## 1191 Determinants of Vasoreactivity

Wednesday, April 1, 1998, Noon–2:00 p.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: Noon–1:00 p.m.

### 1191-1 Comparative Effect of Continuos Combined Hormonn Replacement Therapy Regimens on Brachial Artery Blood Flow

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Estrogen replacement therapy in postmenopausal women improves endothelium-dependent flow-mediated dilatation. In hormone replacement schemes progestins are required in order to reduce the likelihood of uterine malignancies. However, little is shown on the cardiovascular effect of progestins. The purpose of the study was to evaluate endothelium-dependent, flow-mediated dilatation in the brachial artery in 12 menopausal women (mean age 55 ± 2 years) who entered a double blind, cross-over study evaluating the effect of therapy with either conjugated equine estrogens (CEE) (0.625 md o.d.) and medroxyprogesterone acetate (MPA) (2.5 mg o.d.) or estradiol 17 $\beta$ (E2) (2 mg o.d.) and norethisterone acetate (NETA) (1 mg o.d.) administered in a random order. Forearm vascular reactivity and blood pressure were evaluated at baseline and at the end of each period. Compared to baseline, CEE-MPA caused a mild reduction of systolic blood pressure (126 ± 12 vs 132 ± 10 mmHg) while E2-NETA increased systolic blood pressure values (138 ± 14 mmHg, $p < 0.01$ comared to CEE-MPA). Compared to baseline, brachial artery flow-mediated dilatation was increased by CEE-MPA by 12% while it was reduced by E2-NETA by 20% ($p < 0.01$). Brachial artery resistances were reduced by 15% by CEE-MPA while E2-NETA caused a 16% increase ($p < 0.01$). An increase in nitroglicerine-induced brachial artery blood flow was observed after both treatment regimens, but was more pronounced after CEE-MPA (8% vs 2%; $p < 0.01$). These data show that different estrogen-progestin treatments have different effects upon blood pressure and vascular reactivity. Compared to low-dose MPA, adding NETA to estrogens increases in peripheral vascular resistances.

### 1191-2 A Non-invasive Test of Vascular Function Using Radial Artery Occlusion and Plethysmography

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*Background:* The available provocative tests of vascular function are invasive, time-consuming and costly.

*Methods:* We have applied the simple and non-invasive technique of plethysmography to assess the forearm blood flow (FBF) response to hand ischaemia in healthy individuals and in patients with coronary heart disease (CHD). Eleven healthy individuals [age 51.0 ± 3.6 years (mean ± SEM)] and 12 patients with angiographically proven CHD underwent measurement of FBF (mercury-in-silastic strain gauge plethysmograph, venous occlusion technique) before and after a 2-min period of hand ischaemia, elicited by suprasystolic inflation of a cuff at the wrist.

*Results:* In healthy subjects, FBF increased by 80 ± 15% above baseline immediately following a 2 min period of hand ischaemia, and remained significantly above baseline up at 30 sees post-deflation of the wrist cuff (52 ± 13%, $p < 0.001$, repeated measures ANOVA). In patients with coronary heart disease, FBF increased by 46 ± 14% above baseline immediately following cuff deflation ($P < 0.001$) and returned to baseline values at 20 sees. At all time points following deflation of the wrist cuff, FBF, expressed as change from baseline, was lower in patients with CHD than in controls (immediate, 10, 20 and 30 secs $p < 0.001$).

*Conclusions:* Venous occlusion plethysmography can detect FBF responses to a 2-min period of hand ischemia in healthy individuals. This vascular response is markedly impaired and short-lived in patients with CHD. Further studies are needed to assess the value of this simple procedure in the assessment of endothelium-dependent vascular function.

### 1191-3 Acetylcholine-Induced Release of Nitric Oxide Is Impaired in Patients With Coronary Risk Factors

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Dysfunction of coronary endothelia has been documented in patients with coronary risk factors. Acetylcholine (Ach) causes endothelium-dependent vasodilation presumably through release of nitric oxide (NO), an endogenous vasodilator. This study aimed to test if Ach-induced release of NO is impaired in patients with coronary risk factors. Twenty-four patients with chest pain at rest were subjected to the Ach provocative test. Their coronary artenes were angiographically normal. Twenty-five $\mu$g of Ach was injected into a left coronary artery. Blood was sampled in great cardiac vein immediately before and 40 sec after Ach injection. Nitric oxide metabolites ($NO_x$) were measured by Griess method. The patients were divided into 2 groups, the risky group ($n = 18$) characterized by at least one of the 4 coronary risk factors including smoking, hypertension, diabetes mellitus, and hypercholestrolemia; and the normal group ($n = 10$) who did not have any risk factors. After Ach injection, $NO_x$ level increased by 18.5 ± 9.6% in the normal group. In the risky group, Ach caused subtle change of $NO_x$ (−1.5 ± 4.0%, $P < 0.05$ vs the normal group). These results indicate that Ach-induced release of NO is impaired in patients with coronary risk factors.

### 1191-4 Assessment of Arterial Compliance by Carotid Midwall Strain-Stress Relations in Normotensive Adults

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*Background:* Recent studies indicate that left ventricular (LV) midwall as opposed to endocardial mechanics better define LV function in individuals with abnormal LV geometry.

*Methods:* To develop methods to assess arterial midwall mechanics, we performed carotid ultrasonography and applanation tonometry in 82 normotensive adults. Carotid midwall strain and end-diastolic (EDS) and peak-systolic (PSS) circumferential midwall stress were derived by a cylindrical model. Regression equations relating carotid luminal and midwall strain to the carotid stress delta (PSS-EDS) were used to obtain predicted values of strain for observed stress delta. Observed/predicted carotid strain ratios were calculated (stress-corrected carotid luminal and midwall strain).

*Results:* Carotid midwall and luminal strain were similar in men and women; both fell with advancing age and greater body mass index. Midwall strain was positively related to the stress delta ($r = 0.44$, $p < 0.001$) more closely than was luminal strain ($r = 0.34$). Carotid luminal strain was independently related to the stress delta ($\beta = 0.35$, $p = 0.001$), smaller carotid diastolic diameter ($\beta = -0.46$, $p < 0.001$) and younger age ($\beta = 0.20$, $p = 0.04$). Carotid midwall strain was related to higher stress deltas ($\beta = 0.44$, $p < 0.001$), and lower carotid diastolic diameter ($\beta = 0.33$, $p < 0.001$) and age ($\beta = 0.40$, $p = 0.001$). Stress-corrected midwall strain was strongly related to arterial stiffness ($\beta$) ($r = 0.66$, $p < 0.001$).

*Conclusion:* Stress-corrected carotid midwall strain may be a useful measure of arterial compliance.

### 1191-5 Effect of Mental Stress and Nitroglycerin on Vascular Compliance in Human Volunteers

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*Background:* The effect of mental stress on vascular compliance (VC) has not been examined in a systematic fashion. Nitroglycerin (NTG) increases VC. We evaluated the effect of mental stress and NTG on VC, as measured by oscillometry from arm arterial pressure and vascular volume and normalized for arm volume.

*Mental Stress Evaluation:* We measured systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate (HR), and VC at control and following simulated public speaking in ten volunteers. Mental stress was confirmed by significant increase in SBP following speech (118 vs. 124 bpm, $p < 0.05$). VC at 100 mm Hg significantly decreased following mental stress (10.3%, $p < 0.05$).

*NTG Evaluation:* HR, SBP, DBP and VC were measured in 21 volunteers five times at baseline and five times 5 minutes following IV administration of 100 mcg NTG. Compliance, measured at 0 mm Hg, MAP, and 100 mm Hg, decreased with increasing pressure. Significant changes in SBP (121 vs. 124 mm Hg), DBP (59 vs. 62 mm Hg), and HR (77 vs. 80 bpm) were not observed. VC at 100 mm Hg increased significantly following NTG (11.6%, $p < 0.05$).

*Conclusion:* Mental stress, in the form of simulated public speaking, produces a significant decrease in vascular compliance. A 100 mcg IV dose of NTG was demonstrated to be sufficient to significantly increase vascular compliance.