

Radiation Dose Reduction Methods Gain Traction

A large study showed that a normal stress study has the same 1-year prognosis as a full stress-rest study.

BY RICHARD M. KIRKNER

EXPERT ANALYSIS FROM THE ANNUAL MEETING OF THE AMERICAN SOCIETY OF NUCLEAR CARDIOLOGY

PHILADELPHIA – Population exposure to medical radiation increased by 700% between 1980 and 2006, and nuclear cardiologists are feeling the pressure to reduce patients' radiation exposure, according to Dr. Milena J. Henzlova of Mt. Sinai School of Medicine in New York.

"This is the first time in history that exposure to medical radiation exceeds natural radiation in the population," she reported at the meeting.

Reasons for this increased radiation exposure are varied and range from the availability of improved technology and deteriorating health of the general population, to the economic interests of manufacturers and providers, Dr. Henzlova said. In addition, "more noncardiologists are also referring [patients] for diagnostic studies, which is unusual in other medical subspecialties"

Dr. Henzlova outlined ways in which nuclear cardiologists could reduce radiation dosing in their patient populations.

'The bottom line is that if you maintain adequate signal dose and adequate initial quality with lower tube current, in general that lowers radiation exposure.'

One method is to follow existing American Society of Nuclear Cardiology guidelines and appropriateness criteria and the ALARA – as low as reasonably achievable – principle, she advised.

She also encouraged physicians to focus dose reduction on younger patients, though "if the patient is in the ninth decade of life, maybe this principle becomes irrelevant."

More broadly, more regulation of the imaging equipment might help rein in the dosing. Furthermore, physicians and patients should become better educated in the hazards of

medical radiation and the benefits of dose reduction, she said.

Dose-reduction methods nuclear cardiologists can use immediately include what she called "stress-first testing" rather than full stress-rest testing.

"At least 50% of our stress-rest studies are normal, and when we looked at huge sets of data, we found that 60%-70% were normal," Dr. Henzlova said. "If there is a reason for the rest imaging, it's to find the reversibility of a defect; but in more than half of patients there is no defect to start with."

Her group studied results of more

than 10,000 stress-rest tests and found that outcomes over 5 years were almost identical between the stress-only and image study groups. "We concluded that a normal stress study has the same 1-year prognosis as a full stress-rest study," she said. "This is an attractive alternative to the stress-rest study in appropriately selected patients. Ultimately, time is saved, radiation is saved, and cost is decreased."

Nuclear cardiologists could also opt for a 2-day rest study with lower doses of radiation, she said, referring to U.S. and European protocols. In a cohort at the Mt. Sinai School of Medicine, total microcuries (mCi) ranged from 48 to 72, compared with 33.8 to 47.3 in a European report on 2-day studies.

Dr. Benjamin Chow, of the University of Ottawa Heart Institute in Canada, also reported on dose reduction methods for cardiac CT. The methods he described included minimizing tube current (the number of electrons used) and tube voltage (the energy level of the electrons).

"The bottom line is that if you maintain adequate signal dose and adequate initial quality with lower tube current, in general that lowers radiation exposure," he said.

The dose-reduction methods Dr. Chow reviewed included maintaining the tube current as the CT projects across the chest but reducing it across smaller body areas, turning off the scanner when the patient changes position, using bowtie filters, and activating the padding function, which can also reduce costs by up to 82%. He cautioned, how-

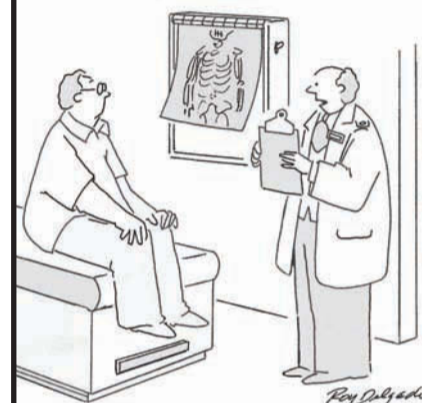
ever, that there would be some loss of image quality with padding.

Tube modulation is another method of maximizing imaging during the patient's diastasis and minimizing it during systole, he said, but this also has its drawbacks, because although it restricts the amount of time the patient is exposed to radiation, "you may lose the ability to read different phases of the study."

Dr. Chow said that his center routinely uses breast shields for women undergoing cardiac CT, which have been shown to reduce radiation exposure to the breast and lung, by 30% and 15%, respectively.

Neither Dr. Henzlova nor Chow had any relevant disclosures. ■

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Study Validates Alternative Stress Agent in Asthma, COPD

BY RICHARD M. KIRKNER

FROM THE ANNUAL MEETING OF THE AMERICAN SOCIETY OF NUCLEAR CARDIOLOGY

PHILADELPHIA – Individuals with asthma or chronic obstructive pulmonary disease can tolerate the imaging agent regadenoson well if they need to undergo cardiac stress testing, a study has shown.

Dr. Bruce Prenner, a San Diego allergist, reported on findings from a multicenter trial involving 999 patients who received either regadenoson or a

placebo. "Regadenoson has a greater affinity for the A2B receptors and the other types of receptors, and thus the risk of bronchospasm and bronchoreactive events should be quite low," he said at the meeting.

The risks of adenosine inducing breathing problems in individuals with asthma and COPD have been well documented. This study set out to determine how regadenoson affected forced expiratory volume in 1 second (FEV₁) in 999 study subjects,

532 with asthma and 467 with COPD. About half of the patients received the placebo. The primary end point was a greater than 15% decrease in forced ex-

'This information should be very useful in considering the selection of regadenoson as a bottom-line stress agent for myocardial perfusion imaging.'

piratory function from baseline within 2 hours of the dose being administered, Dr. Prenner said.

"In the asthma group, 1.1% of [regadenoson] patients had an

FEV₁ decrease greater than 15%, and 2.9% of patients on placebo," he said. Among patients with COPD, 4.2% receiving regadenoson and 5.4% on placebo met the primary end point, he said.

Respiratory problems such as wheezing, dyspnea, obstructive airwaves disorder and tachypnea were more common with regadenoson than placebo: 13% vs. 2%, respectively, in the asthma group; and 19% vs. 4% in the COPD patients. "The asthma patients had less frequency in terms of previous studies," Dr. Prenner said. He said the variation between regadenoson and placebo was driven by dyspnea, a known side effect of A2A agonists.

However, within 1 day of injection, use of short-acting bronchodilators was similar for those who received both regadenoson and placebo, Dr. Prenner reported. In subjects with asthma, 1.4% of the regadenoson group and

1.1% of the placebo group used the inhalers. Among those with COPD, inhaler the rates were 1.6% and 1.3%, respectively, for the regadenoson and placebo cohorts.

The study showed no clinically meaningful differences between treatments in pulmonary function tests in either group, Dr. Prenner said. While the incidence of adverse events was higher with regadenoson, the adverse event profile was similar to that in previous regadenoson trials in nonasthmatic COPD patients. Of six serious adverse events with regadenoson, three were considered treatment related.

"This information should be very useful in considering the selection of regadenoson as a bottom-line stress agent for myocardial perfusion imaging in these types of patient populations," Dr. Prenner said.

Dr. Prenner is a scientific adviser to Astellas, the manufacturer of regadenoson, and serves on its speakers bureau. ■

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