The 20th Maccabiah International Conference of Medicine and Sport Sciences

Keynote Speaker Abstracts

Abstracts appear in alphabetical order of speaker's last name.

Benjamin Domb

University of Chicago, Chicago, Il, USA

Hip Preservation and the Athlete's Hip

The unique demands of an athlete's hip require an understanding of different joint pathologies. There are several technical challenges that require innovative approaches as a means to preserve the hip and delay or prevent joint replacements. Hip arthroscopy is a growing field that has increased awareness and is advancing the field of sports medicine. Coupled with a thorough patient assessment, including physical exam findings and radiographic techniques, hip arthroscopy is addressing problems that were previously undiagnosed or untreated. Such conditions include tears of the labrum or gluteus medius, and femoroacetabular impingements (FAI), such as pincer-type or cam. Dr. Domb will discuss such innovative surgical techniques for hip preservation, including capsular plication, transtendinous gluteus medius repair and labral reconstruction, and will review other groundbreaking surgical techniques that are advancing orthopedic care for athletes with hip conditions.

Benjamin Domb

University of Chicago, Chicago, Il, USA

Running a Yard in Your Patient's Shoes: From a Professional Athlete Caring for Professional Athletes

There are many forces at play for practicing medicine in the professional sports world. Caring for professional athletes requires a collaborative team approach with several involved parties and interests that need to be acknowledged. With the health of the athlete as the priority, combined team efforts from the areas of clinical/surgical, physical therapy/rehabilitation, and research will be discussed for improving patient outcomes for the athlete. From firsthand experiences, Dr. Domb will also share professional athlete's stories and successes as a result of such team approaches to care.

Mark Hutchinson

University of Illinois at Chicago, Chicago, USA

Leg Pain in Athletes: A Diagnostic Dilemma

Dr. Hutchinson is one of the world's leading experts on leg pain in athletes and, in particular, exertional compartment syndrome. This presentation will allow the attendee to make accurate diagnoses of leg pain in their athletes, rule out atypical diagnoses, and use the best available evidence to guide treatment and optimize outcomes.

Mark Hutchinson

University of Illinois at Chicago, Chicago, USA

Citius, Altius, Fortius: An Olympic Medical Experience from Atlanta to Rio

Dr. Hutchinson has served on the USA medical team at the 1996 Atlanta Olympics, 2006 Torino Paralympic Games, and 2016 Games in Rio. This presentation will present the American experience including pre-games preparation and planning, need to know for the medical professional, as well as common and unusual injuries/problem/challenges that may be encountered when caring for athletes at the Olympic level.

Mark Hutchinson

University of Illinois at Chicago, Chicago, USA

25 for 25: Pearls & Pitfalls of Arthroscopic Surgery

Dr. Hutchinson has been clinical practice for over 25 years, been a leading educator of residents, fellows and surgeons, and founder/master instructor of the Arthroscopy Association of North America Courses on Fundamentals in Arthroscopy. This presentation will present 25 avoidable pitfalls and pearls gathered from 25 years of experience including accurate diagnoses, pre-operative planning, and post-operative rehab that can optimize outcomes for your patients.

Andrew M. Jones

Sport and Health Sciences, University of Exeter, Exeter, UK

The Role of VO2 Kinetics in Exercise Physiology

The kinetics of pulmonary O_2 uptake following the onset of exercise provides important insights into the integrated adjustment of the pulmonary-cardiovascular-muscle metabolic systems to meet an increased energy demand. While the control of VO_2 kinetics is complex and continues to be investigated, the rate of adjustment of mitochondrial oxidative phosphorylation is functionally linked to the rate of cytosolic high-energy phosphate hydrolysis, such that the principal limitation appears to be an intrinsic inertia of intracellular processes. In other situations, such as when type II fibres are recruited during high-intensity exercise or there are cardiovascular impediments, substrate supply (in the form of O_2) may further limit the VO_2 on-kinetics. During moderate-intensity exercise, VO_2 typically attains a steady state within 2-4 minutes; however, during heavy- or severe-intensity exercise, VO_2 continues to rise with time despite a constant external power output. This greater O_2 cost of exercise, reflected in the 'VO_2 slow component' phenomenon, signifies a loss of skeletal muscle efficiency.

The VO_2 profile during exercise has important implications for the development of fatigue and exercise (in)tolerance. For example, the magnitude of the O_2 deficit that is incurred during the first 1-2 minutes of exercise, and which is a function both of the VO_2 time constant and amplitude, will determine the extent to which substrate-level phosphorylation is activated with implications for high-energy phosphate depletion and hydrogen ion accumulation. Also, the trajectory of the VO_2 slow component during higher-intensity constant-work-rate exercise will dictate the time to exercise intolerance because exhaustion becomes imminent after the maximum VO_2 has been attained.

Understanding VO_2 kinetics and its relationship to fatigue development enables sport and exercise scientists to consider interventions which might enhance the VO_2 kinetic profile (i.e., speed the initial response or attenuate the subsequent slow component) and thus improve sports or exercise performance. This presentation will consider several such interventions including training, prior exercise, pacing and nutritional supplementation.

Samuele Marcora

University of Kent, Kent, UK

Psychobiology of Endurance Performance

Endurance performance is traditionally assumed to be limited by muscle fatigue and various physiological factors that influence it (e.g. convective oxygen delivery and glycogen depletion). Professor Marcora will present an alternative psychobiological model of endurance performance that integrates exercise physiology with motivation psychology and cognitive neuroscience. This psychobiological model adopts motivational intensity theory to explain how perception of effort and potential motivation cause exhaustion, and how various psychological/physiological manipulations affect endurance performance. The neurophysiology of perception of effort and the practical applications of the psychobiological model will also be discussed.

Marco Narici

MRC-ARUK Centre of Excellence for Musculoskeletal Ageing Research, Metabolic Physiology, School of Medicine and Health, University of Nottingham, UK

Neuromuscular Protective Effects of Regular Physical Activity

Motor neuron degeneration, denervation, loss of structural and functional integrity of the neuromuscular junction (NMJ) and loss of motor units, markedly contribute to the development of sarcopenia. Recent evidence obtained in our and other laboratories shows a close association between NMJ degeneration and sarcopenia. Evidence of NMJ degeneration in humans can now be obtained from measurements in serum of c-terminal peptide fragment (CAF) of agrin, a key component of the NMJ. Interestingly, while loss of MUs is commonly observed in old sedentary individuals, no decline is found in muscles of master runners (MA). This observation prompted us to formulate the hypothesis that regular aerobic exercise protects against neuromuscular degeneration. We compared CAF levels of endurance master athletes (MA) elderly dancers (ED), active elderly (AE), sedentary elderly (SE) and frail elderly (FE) with respect to a population of young healthy controls (YC). CAF levels were found to be 2.1-2.5 fold higher in the SE and EF with respect to YC, while MA, ED and AE had CAF levels not significantly different from YC (1.4-1.6 fold higher). Next we investigated whether these neuroprotective effects were present in habitual older dancers (OD) compared to sedentary older (OS) individuals. Twenty OD (aged 67-87 years) practicing dancing (sequence/morris/rapper/sword dancing) >twice/wk, 90 min, for 2 yr min., and 15 OS (aged 65-86 years) were recruited for this study. OD and OS were compared in terms of neuromuscular characteristics: 1) blood serum CAF levels, CH), 2) muscle structure (vastus lateralis, VL, muscle cross-sectional area (CSA) by ultrasound), 2) VL muscle architecture (fascicle length and pennation angle) by ultrasound, 3) leg extensors muscle strength (MVC) and power (Nottingham Power Rig), 4) neuromuscular fatigue (isometric contraction @ 60% MVC until task failure). CAF serum level in OD were 42% lower than in OS (215.9±27.4 pM vs. 369.7± 50.6 pM, $p<0.02$)**.** Also, greater VL muscle thickness (+13%, 1.94±0.06 cm vs 1.72±0.11 cm) and pennation angle (+8%, 14.3±0.52 deg vs 13.3±0.60 deg) were found in OD than in OS. Notably, neuromuscular fatigue (time to task failure) was 28% lower in OD than in OS.

These findings suggest that habitual recreational dancing affords protection against neuromuscular degeneration in older individuals preserving NMJ integrity, muscle mass and neuromuscular function. These benefits may originate from: 1) reduced oxidative stress, 2) lower inflammation, 3) preserved neurotrophins levels, 4) loading of skeletal muscle and 5) stimulation of the somatosensory system, associated with dancing.

Bradley C. Nindl

University of Pittsburgh, Pittsburgh, Penn, USA

This presentation will discuss science and strategies for optimizing human physical performance in military populations. Injury epidemiology, training adaptations for military-centric occupations, injury prevention, and human performance metrics will be overviewed. Particular focus will be given to the relative utility of scientific best practices and how best to operationalize scientific best practices. By taking advantage of the science and applications of physical fitness and injury prevention research, we can leverage our increased understanding for the optimal application of physical readiness processes while minimizing the injury risk potential. Continued scientific and evidence-based dialog across international partners will prove to be transformative in identifying the most effective strategies for human performance optimization in the 21st century.