

1076-141 Neovascularization of Adventitial Vasa Vasorum in Experimental Hypercholesterolemic Coronary Arteries: Visualization by a Microscopic Three-Dimensional Computerized Tomography

Hyuck Moon Kwon, Giuseppe Sangiorgi, Erik L. Ritman, Charles McKenna, David R. Holmes Jr., Robert S. Schwartz, Amir Lerman. *Mayo Clinic, Rochester, MN, USA*

Advanced atherosclerosis is associated with an increased number of vasa vasorum (vv), both in the adventitia and in the plaque itself. However, the three dimensional anatomy of these vessels in early coronary atherosclerosis is unknown. The purpose of this study was to visualize and quantitate the spatial patterns of vv in normal and experimental hypercholesterolemic porcine coronary arteries, using a microscopic computed tomography (micro-CT).

Methods and Results: Animals were euthanized after being fed either a high cholesterol diet (n = 4) or a control diet (n = 4) for 12 weeks. The coronary arteries were injected with a low viscosity, radiopaque liquid polymer compound and the proximal LAD coronary artery was scanned and reconstructed. Two different types of vv were defined anatomically: first-order vv originated from the branching point of the coronary artery and ran longitudinally parallel to the vessel. Second-order vv originated from first-order vasa to form arches circumferentially around the vessel wall. Experimental hypercholesterolemic arteries showed thickened coronary vessel wall (vessel wall area: $8.07 \pm 0.48 \text{ mm}^2$ vs $3.86 \pm 0.22 \text{ mm}^2$). In hypercholesterolemic coronary arteries, disorientation of the normal spatial pattern of vv was associated with an increase in vv density compared with control ($4.73 \pm 0.24 \text{ mm}^2$ vs. $1.84 \pm 0.05 / \text{mm}^2$, $p = 0.0001$, respectively). This occurred especially by an increase of second-order vv.

Conclusion: This study suggests that adventitial neovascularization of vasa vasorum occurs in experimental hypercholesterolemic coronary arteries. These changes may play a role in the adaptive process of the vessel wall in early atherosclerosis.

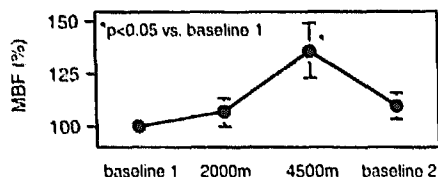
1076-142 Influence of High Altitudes on Myocardial Perfusion

Ph. Kaufmann^{1,2}, C. Schirio³, A. Buck², V. Pavlicek³, T. Berthold², C. Burger², E.A. Koller², G.K. von Schulthess². ¹Cardiology and ²Nuclear Medicine, University Hospital Zurich and ³Institute of Physiology, University of Zurich, Switzerland

Background: In our country it is current clinical practice to advise patients with known coronary artery disease not to exceed a high altitude exposure of 2000m above sea level although there are no data on myocardial blood flow (MBF) in high altitude.

Methods: The influence of acute exposure to high altitudes on MBF was evaluated in 8 healthy young volunteers (mean age 26 ± 3 years). MBF was measured by PET using O¹⁵-labelled water at baseline (Zurich, 450 m) as well as during acute hypoxic hypoxemia induced by inhalation of a gas mixture corresponding to an altitude of 2000 m and 4500 m (during 20 minutes) respectively.

Results: After correcting for the rate pressure product MBF remained unchanged at 2000m (+ 8% ns) but increased at 4500 m (+ 36%, $p < 0.05$) (figure).



Conclusions: Acute exposure to an altitude of 2000 m (corresponding to the cabin pressure in most airlines during the flight) induces no changes in MBF at rest, explaining why these conditions are clinically well tolerated even by patients with reduced flow reserve such as in CAD. However, at altitudes of 4500 m MBF increases by 36% even at rest. Thus, patients with impaired flow reserve should be warned from any exposure to excessive altitudes.

1077 Nuclear Cardiology: Practical Aspects

Monday, March 30, 1998, 3:00 p.m.-5:00 p.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 3:00 p.m.-4:00 p.m.

1077-143 Is Gated Blood Pool Imaging With Exercise Necessary Before Bone Marrow Transplantation?

L.B. Craft, D.A. Sandler, J.A. Diamond, J. Machac, M. Zangari, J. Platnick, S.M. Fruchtman, M.J. Hanzlova. *Mount Sinai Medical Center, New York, NY, USA*

Gated blood pool studies with exercise (BBPex) are often performed before conditioning chemotherapy for bone marrow (or stem cell) transplantation (Tx). We evaluated the role of BBPex as a predictor of early post Tx mortality. Of 163 pts (60 M/103 F, 43 ± 11 yrs), 105 underwent autologous and 58 allogeneic Tx. Thirty five pts died ≤ 3 months after Tx (Group I), 128 remained alive for > 3 months (Group II). No death was due to congestive heart failure. We subdivided Groups I and II pts according to resting EF (left ventricular ejection fraction, normal = $\geq 50\%$) and Δ EF (exercise EF-rest EF, normal = $\geq 5\%$).

	Group I n (%)	Group II n
nl EF, nl Δ EF	12 (16)	64
nl EF, low Δ EF	5 (19)	21
low EF, nl Δ EF	8 (19)	35
low EF, low Δ EF	10 (56)	8

Early mortality was highest (56%) in pts with low resting EF and low Δ EF. Pts with preserved cardiac contractile reserve (normal Δ EF), had lower (16% and 19%, resp.) mortality ($p < 0.01$).

Thus, BBPex as a predictor of early mortality after Tx appears useful only in pts with low resting EF. Normal Δ EF may be used as a predictor of improved early outcome in pts with low resting EF, who would otherwise be excluded from this form of therapy.

1077-144 Does the Choice Between Tc-99m Tetrofosmin and Tc-99m Sestamibi Influence Exercise-Induced Myocardial Perfusion Defect Size and Reversibility?

M. Ferraro-Borgida, A.W. Ahlberg, M.G. Levine, M.R. Mansoor, C.C. McGill, G.M. Cyr, J.M. Phillips, D.A. Clapp, D. Waters, G.V. Heller. *Hartford Hospital, University of Connecticut, Hartford, CT, USA*

Differences in tracer kinetics between Tc-99m tetrofosmin (TETRO) and Tc-99m sestamibi (MIBI) may result in smaller defects on exercise SPECT imaging with TETRO. To address this issue, we performed rest and standard Bruce protocol exercise with SPECT myocardial perfusion imaging with both TETRO and MIBI on two separate visits in 19 men with known coronary disease. Each imaging agent was injected at peak exercise (25-30 mCi) and images were obtained 30-60 minutes later. Stress images were compared with rest myocardial perfusion images obtained on the same or on a separate day. All images were read by consensus of three readers without knowledge of patient identity or imaging agent using a 17 segment scoring system (0 = normal, 4 = absent photon counts). The stress, rest, and reversibility scores were summed from all segments.

Results: Summed stress, rest, and reversibility scores were slightly but not significantly lower, and % age-predicted maximal heart rate slightly higher with TETRO.

	Stress Score	Rest Score	Reversibility Score	%MPHR
MIBI	8.6 ± 4.1	2.1 ± 3.1	6.5 ± 3.7	90 ± 12
TETRO	8.3 ± 4.3	2.0 ± 3.0	6.2 ± 4.0	94 ± 14
p	NS	NS	NS	0.02

Conclusion: Despite differences in tracer kinetics, Tc-99m sestamibi and Tc-99m tetrofosmin are comparable myocardial perfusion imaging agents when used with exercise.

1077-145 Effect of Body Mass Index on Side Effects During Adenosine Stress Testing

D. Berman, A. Iskandrian, M. Verani, D. Johnston, J. Parry, J. Quinn, M. Dixon, C. Orlandi. *Cedars-Sinai Medical Center, L.A., CA, USA*

Background: The calculations to determine the total dose of adenosine to be administered during pharmacologic stress imaging (PSI) are based on