

**Harvard Medical School Department of
Continuing Education and the Cardiovascular
Division of the Department of Medicine,
Brigham and Women's Hospital**



Cardiology Rounds
June/July 2004

**Intracoronary Vascular Profiling of Shear Stress, Lumen, and Wall Morphology
to Predict Vascular Behavior and Atherosclerosis Progression
Part 2: Clinical Implications**

By Peter H. Stone, M.D., and Charles L. Feldman, Sc.D.

Objectives:

In this two-part presentation of *Cardiology Rounds*, the authors discuss the role of intracoronary endothelial shear stress – ie, the rubbing force exerted by blood flow on the endothelial monolayer that lines the coronary arteries – in the development and progression of coronary artery disease. Part 1 of this topic reviewed the role of coronary endothelium as the modulator of CAD pathogenesis and the molecular biology underlying the adverse effects of low intracoronary shear stress. In Part 2, readers will gain an understanding of:

- how shear stress influences atherogenesis and coronary artery remodeling
- vascular profiling methodology that now allows for routine in-vivo measurements of intracoronary hemodynamics and intracoronary shear stress, and arterial wall morphology in man
- the results of the authors' pilot study of serial investigations of minimally-diseased coronary arteries in patients, studied 6 months apart; in this study, areas of plaque progression and arterial remodeling at the follow-up study were predicted based on the intracoronary hemodynamics present at the index study
- how application of this methodology may allow early identification of portions of the coronary arteries that are destined to become high risk for causing a clinical events; early identification of high risk coronary lesions may lead to pre-emptive therapeutic strategies.

Test:

1. Today, most minor stenoses detected during angiography are stented because they might evolve into vulnerable plaques:

True False

2. Two planes of coronary angiography are necessary to reconstruct the coronary artery lumen and external elastic membrane (EEM) in anatomically correct 3D space.

True False

3. Blood viscosity, required to determine shear stress, depends primarily on hematocrit.
True False
4. Coronary blood flow, blood viscosity, and lumen diameter are necessary and sufficient to determine shear stress at each point within a coronary artery.
True False
5. Within 6 months, minimally diseased coronary arteries exposed to low shear stress show increased plaque volume and increased EEM diameter.
True False
6. Within 6 months, minimally diseased coronary arteries exposed to high shear stress show outward remodeling without increased plaque volume.
True False
7. Within 6 months, restenosis of coronary arteries stented with bare metal stents strongly depends on shear stress within the stent.
True False

To receive AMA category 1 credit, you must correctly answer 60% of the test questions.

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