Nº de abstracts = 140

Modifcado em 23 Fevereiro 2012

Effects of 21 days of intensified training on markers of overtraining.

Slivka DR, Hailes WS, Cuddy JS, Ruby BC : Journal of strength and conditioning research / National Strength & Conditioning Association, 2010
24(10):2604-12.
Montana Center for Work Physiology and Exercise Metabolism, University of Montana, Missoula, Montana, USA.

The purpose of this study was to impose a period of quantifiable intensified training to determine if commonly used diagnostic markers of overtraining parallel changes in physical performance and thus overtraining status. Eight trained male cyclists (24 ± 1 years, 71 ± 3 kg, VO2peak = 4.5 ± 0.1·L·min?¹) performed 21 days (3,211 km) of intensified training in the field where volume and intensity were increased over normal training. Salivary IgA, testosterone, and cortisol, 1-hour time trial performance, heart rate response, and profile of mood states (POMS) were collected and analyzed throughout the 21-day training period. The POMS category vigor declined from day 1 to day 4 and remained lower throughout (p

Effects of a concurrent strength and endurance training on running performance and running economy in recreational marathon runners.

Ferrauti A, Bergermann M, Fernandez-Fernandez J .: Journal of strength and conditioning research / National Strength & Conditioning Association, 2010, 24(10):2770-8.
Department of Coaching Science, Faculty of Sports Science, Ruhr-University, Bochum, Germany.

The purpose of this study was to investigate the effects of a concurrent strength and endurance training program on running performance and running economy of middle-aged runners during their marathon preparation. Twenty-two (8 women and 14 men) recreational runners (mean ± SD: age 40.0 ± 11.7 years; body mass index 22.6 ± 2.1 kg·m?²) were separated into 2 groups (n = 11; combined endurance running and strength training program [ES]: 9 men, 2 women and endurance running [E]: 7 men, and 4 women). Both completed an 8-week intervention period that consisted of either endurance training (E: 276 ± 108 minute running per week) or a combined endurance and strength training program (ES: 240 ± 121-minute running plus 2 strength training sessions per week [120 minutes]). Strength training was focused on trunk (strength endurance program) and leg muscles (high-intensity program). Before and after the intervention, subjects completed an incremental treadmill run and maximal isometric strength tests. The initial values for VO2peak (ES: 52.0 ± 6.1 vs. E: 51.1 ± 7.5 ml·kg?¹·min?¹) and anaerobic threshold (ES: 3.5 ± 0.4 vs. E: 3.4 ± 0.5 m·s?¹) were identical in both groups. A significant time × intervention effect was found for maximal isometric force of knee extension (ES: from 4.6 ± 1.4 to 6.2 ± 1.0 N·kg?¹, p

Metabolic factors limiting performance in marathon runners.

Rapoport BI.: PLoS computational biology, 2010 (10):e1000960. States M.D.- Ph.D. Program, Harvard Medical School, Boston, Massachusetts, United States of America.

Each year in the past three decades has seen hundreds of thousands of runners register to run

a major marathon. Of those who attempt to race over the marathon distance of 26 miles and 385 yards (42.195 kilometers), more than two-fifths experience severe and performance-limiting depletion of physiologic carbohydrate reserves (a phenomenon known as 'hitting the wall'), and thousands drop out before reaching the finish lines (approximately 1-2% of those who start). Analyses of endurance physiology have often either used coarse approximations to suggest that human glycogen reserves are insufficient to fuel a marathon (making 'hitting the wall' seem inevitable), or implied that maximal glycogen loading is required in order to complete a marathon without 'hitting the wall.' The present computational study demonstrates that the energetic constraints on endurance runners are more subtle, and depend on several physiologic variables including the muscle mass distribution, liver and muscle glycogen densities, and running speed (exercise intensity as a fraction of aerobic capacity) of individual runners, in personalized but nevertheless quantifiable and predictable ways. The analytic approach presented here is used to estimate the distance at which runners will exhaust their glycogen stores as a function of running intensity. In so doing it also provides a basis for guidelines ensuring the safety and optimizing the performance of endurance runners, both by setting personally appropriate paces and by prescribing midrace fueling requirements for avoiding 'the wall.' The present analysis also sheds physiologically principled light on important standards in marathon running that until now have remained empirically defined: The qualifying times for the Boston Marathon.

Effects of dynamic stretching on energy cost and running endurance performance in trained male runners. Zourdos MC, Wil son JM, Sommer BA, Lee SR, Park YM, Henning PC, Panton LB, Kim JS

Journal of strength and conditioning research / National Strength & Conditioning Association

26(2):335-41, 2012 Zourdos, MC, Wilson, JM, Sommer, BA, Lee, S-R, Park, Y-M, Henning, PC, Panton, LB, and Kim, J-S. Effects of dynamic stretching on energy cost and running endurance performance in trained male runners. J Strength Cond Res 26(2): 335-341, 2012-The purpose of this study was to examine the effects of dynamic stretching on running

energy cost and endurance performance in trained male runners. Fourteen male runners performed both a 30-minute preload run at 65% &OV0312;O2max and a 30-minute time trial to assess running energy cost and performance, respectively. The subjects repeated both the trials after either 15 minutes of dynamic stretching (i.e., experimental condition) or quiet sitting (i.e., control condition) while the order was balanced between the subjects to avoid any order effect. The total calories expended were determined for the 30-minute preload run, whereas the distance covered was measured in the time trial. Average resting &OV0312;O2 increased significantly (p

Effect of cold acclimatization on exercise economy in the cold. Muller MD, Kim CH, Bellar DM, Ryan EJ, Seo Y, Muller SM, Glickman EL.

European journal of applied physiology

112(2):795-800, 2012 We sought to determine if cold acclimatized men display higher economy (i.e. lower oxygen consumption at a given workload) during graded cycle ergometry in the cold (5°C). After completing a familiarization trial 1 week prior, five cold weather athletes (CWA) and eight physically active men (NON) underwent graded exercise tests to volitional fatigue in 5°C. The protocol always started at 60 W and increased by 20 W each minute. Oxygen consumption (VO(2)), respiration rate (RR), tidal volume (TV), and respiratory exchange ratio (RER) were determined via open circuit spirometry. Individuals were matched for body size and minutes of weekly physical activity. Repeated measures analyses of variance were conducted across time (workload) and cold acclimatization was entered as a between subjects factor. VO(2) peak was not different between groups but CWA had lower VO(2) at 60 and 240 W. CWA also had lower RR at 180 and 260 W as well as lower RER at 240 and 260 W. At submaximal workloads, cold acclimatized men have higher exercise economy than non-acclimatized men. This could have implications for those who work in this context.

Dry-Land Strength Training vs. Electrical Stimulation in Sprint Swimming Performance. Girold S, Jalab C, Bernard O, Carette P, Kemoun G, DuguÃ© B.

Journal of strength and conditioning research / National Strength & Conditioning Association

26(2):497-505, 2012 Dry-land strength training vs. electrical stimulation in sprint swimming performance. J Strength Cond Res 26(2): 497-505, 2012-This study was undertaken to compare the effects of dry-land strength training vs. an electrical stimulation program on swimmers. Twenty-four national-level swimmers were randomly assigned to 3 groups: the dry-land strength training program (S), the electrical stimulation training program (ES), and the control (C) group. The training program lasted 4 weeks. The subjects were evaluated before the training, at the end of the training program, and 4 weeks later. The outcome values ascertained were peak torque during arm extension at different velocities (from -60 to 180°·s) using an isokinetic dynamometer and performance, stroke rate, and stroke length during a 50-m front crawl. A significant increase in swimming velocity and peak torque was observed for both S and ES at the end of the training and 4 weeks later. Stroke length increased in the S group but not in the ES group. However, no significant differences in swimming velocity between S and ES groups were observed. No significant changes occurred in the C group. Programs combining swimming training with dry-land strength or electrical stimulation programs led to a similar gain in sprint performance and were more efficient than swimming alone.

Differences in adaptations to 1 year of aerobic endurance training: individual patterns of nonresponse. Scharhag-Rosenberger F, Walitzek S, Kindermann W, Meyer T

Scandinavian journal of medicine & science in sports

22(1):113-8, 2012.Lacking responses to endurance training (ET) have been observed for several variables. However, detailed analyses of individuals' responses are scarce. To learn

more about the variability of ET adaptations, patterns of response were analyzed for each subject in a 1-year ET study. Eighteen participants [42±5 years, body mass index: 24±3 kg/m(2) , maximal oxygen uptake (VO(2max)): 38±5 mL/min/kg] completed a 1-year jogging/walking program on 3 days/week, 45 min/session at 60% heart rate (HR) reserve. VO(2max) , resting HR (rHR), exercise HR (eHR) and individual anaerobic threshold (IAT) were determined by treadmill and cycling ergometry respectively. Intraindividual coefficients of variation were extracted from the literature to distinguish random changes from training responses. Eight participants showed improvements in all variables. In 10 participants, one or two variables did not improve (VO(2max) , rHR, eHR and IAT remained unchanged in four, four, three and one cases, respectively). At least one variable improved in each subject. Data indicate that ET adaptations might be detected in each individual using multiple variables of different adaptation levels and intensity domains. Nonresponse seems to occur frequently and might affect all variables. Further studies should investigate whether nonresponders improve with altered training. Furthermore, associations between patterns of nonresponse and health benefits from ET are worth considering.

Cold water immersion recovery after simulated collision sport exercise. Pointon M, Duffield R

Medicine and science in sports and exercise

44(2):206-16, 2012 **PURPOSE:** This investigation examined the effects of cold water immersion (CWI) recovery after simulated collision sport exercise.

METHODS: Ten male rugby athletes performed three sessions consisting of a 2 × 30-min intermittent-sprint exercise (ISE) protocol with either tackling (T) or no tackling (CONT), followed by a 20-min CWI intervention (TCWI) or passive recovery (TPASS and CONT) in a randomized order. The ISE consisted of a 15-m sprint every minute separated by self-paced bouts of hard running, jogging, and walking for the remainder of the minute. Every sixth

rotation, participants performed 5 × 10-m runs, receiving a shoulder-led tackle to the lower body on each effort. Sprint time and distance covered during ISE were recorded, with voluntary (maximal voluntary contraction; MVC) and evoked neuromuscular function (voluntary activation; VA), electromyogram (root mean square (RMS)), ratings of perceived muscle soreness (MS), capillary and venous blood markers for metabolites and muscle damage, respectively measured before and after exercise, immediately after recovery, and 2 and 24 h after recovery.

RESULTS: Total distance covered during exercise was significantly greater in CONT (P = 0.01), without differences between TPASS and TCWI (P > 0.05). TCWI resulted in increased MVC, VA, and RMS immediately after recovery (P

CONCLUSIONS: The introduction of body contact reduces exercise performance, whereas the use of CWI results in a faster recovery of MVC, VA, and RMS and improves muscle contractile properties and perceptions of soreness after collision-based exercise.

Analysis of repeated high-intensity running performance in professional soccer. Carling C, Le Gall F, Dupont G

201202,

Journal of sports sciences

30(4):325-36 Abstract The aims of this study were twofold: (1) to characterize repeated high-intensity movement activity profiles of a professional soccer team in official match-play; and (2) to inform and verify the construct validity of tests commonly used to determine repeated-sprint ability in soccer by investigating the relationship between the results from a test of repeated-sprint ability and repeated high-intensity performance in competition.
High-intensity running performance (movement at velocities >19.8 km · h(-1) for a minimum of

1 s duration) was measured in 20 players using computerized time-motion analysis. Performance in 80 French League 1 matches was analysed. In addition, 12 of the 20 players performed a repeated-sprint test on a non-motorized treadmill consisting of six consecutive 6 s sprints separated by 20 s passive recovery intervals. In all players, most consecutive high-intensity actions in competition were performed after recovery durations =61 s, recovery activity separating these efforts was generally active in nature with the major part of this spent walking, and players performed 1.1 ± 1.1 repeated high-intensity bouts (a minimum of three consecutive high-intensity bouts with a mean recovery time =20 s separating efforts) per game. Players reporting lowest performance decrements in the repeated-sprint ability test performed more high-intensity actions interspersed by short recovery times (=20 s, P 0.05) was found between the reached distance and the anthropometric properties. There was also no significant association between the reached distance with the weekly training hours, running years, the number of finished marathons and the number of finished 24-h runs. The reached distance was significantly (p .05) except that total eccentric work increased in groups 1 and 3 but decreased in group 2 at 180 degrees during the full can (P .05). Internal-rotation values at 60 and 180 degrees decreased for both peak torque and total work for all groups. External-rotation peak torque and total work at 60 degrees increased for group 1. External-rotation peak torque and total work at 180 degrees increased for all groups.
Conclusions
: The
Results
indicate that a jump-rope training program is a good conditioning method for overhead athletes because of its potential benefits to shoulder strength.

Acute effects of different warm-up methods on sprint, slalom dribbling, and penalty kick performance in soccer players.

Gelen E.: Journal of Strength and Conditioning research / National Strength & Conditioning Association

201004 24(4):950-6. Sakarya University, School of Physical Education and Sport, Sakarya, Turkey.

Although pre-event static stretching is an accepted practice in most athletics program, pre-event dynamic exercise is becoming popular. The purpose of this study was to compare the acute effects of different warm-up methods on soccer performance. Twenty-six professional soccer players (23.3 +/- 3.2 years, 178.2 +/- 6.1 cm, and 73.0 +/- 6.5 kg) performed 4 different warm-up routines in random order on nonconsecutive days. The warm-up methods consisted of only 5 minutes of jogging (Method A), 5 minutes of jogging and static stretching (Method B), 5 minutes of jogging and dynamic exercise (Method C), and 5 minutes of jogging and a combination of static stretching and dynamic exercise (Method D). After each warm-up session, subjects were tested on the sprint, slalom dribbling, and penalty kick performance. Methods A-D were compared by repeated-measures analyses of variance and post hoc comparisons. In this study, existence of a significant drop in sprint, slalom dribbling, and penalty kick performances of Method C has been determined in comparison with that of Method A (p

Whole-body vibration training effects on the physical performance of basketball players.

Colson SS, Pensini M, Espinosa J, Garrandes F, Legros P.: Journal of Strength and Conditioning Research / National Strength & Conditioning Association, 2010-04 24(4):999-1006.
Laboratory of Human Motricity, Education and Health, University of Nice-Sophia Antipolis, Nice Cedex 03, France.

The aim of this study was to investigate the influence of 4 weeks of whole-body vibration training added to the conventional training of basketball players. Eighteen competitive basketball players (13 male symbol, 5 female symbol, 18-24 years old) were randomly assigned to a whole-body vibration group (WBVG, n = 10; 7 male symbol and 3 female symbol) or a control group (CG, n = 8; 6 male symbol and 2 female symbol). During the 4-week period, all subjects maintained their conventional basketball training program. The members of WBVG

were additionally trained 3 times a week for 20 minutes on a vibration platform (10 unloaded static lower limb exercises, 40-Hz, 4-mm, Silverplate). Testing was performed before and after the 4-week period and comprised strength assessment, vertical jump performance, and a 10-m sprint test. The maximal voluntary isometric strength of the knee extensors significantly increased (p

Talent identification and promotion programmes of Olympic athletes.

Vaeyens R, Güllich A, Warr CR, Philippaerts R.: Journal of Sports Sciences, 2009-11 27(13):1367-80. Department of Movement and Sports Sciences, Faculty of Medicine and Health Sciences, Ghent University, B-9000 Ghent, Belgium.

The start of a new Olympic cycle offers a fresh chance for individuals and nations to excel at the highest level in sport. Most countries attempt to develop systematic structures to identify gifted athletes and to promote their development in a certain sport. However, forecasting years in advance the next generation of sporting experts and stimulating their development remains problematic. In this article, we discuss issues related to the identification and preparation of Olympic athletes. We provide field-based data suggesting that an earlier onset and a higher volume of discipline-specific training and competition, and an extended involvement in institutional talent promotion programmes, during adolescence need not necessarily be associated with greater success in senior international elite sport. Next, we consider some of the promising methods that have been (recently) presented in the literature and applied in the field. Finally, implications for talent identification and promotion and directions for future research are highlighted.

Single vs. multiple sets of resistance exercise for muscle hypertrophy: a

meta-analysis.

Krieger JW.: Journal of Strength and Conditioning Research / National Strength & Conditioning Association, 2010-04 24(4):1150-9. Journal of Pure Power, Colorado Springs, CO, USA

Previous meta-analyses have compared the effects of single to multiple sets on strength, but analyses on muscle hypertrophy are lacking. The purpose of this study was to use multilevel meta-regression to compare the effects of single and multiple sets per exercise on muscle hypertrophy. The analysis comprised 55 effect sizes (ESs), nested within 19 treatment groups and 8 studies. Multiple sets were associated with a larger ES than a single set (difference = 0.10 +/- 0.04; confidence interval [CI]: 0.02, 0.19; p = 0.016). In a dose-response model, there was a trend for 2-3 sets per exercise to be associated with a greater ES than 1 set (difference = 0.09 +/- 0.05; CI: -0.02, 0.20; p = 0.09), and a trend for 4-6 sets per exercise to be associated with a greater ES than 1 set (difference = 0.20 +/- 0.11; CI: -0.04, 0.43; p = 0.096). Both of these trends were significant when considering permutation test p values (p

Physiological monitoring of the Olympic athlete.

Davison RR, Van Someren KA, Jones AM.: Journal of Sports Sciences, 2009-11 27(13):1433-42. School of Life Sciences, Edinburgh Napier University, Edinburgh EH10 5DT, UK.

As the winning margin in Olympic competition is so small, there is a continuous quest for improvements in the preparation of athletes at this standard. Therefore, even the smallest physiological improvements that result from modifications in training strategy, preparation regime or ergogenic aids are potentially useful. Unfortunately, there is a lack of research data on elite competitors, which limits our interpretation of current literature to the elite sporting environment. This places extra responsibility on the physiologist to carefully consider the most appropriate physiological variables to monitor, the best protocols to assess those variables, and

the accurate interpretation of the test results. In this paper, we address the key issues of ecological validity, measurement error, and interpretation for the most commonly monitored physiological variables. Where appropriate, we also indicate areas that would benefit from further research.

Percentile values for running sprint field tests in children ages 6-17 years: influence of weight status.

Castro-Piñero J, González-Montesinos JL, Keating XD, Mora J, Sjöström M, Ruiz JR.: Research Quarterly for Exercise and Sport, 2010-06
81(2):143-51.
Department of Physical Education, University of Cadiz, Puerto Real, Spain.

The aim of this study was to provide percentile values for six different sprint tests in 2,708 Spanish children (1,234 girls) ages 6-17.9 years. We also examined the influence of weight status on sprint performance across age groups, with a focus on underweight and obese groups. We used the 20-m, 30-m, and 50-m running sprint standing start and running start tests to assess sprint performance. We calculated body mass index (BMI) using and categorized participants according to the BMI international cut-off for underweight, normal weight, overweight, and obese. Boys had significantly better scores than girls in all tests, except for the 30-m running sprint standing start and running start tests in the 6-7 year-old group. The underweight group had significantly better scores than their obese counterparts, whereas there were similar levels between underweight and normal weight individuals. The normal weight group showed a significantly better performance than their overweight and obese counterparts. Overweight boys had significantly better performance than their obese counterparts. In conclusion, the percentiles values of six running tests varied by age and gender The findings indicated that underweight youth did not have poorer sprint performance, and the obese group had lower scores than their leaner counterparts.

The influence of posture on transmission and absorption of vibration energy in whole body vibration exercise

Berschin G, Sommer HM.: Sportverletzung Sportschaden : Organ der Gesellschaft für Orthopädisch-Traumatologische Sportmedizin, 2010-03 24(1):36-9.
Institut für Sportwissenschaft und Motologie, Abteilung Sportmedizin, Philipps-Universität Marburg, Marburg.

Muscle exercise using whole body vibration platforms is well known as an alternative physical exercise in therapy as well as in high performance sports. Various studies could show an effectiveness in particular to improve maximal strength and springiness. Using these platforms there is no consideration to posture although the damage potential of vibration stress i. e. on intervertebral discs is well-known. Therefore the effect of posture on the transmission and absorption of vibration loads in bipedal standing was examined in a study with 20 sport students. They were exposed to a whole body vibration load in bipedal standing at a vibration frequency of 25 Hz. The transmission of energy was measured at the head in different postural positions. An average transmission of 9 % was measured in spontaneous bipedal standing. It significantly decreased with gradual changes of posture. After 6 weeks posture conditioning exercise this effect was significantly improved. In conclusion different posture in bipedal standing implies not only different energy absorption but also different effects on muscle performance which can explain the partly inconsistent results after vibration exercise. In addition whole body vibration exercise in a prone or sitting position may increase the risk of overload and should be avoided because of reduced energy absorption capacity.

Work-rate of substitutes in elite soccer: a preliminary study.

Carling C, Espié V, Le Gall F, Bloomfield J, Jullien H.: Journal of Science and Medicine in Sport / Sports Medicine Australia, 2010, 13(2):253-5.Ecole des Métiers du Sport Professionnel, LOSC Lille Métropole Football Club, Centre de Formation, Domain de Luchin, Camphin-en-Pévèle, France.

The aim of this study was to investigate the work-rate of substitutes in professional soccer. A computerised player tracking system was used to assess the work-rates of second-half substitutes (11 midfielders and 14 forwards) in a French Ligue 1 club. Total distance, distance covered in five categories of movement intensity and recovery time between high-intensity efforts were evaluated. First- and second-half work-rates of the replaced players were compared. The performance of substitutes was compared to that of the players they replaced, to team-mates in the same position who remained on the pitch after the substitution and in relation to their habitual performances when starting games. No differences in work-rate between first- and second-halves were observed in all players who were substituted. In the second-half, a non-significant trend was observed in midfield substitutes who covered greater distances than the player they replaced whereas no differences were observed in forwards. Midfield substitutes covered a greater overall distance and distance at high-intensities (p 0.05) among any of the stretching protocols NS (129.7 +/- 3.3 kg), LVPNFS (128.9 +/- 3.8 kg), HVPNFS (128.3 +/- 3.7 kg), LVSS (129.7 +/- 3.7 kg), and HVSS (128.2 +/- 3.7 kg). We conclude that low- and high-volume PNF and static stretching have no significant acute effect on 1RM bench press in resistance-trained collegiate football players. This suggests that resistance-trained athletes can include either (a) a dynamic warm-up with no stretching or (b) a dynamic warm-up in concert with low- or high-volume static or PNF flexibility exercises before maximal upper body isotonic resistance-training lifts, if adequate rest is allowed before performance.

Effect of squatting on sprinting performance and repeated exposure to complex training in male rugby players.

Comyns TM, Harrison AJ, Hennessy LK.: Journal of Strength and Conditioning Research /

National Strength & Conditioning Association, 201003
24(3):610-8.
Strength and Conditioning Department, Irish Rugby Football Union, Dublin 4, Ireland.

This study was undertaken to examine the effect of a heavy weight training exercise on sprinting performance and on the effect of repeated exposure to a complex training protocol. Eleven male rugby union players (age 20.9 +/- 3.1 years) participated in the study, which involved 5 separate testing sessions. Back squat 3 repetition maximum (3RM) was established in session 1. Sessions 2-5 were identical and involved the subjects completing a 30-m sprint before and after a 3RM back squat protocol. Four minutes of rest was given between the back squatting and the posttest 30-m sprint. All sprint trials were measured with a laser measurement device (LAVEG, Jenoptik, Jena, Germany). Sprint time and instantaneous, average, and maximum velocity were the dependent variables. The criterion for significance was set at an alpha level of p > or = 0.05. No significant improvement was evident for any of the testing sessions (p > or = 0.05). In session 1, there was a significant increase in 30-m time and a significant reduction in average 30-m velocity and maximum velocity (p

Is hypoxia training good for muscles and exercise performance?

Vogt M, Hoppeler H.: Progress in Cardiovascular Diseases, 2010 May-Jun 52(6):525-33 Depart ment of Anatomy, University of Bern, CH-3012 Bern, Switzerland.

Altitude training has become very popular among athletes as a means to further increase exercise performance at sea level or to acclimatize to competition at altitude. Several approaches have evolved during the last few decades, with "live high-train low" and "live low-train high" being the most popular. This review focuses on functional, muscular, and practical aspects derived from extensive Research on the "live low-train high" approach. According to this, subjects train in hypoxia but remain under normoxia for the rest of the time. It has been reasoned that exercising in hypoxia could increase the training stimulus. Hypoxia training studies published in the past have varied considerably in altitude (2300-5700 m) and training duration (10 days to 8 weeks) and the fitness of the subjects. The evidence from muscle structural, biochemical, and molecular findings point to a specific role of hypoxia in endurance training. However, based on the available performance capacity data such as maximal oxygen uptake (Vo(2)max) and (maximal) power output, hypoxia as a supplement to training is not

consistently found to be advantageous for performance at sea level. Stronger evidence exists for benefits of hypoxic training on performance at altitude. "Live low-train high" may thus be considered when altitude acclimatization is not an option. In addition, the complex pattern of gene expression adaptations induced by supplemental training in hypoxia, but not normoxia, suggest that muscle tissue specifically responds to hypoxia. Whether and to what degree these gene expression changes translate into significant changes in protein concentrations that are ultimately responsible for observable structural or functional phenotypes remains open. It is conceivable that the global functional markers such as Vo(2)max and (maximal) power output are too coarse to detect more subtle changes that might still be functionally relevant, at least to high-level athletes.

Variation in human performance in the hypoxic mountain environment.

Martin DS, Levett DZ, Grocott MP, Montgomery HE.: Experimental Physiology, 201003 95(3):463-70.
UCL Institute for Human Health and Performance, 2nd Floor, Charterhouse Building, UCL Archway Campus, Highgate Hill, Archway, London N19 5LW, UK.

Ascent to altitude is associated with a fall in barometric pressure, and with it a decline in the partial pressure of atmospheric (and thus alveolar) oxygen. As a result, a variety of adaptive physiological processes are engaged to mitigate the fall in tissue convective oxygen delivery which might otherwise occur. The magnitude and nature of such changes is also modified with time, a process known as acclimatization. However, other phenomena are at work; the ability to perform physical work at altitude falls in a manner which is not wholly related to changes in arterial oxygen content. Indeed, alterations in local skeletal muscle blood flow and metabolism may play an axial role. Thus, for those who are not native to high altitude, the ability to compete at altitude is likely to be impaired. The magnitude of such impairment in performance, however, differs greatly between individuals, and it seems that genetic variation underpins much of this difference. The identification of the relevant genetic elements is in its infancy in humans, but ongoing work is likely to help us gain an increasing understanding of how humans adapt to altitude and to develop mitigating interventions.

Watching a previous victory produces an increase in testosterone among elite hockey players.

Carré JM, Putnam SK.: Psychoneuroendocrinology, 201004 35(3):475-9. Department of Psychology, Brock University, St Catharines, Ontario, Canada.

Previous Research indicates that testosterone concentrations are highly responsive to human competitive interactions and that winners have elevated testosterone concentrations relative to losers. Also, there is some evidence that simply observing others compete can have a similar effect on the endocrine system. Here, in two studies, we examined the extent to which elite male hockey players would demonstrate an increase in testosterone concentrations after watching themselves engaged in a previous successful competitive interaction. Results indicated that watching a previous victory produced a significant increase in testosterone concentrations (42-44% increase), whereas watching a previous defeat or a neutral video did not produce a significant change in testosterone (17% and 6%, respectively). Given that natural fluctuations in testosterone have been shown to influence future competitive and aggressive behaviours, the current studies may have important practical implications for individuals involved in competitive sports.

Young tennis players and balance performance.

Malliou VJ, Beneka AG, Gioftsidou AF, Malliou PK, Kallistratos E, Pafis GK, Katsikas CA, Douvis S

Journal of Strength and Conditioning Research / National Strength & Conditioning Association

201002 24(2):389-93. Department of Physical Education & Sports Science, National & Kapodistrian University of Athens, Athens, Greece.

The Purpose of the present study was to investigate the effect of a tennis training session on the balance performance of young tennis players. The study was conducted on 36 elite tennis players (age 14 +/- 2 years; body mass 55 +/- 6 kg; body height 165 +/- 6 cm; mean +/- SD) participating in the national young tennis championship. Balance performance was assessed before and immediately after a tennis training session (pre-training and post-training, respectively). The balance assessment was performed with 2 different balance boards and the Biodex Stability System. In addition, dynamometric measurements of peak isokinetic moment in the knee flexors and extensors were performed pre and post tennis training session, to quantify the degree of muscle fatigue induced by the tennis training session. One-way analysis of variance with repeated measures was used to test for differences in balance performance and in isokinetic performance between pre and post tennis training session. The data analysis revealed no significant differences ($p > 0.05$) in balance performance, whereas there were significant differences in knee joint moment production between pre and post tennis training measures. Although the tennis training session of the present study had no significant effect ($p > 0.05$) on any of the balance performance indicators examined, there was a decline in balance performance, which suggests that different level of fatigue for an extended period (games) will have greater effect on balance performance. It is suggested that a tennis-specific balance exercise program should be included in the tennis training session.

Upper-body Strength and power changes during a football season.

Hrysomallis C.: Journal of Strength and Conditioning Research / National Strength & Conditioning Association, 201002 24(2):557-9. Centre for Ageing, Rehabilitation, Exercise and Sport, Victoria University, Melbourne, Australia.

There are different football codes played around the world, and most of them involve contact and collision during competition. Upper-body Strength and power are important for success in American football, rugby league, rugby union, and Australian football. The goal of the preseason Conditioning program is usually to maximize muscular fitness before the competitive season. The in-season program is usually intended to maintain the preseason gains, but it is unclear as to whether the preseason levels of upper-body Strength and power can be maintained or even increased during the in-season. The aims of this review were to investigate and identify any general trends in the training programs and results of football studies that have monitored levels of upper-body Strength and power preseason, in-season, or postseason. Six studies were

identified: 4 involved American college football and the other 2 involved rugby codes and included professional athletes. For most studies, resistance training was conducted 4 times per week preseason and reduced to 2 times per week in-season. The bench press exercise was used as the measure of upper-body strength, and only one of the rugby studies measured upper-body power and used bench press throws. It was found that upper-body Strength or power could be maintained or even increased past the mid-season point, but this may be dependent on age, football code, and level of play. At the end of the season, decreases were starting to be reported but only for 2 studies. Surprisingly, an increase in Strength was reported postseason for college rugby league players. From the available information, it seems that an in-season periodized program that includes high-intensity resistance training may optimize Strength and power ability during the in-season, but more Research is required that compares the effectiveness of Conditioning programs with varying combinations of training variables.

Early-phase resistance training Strength gains in novice lifters are enhanced by doing static stretching.

Kokkonen J, Nelson AG, Tarawhiti T, Buckingham P, Winchester JB.: Journal of Strength and Conditioning Research / National Strength & Conditioning Association, 201002 24(2):502-6. Exercise and Sport Science Department, Brigham Young University-Hawaii, Laie, Hawaii, USA.

This study investigated differences in lower-body Strength improvements when using standard progressive resistance training (WT) vs. the same progressive resistance training combined with static stretching exercises (WT + ST). Thirty-two college students (16 women and 16 men) were pair matched according to sex and knee extension 1 repetition maximum (1RM). One person from each pair was randomly assigned to WT and the other to WT + ST. WT did 3 sets of 6 repetitions of knee extension, knee flexion, and leg press 3 days per week for 8 weeks with weekly increases in the weight lifted. The WT + ST group performed the same lifting program as the WT group along with static stretching exercises designed to stretch the hip, thigh, and calf muscle groups. Stretching exercise sessions were done twice a week for 30 minutes during the 8-week period. WT significantly (p

Game-induced fatigue patterns in elite female soccer.

Krustrup P, Zebis M, Jensen JM, Mohr M.: Journal of Strength and Conditioning Research / National Strength & Conditioning Association, 201002
24(2):437-41.
Department of Exercise and Sport Sciences, University of Copenhagen, Copenhagen, Denmark.

The Purpose was to examine the fatigue pattern of elite female soccer players after competitive games. Soccer players (n = 23) from the Danish women Premier League performed a countermovement vertical jump test, a repeated 30-m sprint test, and the Yo-Yo intermittent endurance level 2 (Yo-Yo IE2) test at rested state and after a competitive game. Average heart rate during the game was 86 +/- 1% of maximal heart rate with no differences between halves. Blood lactate was 5.1 +/- 0.5 mmol.L after the first half, which was higher (p

Effects of simulated and real altitude exposure in elite swimmers.

Robertson EY, Aughey RJ, Anson JM, Hopkins WG, Pyne DB.: Journal of Strength and Conditioning Research / National Strength & Conditioning Association, 201002
24(2):487-93.
Department of Physiology, Australian Institute of Sport, Canberra, Australia.

The effect of repeated exposures to natural and simulated moderate altitude on Physiology and competitive performance of elite athletes warrants further investigation. This study quantified changes in hemoglobin mass, performance tests, and competitive performance of elite swimmers undertaking a coach-prescribed program of natural and simulated altitude training.

Nine swimmers (age 21.1 +/- 1.4 years, mean +/- SD) completed up to four 2-week blocks of combined living and training at moderate natural altitude (1,350 m) and simulated live high-train low (2,600-600 m) altitude exposure between 2 National Championships. Changes in hemoglobin mass (Hbmass), 4-mM lactate threshold velocity, and 2,000 m time trial were measured. Competition performance of these swimmers was compared with that of 9 similarly trained swimmers (21.1 +/- 4.1 years) who undertook no altitude training. Each 2-week altitude block on average produced the following improvements: Hbmass, 0.9% (90% confidence limits, +/-0.8%); 4-mM lactate threshold velocity, 0.9% (+/-0.8%); and 2,000 m time trial performance, 1.2% (+/-1.6%). The increases in Hbmass had a moderate correlation with time trial performance (r = 0.47; +/-0.41) but an unclear correlation with lactate threshold velocity (r = -0.23; +/-0.48). The altitude group did not swim faster at National Championships compared with swimmers who did not receive any altitude exposure, the difference between the groups was not substantial (-0.5%; +/-1.0%). A coach-prescribed program of repeated altitude training and exposure elicited modest changes in Physiology but did not substantially improve competition performance of elite swimmers. Sports should investigate the efficacy of their altitude training program to justify the investment.

Effect of in- versus out-of-water recovery on repeated swimming sprint performance.

Buchheit M, Al Haddad H, Chivot A, Leprêtre PM, Ahmaidi S, Laursen PB

European Journal of Applied Physiology, 201001 108(2):321-7 Research Laboratory, EA 3300, Laboratory of Exercise Physiology and Rehabilitation, Faculty of Sport Sciences, University of Picardie, Jules Verne, 80025, Amiens, France.

The aim of this study was to compare the effect of passive in- (IN) versus out-of-(OUT) water recovery on performance during repeated maximal sprint swimming. Nine well-trained male swimmers (21 +/- 3.5 years) performed six repeated maximal 50-m sprints (RS), departing every 2 min, interspersed with either IN or OUT recovery. Best (RS(b)) and mean (RS(m)) RS times, percentage speed decrement (%Dec) and between-sprint heart rate recovery (HRR(80s))

were calculated for both conditions. Blood lactate was measured after the third ([La](b) S3) and sixth sprints (post [La](b)). Rating of perceived recovery level (REC) and exertion (RPE) were collected before and after each sprint. Repeated sprint performance was significantly lower in the OUT condition (i.e., for RS(m), P = 0.02, +1.3%, 90% CI -0.7, 3.2%). OUT was also associated with poorer HRR(80s) (P

Acute alcohol consumption aggravates the decline in muscle performance following strenuous eccentric exercise.

Barnes MJ, Mündel T, Stannard SR.: Journal of Science and Medicine in sport / Sports Medicine Australia, 201001 13(1):189-93. Institute of Food, Nutrition, and Human Health, Massey University, Palmerston North, New Zealand.

This study investigated the effects of acute moderate alcohol intake on muscular performance during recovery from eccentric exercise-induced muscle damage. Eleven healthy males performed 300 maximal eccentric contractions of the quadriceps muscles of one leg on an isokinetic dynamometer. They then consumed a beverage containing 1g/kg bodyweight ethanol (as vodka and orange juice) (ALC). On another occasion they performed an equivalent bout of eccentric exercise on the contralateral leg after which they consumed an isocaloric quantity of orange juice (OJ). Measurement of maximal isokinetic (concentric and eccentric) and isometric torque produced across the knee, plasma creatine kinase (CK) concentrations and muscle soreness were made before and at 36 and 60h following each exercise bout. All measures of muscle performance were significantly reduced at 36 and 60h post-exercise compared to pre-exercise measures (all p0.05). These results indicate that consumption of even moderate amounts of alcohol following eccentric-based exercise magnifies the normally observed losses in dynamic and static strength. Therefore, to minimise exercise related losses in muscle function and expedite recovery, participants in sports involving eccentric muscle work should avoid alcohol-containing beverages in the post-event period.

Neuromuscular fatigue induced by an isotonic heavy-resistance loading protocol in knee extensors.

Walker S, Peltonen J, Ahtiainen JP, Avela J, Hakkinen K.: Journal of Sports Sciences, 200910 27(12):1271-9.
Department of Biology of Physical Activity, University of Jyvaskyla, Jyvaskyla, Finland.

The main aim of this study was to assess neuromuscular fatigue during a typical high-load, low-repetition loading protocol. Muscle stimulations were used to assess maximum voluntary contraction, resting single- and double-pulse twitch characteristics, and superimposed double-pulse twitch force (used to calculate voluntary activation) before and after an acute knee extension loading protocol. In our participants, who had previous resistance training experience, the mean voluntary activation level was 96.2% in an unfatigued state. Maximum voluntary contraction (-11.8%), resting double-pulse twitch force (-10.6%), and voluntary activation (-2.1%) were markedly decreased as a consequence of loading (P

Modificado em 17 de Junho de 2010

Usefulness of the jump-and-reach test in assessment of vertical jump performance.

Menzel HJ, Chagas MH, Szmuchrowski LA, Araujo SR, Campos CE, Giannetti MR.: Perceptual and Motor Skills, 2010,
110(1):150-8.
School of Physical Education, Physiotherapy and Occupational Therapy Federal University of Minas Gerais, Belo Horizonte, Brazil.

The objective was to estimate the reliability and criterion-related validity of the Jump-and-Reach Test for the assessment of squat, countermovement, and drop jump performance of 32 male Brazilian professional volleyball players. Performance of squat, countermovement, and drop jumps with different dropping heights was assessed on the Jump-and-Reach Test and the measurement of flight time, then compared across different jump trials. The very high reliability coefficients of both assessment Methods and the lower correlation coefficients between scores on the assessments indicate a very high consistency of each method but only moderate covariation, which means that they measure partly different items. As a consequence, the Jump-and-Reach Test has good ecological validity in situations when reaching height during the flight phase is critical for performance (e.g., basketball and volleyball) but only limited accuracy for the assessment of vertical impulse production with different jump techniques and conditions.

Respiratory muscle endurance training: effect on normoxic and hypoxic exercise performance.

Keramidas ME, Debevec T, Amon M, Kounalakis SN, Simunic B, Mekjavic IB.: European Journal of Applied Physiology, 2010,
108(4):759-69.
Department of Automation, Biocybernetics and Robotics, Jozef Stefan Institute, Jamova 39, 1000 Ljubljana, Slovenia.

The aim of this study was to investigate the effect of respiratory muscle endurance training on endurance exercise performance in normoxic and hypoxic conditions. Eighteen healthy males were stratified for age and aerobic capacity; and randomly assigned either to the respiratory

muscle endurance training (RMT = 9) or to the control training group (CON = 9). Both groups trained on a cycle-ergometer 1 h day(-1), 5 days per week for a period of 4 weeks at an intensity corresponding to 50% of peak power output. Additionally, the RMT group performed a 30-min specific endurance training of respiratory muscles (isocapnic hyperpnea) prior to the cycle ergometry. Pre, Mid, Post and 10 days after the end of training period, subjects conducted pulmonary function tests (PFTs), maximal aerobic tests in normoxia (VO(2max)NOR), and in hypoxia (VO(2max)HYPO; F(I)O(2) = 0.12); and constant-load tests at 80% of VO(2max)NOR in normoxia (CLT(NOR)), and in hypoxia (CLTHYPO). Both groups enhanced VO(2max)NOR (CON: +13.5%; RMT: +13.4%), but only the RMT group improved VO(2max)HYPO Post training (CON: -6.5%; RMT: +14.2%). Post training, the CON group increased peak power output, whereas the RMT group had higher values of maximum ventilation. Both groups increased CLT(NOR) duration (CON: +79.9%; RMT: +116.6%), but only the RMT group maintained a significantly higher CLT(NOR) 10 days after training (CON: +56.7%; RMT: +91.3%). CLT(HYPO) remained unchanged in both groups. Therefore, the respiratory muscle endurance training combined with cycle ergometer training enhanced aerobic capacity in hypoxia above the control values, but did not in normoxia. Moreover, no additional effect was obtained during constant-load exercise.

Respiratory muscle training reduces the work of breathing at depth.

Ray AD, Pendergast DR, Lundgren CE.: European Journal of Applied Physiology, 2010, 108(4): 811-20.
Department of Rehabilitation Science, Center for Research and Education in Special Environments, School of Public Health and Health Professions, State University of New York at Buffalo, Kimball Tower, Rm. 515, 3435 Main Street, Buffalo, NY 14214, USA.

Resistance respiratory muscle training (RRMT) increases respiratory muscle and swimming performance at depths down to 17 msw. It is unknown if RRMT improves swimming performance at greater depths and if the improvements are associated with a reduced work of breathing (WOB), altered respiratory mechanics and/or improved respiratory muscle

performance. Eight male subjects (30.3 +/- 6.0 years) were tested swimming underwater in a hyperbaric chamber at 37 m of depth against a pre-determined load (70% VO(2)) until exhausted. End expiratory lung volume (EELV) was determined by subtracting inspiratory capacity from total lung capacity throughout the swims. The mechanical WOB on the lung was calculated as the integrated product of the transpulmonary pressure and ventilatory flow. Maximal expiratory (P EMAX) and inspiratory pressures (P IMAX) were measured pre- and post-RRMT. RRMT was performed every 30 s against spring loaded inspiratory and expiratory valves 30 min/day, 5 days/week, for 4 weeks. RRMT increased P (IMAX) and P (EMAX) by 40% (110 +/- 11 cmH2O (SD) vs. 155 +/- 22, p

Physiological factors to predict on traditional rowing performance.

Izquierdo-Gabarren M, Expósito RG, de Villarreal ES, Izquierdo M.: European Journal of Applied Physiology, 2010,
108(1):83-92.
Research Center of Rowing Club Orio, Orio, Spain.

The Purpose of this study was to determine the best prediction factors of traditional rowing performance in traditional elite (ER) and amateur (AR) rowers. Average power during the 20-min all-out test (W(20 min)), average power output which elicited a blood lactate concentration of 4 mmol l(-1) (W(4 mmol l(-1))), power output in 10 maximal strokes (W(10 strokes)), maximal strength and muscle power output during a bench pull (BP) and anthropometric values were all measured for 46 trained male rowers aged 21-30 with 8-15 years of rowing training experience. The ER group showed greater body mass (5%, p

Reproducibility of performance changes to simulated live high/train low altitude.

Robertson EY, Saunders PU, Pyne DB, Aughey RJ, Anson JM, Gore CJ.: Medicine and Science in Sports and Exercise, 2010,
42(2):394-401.
Department of Physiology, Australian Institute of Sport, Canberra, Australia.

Elite athletes often undertake multiple altitude exposures within and between training years in an attempt to improve sea level performance. Purpose: To quantify the reproducibility of responses to live high/train low (LHTL) altitude exposure in the same group of athletes.
Methods
: Sixteen highly trained runners with maximal aerobic power (VO2max) of 73.1 +/- 4.6 and 64.4 +/- 3.2 mL x kg(-1) x min(-1) (mean +/- SD) for males and females, respectively, completed 2 x 3-wk blocks of simulated LHTL (14 h x d(-1), 3000 m) or resided near sea level (600 m) in a controlled study design. Changes in the 4.5-km time trial performance and physiological measures including VO2max, running economy and hemoglobin mass (Hb(mass)) were assessed.
Results
: Time trial performance showed small and variable changes after each 3-wk altitude block in both the LHTL (mean [+/-90% confidence limits]: -1.4% [+/-1.1%] and 0.7% [+/-1.3%]) and the control (0.5% [+/-1.5%] and -0.7% [+/-0.8%]) groups. The LHTL group demonstrated reproducible improvements in VO2max (2.1% [+/-2.1%] and 2.1% [+/-3.9%]) and Hb(mass) (2.8% [+/-2.1%] and 2.7% [+/-1.8%]) after each 3-wk block. Compared with those in the control group, the runners in the LHTL group were substantially faster after the first 3-wk block (LHTL - control = -1.9% [+/-1.8%]) and had substantially higher Hb(mass) after the second 3-wk block (4.2% [+/-2.1%]). There was no substantial difference in the change in mean VO2max between the groups after the first (1.2% [+/-3.3%]) or second 3-wk block (1.4% [+/-4.6%]).
Conclusions
: Three-week LHTL altitude exposure can induce reproducible mean improvements in VO2max and Hb(mass) in highly trained runners, but changes in time trial performance seem to be more variable. Competitive performance is dependent not only on improvements in physiological capacities that underpin performance but also on a complex interaction of many factors including fitness, fatigue, and motivation.

The effect of training volume and intensity on competitive cyclists' efficiency.

Hopker J, Coleman D, Passfield L, Wiles J.: Applied Physiology, Nutrition, and Metabolism = Physiologie Appliquée, Nutrition et Métabolisme, 2010,
35(1):17-22. Centre for Sports Studies, University of Kent, Chatham Maritime, Chatham, Kent, ME4 4AG, UK.

The impact of different intensity training on cycling efficiency in competitive cyclists is unknown. Twenty-nine endurance-trained competitive male cyclists completed 3 laboratory visits during a 12-week training period. At each visit, their cycling efficiency and maximal oxygen uptake were determined. After the first visit, cyclists were randomly split into 2 groups (A and B). Over the first 6 weeks, between tests 1 and 2, group A was prescribed specific high-intensity training sessions, whereas group B was restricted in the amount of intensive work undertaken. After test 2 and for the second 6-week period, group B was allowed to conduct high-intensity training. Gross efficiency (GE) increased in group A (+1.6 +/- 1.4%; p 0.05). Group B cyclists increased their GE between tests 2 and 3 (+1.4 +/- 0.8%; p 0.05). Delta efficiency (DE) did not change significantly in either group across the study period. This study demonstrates that GE is increased following high-intensity training in competitive male cyclists after 12 weeks.

Effects of aerobic fitness on hypohydration-induced physiological strain and exercise impairment.

Merry TL, Ainslie PN, Cotter JD.: Acta Physiologica (Oxford, England), 2010, 198(2):179-90. School of Physical Education, University of Otago, Dunedin, New Zealand.

AIM: Hypohydration exacerbates cardiovascular and thermal strain and can impair exercise capacity in temperate and warm conditions. Yet, athletes often dehydrate in exercise, are hypervolaemic and have less cardiovascular sensitivity to acute hypervolaemia. We tested the hypothesis that trained individuals have less cardiovascular, thermoregulatory and performance affect of hypohydration during exercise. Methods: After familiarization, six trained [VO(2 peak) = 64 (SD 8) mL kg(-1) min(-1)] and six untrained [O(2 peak) = 45 (4) mL kg(-1) min(-1)] males cycled 40 min at 70%O(2 peak) while euhydrated or hypohydrated by 1.5-2.0% body mass (crossover design), before a 40-min work trial with euhydration or ad libitum drinking (in Hypohydration trial), in temperate conditions (24.3 degrees C, RH 50%, v(a) = 4.5 m s(-1)). Baseline hydration was by complete or partial rehydration from exercise+heat stress the previous evening. Results: During constant workload, heart rate and its drift were increased in Hypohydration compared with Euhydration for Untrained [drift: 33 (11) vs. 24 beats min(-1) h(-1) (10), 95% CI 5-11] but not Trained [14 (3) vs. 13 beats min(-1) h(-1) (3), CI -2 to 3; P = 0.01 vs. Untrained]. Similarly, rectal temperature drift was faster in Hypohydration for Untrained only [by 0.57 degrees C h(-1) (0.25); P = 0.03 vs. Trained], concomitant with their reduced sweat rate (P = 0.05) and its relation to plasma osmolality (P = 0.03). Performance power tended to be reduced for Untrained (-13%, CI -35 to 2) and Trained (-7%, CI: -16 to 1), without an effect of fitness (P = 0.38).
Conclusion
: Mild hypohydration exacerbated cardiovascular and thermoregulatory strain and tended to impair endurance performance, but aerobic fitness attenuated the physiological effects.

Modificado em 26 de Maio de 2010

Effects of a recovery swim on subsequent running performance.

Lum D, Landers G, Peeling P.: International Journal of Sports Medicine, 2010 31(1):26-30. The University of Western Australia, School of Sport Science, Exercise and Health, Crawley, Australia.

The effects of a swimming-based recovery session implemented 10 h post high intensity interval running on subsequent run performance the next day was investigated. Nine well trained triathletes performed two high intensity interval running sessions (HIIS) (8x3 min at 85-90% VO(2peak) velocity), followed 10 h later by either a swim recovery session (SRS) (20x100 m at 90% of 1 km time trial speed), or a passive recovery session (PRS). Subsequently, a time to fatigue run (TTF) was completed 24 h post-HIIS. Venous blood samples were taken pre-HIIS and pre-TTF to determine the levels of circulating C-Reactive Protein (CRP). Subjects were also asked to rate their perceived recovery prior to commencing the TTF run. The SRS resulted in a significantly longer (830+/-198 s) TTF as compared to PRS (728+/-183 s) (P=0.005). There was also a significant percentage change from baseline in the CRP levels 24 h post-HIIS (SRS=-23%, PRS=+/-5%, P=0.007). There were no significant differences in perceived recovery between two conditions (P=0.40) . The findings of the present study showed that a swimming-based recovery session enhanced following day exercise performance, possibly due to the hydrostatic properties of water and its associated influence on inflammation.

Influence of acetaminophen on performance during time trial cycling.

Mauger AR, Jones AM, Williams CA.: Journal of Applied Physiology (Bethesda, Md. : 1985), 2010 108(1):98-104. Dept. of Sport and Exercise Sciences, Univ. of Bedfordshire, Polhill Campus, Polhill Ave., Bedford MK419EA, United Kingdom.

To establish whether acetaminophen improves performance of self-paced exercise through the reduction of perceived pain, 13 trained male cyclists performed a self-paced 10-mile (16.1 km) cycle time trial (TT) following the ingestion of either acetaminophen (ACT) or a placebo (PLA), administered in randomized double-blind design. TT were completed in a significantly faster time (t(12) = 2.55, P

Effects of age and rest interval on strength recovery.

Bottaro M, Ernesto C, Celes R, Farinatti PT, Brown LE, Oliveira RJ.: International Journal of Sports Medicine, 2010, 31 (1):22-5. University of Brasília, College of Physical Education, Brasília, Brazil.

The purpose of this study was to compare the effect of two different rest intervals between sets of isokinetic knee extension exercise on peak torque (PT), and Total Work (TW) between untrained younger and older men. Seventeen young men (24.22+/-2.58 yrs) and 20 older men (66.85+/-4.02 yrs) performed 3 sets of 10 unilateral isokinetic knee extension repetitions at 60 degrees /s. The rest intervals between sets were 1 and 2 min. There was a significant decline in PT when 1 and 2 min rest intervals were used for young men, but not when a 2 min rest interval was applied for old men. There was also a significant decline in TW among the 3 sets when 1 and 2 min rest intervals were applied for young men, whereas the decline in TW in older men occurred only between the 2(nd) and 3(rd) sets. PT and TW in the 3(rd) set were significant greater following a 2 min rest interval than a 1 min rest in both young and older men. The present study indicated that non-resistance trained young men may require longer rest interval to recover full PT and TW when compared to older men.

Modificado em 23 de Maio de 2010

Effect of static and dynamic stretching on vertical jump performance in collegiate women volleyball players.

Dalrymple KJ, Davis SE, Dwyer GB, Moir GL.: Journal of Strength and Conditioning Research / National Strength & Conditioning Association, 2010, 24(1):149-55. Exercise Science Department, East Stroudsburg University of Pennsylvania, East Stroudsburg, Pennsylvania, USA.

The purpose of this study was to determine the effect of stretching on peak jump height during a series of vertical jumps, specifically focusing on a) static stretching (SS), b) dynamic stretching (DS) and c) no stretching (NS) performed immediately before a series of countermovement vertical jumps (CMJ). Twelve female collegiate volleyball players (mean +/- SD; age 19.5 +/- 1.1 yr; height 1.71 +/- 0.06 m; mass 71.3 +/- 8.54 kg) volunteered for this study. Data collection lasted a total of 3 weeks, and each subject performed all 3 stretching protocols, 1 session per week, with 1 week between sessions. The order of the stretching protocols was randomized for each subject. During each testing session, all subjects performed a 5-minute light jog as a warm-up, followed by 8 minutes of 1 of the stretching protocols. One minute after the completion of each protocol, 5 maximal CMJ were performed on a force platform, with each jump separated by 1 minute of passive recovery. Jump heights were calculated by integrating the vertical force trace. There were no significant differences between the SS, DS, and NS conditions for any of the jumps ($p > 0.05$). Despite the lack of significant effects for the group, there were notable individual responses to each of the warm-up conditions. Practitioners should be aware of the individual responses of their athletes to different types of warm-up protocols before athletic performance and the possible impact of prescribing

or eliminating certain exercises.

Shuttle swim test for water polo players: validity and reliability.

Melchiorri G, Manzi V, Padua E, Sardella F, Bonifazi M.: The Journal of Sports Medicine and Physical Fitness, 2009 49(3):327-30. M
otor Science Department, Tor Vergata University, Rome, Italy.

Aim: The purpose of this study, carried out on elite water polo players, was to examine: 1) the relationship between the shuttle swim test (SST) and the performance during official water polo games, and 2) the SST reliability. Methods: Sixteen male players of the Italian National Water Polo Team (age: 27.9 + or - 2.1 years, body mass: 88.5 + or - 10.3 kg, height: 186.6 + or - 6.9 cm) performed the SST, consisting of two sets of seven repetitions from 40 to 10 m (total of 120 m for each set) at a maximal intensity with 90 s of rest between sets. During the SST, average swimming speed, blood lactate concentration and heart rate were recorded. Direct validity of the SST was evaluated by comparing the average swimming speed with the total distance covered (TD) and the distance covered at high intensity swimming (above 1.8 m x s(-1), HIS) during three official water polo games. SST reliability was assessed by testing the same athletes one week apart. Results: Average swimming speed during the SST was significantly correlated with TD (r=0.67, P 0.05). No time x training group effect was found for any of the vertical jump and Agility-15m variables (p > 0.05). A time x training group effect was found for Sprint-15m performance with the CONTRAST group showing significantly better scores than the SPRINT group (7.23 +/- 0.18 vs. 7.09 +/- 0.20 m.s, p

Effects of a back squat training program on leg power, jump, and sprint performances in junior soccer players.

Chelly MS, Fathloun M, Cherif N, Ben Amar M, Tabka Z, Van Praagh E.: Journal of Strength and Conditioning Research / National Strength & Conditioning Association
, 23(8):2241-9
, 2009.
Faculty of Medicine Ibn-El-jazzar, Sousse, Tunisia.

The aim of the present study was to investigate the effects of voluntary maximal leg strength training on peak power output (Wpeak), vertical jump performance, and field performances in junior soccer players. Twenty-two male soccer players participated in this investigation and were divided into 2 groups: A resistance training group (RTG; age 17 +/- 0.3 years) and a control group (CG; age 17 +/- 0.5 years). Before and after the training sessions (twice a week for 2 months), Wpeak was determined by means of a cycling force-velocity test. Squat jump (SJ), countermovement jump (CMJ), and 5-jump test (5-JT) performances were assessed. Kinematics analyses were made using a video camera during a 40-m sprint running test and the following running velocities were calculated: The first step after the start (V(first step)), the first 5 m (V(first 5 meters)), and between the 35 m and 40 m (V(max)). Back half squat exercises were performed to determine 1-repetition maximum (1-RM). Leg and thigh muscle volume and mean thigh cross-sectional area (CSA) were assessed by anthropometry. The resistance training group showed improvement in Wpeak (p

Effects of in-season plyometric training within soccer practice on explosive actions of young players.

Meylan C, Malatesta D.:

Journal of Strength and Conditioning Research / National Strength & Conditioning Association, 23(9):2605-13

, 2009.
Institute of Sport and Recreation Research New Zealand, AUT University, Auckland, New Zealand.

In soccer, explosive actions such as jumping, sprinting, and changes of direction are essential to optimal performance not only in adults, but also in children's games. The purpose of the present investigation was to determine the influence of a short-term plyometric training within regular soccer practice on explosive actions of early pubertal soccer players during the in-season. Fourteen children (13.3 +/- 0.6 years) were selected as the training group (TG) and 11 children (13.1 +/- 0.6 years) were defined as the control group (CG). All children were playing in the same league and trained twice per week for 90 minutes with the same soccer drills. The TG followed an 8-week plyometric program (i.e., jumping, hurdling, bouncing, skipping, and footwork) implemented as a substitute for some soccer drills to obtain the same session duration as CG. At baseline and after training, explosive actions were assessed with the following 6 tests: 10-meter sprint, agility test, 3 vertical jump tests (squat jump [SJ], countermovement jump [CMJ], contact test [CT] and multiple 5 bounds test [MB5]). Plyometric training was associated with significant decreases in 10-m sprint time (-2.1%) and agility test time (-9.6%) and significant increases in jump height for the CMJ (+7.9%) and CT (+10.9%). No significant changes in explosive actions after the 8-week period were recorded for the CG. The current study demonstrated that a plyometric program within regular soccer practice improved explosive actions of young players compared to conventional soccer training only. Therefore, the short-term plyometric program had a beneficial impact on explosive actions, such as sprinting, change of direction, and jumping, which are important determinants of match-winning actions in soccer performance.

Negative effect of static stretching restored when combined with a sport specific warm-up component.

Taylor KL, Sheppard JM, Lee H, Plummer N. Journal of Science and Medicine in Sport / Sports Medicine Australia , 12(6):657-61, 2009.

Department of Physiology, Australian Institute of Sport, Australia.

There is substantial evidence that static stretching may inhibit performance in strength and power activities. However, most of this research has involved stretching routines dissimilar to those practiced by athletes. The purpose of this study was to evaluate whether the decline in performance normally associated with static stretching pervades when the static stretching is conducted prior to a sport specific warm-up. Thirteen netball players completed two experimental warm-up conditions. Day 1 warm-up involved a submaximal run followed by 15 min of static stretching and a netball specific skill warm-up. Day 2 followed the same design; however, the static stretching was replaced with a 15 min dynamic warm-up routine to allow for a direct comparison between the static stretching and dynamic warm-up effects. Participants performed a countermovement vertical jump and 20m sprint after the first warm-up intervention (static or dynamic) and also after the netball specific skill warm-up. The static stretching condition resulted in significantly worse performance than the dynamic warm-up in vertical jump height (-4.2%, 0.40 ES) and 20m sprint time (1.4%, 0.34 ES) (p0.05) on race performance. No significant correlation (p>0.05) was observed between total race time and any of the directly measured and calculated anthropometric properties. A significant correlation (p0.05) was shown between swimming time and total race time. CONCLUSIONS: There is no significant association between anthropometric parameters and race performance in ultra-endurance triathletes. Running performance rather than cycling performance seems to be the most important factor in order to be successful in a Triple Iron Triathlon. Swimming performance seems to be of low importance.

Neuromuscular adaptations to training, injury and passive interventions: implications for running economy.

Bonacci, J., Chapaman, A. et al: Musculoskeletal Pain and Injury Research Unit, University of Queensland, Brisbane, Queensland, Australia.

Sports medicine (Auckland, N.Z.): 39(11):903-21, 2009.

Performance in endurance sports such as running, cycling and triathlon has long been investigated from a physiological perspective. A strong relationship between running economy and distance running performance is well established in the literature. From this established base, improvements in running economy have traditionally been achieved through endurance training. More recently, research has demonstrated short-term resistance and plyometric training has resulted in enhanced running economy. This improvement in running economy has

been hypothesized to be a result of enhanced neuromuscular characteristics such as improved muscle power development and more efficient use of stored elastic energy during running. Changes in indirect measures of neuromuscular control (i.e. stance phase contact times, maximal forward jumps) have been used to support this hypothesis. These results suggest that neuromuscular adaptations in response to training (i.e. neuromuscular learning effects) are an important contributor to enhancements in running economy. However, there is no direct evidence to suggest that these adaptations translate into more efficient muscle recruitment patterns during running. Optimization of training and run performance may be facilitated through direct investigation of muscle recruitment patterns before and after training interventions. There is emerging evidence that demonstrates neuromuscular adaptations during running and cycling vary with training status. Highly trained runners and cyclists display more refined patterns of muscle recruitment than their novice counterparts. In contrast, interference with motor learning and neuromuscular adaptation may occur as a result of ongoing multidiscipline training (e.g. triathlon). In the sport of triathlon, impairments in running economy are frequently observed after cycling. This impairment is related mainly to physiological stress, but an alteration in lower limb muscle coordination during running after cycling has also been observed. Muscle activity during running after cycling has yet to be fully investigated, and to date, the effect of alterations in muscle coordination on running economy is largely unknown. Stretching, which is another mode of training, may induce acute neuromuscular effects but does not appear to alter running economy. There are also factors other than training structure that may influence running economy and neuromuscular adaptations. For example, passive interventions such as shoes and in-shoe orthoses, as well as the presence of musculoskeletal injury, may be considered important modulators of neuromuscular control and run performance. Alterations in muscle activity and running economy have been reported with different shoes and in-shoe orthoses; however, these changes appear to be subject-specific and non-systematic. Musculoskeletal injury has been associated with modifications in lower limb neuromuscular control, which may persist well after an athlete has returned to activity. The influence of changes in neuromuscular control as a result of injury on running economy has yet to be examined thoroughly, and should be considered in future experimental design and training analysis.

Heart rate-based lactate minimum test: a reproducible method. Strupler, M., Muleller, G., Perret, C.: Swiss Paraplegic Centre Nottwil 6207, Switzerland.
British journal of Sports Medicine, 43(6):432-6, 2009
OBJECTIVE
: To find the individual intensity for aerobic endurance training, the lactate minimum test (LMT) seems to be a promising method. LMTs described in the literature consist of speed or work rate-based protocols, but for training prescription in daily practice mostly heart rate is used. The aim
of the present study was to investigate the reproducibility of a new heart rate-based LMT protocol.
DESIGN
: 20 subjects each underwent four LMTs on a cycle ergometer. The LMT consisted of a first part

(Conconi test) to induce lactate accumulation and a second part (incremental protocol) with stages of 5 min starting beyond the aerobic threshold. During these stages work rate was adjusted to reach predetermined heart rates, which were calculated for every single test from heart rate (HR) at rest and maximum HR. Lactate was measured after each stage to define the lactate minimum (LM) and the corresponding HR.
SETTING
: Institute of Sports Medicine.
PARTICIPANTS
: 20 healthy and endurance-trained individuals (13 men, seven women).
MAIN OUTCOME MEASURES
: Reproducibility of heart rate at LM. RESULTS: The reproducibility of heart rate at LM was high (coefficient of variation (CV) = 2.1%). The reproducibility of work rate at LM was good (CV = 6.7%). CV for lactate concentrations at LM was 17.4%. High interindividual differences at LM were found in heart rate (range 149-178 beats/min) and lactate levels (range 1.2-6.8 mmol/l).
CONCLUSION
: The LMT using a heart rate-based protocol is a reproducible method of assessing HR at an exercise intensity where an equilibrium exists between blood lactate accumulation and elimination.

High-intensity training in football. Iaia, F.M., Rampinini, E., Bangsbo, J.: Copenhagen Muscle Research Centre, Department of Exercise and Sport Sciences, Section of Human Physiology, University of Copenhagen, Copenhagen, Denmark. Internation al journal of sports physiology and performance, 4(3):291-306, 2009.

This article reviews the major physiological and performance effects of aerobic high-intensity and speed-endurance training in football, and provides insight on implementation of individual game-related physical training. Analysis and physiological measurements have revealed that modern football is highly energetically demanding, and the ability to perform repeated high-intensity work is of importance for the players. Furthermore, the most successful teams perform more high-intensity activities during a game when in possession of the ball. Hence, footballers need a high fitness level to cope with the physical demands of the game. Studies on football players have shown that 8 to 12 wk of aerobic high-intensity running training (> 85% HR(max)) leads to VO2(max) enhancement (5% to 11%), increased running economy (3% to 7%), and lower blood lactate accumulation during submaximal exercise, as well as improvements in the yo-yo intermittent recovery (YYIR) test performance (13%). Similar adaptations are observed when performing aerobic high-intensity training with small-sided games. Speed-endurance training has a positive effect on football-specific endurance, as shown by the marked improvements in the YYIR test (22% to 28%) and the ability to perform repeated sprints (approximately 2%). In conclusion, both aerobic and speed-endurance training

can be used during the season to improve high-intensity intermittent exercise performance. The type and amount of training should be game related and specific to the technical, tactical, and physical demands imposed on each player.

Gender comparison of physiologic and perceptual responses in recreational marathon runners.

Loftin, M., Sothern, M. et al. Department of Health, Exercise Science, and Recreation Management, University of Mississippi, University, MS, USA. International journal of sports physiology and performance, 4(3): 307-16, 2009.

PURPOSE: The aim of this investigation was to compare gender differences in physiologic and perceptual responses during a 1-h run at recent marathon pace and running economy at three speeds in recreational marathon runners. METHODS: In a counterbalanced design, 10 men and 10 women completed a 1-h treadmill run and a running economy test. Treadmill speed for the 1-h run ranged from 141 to 241 mmin(-1) and 134, 168, and 188 m x min(-1) for running economy. Physiologic parameters (oxygen uptake, carbon dioxide production, pulmonary ventilation, and heart rate) and perceived exertion were measured. Repeated-measures ANOVA was used to compare any gender differences (P
RESULTS
: With the exception of an allometric expression of VO2 (mL x min(-1) kg BW(-0.75)), similar gender physiologic and perceptual responses were found during the 1-h run. Although not significant, the females exercised at a higher percent VO2(max) (8% to 9%) during the run. Similar gender differences were also noted during the running economy tests.
CONCLUSIONS
: Although the male runners completed a recent marathon significantly faster than the females, similar gender physiologic and perceptual responses were generally found during the 1-h treadmill run and the running economy tests.

Effect of local cold-pack application on systemic anabolic and inflammatory response to sprint-interval training: a prospective comparative trial.

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European journal of applied physiology, 107(4):411-7, 2009. We evaluated the effect of cold ice-pack application following a brief sprint-interval training on the balance between anabolic mediators [growth hormone (GH), insulin-like growth factor-I (IGF-I), testosterone], catabolic markers (cortisol, IGFBP-1), and circulating pro [Interlukin-6 (IL-6) and IL-1beta]- and anti-inflammatory cytokines [IL-1 receptor antagonist (IL-1ra)]. Twelve males, elite junior handball players performed 4 x 250 m treadmill run, at 80% of each individual's maximal speed,

followed by a rest period with and without local cold-pack application. Pre, immediately post, and 60-min post-exercise blood samples were drawn. Exercise was associated with a significant increase in IL-6, GH, IGFBP-3, and testosterone levels. Local cold-pack application was associated with significant decreases in IL-1beta, IL-1ra, IGF-I, and IGFBP-3 and a greater increase of IGFBP-1 during recovery. Local ice therapy immediately following sprint-interval training was associated with greater decreases in both pro- and anti-inflammatory cytokines and anabolic hormones supporting some clinical evidence for possible negative effects on athletic performance.