

Sport Performance Research at the 2016 Meeting of the American College of Sports Medicine

David B Pyne¹, Marc R Portus¹, Will G Hopkins²

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1 Australian Institute of Sport, Canberra, ACT, Australia; [Email](#). 2 High Performance Sport NZ, Auckland, New Zealand and Victoria University, Melbourne, Victoria, Australia; [Email](#). Reviewer: Jos de Koning, VU University, Amsterdam, Netherlands.

Priority themes at the 63rd annual meeting of the American College of Sports Medicine were athlete care and clinical medicine, sports nutrition, physiology of exercise, motor control and population physical activity. There were few presentations with a focus on high-level sports performance. **Featured Presentations**: celebrating the Boston Marathon, minimalist footwear, physical activity for future generations, Paralympic sports, mitochondrial biogenesis, fatigue, dehydration, energy balance, concussion, Bengt Saltin. **Noteworthy Abstracts**. Very few on athletic performance, and sample sizes were often inadequate. **Acute Effects**: minimalist shoes; carbon-fiber insoles; post-activation potentiation; stretching; cycle crank length; mountain-bike wheels; heated tracksuit; morning priming bouts; cold-water immersion; focus of attention; home advantage; placebo and nocebo effects. **Injury**: hip abductor strength and ankle sprains in soccer; rotational laxity and ACL injury; runners in minimalist shoes; overuse in runners; Thrower's 10 and upper-extremity in overhead athletes. **Nutrition**: GABA; probiotics; antioxidants; calcium lactate; beetroot; nitrate; citrulline-malate; Relora. **Talent Identification**: speed and technical skill in soccer. **Training**: high-intensity intervals in rowers; high-intensity aerobic in mountain bikers; Pilates in ballet dancers; modeling training load in cross-country runners. KEYWORDS: elite athletes, ergogenic aids, nutrition, performance, training.

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A record 7000 delegates attended the 63rd Annual Meeting of the American College of Sports Medicine (ACSM) at the Hynes Convention Center, in Boston, from 1-4 June. For those with time to explore, Boston offers some interesting historical sites in US history, landmark universities including Massachusetts Institute of Technology (MIT) and Harvard, and its world famous marathon. The role of Boston in the American Revolution is highlighted on the Freedom Trail, a 2.5-mile walking route of historic sites that tells the story of the nation's founding. This year the ACSM featured several sessions on the Boston Marathon as well as the 7th World Congress on Exercise is Medicine and the World Congress on the Basic Science of Energy Balance. Here we present commentary and analysis of selected sessions: featured presentations of keynotes, showcase events, symposia and tutorial lectures, which lack abstracts (by David Pyne and Marc Portus) and noteworthy abstracts of the free communica-

tions and poster presentations (by Will Hopkins).

Featured Presentations

[David Pyne and Marc Portus](#)

The conference program followed the well-established format of previous ACSM Annual Meetings: several pre-conference programs including nutrition, the ISB Symposium on Motor Control in Biomechanics, Exercise is Medicine and research training, followed by three and a half days of the main meeting.

The 3500 abstracts were available online or as a pdf—with no less than 868 pages and around 3500 abstracts—prior to the meeting. Attendees were given the three choices to access the abstracts: via pdf format, an online program planner, or a mobile app. The mobile app worked really well and showed the benefit of some advancements from the previous year. Importantly the free WiFi extended to almost all areas of the convention center, including the

meeting rooms. The standard of organisation certainly met the typically high expectations for the ACSM Annual Meeting. There was also a large number of formal meetings (interest groups, journal editorial boards) and informal meetings (alumni reunions, other receptions) conducted in and around the main program. The trade exhibits had plenty to interest the delegates from instrumentation and equipment, to publication houses, software and increasing consumer technology and wearables.

The strongest areas of the conference were athlete care and clinical medicine, exercise and health, physical activity and inactivity, physiology and nutrition.

Third ISB Symposium on Motor Control in Biomechanics

This was a preconference session and featured esteemed speakers such as Carlo Deluca, Irene Davis, Joe Hammill and Jim Richards. Irene presented on minimalist footwear and explored various types of training interventions to successfully transfer to a forefoot strike pattern in minimalist footwear. Other presentations focused on the latest results in EMG research in Europe and the US. Muscle recruitment and motor unit firing pattern differences and variability in muscle unit force capabilities under different conditions with the concept of a potential reserve in force capacity being a central focus. Joe Hammill presented a study following up on research he published 21 years ago investigating the attenuation of force between the tibia and head to maintain a stable visual field in recreational runners. Jim Richards showed different taping techniques on Japanese cats affecting movement patterns, often with hilarious results (no cats harmed!). He also reported results indicating that different knee bracing technologies affect movement patterns in a slow stair descent task. Whether faster sporting movement patterns can be influenced needs further investigation.

Boston Marathon: special guest speakers

Boston is justifiably proud of its world famous marathon run each April. Three guests featured prominently this year: four-time winner Bill Rodgers, pioneering women athlete Kathrine Switzer and 2014 men's champion Meb Keflezighi. All three were interviewed on their marathon involvement. Rodgers ran in the 1970s at a time of a boom in competitive running. Switzer ran to prominence in 1967 as the

first woman to officially enter and run the Boston Marathon. All three spoke of their marathon memories, training programs, and lifelong commitment to running, physical activity and good health. Other sessions focused on medical aspects of the Boston Marathon.

Wolfe and Dill Lectures: physical activity and sports medicine

Although our focus here is on sports performance, brief comments are appropriate on the J.B. Wolfe Memorial and D.B. Dill historical lectures. Russ Pate used the Wolfe lecture to summarize US initiatives in delivering an active, fit and healthy future generation of children. In addition to increasing physical activity in schools and playgrounds, there is a concerted effort being made in developing federal, state and local policies, well-built community environments, upskilling clinicians, teachers and parents, and renormalizing walking and biking as modes of school transport. Robert Johnson outlined the development of sports medicine in the USA over the last 50 years. Like many fields it is possible to trace the lineage of key personnel back to pioneers in the field and the universities or clinics that supported them. The lesson here, irrespective of the discipline, is that mentoring and personal/professional contributions are as important as appointments and publications.

New technologies and sports concussion: quantitative monitoring of concussion.

Traumatic brain injury and concussion in sport have seen an explosion in helmet designs in the US, for NFL in particular. Many helmets have not been tested rigorously however some designs with a sliding attenuation element show promise. Research is ongoing from prevention, assessment and recovery perspectives. One area presented by Erik Swartz was an NFL training intervention to graduate training impact progression and modify tackling technique, taking cues from rugby, where the head is typically not used as a projectile! Nicholas Murray's group is examining dual task and skill-specific methodologies (e.g., simulated soccer heading tasks in a Nintendo Wii style application) as a more sensitive approach to assess cognitive abilities after concussion. Visual approaches are showing most promise so far (e.g., visual gaze excursions and velocity in virtual skill-based contexts). Other promising research presented by Bill Meehan from Boston Children's Hospital is

the effects of light emitting diodes to normalize sodium and potassium balance of the brain neurons in rats after a concussion. In a concussion this balance typically is disrupted by rotational and shear forces. Some trials have commenced on soldiers in the US and are showing great potential to restore this chemical balance and normal brain function after a concussion.

Sudden death in sport: preventing deaths from heat stroke and sickle cell.

Douglas Casa provided a compelling keynote lecture. It appears that heat-stroke deaths remain an issue particularly in south-eastern US states, where heat and humidity prevail. Over 80% of heat-stroke deaths occur within 3 days of a new training program in a new hot environment. Heat acclimatization strategies can be effective if implemented properly with a logical progression. Athlete, coach and team personnel education is important—the “Heads Up” certified program in particular has saved lives in the last 10 years. Cooling strategies include cold-water immersion, aggressive cooling, and patient monitoring during transport and recovery. Graduated introduction to padding and protective equipment for off-season training in new hot environments was another sensible strategy. For example the first 3 days is helmets only with low impacts, before more protective padding is introduced.

Repeat sprints with limited recovery are problematic for sickle-cell sufferers. Sickle-cell deaths have decreased by 80% since guidelines and policies were implemented.

Wearable devices: consumer and research applications

The world is awash with wearable devices, with developments spanning from the individual to big data. Some manufacturers are starting to introduce a fashion edge to their designs—soon you’ll be able to wear your physical activity monitoring device as a piece of stylish jewelry!

Joe Godino queried the validity and reliability of many devices, and highlighted a divergence between the performance of consumer and research grade versions of inertial measurement units. Barely half of the published studies assessing devices for physical activity monitoring had acceptable validity. Market releases are clearly outpacing validation and reliability studies, and algorithms and specifications are often not disclosed or released by

manufacturers. He suggested that the industry needed to adopt some agreed standards.

Despite these concerns there was still enthusiasm for the wide ranging applications of validated units, particularly in the areas of health and disease epidemiology. Further establishing the dose-response relationship between exercise and health, the influence of different physical activity lifestyles, such as active occupations like tradespeople versus the office-bound worker who is a weekend athlete, are all of continuing research interest. For researchers in health and sport, assessment of the validity and reliability of these units should form a key part of study design.

Olympic and Paralympic legacies

Leading lights in the Olympic and Paralympic movements including Margo Mountjoy, Arne Ljunqvist, Richard Budget and Cheri Blauwet spoke to the issue of legacies. Although health, sport and activity benefits at a population level from hosting of Olympic Games are often touted, the evidence is not conclusive. In terms of athlete cohorts, Mountjoy provided evidence that the injury rate in Olympic Winter game competitors has actually increased. At the London 2012 Olympics the injury rates were 12.7 per 100 athletes while illness was 7.1 per 100 athletes. Blauwet highlighted the challenges of classification of functioning, disability and health in Paralympic sports. Research on performance, medical and social issues continues to evolve in the Paralympic movement.

Minimalist footwear biomechanics

Several sessions led by Irene Davis of Harvard University covered the biomechanics of minimalist footwear. Major manufacturers now produce a range of minimalist designs offering reduced or no midsoles, cushioning and motion control. Biomechanical research to date demonstrates reduced ground reaction force loading rates (peak forces and rate of force development) when a forefoot or midfoot striking pattern is successfully adopted in minimalist footwear. “Softer landings,” as Irene Davis espouses, is a new catch-cry. In general terms joint loading patterns also change, with most research indicating the knee joint has reduced forces but the ankle joint and Achilles tendon complex forces increase. Perhaps softer landings provide an attractive proposition for those runners suffering knee ailments and pain. There

are individual responses, however, and it's not necessarily an easy transition over to a minimalist footwear mid-foot or fore-foot striking pattern. A heel strike pattern in minimalist shoes is likely to lead to stress-related cumulative loading issues too.

For those seeking minimalist running nirvana, Joe Warne recommended an individualized 8- to 14-week transition program including slowly reducing loads in conventional footwear, progressively increasing training loads in the new footwear, foot strengthening, foot functionality increases (e.g., "dome hopping") and range-of-motion exercises. Simple coaching instructions to "run lighter and quieter" reportedly help some make the transition too. The next frontier for the minimalist movement appears to be further understanding of longer term injury rates (knee versus ankle), running economy evaluations and performance benefits.

Olympics 2016 – Dutch and US preparations

The ECSS Exchange Lecture featured Kamiel Maase (Netherlands) and Randy Wilber (USA) highlighting key aspects of their team's preparations. The Dutch cover the main sport science and medicine disciplines and are developing expertise in chronobiology, visual skills, genomics, aero- and hydro-dynamics, and sensor technology. Identifying and developing the right people, sharing knowledge, innovation projects and embedding scientists with sports are priorities. Evidence-based practice, creativity and willingness to give and take are important. Maase shared experiences of developing athlete and commercially available versions of yoghurts/supplements and contemporary cooling vest designs as collaborative projects with industry.

Randy Wilber outlined the structure and philosophy of Team USA to commit to Olympic ideas, be 100% drug-free, and win the gold and total medal counts. Wilber highlighted aspects of the swimming and athletics preparations for 2016, and spoke of his seven visits to Rio. He also outlined the recent renovations at the USOC's Colorado Springs training center, as well as their network of altitude training centers throughout the Rocky Mountains. These developments have enhanced the uptake and athlete preparation camps held at these locations, which are strategically prioritized in relation to the phases of the Olympic cycle. The attention to detail and comprehensive preparations of

Team USA continue to set the standard for other nations.

Mitochondrial Biogenesis: informing training prescription and supplementation

A three-person symposium examined various aspects of mitochondrial biogenesis in relation to exercise and training. David Bishop reviewed different analytical methods for the non-experts and highlighted studies indicating that training volume is the key for increasing mitochondrial content while training intensity is the primary signal for mitochondrial respiration. Training adaptations may be related to changes in the key regulators, PGC-1 α and P53. Jeff Coombes was persuasive in asserting there is little evidence for promotion of mitochondrial biogenesis via supplementation, however there is evidence that it might impede biogenesis and be detrimental to health. So taking supplements might be harmful as well as wasteful.

Pre-participation screening: implications for Olympians and Paralympians

Given this is an Olympic/Paralympic year, there were a couple of sessions devoted to elite athletes, especially the ongoing debate on the value of cardiovascular screening. Ben Levine summarized the research showing that athletes typically have large compliant hearts that twist and relax quickly—adaptations that can take years. Bill Roberts queried whether sports should screen athletes and the total cost of the exercise. He concluded that not all screenings provide individual benefits, and there is insufficient evidence to mandate specific screening tests for athletes. Marco Bernadi reported that there was very little pre-participation screening on Paralympians. This session was clinical in nature and it wasn't clear whether screening of other aspects, including fitness, skills and psychological factors is lacking.

Meb Keflezighi: cross-training to extend competitive performance

US marathon runner and three-time Olympian Meb Keflezighi shared some insights on his training and load management at age 41 y, most notably his extensive use (1:00 to 1:45 h per day) of an elliptical bicycle to complement his running training. Elliptical cycle training was seen as particularly valuable when injured to maintain fitness and weight. He also follows an atypical 9-day training cycle (rather than the

usual 7-day cycle) to allow more rest, and valued highly the qualities of personal commitment and perseverance.

Paralympics sports: autonomic dysreflexia

Cheri Blauwet, a sports physician from the Boston area, gave a President's lecture on medical and scientific conundrums in Paralympic sports. She outlined the suspected use of intentional induction of autonomic dysreflexia, where nausea stimuli send an afferent response which pumps out adrenaline reflexively—with downstream responses (elevated blood pressure) and potentially catastrophic consequences—but associated with up to a 10% enhancement in performance! The International Paralympic Committee (IPC) now has a testing protocol involving systolic blood pressure, but few positives have been identified. The (athletic) controversy with Oscar Pistorius has prompted new paradigms for anthropometric measurement relating to physical disabilities. The same antidoping WADA code as Olympics is in use at the Paralympics.

Heat tolerance testing

The incidence of heat illness is an ongoing issue for sports. Here the focus was on the relevance of performance and physiological testing (via the so-called heat tolerance test) on return to play in athletes (and return to duty in military personnel). Much of the literature pertains to military rather than sporting settings. The current iteration of the heat tolerance test is a 2-h walk on a 2% incline at 3.1 mph in conditions of 40 °C and 40% relative humidity. Although the heat tolerance test in various forms has been around for 40 years, questions remain on protocols and implementation. Yoram Epstein concluded that the heat tolerance test is a good tool for heat intolerant individuals, particularly for short-term management, but long-term prognosis is somewhat unclear. Lisa Leon outlined heat-stroke pathophysiology around ischemia, endotoxemia and multi-organ dysfunction. A key point was assessing heat tolerance during both exercise and recovery. She suggested that more work is needed in validating sensitivity and specificity of heat tolerance testing in athletes, for both genders, and with different severities of heat illness. New biomarkers are needed to further characterize tolerance and recovery. Fran O'Connor made reference to the ACSM Position Stand on heat illness. A paradigm shift

is occurring where there is no specific algorithm and diagnosis is best made retrospectively on an individual basis. His conclusion was that the heat tolerance test is useful but has gaps.

Bengt Saltin - 50 years legacy

A very well-attended session was a perfect setting to celebrate the life and contributions of Bengt Saltin, who passed away in late 2014. Saltin was one of the pioneers of exercise physiology in his native Sweden, in Denmark, and via many long-time US collaborations. His tally of over 400 Medline-listed publications is testament to his scientific legacy. In this session collaborators including Mark Hargreaves, Carsten Lundby, Ben Levine and Bente Pedersen reflected on the man and his work. His research encompassed an impressive array of interests including the physiological effects of exercise, effects of training, diet, fatigue, altitude training, bed-rest studies, experimental models such as single-leg exercise, and gene expression. Recent work in subcellular localization with new technologies in the last decade confirmed mechanisms of the pioneering work in the 1970's implicating glycogen-dependent components in skeletal muscle fatigue. Saltin had many collaborators in both Europe (including Hultman, Karlsson) and the US (Gollnick, Costill).

Arne Ljungqvist: doping's nemesis

The final President's lecture was a spirited personal reflection of the history of doping and anti-doping strategies. Ljungqvist gave personal insights on many of the well-known and less-known doping issues, including high profile cases, scientific advancements and all the political, legal and bureaucratic battles, particularly within the IOC and IAAF. His timeline of significant, interesting and sometimes humorous events that he discussed spanned from the 1960 Rome Olympics death of a Danish cyclist, suspected but never proved to have suffered from a cocktail of heat and stimulants, through to the 2008 Beijing Olympics. The Seoul 1988 Olympics was seen as a watershed moment with the Ben Johnson doping case and the development of a formal global IOC stance addressing the issue. Although he lamented that doping will probably continue to be a part of sport, Ljungqvist remained positive that anti-doping initiatives are worthwhile and having positive effects. A well organized, funded and accredit-

ed approach towards anti-doping will see the science minimize the cheats. He received a standing ovation at the conclusion of his lecture.

Noteworthy Abstracts

Will Hopkins

Once again I did not attend the meeting, but I have summarized the abstracts of the slide and poster sessions, where all the new research was presented. As usual, the focus of my report is athletic performance and injury prevention, topics that were represented by only a small proportion of the presentations.

You can access the conference abstracts via [this link](#). The link currently states 2015, so you might have to update it to 2016, if the mistake is corrected. Download all seven PDFs and merge them into one document, then use the advanced search form (Ctrl-Shift-F) in Adobe Acrobat to find abstracts featured in this report via the number in brackets [...]. You will get several hits, but you can quickly home in on the right one. The abstracts are also freely available in the [May supplement](#) of Medicine and Science in Sports and Exercise. Search for key words using the [advanced search form](#) (enter 48 in the Volume field and 5s in the Issue field).

Reading these abstracts was not exactly an inspirational experience, I am afraid to say. The worst thing was pitifully inadequate sample sizes for crossovers (<10 subjects) and controlled trials (<10 in each group). When the authors almost invariably got non-significant effects, what could they conclude? Correlational studies with 20 or so subjects were also common and are also likely to be inconclusive for all but large effects. Then there was the usual impenetrable thicket of author-defined abbreviations, which I often gave up trying to decipher. On the plus side, magnitude-based inference still seems to be making inroads on null-hypothesis testing.

Acute Effects

Minimalist shoes improved running economy acutely by 2.3-2.8% in **runners** whether they were experienced (n=7) or inexperienced (n=12) with such shoes [97]

"A carbon fiber **shoe insole** tuned for optimal energy return of the human body-footwear system" produced trivial improvements in jump height (0.7%) and agility time (-0.3%), but a small improvement in 10-yard sprint time

(-1.0%) in a crossover with 22 male and female **collegiate athletes**. Not significant, of course, but they pleaded that the insole might work. Why not calculate *might* with magnitude-based inference? [647]

The majority of the 15 **resistance-trained men** in this study did not show **post-activation potentiation** of a vertical jump after a set of heavy back squats. The data could not address the possibility of positive and negative responders. [1496]

Post-activation potentiation was also not evident in a study of baseball pitching speed in 15 male collegiate **baseball pitchers**. [3742]

However, adding three reps of a hang clean and jerk to a normal warm-up had a **post-activation potentiation** effect on shot-put (3.4%) and standing **long jump** (2.1%) in a crossover of seven female and six male **collegiate Division-I athletes**. [3731]

Compared with static and dynamic **stretching**, resisted stretching (dynamic stretching with weights) produced slightly greater improvements in shuttlecock speed and time to complete a **badminton**-specific endurance test in a crossover with 16 collegiate male players. [3264]

For the same oxygen consumption, nine amateur **triathletes** attained an astonishing 6.2% more power with shorter-than-normal **cycle crank lengths** (145 mm vs 175 mm). [2544]

Thirteen experienced **mountain bikers** went 6.8% faster over a standardized trail with **29-inch wheels** compared with 26-inch. What's the next size up? [2557]

A **heated tracksuit** plus 5 min of dryland exercise produced a 0.8% faster time trial than a normal tracksuit and no exercise in the 30 min transition prior to the time trial in 22 elite free-style **swimmers**, although there was no clear effect in 10 breaststrokers. In a separate crossover, **morning priming bouts** consisting of a morning swim with or without dryland exercise (no details provided) enhanced sprint swim performance by 1.7% and 1.6% compared with no-exercise control. [1819]

Repeated **cold-water immersion** had substantial effects on several indices of recovery following a simulated rugby-union match in a controlled trial of 8+8 male university **rugby players**. A crossover would have improved the precision of the estimates. [3818]

A crossover with 10 male **basketball players**

showed similar benefits in recovery with continuous or intermittent **cold-water immersion** compared with control. [3819]

"Changing an athlete's **focus of attention** was not an effective strategy to improve long-jump performance [in a crossover with 10 female **long jumpers**]. Athletes performed best when using a self-selected focus of attention, which, based on self-reports, generally involved looking up while jumping." [967]

Home advantage in **Super Rugby** amounts to winning 59% vs 41% of games, or 1.8 extra wins in every 10 games. [3723]

Placebo and nocebo effects were induced on repeated sprint performance in this unusually large study (305 **team-sport athletes**). [1278]

Injury

In a one-season prospective study of 210 male **soccer players**, "impaired" (undefined) **hip abductor strength** was associated with increased risk of lateral non-contact **ankle sprains**. The odds ratio (should have been hazard ratio, but it's approximately the same) was only 1.10. The risk appeared to be a lot higher for presumably a very low strength, but no confidence limits were given in this case. [133]

Reliability and validity correlations of 0.70-0.88 in 14 **healthy females** are not that wonderful for a new simple device to measure a risk factor for **ACL injury, rotational laxity** of the knee. The authors thought otherwise, of course. [189]

In a randomized controlled trial of 31 **runners** training for 26 weeks in **minimalist shoes** for the first time vs 30 runners who trained in usual shoes, "runners [who] weighed one standard deviation (9.1 kg) more than the sample mean body mass (74.8 kg) were 4.1 times more likely to get injured running in the minimalist shoe compared to the control shoe". Odds ratios appear incorrectly elsewhere in the abstract, so this effect was probably an odds ratio, and the risks were 30-50%, so the real risk is less than that, but worth worrying about. [645]

A prospective study of 300 male and female **runners** over two years identified various factors associated with **overuse injury**. A pity it was done by comparing mean baseline values of the runners who ended up injured vs those who didn't. I mean, really, incident-rate (hazard) ratios are the only way to analyze and interpret the data. Non-injured runners had greater ground reaction forces, higher tibiofemoral

loads, better mental health-related quality of life, lower negative affect, were younger, and more likely to be male. [652]

A randomized controlled trial of the **Thrower's 10** exercise program for injury prevention in adolescent **overhead athletes** produced substantial but non-significant reduction in total and **upper-extremity injury** incidence. [1632]

Nutrition

Combined ingestion of **gamma-amino butyric acid (GABA)** with whey protein increased lean mass more effectively (1.3 kg) than ingestion of whey protein alone (0.1 kg) in a controlled trial of 26 **resistance-trained men**, possibly via increased growth hormone. [241]

The 20 **elite athletes** randomized to a **probiotic** supplementation for 14 weeks showed improvement in various immune markers and self-rated mood compared with the 19 in the placebo group. [877]

There were several studies of the acute effects of **antioxidants** on exercise performance, but none on competitive athletes. The weirdest was "**molecular hydrogen**" gas dissolved in water. Amazingly it produced 1-2% reductions in repeated sprint time in a crossover with 15 **physically active men**. [903]

Various **antioxidants** were also variously successful in various indices of recovery following hard exercise, for example cherry juice in simulated **soccer**. [2883] The concern with the use of antioxidants for recovery is the potential for reduced adaptation to training.

Calcium lactate produced an ergogenic effect on high-intensity sprints in 12 trained **cyclists** via a mechanism similar to sodium bicarbonate. The test protocol was too complex to convert the effect into something like a time trial. There's no mention of whether the supplement might cause less gastrointestinal disturbance than bicarbonate. [889]

Beetroot juice had expected ergogenic effects in **subelite athletes** [898, 907, 909], but not in moderately well-trained **runners** [913].

Compared with baseline control, nine competitive **cyclists** got no benefit from **ischemic preconditioning** in a 16-km time trial with or without **nitrate** supplementation (both 0.6% slower). [914]

Acute supplementation with **citrulline-malate** (an amino acid) improves high-intensity power output in **subelite and non-athletes**,

apparently via nitric oxide. Will there be the same lack of benefit that highly trained athletes experience with beetroot juice? [894, 896, 897, 906]

"**Relora** (a proprietary blend of *Magnolia officinalis* and *Phellodendron amurense* bark extracts" conferred 27 min more deep **sleep** in a placebo-controlled trial with 66 **cyclists** the night before an early next-day event. [900]

Talent Identification

Measures of **speed and technical skill** in Under-12 **soccer players** in Germany were reasonably good predictors of performance level ~10 years later. [2798]

Training

Adding some **high-intensity intervals** to the otherwise long-slow distance of 7 well-trained male **rowers** [for 8 weeks?] produced a 1.8% improvement in 2000-m time trial time, whereas the control group of 7 rowers improved by only 0.3%. [1818]

High-intensity aerobic training (~5-min intervals) three times a week for six weeks is likely to be better than sprint interval training (30-s intervals) for **mountain bikers**, but performance times and details of the test were not provided. [3043]

Adding two **Pilates** classes per week for three months to the usual training of a group of seven **ballet dancers** had little effect on static balance (relevé), but anterior-posterior and medio-lateral displacements were 10% and 25% smaller in dynamic balance (pirouettes) than in

a control training group of eight dancers. [3735]

Mixed modeling was used to develop within-subject models showing substantial effects of **training load** and oxidative status on competitive performance of 18 female **cross-country runners**. [1666]

Reviewer's Comment

with Jos de Koning

The amount of sport science at the ACSM annual meeting is clearly on the down slope, something the ACSM leadership needs to have a look at! I don't know if this is due to difficulties in attracting research funding for sport science (which I experience in my country) or the success of competing conferences like the ECSS. The Wolfe and Dill lectures were also a little disappointing—a pity, considering they were the only unopposed lectures, with several thousand delegates in attendance. That said, I always get inspired by this conference. I visited numerous symposia, some of which are reviewed in this report, but also some just for my general interest in exercise science. I had good discussions at the posters. I learned a lot, I enjoyed meeting friends, and I came home tired but full of plans for the new academic year.

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