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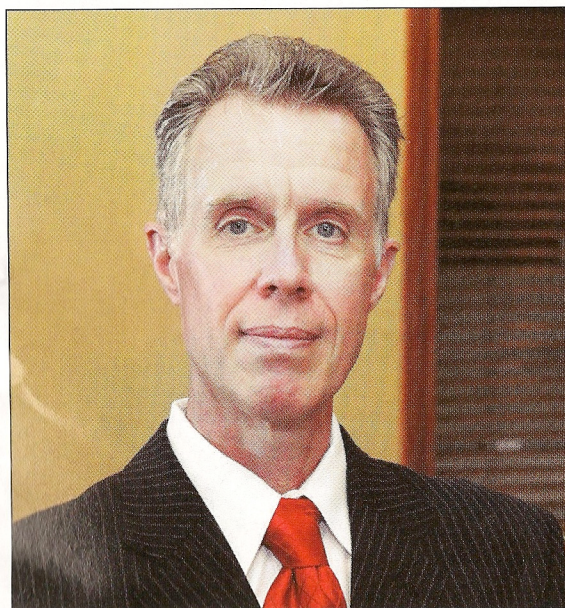
NEWS & PERSPECTIVE FOR THE CARDIOVASCULAR SPECIALIST

Carl J. Pepine, MD, Chief Medical Editor

IMAGING

All Imaging articles start on page 10

Innovations in myocardial perfusion imaging reveal potential life-saving strategy



Source: Mir Image Photography

Richard M. Fleming, MD, said that a newly-devised formula could help get certain patients into the cath lab that may have been missed by nuclear studies.

About 40,000 to 70,000 Americans go home after being told they do not have heart disease following nuclear testing, only to have an MI. Of this number, half will die before they can make it into an ambulance.

"Currently, what's happening is that many Americans each year are told by their nuclear study that everything's fine and they can go home," **Richard M. Fleming, MD**, of the Sierra Nevada Cardiovascular Associates in Reno, Nev., and of the Cardiovascular Institute of Southern Missouri, said in an interview with **CARDIOLOGY TODAY**.

This oversight has resulted in fatalities, which according to Fleming, can be detected in advance by combining a 20th century technique with 21st century technology. Research performed by Fleming and colleagues has suggested that images taken at 5 and 60 minutes of a stressed heart given a single injection of a radioactive isotope finds life-threatening disease that is currently being missed by CV imaging.

This form of nuclear cardiac imaging has origins as

Innovations continues on page 10

PRACTICE MANAGEMENT AND QUALITY CARE

All Practice Management and Quality Care articles start on page 8

HHS: New health plans must cover preventive care, eliminate cost-sharing

According to regulations issued recently by the departments of Health and Human Services, Labor and the Treasury, private health plans beginning on or after Sept. 23 must cover evidence-based preventive care and eliminate cost-sharing requirements.

"From the Recovery Act to the first lady's 'Let's Move' campaign to the Affordable Care Act, the

Health plans continues on page 9

HF AND TRANSPLANTATION

All HF and Transplantation articles start on page 15

DIAL

Randomized Trial of Phone Intervention in Chronic Heart Failure

Design:	randomized, controlled, open-label
Patients:	1,518
Centers:	51
Country:	Argentina

RESULTS: See pages 16, 17

CHD AND PREVENTION

All CHD and Prevention articles start on page 28

Advisory panel gives nod to ticagrelor

cardiac magnetic resonance in patients with known or suspected coronary artery disease.

This prospective, head-to-head comparison study comprised patients (n=41) with an abnormal single-positron emission CT stress test who were awaiting or had undergone a diagnostic X-ray angiogram. Patients were excluded if they had

Of the remaining population who had complete quantitative data (n=30), researchers observed that perfusion reserve (mean $\pm$ SD) decreased as coronary artery stenosis severity increased: 2.42 ± 0.94 for $<50\%$; 2.14 ± 0.87 for 50% to 70% ; and 1.85 ± 0.77 for $>70\%$ ($P<.001$). Researchers noted similar diagnostic accuracies with perfusion

terary stenosis $>70\%$ (77% vs. 67%). Additionally, the use of perfusion reserve in patients with triple-vessel CAD had a higher burden of detectable ischemia vs. patients with single-vessel CAD (60% vs. 25%; $P=.02$), whereas qualitative interpretation detected no difference (31% vs. 21%; $P=.26$).

"We have shown ... that perfusion

erate from severe CAD and can better discriminate patients with triple-vessel CAD from patients with single-vessel CAD. ... These findings have important implications for ascertaining prognosis in an individual patient and determining an optimal therapeutic approach." ■

Patel A. *J Am Coll Cardiol.* 2010;56:561-569.

Innovations

continued from cover

far back as the 1920s when Blumgart and Yens first found that measuring the rate and magnitude of nuclide transfer from right arm to left arm could diagnose the presence or absence of heart disease. "Blumgart basically said you keep the heart in the same state condition and you check the radioactivity over a period of time and compare it," Fleming said. "Then, in 1959, Gorlin published a paper stating that rest images weren't at all useful in detecting ischemia."

Despite this research, Fleming and other colleagues fell into the practice of performing rest and stress imaging, due to the use of thallium as a tracer. "What this entailed was you stress the heart, give it thallium, and then get an image at 1 hour and another at 4 hours," he said. "It went from comparing two sets of images following stress to getting the term stress/rest, which is probably the worst thing we could have done as far as misleading ourselves."

Sestamibi and the formula for redistribution

In the late 1980s, sestamibi (technetium-99m isotope) was introduced as another radioactive tracer. Although it is now recognized in the literature that sestamibi washes out, researchers at the

time were concerned with whether it bonded with healthy cells, particularly since early protocol had it injected twice into the bloodstream.

"The argument at the time was that sestamibi somehow sticks to the healthy cells and doesn't stick to the unhealthy cells. Clearly, though, it doesn't stay in the system forever," **Gordon M. Harrington, MD**, professor emeritus at the University of Northern Iowa, and fellow researcher with Fleming, told *CARDIOLOGY TODAY*. "The clue to me was that there had to be uptake and release."

This clue was the catalyst for the development of the Fleming-Harrington redistribution Washin Washout (FHRWW) rate equation. This equation involves denoting regions of interest on eight different areas of the heart and calculating the radioactive count with single-photon emission CT in place of the traditional Geiger counter. "This allows us to quantify the process by taking the numbers the computers sees at 5 minutes and comparing it to what it sees at 60 minutes.

The resulting number is then plotted against what is seen in the cath lab for percent diameter stenosis, which results in a parabolic curve. According to Fleming, "You then ask the statistician what the description of this curve is. The FHRWW is what you come up with.

"This allows, for the first time, a nucle-

ar study to be translated into exactly what you see in the cath lab," he said. "You're then able to look at people and say they have heart disease without exposing them to the risk of something going wrong in the cath lab. You're also able to catch people who in the wash-in study looked bad at 5 minutes but fine at 60 minutes — these people would have been completely missed. And these are the people that need to be in the cath lab because they have serious disease."

Clinical application

To test their method, Fleming, Harrington and colleagues studied patients (n=120) suspected of having ischemic heart disease, utilizing rest/stress and FHRWW (stress/stress) imaging. The participants had sestamibi injected into their bloodstream per protocol and underwent exercise (treadmill) or pharmacologic stress. A SPECT camera was then used to obtain an image 5 and 60 minutes after delivery of sestamibi.

The researchers compared the results of rest/stress and FHRWW imaging to coronary angiography. For rest/stress images, the OR for detecting ischemia was 4.88 (95% CI, 2.3-10.3), whereas for FHRWW, the OR was 56.7 (95% CI, 27.5-117.2).

Rest/stress image results vs. angiographic results showed a sestamibi rest/stress imaging sensitivity of 67%.

Of the 22 false negatives, four had critically narrowed arteries with vulnerable plaques whose 60-minute images appeared normal. Evaluation of the 5-minute images for redistribution via FHRWW, however, showed qualitative and quantitative decreased uptake, demonstrating a wash-in effect. This wash-in phenomenon was missed when the 60-minute post-stress images were looked at independent of the 5-minute images, resulting in incorrect data.

Compared with coronary angiography, FHRWW offers a key advantage, according to Harrington. "When reading an image, you're going back to the original data, whereas with X-rays you're looking at a picture where some of the information can be lost due to factors involving how the print is made, the exposure of the film, among other things," he said.

Regarding their research, Fleming said FHRWW will provide a way to reduce radiation and get better results, something the imaging community has long been seeking. "This method requires less patient time and radiation, is more accurate, and, at a time when everyone is worried about health care costs and the availability of radioactive isotopes, its timing is impeccable," he said. — *by Brian Ellis* ■

For a full list of reference information, please visit CARDIOLOGYTODAY.com.

