	Before	After	p
ETT Time (sec)	497 ± 118	648 ± 144	<0.001
Peak VO_2 (ml/mg/min)	23.8 ± 6.93	31.6 ± 6.04	<0.001
HR at matched workrate (bpm)	118 ± 25	102 ± 17	0.012
Average WBV (cP)	5.20 ± 0.58	5.46 ± 1.00	NS
Plasma viscosity (cP)	1.41 ± 0.10	1.46 ± 0.09	NS
Hematocrit (%)	39.7 ± 2.50	41.0 ± 3.50	NS
Fibrinogen (mg/dl)	307 ± 55.4	322 ± 89.5	NS
Sedimentation rate (mm/hr)	26 ± 15	24 ± 14	NS

The standard ten week cardiac rehabilitation program of moderate intensity dynamic exercise leads to a highly significant improvement in exercise tolerance, but does not have a beneficial effect on blood viscosity in patients with ischemic heart disease.

978-65 Exercise Forearm Vascular Responses in Patients Studied 7 Days After Myocardial Infarction

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Background: We have reported that exercise hypotension in patients with ischaemic heart disease may be due to abnormal vasodilation. Whilst exercise hypotension is not common in post infarction patients, we hypothesised that forearm vascular responses may commonly be abnormal. We assessed the frequency of abnormal forearm vascular responses in an unselected group of patients studied 7 days post myocardial infarction and the association with exercise blood pressure (BP) responses and with baroreceptor gain.

Method: Forty consecutive consenting patients (36 male 4 female age 33–74 mean 56.2 years) were studied 7 days post myocardial infarction and were compared with 20 healthy controls (14 male 6 female age 44–69 mean 56.2 years). All subjects underwent assessment of changes in forearm vascular resistance (FVR) by venous occlusion plethysmography during semi erect exercise, BP recordings during erect treadmill exercise, and baroreceptor gain assessed by the change in RR interval per unit change in blood pressure induced by phenylephrine (standard phenylephrine ramp method).

Results (expressed as mean ± SD): FVR increased during exercise by 41 ± 67% in patients versus 124 ± 110% in controls ($p = 0.001$), and fell in 12 patients. Using an increase of 15% (one standard deviation below the mean for the controls) as the cut off for normality, 15 patients exhibited abnormal exercise vascular responses. Exercise hypotension was demonstrated in 4 patients all of whom had abnormal forearm vascular responses. Baroreceptor gain was lower in patients with abnormal forearm vascular responses than those with normal forearm vascular responses (24 ± 62. msec/mmHg vs 73 ± 67 msec/mmHg, $p = 0.04$).

Conclusions: Impaired forearm vasoconstriction or vasodilation during leg exercise is common in patients studied 7 days post MI, even in patients without exercise hypotension and is associated with low baroreceptor gain. Exercise hypotension may only result in patients with abnormal forearm vascular responses, if they are unable to augment cardiac output. The absence of exercise hypotension in the majority of these patients implies a vigorous cardiac output response.

978-66 Prolonged Bed Rest Impairs Response of the Small Arteries to Cold Pressor Test

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Although most of the effects of prolonged bed rest on cardiovascular system is considered to be mediated by autonomic nervous system, there has been no evidence of change in α adrenergic activity. Cold pressor test has been known to increase vascular resistance through α adrenergic stimulation. To assess if change in α adrenergic activity occurs after prolonged bed rest, blood flow velocity of the proper palmar digital artery of the index finger (resistance vessel) was measured during 90 seconds of cold pressor test by pulsed Doppler ultrasound using a 7.5 MHz linear transducer in 10 healthy volunteers before and after 20 days of strict horizontal bed rest. Lower body negative pressure (LBNP) test was performed to measure LBNP tolerance time as an indicator of orthostatic tolerance.

Flow velocity decreased during the first 45 seconds of cold pressor test both before and after bed rest, and decreases in peak flow velocity were more prominent ($p < 0.05$) before bed rest (−68 ± 25%) than after bed rest (−48 ± 20%). After 20 days bed rest, LBNP tolerance time shortened ($p < 0.02$) from 19.5 ± 5.6 min to 10.8 ± 5.0 min in all but one subject who demonstrated prominent decrease in peak flow velocity during the first 45 seconds of cold pressor test. During the latter 45 seconds of cold pressor test, recovery of peak flow velocity was found in 7 subjects before bed rest, but in only 2 subjects after 20 days bed rest ($p < 0.05$).

In conclusion, 20 days bed rest impairs response of the small digital arteries to cold pressor test, which suggests that α adrenergic response diminishes after prolonged bed rest.

978-67 Can Post-Stenotic Coronary Blood Flow be Increased by Exercise?

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The ability of post-stenotic coronary blood flow to increase at exercise is one of the major determinants of the severity of coronary artery stenosis. Few studies have been performed on the changes induced by physical exercise on coronary blood flow using invasive methods. To assess the response of the coronary circulation to exercise distal to stenosis, coronary blood flow was measured at rest and during a supine bicycle exercise. Exercise was started at a workload of 30 W with a resistance increased in 30 W increments every 3 min to a maximum of 90 W. Coronary blood flow was derived from blood flow velocity measurements using a 15 MHz Doppler-tipped 0.014 inch guidewire and cross sectional area (CSA) measured at the site of the Doppler sensor using quantitative coronary angiography (QCA) according to the formula: CBF (ml/min) = APV/2 (cm/sec) × CSA (mm^2) × 0.6 where APV is the time-average peak velocity and 0.6 the conversion factor for mm^2/cm^2 and min/sec. The measurements were performed distal to a 78 ± 14 percent diameter stenosis in 25 patients aged 57 ± 9 years submitted to PTCA. The site of stenosis was the left anterior descending ($n = 15$) or the left circumflex ($n = 10$) coronary artery. No complication occurred during the procedure.

Results:

	Rest	Exercise
Heart Rate (bpm)	72 ± 12	98 ± 13*
Mean arterial pressure (mmHg)	82 ± 12	103 ± 17*
APV	19 ± 9	28 ± 15*
CSA	3.1 ± 2.0	3.6 ± 2.4
CBF	18 ± 6	31 ± 11*

*p < 0.01 vs rest

Conclusions: 1. Assessment of coronary blood flow at exercise is feasible and safe during PTCA; 2. Exercise is able to significantly increase the post-stenotic coronary blood flow; 3. Further studies are required to determine whether this increase is sufficient for adequate blood supply to the myocardium.

978-118 Exercise Capacity and Coronary Flow Reserve in Patients with Intermediate Coronary Stenoses

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In patients with coronary disease, exercise time is a predictor of disease severity. More severe disease is associated with shorter exercise time due to greater ischemia. In patients with intermediate coronary stenoses, however, it is unclear whether stenosis severity predicts functional effects. Thus, we examined the relationship between exercise time and the angiographic and physiologic significance of 25 intermediate coronary stenoses (40–70%). Using an intracoronary Doppler flow wire we measured coronary flow reserve (CFR) as the ratio of adenosine-induced hyperemic coronary flow velocity to resting velocity. Stenosis severity was determined by quantitative angiography. Patients subsequently underwent maximal exercise testing on a Bruce protocol. No patient had left ventricular dysfunction, ischemia in other vascular distributions or other diseases known to limit exercise capacity. Exercise time was normalized for age and gender according to the method of Bruce. Total exercise time ranged from 3.9 to 12.8 min while normalized time ranged from 37 to 152% of predicted. CFR ranged from 1.0 to 3.5 (normal ≥2.0) and was directly related to exercise time ($r = 0.7$, $p < 0.0001$, SEE = 2.1) and normalized exercise time ($r = 0.7$ $p < 0.0001$, SEE = 25). Normalized exercise time was 72 ± 21% of predicted in patients with an abnormal CFR vs 125 ± 23% of predicted in those with normal CFR ($p < 0.0001$). There was no relationship between angiographic percent stenosis and exercise time ($r = -0.01$) or normalized exercise time ($r = -0.01$). Normalized exercise time was ≥100% of predicted in 9 of 11 patients with a normal CFR, and <100% in 13 of 14 patients with abnormal CFR. The sensitivity, specificity and predictive accuracy of normalized exercise time for CFR were 93%, 82% and 88%, respectively. Thus, in patients with intermediate coronary stenoses and no other exercise limitations, treadmill exercise time is a useful marker of the physiologic severity of disease.

TUESDAY PM