

## C-4 SYMPOSIUM

## 320 ASSESSMENT AND MANAGEMENT OF BACK PAIN IN THE PHYSICALLY ACTIVE INDIVIDUAL

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Back pain is one of the most common complaints in society today. Eighty percent of the population will experience back problems in their lives while estimated annual costs run between 50 and 80 billion dollars. Back pain is not unknown to active populations - both the athlete and the moderately active find themselves plagued by the effects of acute and sometimes chronic back pain. The traditional approach has been rest, analgesics, application of heat, cold, ultrasound and/or combinations thereof. Since a clear understanding of the etiology of back pain has been slow to emerge, much of what has been done to treat back pain has been largely ineffective. Treatment protocols have not been well defined, because the underlying mechanisms of back pain have been poorly understood. In recent years, data have begun to appear showing greater effectiveness of active rehabilitation programs versus the more traditional passive approaches. Strength and endurance training are becoming more accepted in management of these patients. The emergence of 'outcomes management' has also begun to drive spine rehabilitation toward a more quantitative approach. This symposium will bring together recognized experts to discuss epidemiology, diagnostic and quantitative assessment, current controversies, and management of back pain in the physically active individual.

## C-6 SYMPOSIUM

## 322 Endurance Sports Participation for Children

Chair: Anthony D. Mahon, Ph.D. Participants: Wim H. M. Saris, M.D., Ph.D., Thomas W. Rowland, M.D., FACSM, Baretet Falk, Ph.D., Lyle J. Micheli, M.D., FACSM, and Dan Gould, Ph.D.

The physiological and psychological responses in adults participating in endurance sports have been well documented. More and more children are entering into this type of physical activity. However, the physiological and psychological consequences of this participation are not fully understood in the developing child. The question of whether endurance sports participation may be harmful to children has been raised and requires resolution. The purpose of this symposium is to examine specific physiological and psychological topics as they relate to the growing child participating in endurance sports. The program participants will be Drs. Lyle Micheli, Wim Saris, Thomas Rowland, Baretet Falk, and Dan Gould. Dr. Micheli will open the symposium by discussing orthopedic considerations in children involved in endurance sports activity. The second speaker, Dr. Saris, will examine nutritional aspects relating to participation in this type of activity. Dr. Rowland will follow by addressing cardiovascular responses to endurance exercise and training. Dr. Falk will then discuss temperature regulation and fluid intake. The final speaker of the symposium, Dr. Gould, will examine the psychological issues associated with endurance sports participation. Following Dr. Gould's presentation there will be a 30 minute panel discussion addressing the risks as well as the benefits for children participating in endurance sports.

## C-10 SLIDE ENERGY BALANCE AND WEIGHT CONTROL I

## 324 EFFECTS OF DIET &amp; EXERCISE ON WEIGHT LOSS, FAT DISTRIBUTION &amp; BLOOD LIPID CHANGES IN MODERATELY OBESE OLDER WOMEN

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Studies of diet and exercise have shown reduction of weight and related cardiovascular disease (CVD) risk factors in premenopausal women. This relationship has not been investigated in older women. We studied 40 healthy, moderately obese (120-140% IBW), postmenopausal women (65.6±3.3 yrs) participating in a 24 week (24W) diet or diet+exercise program. Daily energy need (DEN) was estimated from basal energy expenditure and self-reported activity levels. Group I (n=16) reduced daily energy intake (DEI) 500 kcal from DEN and expended 200 kcal/d in walking and light resistance exercise. Groups II (n=13) and III (n=11) reduced DEI 500 and 700 kcal from DEN respectively. Fasting blood was drawn for determination of blood lipids by indirect beta quantification, and trunk fat weight (KgTrF) and percent of body fat as trunk fat (PTfF) were estimated using dual-energy x-ray absorptiometry (DEXA) on the Hologic 2000QDR. Baseline (B) and 24W measures of body weight (WT), waist-to-hip ratio (WHR), KgTrF, PTfF, total blood cholesterol (TCHOL), LDL, HDL, and triglycerides (TG) were compared using a two-way ANOVA (p<0.05) with Tukey post hoc tests. Loss of WT and KgTrF were significant across time (B: WT=79.2±7.6 kg, KgTrF=15.8±3.5 kg; 24W: WT=72.8±8.0 kg, KgTrF=12.7±3.4 kg) but not treatments. There were no significant changes in WHR, PTfF, TCHOL, LDL, HDL, and TG across time or treatments. A positive Pearson correlation (p<0.05) was found between initial WHR and change in TG from B to 24W (r=0.51). While diet and diet+exercise may significantly decrease WT and KgTrF in this age group after 24 weeks, these declines are not accompanied by changes in the parameters usually considered to be negative CVD risk factors, i.e. body fat distribution estimated by WHR and PTfF, or blood lipids. However, high initial WHR may be predictive of TG declines in older women after 24W of diet or diet+exercise.

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## C-5 SYMPOSIUM

## 321 ENDOTHELIAL-MEDIATED CONTROL OF CORONARY AND SKELETAL MUSCLE BLOOD FLOW DURING EXERCISE

R.M. McAllister, T.H. Hintze\*, M.H. Laughlin, FACSM, T.I. Musch, FACSM, M.D. Delp, S.S. Segal, FACSM, and J.C. Falcone\*

Since 1980 there has been an accumulation of knowledge concerning the release of vascular endothelium-derived relaxing factor (EDRF) and its involvement in vasodilation. The purpose of this symposium is to educate College members on the role of EDRF in controlling blood flow to the myocardium and skeletal muscle during exercise. T.H. Hintze will present data suggesting a role for EDRF in increasing coronary blood flow during acute exercise, and also data concerning the impact of short term exercise training on this role. M.H. Laughlin will then discuss the effects of longer term training on endothelial control of myocardial blood flow in coronary arteries of varying size, ranging from large conduit vessels to small resistance vessels. The focus of the symposium will then shift to skeletal muscle. T.I. Musch will examine the role of EDRF in controlling muscle blood flow during acute exercise, both in health and in a cardiovascular disease (heart failure) state. M.D. Delp will follow with a presentation concerning the effects of both exercise training and inactivity on endothelial control of peripheral vasculature. S.S. Segal will then describe the coordination of blood flow control in skeletal muscle vasculature, emphasizing the role of the endothelium in this process. Finally, J.C. Falcone will present data concerning the cellular mechanisms involved in endothelial-dependent vasodilation in skeletal muscle vasculature.

## C-7 SYMPOSIUM

## 323 Mechanisms of Striated Muscle Hypertrophy

Chair: Marvin O. Botuyt and Susan C. Kandarian

Mounting evidence suggests that hypertrophy of striated muscle involves mechanical load and/or stretch. The long sought after mechanisms responsible for transducing mechanical stress across the cell membrane through the cytoplasm to the nucleus are beginning to emerge as a result of advances in cellular and molecular biology. In cultured cardiac myocytes hypertrophic stimuli (e.g. stretch, adrenergic stimulation) activate a cascade of intracellular kinases, which in turn induce expression of immediate early genes and phosphorylate proteins believed to regulate protein synthesis. The involvement of autocrine and/or paracrine growth factors and modulation by purinergic receptor stimulation have been demonstrated as well. In cultured skeletal myotubes, mechanical stretch increases synthesis of prostaglandins, which regulate protein turnover rates. Stretch induced activation of phospholipases appears to be a mechanism for the increase in prostaglandin synthesis via the generation of arachadonic acid, a precursor of prostaglandins. Membrane-spanning integrins have been shown to act as mechanical force transducers by transmitting extracellular mechanical perturbations to the cytoskeleton. The urokinase plasminogen activator receptor may play a similar mechanical transduction role. The goal of the symposium is to summarize emerging advances in our understanding of intracellular signal transduction pathways and crosstalk that influence hypertrophic growth in striated muscle.

## 325

## NUTRITION AND EXERCISE OBESITY INTERVENTION TRIAL IN ELEMENTARY SCHOOL CHILDREN.

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Children are becoming obese at an early age and the degree of obesity is increasing. Healthy People 2000 recommends adoption of programs of nutrition and physical activity to obtain appropriate weight and decrease risk factors in children. We implemented a school lunch program low in sodium and fat in conjunction with a physical activity program which emphasized fitness to determine if onset of obesity and cardiovascular risk factors could be attenuated. Two rural Nebraska schools of similar socioeconomic status served as either intervention (INT) or control (C). Sociocultural changes after the first year of the trial. Analysis of school lunches showed the % of total calories from fat for INT was ~28% and ~35% for C (p<0.05); however, % of calories from fat in a 24h period was not different between INT and C. Percentage of calories from protein remained unchanged. Blood lipid analysis showed no differences for cholesterol for INT and C; however, triglycerides (mg/dl) were 111.5±41.9 for C and 78.9±26.9 for INT (p<0.05). HDL cholesterol (mg/dl) decreased for C at 46.8±9.9 and increased for INT at 51.7±9.1 (p<0.05). Resting diastolic blood pressure (RDBP; mmHg) increased for C from 89±7 to 73±7 (p<0.05) with no change for INT. Body weight increased equally for both groups ~2 to 3 kg and % fat remained unchanged for both groups. The INT school showed decreases in % calories from fat at lunch but did not show a difference during a 24 h period suggesting compensation. Fitness and fatness did not differ between schools as result of the intervention. Triglycerides and HDL cholesterol were improved for INT and RDBP was significantly lower for INT than C. Thus, some positive trends are shown for INT versus C.

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