q scans) to improve their utility. Radiologists have been interpreting V/Q scans as showing high, moderate, or low probability, generally using the criteria established for these categories by the Prospective Investigation of Pulmonary Embolism Diagnosis (PIOPED) study. But the low-probability category has been criticized as having an "unacceptably high prevalence of pulmonary embolism [PE]," note Dr. Paul Stein of Henry Ford Heart and Vascular Institute in Detroit and Dr. Alexander Gottschalk from Michigan State University in East Lansing, MI.

In their *RadioGraphics* paper, Stein and Gottschalk suggest that further stratification with a "very low-probability" interpretation would help counter those concerns. The very low-probability category would include abnormalities with <10% likelihood of PE, including triple-matched defects in the upper or middle lung, nonsegmental perfusion abnormalities, the stripe sign, and 3 other findings. Although the very low-probability signs have been discussed individually in other publications, their compilation in *RadioGraphics* may help radiologists implement such interpretations, Gottschalk said in an interview. "I think they're not terribly difficult to use," noted Gottschalk, who has also been working to validate the criteria. The benefit, Gottschalk believes, is that unlike low-probability readings, very low-probability readings are no longer seen as nondiagnostic and can reassure clinicians about the truly low likelihood of PE.

"The hope is, given an appropriate clinical suspicion and a very-low reading, a patient will not be anticoagulated," Gottschalk said. Other nondiagnostic V/Q scans would appropriately be followed up with CT angiography, pulmonary angiography, or serial ultrasound scans of the legs.

Gottschalk believes V/Q scanning eventually should share the stage with CT angiography, in a stratification scheme based on the patient's initial chest radiograph. Patients with a clinical suspicion of PE but a normal or near-normal chest film would undergo V/Q, which is frequently definitive in such cases, Gottschalk said. Conversely, complicated chest films would be followed by CT angiography. The key to this approach, noted Gottschalk: "You have to be able to do both of these things (CT angiography and V/Q) well."

—AuntMinnie.com

Combating Arthritis with Neutrons

Physicists at the Department of Energy's (DOE's) Idaho National Engineering and Environmental Laboratory (INEEL) and the Massachusetts Institute of Technology (MIT) are collaborating on a new technique that may someday ease the pain of severe rheumatoid arthritis. In helping develop the new arthritis treatment, INEEL, the DOE's leading nuclear technology laboratory, is applying and expanding its nuclear expertise and advancing nuclear technologies.

MIT physicist Jacquelyn Yanch has devised a new way to kill the synovium, by injecting a boron compound into an arthritic joint and exposing the joint to a neutron. The boron absorbs some of the neutrons and forms a radioactive substance that quickly decays. Radiation from the decay kills the synovium and vanishes as soon as the neutron beam is turned off.

INEEL is studying the speeds and trajectories of the neutrons in the beam so Yanch and her research team can better estimate how much radiation is being administered. For more than 10 years, the laboratory has conducted research on boron neutron capture therapy to treat brain tumors.

"This is an application for certain key technologies we've developed from the cancer program," said INEEL physicist David Nigg. "We're excited about it."

More than 2 million Americans suffer from rheumatoid arthritis. Although medication can often hold the disease in check, 10%–20% of patients continue to suffer in at least 1 joint even after drug therapy. The new technique should be more effective than surgery, which often fails to completely remove diseased tissue, and promises to be safer than injections of a radioactive material that kill the synovium but leave radioactivity in the body.

Yanch is testing the technique in rabbits with induced rheumatoid arthritis, and early results are promising. "We have very clear evidence that we've killed the synovium, which is what you want to do," Yanch said. She first had the idea for the technique in 1992, but the technology began to grow after she received support in 1995 from INEEL's University Research Consortium. The consortium fosters collaboration between laboratory and university researchers to produce valuable new technologies and address national energy or environmental needs.

—U.S. Department of Energy