

# Inside the Transition to Flow-Based Patient Care

The nuclear cardiology department at Ochsner Health System, a New Orleans-based multi-hospital organization with facilities peppered throughout southern Louisiana, is revising its cardiac imaging model and implementing a flow-based imaging program. Leveraging the Positron Attrius cardiac PET system, the new model is characterized by highly accurate patient diagnosis and treatment and judicious use of healthcare resources. It's a win-win proposition, says Robert Bober, MD, director of nuclear cardiology.

"The traditional methods of treating coronary disease have not led to better outcomes," says Bober, an affirmed evidence-based practitioner, who refers to the COURAGE and FAME trials as strong rationales for a flow-based approach to revascularization. The FAME trial, in particular, demonstrated that FFR-guided percutaneous coronary interventions produced improved clinical outcomes compared with angiography-guided stent placement.



Ochsner Health System, New Orleans, La.

FDA-approved flow quantification software that provides flow and flow reserve, it fundamentally changes which patients you send for revascularization and which patients are not referred."

Other imaging options do not match the capabilities of cardiac PET. Newer CZT-SPECT systems may be approaching flow capabilities, however, this technology is in its infancy with regards to flow, Bober notes. The decision-making team

## Setting the stage

Prior to 2010, the nuclear imaging infrastructure at Ochsner was fairly slim. The hospital had purchased a SPECT camera in 2005, which was moved to a satellite clinic after Hurricane Katrina that same year. Stress echocardiography played a dominant role in imaging. Bober employed a two-pronged approach to coronary imaging, focusing on educating providers about appropriate roles and candidates for stress echo and perfusion imaging, while also trying to boost volume.

By early 2010, it became clear that the health system needed another coronary imaging option to supplement the offsite SPECT camera. Committed to making a sound clinical and economic investment, Bober and colleagues surveyed the market, considering PET/CT, SPECT and PET.

"It was clear that PET represented the future of cardiac perfusion imaging," he says. "The cardiology community is moving to a flow-based approach to coronary imaging, and PET is the right tool to do that.

"At this time, we can't non-invasively evaluate flow data with any other modality," Bober shares. "PET provides the ability to quantify absolute myocardial perfusion at rest and stress. With PET and

also considered the economic implications of investing in a hybrid PET/CT system. However, the numbers didn't add up, he confides. CT added hundreds of thousands of dollars in costs to the system, and CT angiography volume at Ochsner did not justify the additional expense.

In contrast to other options, Positron's Attrius cardiac PET system provides the right mix of diagnostic capabilities and value for Ochsner Health System. "The primary drivers have been the clinical application of the technology and what it brings to the practice in terms of diagnostic differentiation. It is cutting-edge technology in cardiology," explains Mark A. French, vice president of operations, surgical services and cardiology at Ochsner. The Attrius effectively weds cutting edge with cost-effectiveness. "We want to make sure our investments are sound," continues French. The economic case for the Attrius was crystal clear for Ochsner decision-makers. A pro forma calculated at six studies a day indicated return on investment (ROI) in six to eight months, shares Bober, and the hospital hit a breakeven point at three studies daily.

## Establishing a new standard

The flow-based cardiac PET model represents a stark contrast to the conventional approach, notes Bober. "The standard now is to do a



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stress test and if abnormal, then do an angiogram and hopefully the two correlate. If they don't, the angiographer puts in stents based on what the angiogram shows and calls the stress results wrong. What we should do is use more FFR in the cardiac cath lab, making sure that what we see is actually flow-limiting and then revascularizing the flow-limiting lesions. FFR is very objective and reproducible.”

The Attrius facilitates the flow-guided model and reinvents patient care. Take for example the not atypical case of a large-breasted woman who presented with angina prior to Ochsner's cardiac PET deployment. The stress echo showed multiple abnormalities that confounded the interpretation process. The patient was referred for cardiac catheterization, which demonstrated lesions in territories that did not correlate with the stress echo findings.

After two stress tests, two angiograms and a stent, the patient returned to her cardiologist with unabated angina. Given the conflicting symptoms and imaging data, the cardiologist re-referred the patient to the angiographer, who, in turn, reviewed the entire case with Bober. “We re-examined all of the studies and I agreed with the findings,” recalls Bober.

By that point, the health system had installed the Attrius. Bober recommended a PET scan. “The PET perfusion and flow reserve results were very clear and consistent with an occluded vessel in the distribution of a small second diagonal vessel,” he notes. “If we had had PET from the start, we could have pinpointed the problem, medically managed her and avoided multiple [inconclusive] repeat procedures.”

This case is not an exception. Six months after deploying the Attrius cardiac PET system, Bober observes that the new model has impacted downstream procedures and costs. Although a cardiac PET study costs more than SPECT upfront, it can lower costs downstream, which is achieved via greater diagnostic accuracy.

Bober cites two cases in the last few months in which the PET study provided data that allowed the patient to forego cardiac bypass surgery. Other patients may avoid Plavix or an FFR wire. “The differences in downstream procedures are anecdotal [at this early juncture], but absolutely noticeable,” he says.

### Guidelines: Evolution and education

Current American College of Cardiology (ACC) guidelines present a bit of a quandary for clinicians and payors, insists Bober. That is, current guidelines recommend FFR measurements for indeterminate lesions (approximately 40 to 70 percent diameter narrowing). Consequently, angiographers rely on a subjective assessment to determine whether or not to utilize a wire.

However, a 2010 sub-analysis of FAME data that divided lesions into three categories: 50 to 70 percent, 71 to 90 percent and 91 to 99 percent, produced confusing results. “A small fraction, 4 percent, of 90 to 99 percent lesions had FFR values greater than 0.80. Among the 71 to 90 percent cohort, 20 percent had FFR values greater than 0.80. In other words, a significant number of lesions that one would typically stent after visual analysis without obtaining FFR measurements had FFR values higher than 0.80. Patients with these lesions don't benefit from revascularization, yet are often getting revascularized,” Bober says.

Cardiac PET, however, can provide a clear answer earlier in the diagnostic process, indicating which patients have limited flow and which do not and thus better identify revascularization candidates.

Revised ACC guidelines, issued in 2009, indicate a slowly shifting tide. The change, says Bober, was subtle but deliberate. Earlier guidelines restricted PET to obese patients or those with equivocal SPECT results. The new guidelines broaden the recommendations to include any patients for whom SPECT is indicated.

Bober's diagnosis? “If there is an intermediate probability of coronary disease, PET is the right study. There's less radiation, it provides better diagnostic accuracy and offers flow data.”

As the macro tide shifts toward cardiac PET and flow-based decision making, Bober and his colleagues remain confident in their decision to deploy Positron's Attrius cardiac PET system. This system is the cornerstone of a new model that enables judicious use of healthcare resources while simultaneously enabling optimum patient care and providing healthy ROI. As French says, “We're very confident that this is a real winner for us.” **CVB**

