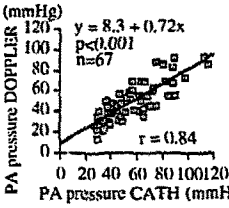
5:15

728-6 Contrast-Enhanced Stress-Doppler for Quantification of Pulmonary Artery Pressure During Exercise in Patients With Chronic Congestive Heart Failure

Helmut F. Kuecherer, Markus Will, Kleber G. da Silva, Matthias Borst, Ruth H. Strasser. *University of Heidelberg, Germany*

Pulmonary artery (PA) pressure response to exercise indicates functional impairment and carries prognostic information in patients with chronic congestive heart failure. To determine whether Doppler echocardiography can be used to non-invasively estimate PA pressure during exercise, we obtained contrast-enhanced spectral tracings of tricuspid regurgitant flow velocities in 19 patients (4 f, 15 m, age 54 ± 11 years) with chronic congestive heart failure (angiographic ejection fraction 27 ± 7%) during supine bicycle exercise and simultaneous invasive PA pressure measurements. Signal enhancement using a right heart contrast agent increased diagnostic yield from 16% to 84% at rest and from 0% to 84% at peak exercise. Estimated PA pressures correlated well with invasively measured PA pressures both at rest ($r = 0.82$, $p < 0.001$) and at peak exercise ($r = 0.86$, $p < 0.001$). Overall correlation including all stages was similar ($r = 0.84$, $p < 0.001$). Mean difference between measured and estimated pressures was 7.3 ± 12 mmHg, indicating good agreement between the methods.



Conclusion: Contrast-enhanced stress-Doppler accurately estimates pulmonary artery pressure response to exercise, thus serving as a non-invasive approach to the assessment of functional status in patients with chronic congestive heart failure.

729 Exercise Physiology and Testing I

Monday, March 25, 1996, 4:00 p.m.–5:30 p.m.
Orange County Convention Center, Room 414B

4:00

729-1 The Acute Rise in Serum Fibrinogen Concentration With Severe Exercise is Influenced by the Fibrinogen Gene G-143-A Polymorphism

Hugh Montgomery, Peter Clarkson, Don Nwose, Ferdaous Arca-Sedda, Mick Jubb [1], Michael World [1], John Deanfield, Jean McEwan, Stephen Humphries. [1] *UCL and Royal Free Hospitals, RAMC Millbank, London, UK*

Fibrinogen levels correlate with risk of cardiovascular disease. Regular exercise training reduces cardiovascular risk. Some of this benefit is lost if the training is very intense, and severe exercise raises immediate coronary risk. Could these effects of exercise on cardiovascular risk be partly mediated by changes in fibrinogen concentration? We have studied the effects of chronic physical training and acute intensive exercise on serum fibrinogen levels [F] and the influence of the beta-fibrinogen G-453-A polymorphism on these responses. *Method:* [F] and G/A polymorphism genotype were determined in 154 male British Army recruits at the start of a 10 week basic fitness training program. Cohorts were restudied between 0.5 and 5 days after a major 2 day strenuous military exercise (ME) undertaken in their final week of training. *Results:* Compared to baseline values, [F] was significantly lower (11.9%, $p = 0.04$) at day 5 after ME, consistent with beneficial effect of training. [F] rose on days 1–3 after ME, and were maximal on days 2 and 3 (27.2%, $p < 0.001$: 37.1%, $p < 0.001$ respectively). Men with ≥ A allele had [F] slightly higher at baseline (4.5%: $p = 0.11$). During this 'acute phase response', the degree of rise was 26.9 ± 5.6% for the 33 men with the genotype GG, but significantly higher for the 11 with one or more A allele (53.0 ± 13.7%: $p = 0.04$). On the day of peak rise, [F] was 31% higher in the GG group and 105% higher in those of AA genotype. *Conclusions:* Physical training lowers, and intensive exercise acutely raises fibrinogen levels-a response is strongly influenced by the G/A polymorphism of the beta-fibrinogen gene. The fibrinogen response to other stresses (such as smoking or surgery) may be similarly influenced with implications for cardiovascular risk stratification of patients.

4:15

729-2 Time Course and Extent of Central and Peripheral Adaptations During Endurance Training in Coronary Artery Bypass Graft Patients: Influence of Training Intensity

Jack Goodman, Jeff Reading, Derek Pallandi, Mike Plyley, Peter Liu, Peter McLaughlin, Terence Kavanagh. *University of Toronto & Toronto Rehabilitation Center, Toronto, Canada*

We examined the effects of 26 weeks of endurance training (ET) 8–10 wks post CABG in 31 patients (mean age = 53 ± 7 yrs) at *high* (HI; 80% VO2max, n = 16) or *low* (LI; 55% VO2max, n = 15) intensities on central and peripheral function. ET included 30–45 min. of walking/jogging, 5 days/week. Central measures (using RNA) included submaximal LVEF (70% VO2max) and extrapolated peak stroke volume (SV). Peripheral measures included peak ischemic vascular conductance (Gmax) using strain gauge plythesmography. In addition, skeletal muscle oxidative enzyme (citrate synthetase (SC) and succinate dehydrogenase (SDH) activities were determined from gastrocnemius biopsy sampling. For HI subjects, VO2max increased 14% and 28% after 12 and 26 weeks of training, respectively. LI training yielded less than 50% of these changes at each time point. HI training resulted in an increase in extrapolated peak SV after 12 weeks (11%) and from 84 ± 4 ml to 101 ± 4 ml after 6 months of training (16%; $p < 0.05$). No changes were observed in the LI group. Changes in submaximal LVEF only mildly favoured HI training, as EF increased in both groups by 8–10% following 26 weeks of training ($p < 0.05$). Changes in Gmax were similar between groups, however, HI training produced more significant increases in SDH and CS activity at all time points ($p < 0.05$). These results suggest that while LI training is of functional benefit, training-induced central and peripheral adaptations are optimized through high-intensity training, thereby yielding greater improvements in functional capacity.

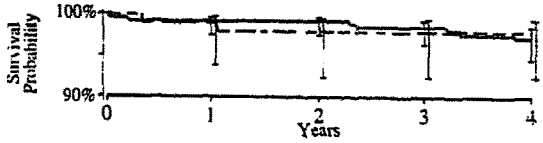
4:30

729-3 Long-Term Prognostic Implications of Abnormal Stress Electrocardiographic or Myocardial Perfusion Scintigraphic Measures in Patients With Angiographically-Insignificant Coronary Artery Disease

Leslee J. Shaw, Karen L. Kesler, Eric D. Peterson, Elizabeth R. Delong, Salvador Borges-Neto, Robert M. Califf. *Duke Noninvasive Research Working Group, Duke University Medical Center, Durham, NC*

It has been reported that patients with insignificant coronary artery disease (CAD) and provocative ischemia have a worsening survival. We examined long-term (4-year) prognosis in 780 catheterized patients with typical exertional angina and normal or insignificant CAD who underwent exercise electrocardiography (n = 503) or myocardial perfusion imaging (n = 277) ≤ 90 days. Mean age = 53 years; 52% were female. An ischemic exercise test was defined as the presence of ≥ 1.0 mm ST segment depression or ≥ 1 reversible defect. Cumulative Kaplan-Meier survival curves were compared for ischemic and non-ischemic exercise tests.

Results. Of the 780 patients, 23.9% had an ischemic test. Overall 4-year cardiac mortality was 1.6% and 2.6% in patients with (solid line) and without (dashed line) an ischemic test ($p = 0.79$); no differences existed between the results from exercise ECG or perfusion tests. Cumulative Kaplan-Meier survival revealed no difference in survival by test results:



Conclusion: Patients with chest pain without obstructive CAD uniformly have excellent long-term survival equal to or exceeding that of a general asymptomatic population. The presence of electrocardiographic or scintigraphic ischemia does not significantly alter this excellent survival.

4:45

729-4 Exercise Capacity Improves After Revascularization but Not Medical Treatment of Patients With Viable Myocardium

Lynn Luthern, M. John Williams, Thomas Marwick. *Cleveland Clinic Foundation, Cleveland, OH*

Left ventricular dysfunction may be improved by revascularization of viable myocardium (VM), but the benefit of surgery on exercise capacity is unknown. To investigate this, sequential exercise tests (interval 6 ± 2 m) were