

# Regional Artery Specific Thresholds of Quantitative Myocardial Perfusion by PET Associated With Reduced MI and Death After Revascularization in Stable CAD



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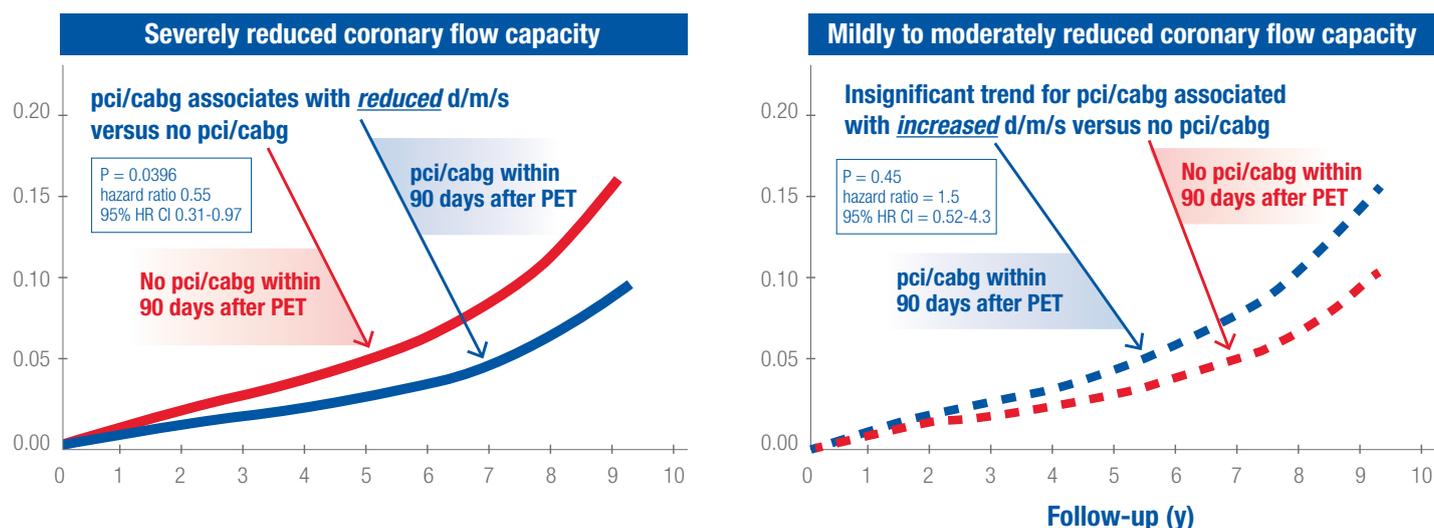
## OBJECTIVE:

Randomized coronary revascularization trials have shown no reduced myocardial infarction (MI) or mortality in stable CAD. The purpose of this article is to analyze the artery-specific threshold of quantitative myocardial perfusion severity associated with reduced death, myocardial infarction or stroke with and without revascularization in stable CAD.

## STUDY DESIGN AND METHODOLOGY:

- The Weatherhead PET Center for Preventing and Reversing Atherosclerosis, McGovern Medical School, University of Texas Health Science Center at Houston carried out a total of 3,774 routine diagnostic rest-stress, quantitative, myocardial perfusion PET studies.
- Absolute myocardial perfusion in cc/min/g was quantified using validated HeartSee™ software.
- Clinical follow-up was obtained for all-cause death, myocardial infarction, stroke, first or repeat percutaneous intervention (PCI) or coronary artery bypass grafting (CABG) as approved by the Committee for Protection of Human Services monthly.

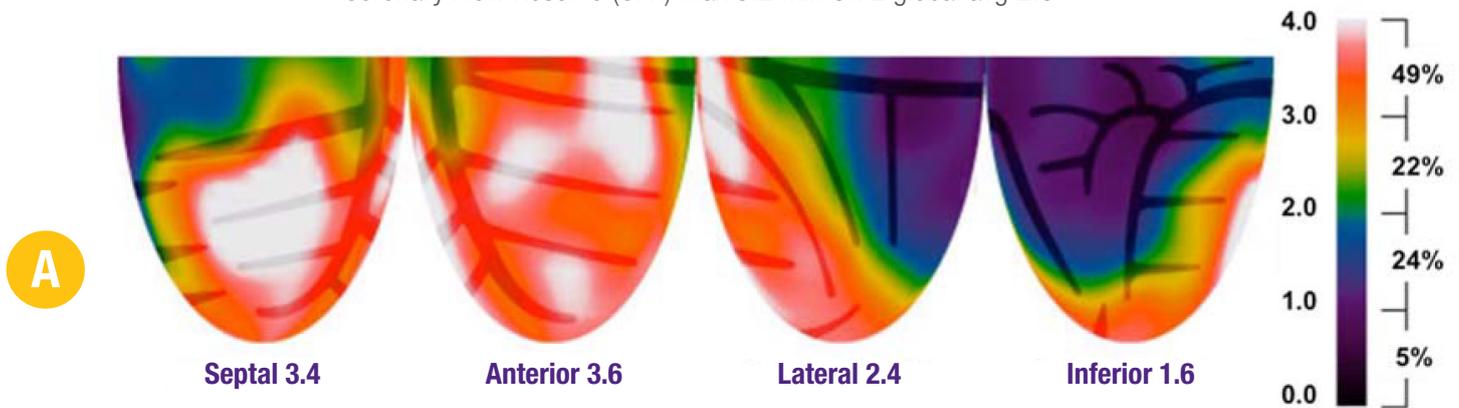
### Cumulative Hazard of Death, MI and Stroke (d/m/s) Associated with Revascularization by PCI or CABG



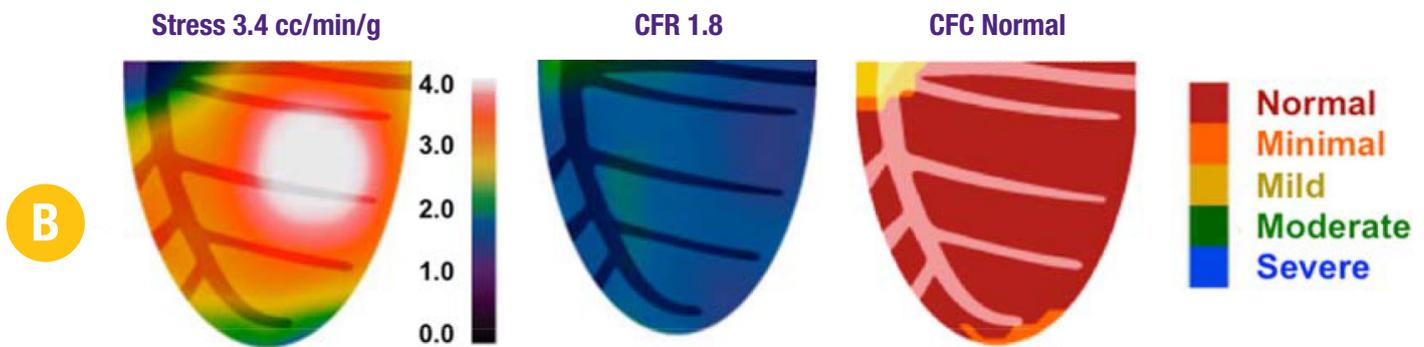
**Figure 4.** Hazard ratios of death/MI/stroke (d/m/s) associated with revascularization (pci/cabg) within 90 days after PET (solid blue line) versus no revascularization within 90 days after PET (solid red line) ( $P = 0.0396$ ). For less severe CFC abnormalities consisting of mild or moderate CFC impairment, death/MI/stroke were insignificantly higher or worse in the revascularization (blue dashed line) versus no-revascularization groups within 90 days after PET (red dashed line) ( $P = 0.45$ ). d/m/s = death, myocardial infarction or stroke. PCI = percutaneous intervention. CABG = bypass surgery).

**Figure 5.** Global perfusion measurements fail to account for severe regional perfusion abnormalities or for resting perfusion heterogeneity with corresponding heterogeneity of CFR.

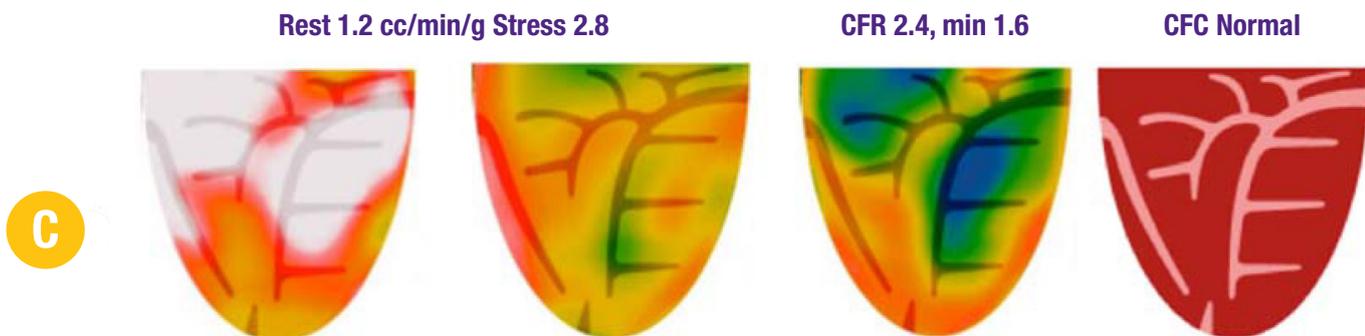
Coronary Flow Reserve (CFR) max 5.2 min 0.72 global avg 2.8



(A) Adequate global CFR of 2.8 that fails to account for severe regionally reduced CFR due to high CFR in the rest of the LV. Despite adequate global CFR, severely reduced regional CFR associates with high risk of MACE.



(B) Single anterior views of high stress perfusion in cc/min/g with low CFR of 1.8 due to high resting perfusion that is accounted for by the normal CFC map associated with low CV risk.



(C) Single inferior views of heterogeneous high resting and high stress perfusion causing apparent severe regional low CFR alone that is accounted for by the low risk normal CFC map.

## CONCLUSIONS:

- With revascularization within 90 days following PET study, risk of death, myocardial infarction and stroke was significantly reduced by 54% in patients with regional, artery-specific, severely reduced coronary flow capacity, compared to moderate or mild CFC, CFR, other PET metrics or medical treatment alone.
  - This association is not seen for mild to moderate perfusion abnormalities or medical treatment alone.
- For 3,774 sequential rest-stress PET studies, regional, artery-specific, severely reduced coronary flow capacity (CFC) associated with a 60% increased hazard ratio for major adverse cardiovascular events (MACE) and 30% increased hazard of death, myocardial infarction or stroke.

## INDICATIONS FOR USE

HeartSee™ Software for cardiac positron emission tomography (PET) is indicated for determining regional and global absolute rest and stress myocardial perfusion in cc/min/g, Coronary Flow Reserve and their combination into the Coronary Flow Capacity (CFC) Map in patients with suspected or known coronary artery disease (CAD) in order to assist clinical interpretation of PET perfusion images by quantification of their severity.

HeartSee™ is intended for use by trained professionals such as nuclear technicians, nuclear medicine or nuclear cardiology physicians, or cardiologists with appropriate training and certification. The clinician remains ultimately responsible for the final assessment and diagnosis based on standard practices, clinical judgment and interpretation of PET images or quantitative data.

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