Effective diagnostic tool for intracoronary assessment of vulnerable plaques, with diagnostic accuracy of 83%. This novel modality may provide guidance for future selective intracoronary treatment for VIUs prone to rupture.

1151-198
Qualitative Results of Intracoronary Imaging During Balloon Inflation With Optical Coherence Tomography in Humans
Olivia Manfrini, Nicholas J. Metere, Barry L. Sharaf, Edward McNamara, David O. Williams, Rhode Island Hospital, Providence, RI, Brown University Medical School, Providence, RI

Background: Intracoronary imaging with optical coherence tomography (OCT) is limited by the presence of red blood cells. Imaging from the lumen of an inflated balloon catheter is a potential solution. The aim of this study was to assess the feasibility and safety of intraluminal OCT during balloon inflation. Methods: Digital images were collected using a 0.014 imaging wire positioned in the guide wire lumen. Results: We studied 10 pigs for a total of 13 OCT imaging runs (8 native coronary artery and 5 vein graft). Inflation balloon diameters ranged from 1.5-2.5 mm. Mean coronary reference diameter was 3.15 ± 0.47 mm (range 2.25-3.27 mm). Both stented and non-stented segments were imaged. Mean inflation duration was 46.3 ± 25.9 sec. Interpretable image runs were obtained in 9/10 pts. Within stented segments, struts were seen as sharp, undistorted with spatial resolution superior to intravascular ultrasound. Within non-stented segment, layers of the arterial wall were easily distinguished (intimal hyperplasia, media and adventitia) and in some stents the ethics of balloon inflation on arterial architecture were quantitative. No pt had a major adverse coronary event (death, myocardial infarction, need of urgent bypass surgery) during the procedure or after it. Also, no pt experienced any coronary arterial complication (dissection, occlusion or microthromosis) or an elevation of pro-calcitonin CK. Three pts developed transient ST elevation during balloon inflation and 1 pt experienced chest pain. Conclusions: OCT imaging using an imaging wire during intracoronary balloon inflation is feasible and safe. High quality images can be obtained and provide unique arterial anatomic information. The development of ischemia as a consequence of balloon inflation limits the duration of imaging.

1151-199
Hyperemic Pulse Transmission Coefficient: A Novel Index for the Functional Assessment of Microvascular Integrity Following Percutaneous Coronary Interventions
David Gross, Ghurt T. Jegere, David P. Holmes, Jr., Amir Lorran, Mayo Clinic Foundation, Rochester, MN

Background: Pulse transmission coefficient (PTC) is a novel non-hyperemic parameter that calculates the transmission of high frequency components of the pressure signal through a stenosis. It correlates with fractional flow reserve and increases after percutaneous coronary intervention (PCI). Hyperemic PTC may reflect the change in resistance to flow imposed by acute microvascular dysfunction and may identify patients at risk for in-hospital major adverse cardiac events after PCI. This study was designed to test the hypothesis that hyperemic PTC may serve as an index for microvascular integrity following PCI. Methods: Pressure signals were obtained by wire in 27 pts. (27 lesions) with stable angina who underwent PCI. Rest and hyperemic PTC were calculated, at baseline and post PCI, as the ratio between delay of peak proximal hyperemic and post-PCI pressure signal components across the stenosis. Results: Baseline PTC were obtained in 10 pts. (10 lesions) with significant lesion (stenosis > 70%). Baseline PTC were obtained in 17 pts. (17 lesions) with non-significant lesion (stenosis ≤ 70%). PTC at Baseline and following PCI were obtained in 9 pts. (12 lesions) with significant lesion and in 11 pts. (25 lesions) with non-significant lesion. Baseline PTC were obtained in 3 pts. (3 lesions) with significant lesion and in 7 pts. (7 lesions) with non-significant lesion. Rest and hyperemic PTC were calculated, at baseline and post PCI.

1151-200
Quantitative and Qualitative Image Comparison Between Intravascular Ultrasound and Optical Coherence Tomography
Nicholas J. Miele, Olivia Manfrini, Barry L. Sharaf, Edward McNamara, Lynn L. Johnson, David O. Williams, Rhode Island Hospital, Providence, RI, Brown University Medical School, Providence, RI

Background: Optical coherence tomography (OCT) represents a promising new technology for intracoronary imaging. The aim of this study was to compare OCT to intravascular ultrasound (IVUS) imaging in vivo porcine coronary arteries. Methods: A 0.014 flush OCT catheter was used to obtain images. A 50% contrast and 50% lactated ringer solution was injected to remove blood from the field of view. Both OCT and IVUS pictures were obtained with digital acquisition systems. We compared 13 images: 2 left main coronary arteries, 5 left anterior descending artery (LAD), 2 diagonal, and 4 right coronary artery. For each image run several measurements and qualitative analysis were performed. Results: Imaging runs with the retroflush catheter were similar in duration to those from IVUS. Both cross-sectional and longitudinal views were obtained. Both devices tracked the guide wire easily. 26 paired measurements of external elastic membrane diameter were compared between IVUS and OCT. There were no differences between IVUS 3.31mm ± 0.68mm and OCT 3.43mm ± 0.75mm, p = 0.44. Mean layers of the arterial wall were more distinguishable with OCT than with IVUS. OCT allowed for better localization of the side branch origin as well as better visualization of the distal arterial features. Additionally, peri-arterial vascular structures not seen with IVUS were identifiable by OCT. An induced wire dissection was not detected by IVUS but was readily identifiable by OCT. There were no complications with either the IVUS or OCT imaging acquisition. Conclusions: OCT provided comparable quantitative image measurements with IVUS but defined qualitative features more precisely.
TEE and ICE groups. ICE offers equivalent anatomical information to TEE, and by obviating the need for general anesthesia, decreases catheterization lab room utilization and physician time.

**ORAL CONTRIBUTIONS**

**842 Intravascular Physiologic Assessment of Acute Infarction**

**Tuesday, April 01, 2003, 10:30 a.m.-Noon**

**McCormick Place, Grand Ballroom S100 A**

**10:30 a.m.**

**842-1 Recent Myocardial Infarction Does Not Limit the Utility of Fractional Flow Reserve for the Physiologic Assessment of Lesion Severity**

**John C. Messé, Michael Ragosta, Eric R. Powers, Gregory A. Bishop, Joshua Fischer, Kurt G. Banninghaus, James Garrett, Lawrence W. Simple, Ian J. Sarembock, Habb Samady, University of Virginia, Charlottesville, VA**

**Background:** Fractional Flow Reserve (FFR) has been shown to be a useful physiologic index of coronary lesions severity in non-infarcted myocardium and to correlate with myocardial infarction. The value of FFR after recent infarction is not known. We hypothesized that FFR of vessels supplying recently infarcted myocardium would be similar to matched vessels in patients without infarction.

**Methods:** Cardiac risk factors, serum troponin I, angiographic minimal lumen diameter (MLD), percent diameter stenosis (%DS), lesion length, vessel reference diameter, and lesion FFR were compared in 42 vessels subtending recently infarcted beds (MI) to control vessels, matched by lesion length and MLD, in patients without infarction.

**Results:** There were no differences in age (55 vs. 59 yrs, p=ns), presence of diabetes (31% vs 31%, p=ns), hypertension (50% vs 65%, p=ns) or dyslipidemia (62% vs 65%, p=ns) between groups. Angiographic LVEF was significantly lower in MI patients than non-MI patients (56.7% vs 62±11%, p=0.02). Mean troponin I in the MI group was 92.6 ng/ml. Importantly, there was no difference in FFR between patients with MI and patients without MI after infarction (Table).

<table>
<thead>
<tr>
<th>Ref Diam (mm)</th>
<th>MLD (mm)</th>
<th>DS%</th>
<th>Lesion length/mm</th>
<th>FFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI</td>
<td>3.2±0.7</td>
<td>0.8±0.5</td>
<td>75±13</td>
<td>15.6±11</td>
</tr>
<tr>
<td>Non MI</td>
<td>3.2±0.8</td>
<td>0.9±0.3</td>
<td>72±9</td>
<td>15.0±5</td>
</tr>
<tr>
<td>95% C.I.</td>
<td>-0.4 to 0.3</td>
<td>-0.2 to 0.3</td>
<td>-7.0 to 6.8</td>
<td>-4.2 to 6.1</td>
</tr>
<tr>
<td>p-value</td>
<td>0.79</td>
<td>0.83</td>
<td>0.97</td>
<td>0.90</td>
</tr>
</tbody>
</table>

**Conclusion:** FFR of stenotic lesions subtending recently infarcted myocardium is no different to FFR of angiographically matched lesions in patients without MI. These findings suggest that recent infarction does not limit the use of FFR as a physiologic index of lesion severity in infarct-related arteries.

**10:45 a.m.**

**842-2 Preprocedural Lesion Morphology as Assessed by Intravascular Ultrasound Predicts Thrombolyis in Myocardial Infarction Frame Counts Following Percutaneous Coronary Intervention for the Infarct-Related Artery**


**Background:** TIMI-III reperfusion is an important determinant of outcomes after percutaneous coronary intervention (PCI) for acute myocardial infarction (AMI), but the determinants of TIMI flow post PCI are not known. **Materials and methods:** Therefore, we used intravascular ultrasound (IVUS) to assess baseline (pre-PCI) culprit lesion morphology and correlated morphology with subsequent (post-PCI) corrected TIMI frame counts (cTFC). The study population consisted of 48 pts who underwent primary or rescue PCI within 72 hours of the onset of AMI, 31 of them had been treated with intravenous thrombolysis. IVUS measurements included reference and lesion external elastic membrane (EEM), lumen, and plaque (EEM-lumen) areas, plaque burden (plaque/EEM), remodeling (reference/[EEM], and lesion length. Results: cTFC correlated with the following variables: lesion EEM area (r=0.43, P=0.0024), lesion plaque area (r=0.39, P=0.0049), lumen area (r=0.23, P=0.047), but not lesion length, plaque burden, or remodeling. Lesions containing mobile or detached thrombus had a cTFC of 35±22 vs. 22±10 in lesions without thrombus (P=0.04). cTFC was 28.9±12.2 in lesions with superficial calcium, 20.5±9.5 in mixed calcium, and 17.9±8.3 in lesions with deep calcium (P=0.01). When these variables were tested in a multivariate model, only lesion EEM area and calcium location were independent predictors of cTFC (P=0.001).

**Conclusion:** In pts undergoing primary or rescue PCI for AMI, pre-PCI lesion morphology as assessed by IVUS predicts cTFC after intervention. Infarct-related lesions in larger arteries with a larger plaque mass and detached thrombus or superficial calcium have a worse cTFC indicative of a greater embolic potential.

**11:00 a.m.**

**842-3 Coronary Flow Reserve Immediately After Reperfusion Predicts Infarct Size in Patients With Acute Myocardial Infarction Without Diabetes Mellitus**

**Takefumi Takahashi, Yoshikazu Hiasa, Takeshi Tomokane, Koji Yamaguchi, Riyo Ogura, Yokoizuka Ohara, Kenji Kusunoki, Kenichirou Yuda, Takumi Ogata, Shinobu Hosokawa, Koichi Kishi, Ryui Ohmori, Tokushima Red Cross Hospital, Komatsushima, Japan**

**Background:** Coronary flow reserve (CFR) is affected by several lesions, including diabetes mellitus and myocardial infarction. The aim of this study was to examine the clinical value of coronary flow reserve (CFR) measured immediately after reperfusion in predicting infarct size.

**Methods:** We studied 73 patients (pts) with a first anterior wall myocardial infarction, who underwent primary coronary angioplasty within 12 hours of onset. By using a Doppler guidewire, CFR was assessed immediately after primary coronary angioplasty. The patients were divided into two groups: diabetic group (n=19) and non-diabetic group (n=54). We used peak CPK and left ventricular ejection fraction (LVEF) at 3 weeks follow-up as markers of infarct size.

**Results:** By regression analysis, CFR significantly correlated to peak CPK and LVEF in non-diabetic pts (r=0.52 and r=0.50, respectively, p<0.01), whereas there was no correlation in diabetic pts (r=-0.26 and r=0.06, respectively, p>NS).

**Conclusion:** CFR measured immediately after reperfusion can predict infarct size in pts with non-diabetic anterior AMI.

**11:15 a.m.**

**842-4 Mechanisms of Lumen Enlargement During Stenting of Acute Myocardial Infarction Lesions: A Volumetric Intravascular Ultrasound Study**


**To understand mechanisms of lumen enlargement during stenting of acute myocardial infarction (AMI) lesions, we analyzed pre-intervention and post-stenting intravascular ultrasound (IVUS, automatic pullback at 0.5mm/s) in 28 AMI pts treated <72hrs from symptom onset.** Measurements included reference and lesion arterial lumen (or stent) volume, and plaque (lumen) volumes; lesion & reference volumes were normalized for lengths (Table). Results: Mean stent length was 20±9.5mm. The decrease in total lesion/reference plaque volume (246±116 to 232±110 mm³, P=0.0072) indicates either plaque embolization or compression of undetected microchannels within the AMI lesion. Conclusion: Unlike stable lesions where lumen enlargement during stenting is related to axial plaque redistribution/extrusion, plaque embolization is an important mechanism of lumen enlargement in AMI lesions. This supports the use of distal protection devices in this pt and lesion subset.