Physical training is generally considered to increase serum high density lipoprotein cholesterol (HDL-C) levels. However, how exhaustive training influences serum HDL-C levels remains unknown. Intense exercise increases oxygen consumption and free radical formation, and induces oxidation of low density lipoprotein (LDL). HDL plays an important protective role in LDL oxidation. An imbalance between free radical production and antioxidants is considered to lead to oxidation of LDL and subsequent alterations in serum HDL metabolism. This study investigates changes in serum urate, which is the most important intrinsic antioxidant, and serum lipids in male athletes after three weeks of exhaustive training. We measured fasting serum lipids and urate in 11 male athletes (mean (SD) age 21.2 (2.2) years; height 168.3 (4.2) cm; body weight 65.4 (3.7) kg) before and after three weeks of exhaustive training. All the subjects performed the same intensity exercise, which consisted of a 20 (3) km run and isometric training for two hours every day for three weeks. The daily diet provided 9802 (209) kJ and consisted of about 12–15% protein, 55–65% carbohydrate, and 25–30% fat over the study period. None were taking drugs known to affect lipid and lipoprotein metabolism. Special care was taken to exclude athletes using anabolic drugs, vitamins, or other antioxidants or who were smokers. Serum lipids were measured by automated enzymatic means using Determiner TC (Kyowa Medex Co, Tokyo, Japan) for total cholesterol, AutoSera S TG-N (Daichi Pure Chemicals, Tokyo, Japan) for triglycerides, Determiner HDL-C (Kyowa Medex) for HDL-C, and Cholestest LDL (Daichi Pure Chemicals) for LDL-C. Serum urate was measured using the uricase calorimetric method (Fuji Co, Tokyo, Japan).

After three weeks of training, serum HDL-C levels increased in six subjects, and decreased in five (fig 1A). As expected, the changes in serum LDL-C levels were inversely associated with the change in serum HDL-C levels (data not shown). However, serum triglyceride levels were not significantly different after training in all participants (data not shown). Unexpectedly, serum urate levels decreased in all subjects with increased HDL-C levels, but increased in all with decreased HDL-C levels (fig 1B). The change in serum urate levels correlated significantly and inversely with the change in serum HDL-C levels (fig 2).

Physical activity is a widely accepted means of increasing serum HDL-C levels, and it represents a metabolic adaptation that contributes to a reduced risk of coronary heart disease. However, the influence of exhaustive training on serum HDL-C levels remains obscure. Our data show that the effect of the same conditioned exhaustive training on serum HDL-C levels varies greatly among individuals.

Furthermore, we identified a significant inverse correlation between the changes in serum urate, which is the most important intrinsic antioxidant, and HDL-C levels, indicating the close association between urate and HDL metabolism during exhaustive training. However, we should mention that the number of participants was limited and the detailed mechanisms underlying this phenomenon remain to be elucidated.

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**PostScript**

**RESEARCH LETTERS**

**Rapid responses**

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Log on to our website (www.bjsportmed.com), find the paper that interests you, click on "full text" and send your response by email by clicking on "eletters" on our homepage.

The editors will decide, as before, whether to also publish it in a future paper issue.

**Significant association between fluctuations in serum urate and high density lipoprotein cholesterol during exhaustive training**

Physical training is generally considered to increase serum high density lipoprotein cholesterol (HDL-C) levels. However, how exhaustive training influences serum HDL-C levels remains unknown. Intense exercise increases oxygen consumption and free radical formation, and induces oxidation of low density lipoprotein (LDL). HDL plays an important protective role in LDL oxidation. An imbalance between free radical production and antioxidants is considered to lead to oxidation of LDL and subsequent alterations in serum HDL metabolism. This study investigates changes in serum urate, which is the most important intrinsic antioxidant, and serum lipids in male athletes after three weeks of exhaustive training. We measured fasting serum lipids and urate in 11 male athletes (mean (SD) age 21.2 (2.2) years; height 168.3 (4.2) cm; body weight 65.4 (3.7) kg) before and after three weeks of exhaustive training. All the subjects performed the same intensity exercise, which consisted of a 20 (3) km run and isometric training for two hours every day for three weeks. The daily diet provided 9802 (209) kJ and consisted of about 12–15% protein, 55–65% carbohydrate, and 25–30% fat over the study period. None were taking drugs known to affect lipid and lipoprotein metabolism. Special care was taken to exclude athletes using anabolic drugs, vitamins, or other antioxidants or who were smokers. Serum lipids were measured by automated enzymatic means using Determiner TC (Kyowa Medex Co, Tokyo, Japan) for total cholesterol, AutoSera S TG-N (Daichi Pure Chemicals, Tokyo, Japan) for triglycerides, Determiner HDL-C (Kyowa Medex) for HDL-C, and Cholestest LDL (Daichi Pure Chemicals) for LDL-C. Serum urate was measured using the uricase calorimetric method (Fuji Co, Tokyo, Japan).

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Physical activity is a widely accepted means of increasing serum HDL-C levels, and it represents a metabolic adaptation that contributes to a reduced risk of coronary heart disease. However, the influence of exhaustive training on serum HDL-C levels remains obscure. Our data show that the effect of the same conditioned exhaustive training on serum HDL-C levels varies greatly among individuals.

Furthermore, we identified a significant inverse correlation between the changes in serum urate, which is the most important intrinsic antioxidant, and HDL-C levels, indicating the close association between urate and HDL metabolism during exhaustive training. However, we should mention that the number of participants was limited and the detailed mechanisms underlying this phenomenon remain to be elucidated.

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**References**


**Are Reliable Change (RC) calculations appropriate for determining the extent of cognitive change in concussed athletes?**

Reliable Change (RC) indices are a group of statistical techniques used in many areas of...
Step 3: Calculate the RC score

This has led to the description of a concussed athlete's change score in the numerator of the RC equation, and the SD_{diff} score in the denominator.

RC = (x_2 - x_1)/SD_{diff}

Adiff is the test-retest difference score for person A, B_{diff} is the test-retest difference score for person B, N is the total number of paired observations, x_1 is the concussed athlete's baseline test score, and x_2 is the concussed athlete's change score after concussion.

Summary

RC analyses have the potential to inform return to play decision making in cases of concussion, particularly where issues of change in an individual's cognitive status are pertinent. Corrections for practice effects and other confounding variables may also be included in this calculation as per current RC techniques.

References

Patient evaluation entails electrodiagnostic studies in addition to the clinical findings. EMG often shows an increase in polyphasic waves and decreased recruitment. Ultra-sonography has recently been proposed as an adjunct in the diagnosis. Because of untoward consequences in chronic cases, surgery is recommended if patients fail to improve after one year of conservative treatment.

We consider this case to be noteworthy in that the muscle receives dual input from the accessory nerve and the cervical roots. We are writing in response to the letter by Dr Webborn about our circadian research on competition swimmers. His first comment, namely how we deal with the media in a clear, concise, and appropriate way.

Response to “Berger in retrospect: effect of varied weight training programmes on strength”

I would not have believed in 1962 that my study would have created such a brouhaha in the sports competitor. More specifically, modest levels of weekly exercise may be immunoenhancing, whereas there is much evidence that elite levels of endurance training may be immunosuppressive, so one always has to be careful which message applies in such a clinical scenario, for which prompt evaluation and management should always be the prerequisite.

Accessory nerve injury during amateur wrestling: silent but not overlooked

A 17-year-old young wrestler presented complaining of vague chest and back pain. His medical history was unremarkable except for a sports injury three to four months previously. The injury occurred during wrestling when his opponent had fallen on his chest and neck region. On physical examination, we noted an asymmetric neckline on the right, the result of injury to the posterior triangle of the right trapezius muscle. Neck and bilateral shoulder movement, both passive and active, were not limited and were painless. There were no functional deformities such as winging scapula or drooping shoulder. No loss of motor function was detected in the right sternocleidomastoid muscle or during right shoulder elevation. Radiographic examination produced no relevant findings. We next performed electromyography (EMG), the likely diagnosis being an injury to the right accessory nerve. The needle EMG was consistent with an almost completely regenerated upper portion of the trapezius muscle compared with the contralateral side.

The superficial course of the spinal accessory nerve below the posterior cervical triangle makes it susceptible to injuries. The most common cause is an iatrogenic injury during surgery. Donner et al., in a series of 83 patients with extracranial spinal accessory nerve injuries, reported the underlying causes to be lymph node biopsy in 42 cases, tumour excision in 14 cases, and carotid endarterectomy, face lift surgery, and irradiation (one case each). They also summarised the other causes as: traumatic, 13; stretch/contusion, 6; stab or glass wound, 1; shotgun, 1; compression, 1; weight lifting, 1; Hansen’s disease, 1; mononeuropathy, 1.

The accessory nerve is a motor nerve which innervates the trapezius and the sternocleidomastoid muscles. Interestingly, injury to this nerve does not usually result in functional loss of the latter muscle. This is usually attributed to the fact that nerve is usually injured in the posterior triangle after it has innervated the muscle and/or the observation that the muscle receives dual input from the accessory nerve and the cervical roots. Consequently, patients present with an ipsilateral trapezius palsy—that is, an asymmetric neckline, a drooping shoulder, winging of the scapula, and weakness of forward elevation—immediately after or within one week of the trauma.
the 21 st century. Dr Carpinelli’s paper credits my study as “the genesis of the unsubstantiated belief that multiple sets are required for optimal gains in strength”. His opinion is complimentary in one respect, but I cannot take full credit for it. Most professionals in the field of art and therapy have added credence and support to these words by employing multiple sets in their practice and research. In my opinion, most professionals train others with multiple sets because they have experimentally discovered that multiple sets are more effective than one set. Some early research studies have compared different weight training programmes, but in practice, multiple sets were used in training. I am hardly the “genesis” of an “unsubstantiated belief”. Historically the medical applications of strength training for therapy involve multiple sets. One set is the exception. So Berger is not as one “crying in the desert”. There are many more therapists and coaches flinging down the gauntlet in support of multiple sets.

The probability level of 0.05, which academics hold so sacred in decision making, does not always supersede in importance common sense when considering the difficulties in experimentally attempting to control numerous factors in strength research. One research problem is finding subjects who have, preferably, no experience in weight training and who are able to train for long periods of time, for 12 weeks, under controlled conditions. If I had concluded in my study in 1962 that one set was as good as multiple sets, I would have had more than just Dr Carpinelli voicing criticism of my paper. The practitioners in the field would have considered my research a year ago to express their disagreement and would not have waited 40 years to do so.

A person who comes to my mind as one having promoted single sets in past years is Arthur Jones, the developer of the Nautilus machine. To my knowledge, he has never presented any acceptable scientific evidence supporting his belief. Furthermore, he has few adherents today of his training views, although one adherent is obvious. Of the 85 references in Dr Carpinelli’s paper, Mr Jones authored not one. Certainly his contribution to the body of knowledge in strength training should not be ignored, if deserving.

I decided to deal with a limited amount of “evidence” in defence of my study. But I must preface my remarks by assuring the readers that my paper was reviewed by several researchers at the time of publication and approved by them for publication. The conclusions I drew were substantiated and accepted by them. For Dr Carpinelli to refer to my study as the “genesis of the unsubstantiated belief...” is to consider the opinions of these reviewers.

The data in tables 1, 2, and 3 of Dr Carpinelli’s paper, which were used to critique my study, were appropriately used according to acceptable statistical protocol. Comparisons between subgroups I-2, III-6, etc were not valid for critiquing my study. When a factorial design is used, as in my study, and no significant interaction is found between facets of sets and repetitions, then the only legitimate analysis to make is on main effects—that is, comparisons among sets 1, 2, and 3 across all levels of sets, and among repetitions 2, 6, and 10 across all levels of sets. When this was done, significant differences were found, with three sets and six reps resulting in the greatest improvement. I spoke to Dr Carpinelli earlier (1998 communication) about his misuse of statistics and suggested he consult a statistician. If this had been done, there would not have been a critique of my study, nor a need for one. I must admit, though, that I made the same mistake as Dr Carpinelli in my study. In table 4 of my study, I erroneously made comparisons among subgroups of sets and repetitions. However, as a neophyte in 1962 I accept the blame. Being wiser today than 40 years ago, and even considering Dr Carpinelli’s critique, I unequivocally support multiple sets over single sets for optimizing strength. I would suggest to Dr Carpinelli that he conduct research of his own in the hope of gaining support for his position. If his zealousness, which is commendable, were redirected to research rather than to critiquing old studies, his academic contributions would be more fruitful.

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References
1 Berger RA. Effect of varied weight training programs on strength. Res Q

Will the new field hockey rules lead to more injuries?

On 1 January 2003, the International Hockey Federation introduced a mandatory experimental amendment to the rules pertaining to the taking of short corners. The new rule now reads “Penalty corner; no shot at goal shall be made until the ball has travelled outside the circle”. This change means it will no longer be necessary for attackers to stop the ball before taking a shot at goal as was previously the case. The reason given for introducing the rule was to “simplify the game without altering the overall nature of something which is unique to hockey”. Short corners present a good opportunity to score a goal and are practised routinely in training. The new rule was introduced on 1 March 2003 by the Ulster Branch of the Irish Hockey Association in whose leagues I play. I have now played three games under the new rule, and the danger of this rule has been brought sharply into focus. In two of the three games, players required hospital attention because of knee and ankle injuries as a result of defending a short corner. It is normal practice that the defenders advance from the goal line to prevent the attacking team shooting, once the ball has been hit. The twin effect of running towards the striker and the decreased time required to take a shot, as a result of the attacking team not being required to stop the ball, leaves defenders with very little reaction time to avoid being struck by an incorrectly hit ball which may rise off the ground. In lower leagues, hitting technique is often less well developed and it is commonplace for the ball to be lifted during a shot.

Concern has been expressed at the number of facial injuries in hockey, and it is my belief that the rate of injuries (both facial and other) will increase as a result of this new rule, some of which may be severe.

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References

Complementary therapies for physical therapists


Public interest in complementary therapies has increased dramatically in the last few decades, with many of the new treatment methods of potential interest to physical therapists and their patients. This is therefore a timely volume.

It comprises some 23 chapters complemented by 11 extra chapters available via the internet. The authors are not well known to me, but they clearly each have a special interest in their chosen topic.

After an initial and intellectually challenging chapter on “Energy medicine”, which a physicist would have difficulty accepting, the authors present a primarily theoretical approach to a wide range of alternative therapies. Some, such as acupuncture, Feldenkrais, and myofascial release, have gained some acceptance among physiotherapists, whereas others, including the techniques involving the Chakra system, reflexology, flower essences, and electro-crystal therapy, remain firmly on the fringe of modern practice.

In the foreword, we are asked to read critically and consider the evidence for the various approaches presented. An excellent suggestion but very difficult to do from the material presented! The authors cover the theory behind the techniques in some detail, but there is little to support their assertions. Those looking for an evidence based text will be disappointed. While reading each chapter, I spent much of my time peering at the reference lists. Most of the references were to
books, unpublished reports, or publications in obscure journals. This was disappointing. In fact in chapter 4, “Healing by intention: a research-based overview”, any references to trials of this form of healing were in other than mainstream medical journals. This form of referencing makes a fair assessment of the evidence frustratingly difficult.

This book is useful mainly as an introduction to the very theoretical but generally very poorly researched field of complementary therapies in physical therapy. The basic problem is that it is heavy on theory, mainly unsubstantiated, and light on evidence of efficacy. It did not convince me to recommend the majority of the therapies to my patients.

More positively, this book is well written and easy to read. I clearly learned much about the subject matter, the validity of much of which I found questionable. However, it would be useful in educating physical therapists about treatments that they may be asked about or choose to trial. As it appears to be the only book of its kind, it should be held as a reference text at institutions involved in the teaching of physical therapies.

**Analysis**

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R Beneke, R M Leithäuser

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**Science for exercise and sport**


The basic scientific principles and working techniques relevant for science in the field of exercise physiology and exercise and sport sciences are described in this book. It is written for undergraduate students with minimal or no experience and knowledge in science.

The book is divided into three sections. The first section covers the physical states of gas, liquid, and solid. The second explains forces, energy, and electricity. The third addresses data analysis and report writing. Each chapter starts with a list of learning objectives, a short introduction which highlights the relevance for sports and exercise, so called “action points” enable the reader to check the learning success. A conclusion briefly summarises the take away message, and “key points” condense the latter to its essence. Each chapter is completed with a list of references, but also examples of additional recommended literature for further reading.

In general, the structure of the book is systematic, consistent, and in principle helpful, and the content covers a thorough portfolio of knowledge which is relevant for a successful start in experimental sport and exercise science. Nevertheless, it remains rather doubtful whether the book would really attract the attention of the targeted readership. It is much too text dominated. This weakens the impact of adequate wording and the provided examples of application and scientific transfer. Most of the figures and flow charts are of poor quality. It also remains questionable whether detailed descriptions of the personal computer, software, and the internet are really necessary nowadays. In what, the layout of the book appears somewhat different compared with modern text books.

In conclusion, this book is well structured with mostly convincing content but a rather suboptimal layout. After thorough revision of the layout and minor aspects of content, it has the potential to improve from one of many more or less adequate handbooks to a very good tool which not only meets the requirements with respect to learning objectives but also to an adequate presentation to the targeted readership.

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**The 5th British Musculoskeletal ultrasound course**

1–3 October 2003, Leeds, UK

Musculoskeletal sonologists from the UK and mainland Europe will cover all aspects of musculoskeletal ultrasound in lectures and tutorials. The course is open to radiologists, radiographers, and clinicians with a US imaging interest.

**Further details**: Gill Bliss, MR Department, Clarendon Wing, Leeds General Infirmary, Great George Street, Leeds LS1 3EX. Tel: +44 (0)113 392 3768; fax: +44 (0)113 392 8241; email: gillian.bliss@leedsth.nhs.uk

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**Back Pain Prevention and Rehabilitation**

5 October 2003, Glasgow, UK

A study day with Professor Stuart McGill.

**Further details**: Yvonne Gilbert, BASEM Secretary, Royal College of Surgeons of Edinburgh, Nicolson Street, Edinburgh EH8 9DW. Tel: +44 (0)131 527 3409; email: y.gilbert@rcsed.ac.uk. Organised by BASEM Scotland.

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**Congress of Sports Medicine of the AZ Sint-Jan AV**

24–25 October 2003, Bruges, Belgium

Further details: Congress Centre, OUD SINT-JIN, Mariastraat 38, B-8000, Brugge, Belgium; email: brucosport@azbrugge.be; website: www.brucosport.be

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**International Conference on the Science and Practice of Rugby**

5–7 November 2003, Brisbane, Australia

Further details: Kerry Williams, Conference Organiser, QUT, GPO Box 2434, Brisbane, QLD 4001, Australia. Tel: +61 7 3864 2220; fax: +61 7 3864 5160; website: www.rugbystudies.com/conference

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**The Fifth International Conference on Sport, Leisure and Ergonomics**

19–21 November 2003, Burton, Cheshire, UK

A three day conference in affiliation with the Ergonomics Society.

**Further details**: Congress Secretariat, Sport, Leisure and Ergonomics, Research Institute for Sport and Exercise Sciences, Liverpool John Moores University, Henry Cotton Campus, L3 2ET, UK. Tel: +44 (0)151 231 4088; email: K.George@livjm.ac.uk

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**Medicare India**

6–8 April 2004, New Delhi, India

This exhibition and conference will be held for the first time, following India’s ambitious “health for all” programme launched in 2002.

**Further details**: Rob Grant, Kinex Log, 5 New Houses, 15–21 Webby Street, Liverpool L3 2ET, UK. Tel: +44 (0)113 392 3768; fax: +44 (0)113 392 8241; email: rob.grant@kinexlog.com; website: www.medicare-expo.com and www.kinexlog.com

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The 6th STMS World Congress on Medicine and Science in Tennis in conjunction with the LTA 2004 Sports Science, Sports Medicine and Performance Coaching Conference


Keynote speakers include Professor Per Renstrom (SWE), Professor Peter Jokl (USA), Professor Savio Woo (USA), Dr Carol Otis (USA), Dr Mark Safran (USA), Dr Ben Kibler (USA), Prof Bruce Elliott (AUS), and Professor Ron Maughan (UK).

Further details: Dr Michael Turner, The Lawn Tennis Association, The Queen’s Club, London W14 9EG, UK. Email: michael.turner@LTA.org.uk

Intercollegiate Academic Board of Sport and Exercise Medicine Diploma Exam

The following were successful diplomates in the Intercollegiate Academic Board of Sport and Exercise Medicine Diploma Exam, the two exams held in 2001 and 2002:

- Dr Andrew J Adair
- Dr Abimola Afolabi
- Dr Sinead M Armstrong
- Dr Terence J R Babwah
- Dr Catriona E L Boyle
- Dr Susan J Brick
- Dr Lawrence J Conway
- Dr Alan J Dawson
- Mr Patrick D Dissmann
- Dr Niall WA Elliott
- Dr Christopher J Ellis
- Dr Roger K Goulds
- Dr Niall A Hogan
- Dr James R Hopkinson
- Mr Ananta K Jayanti
- Dr Michelle Jeffrey
- Mr S P Kale
- Dr Arun Kumar
- Dr Robert M MacFarlane
- Dr Kaushal C Malhan
- Dr Martin D McConaghy
- Dr Lisa A McConnell
- Dr Fergal T E McCourt
- Dr Ronan M McKeown
- Dr Michael G McMullan
- Dr Steven R McNally
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- Dr Nanda K G Pillai
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- Dr Martin O Rochford
- Dr Hungerford A T Rowley
- Dr Shaun A Sexton
- Dr Jason E Smith
- Dr Aravindhan Suppiah
- Dr James A Thomas

For further information contact: Mrs Yvonne Gilbert, Administrative Secretary, Intercollegiate Academic Board of Sport and Exercise Medicine, Royal College of Surgeons of Edinburgh, Nicolson Street, Edinburgh EH8 9DW, UK; tel: +44 (0)131 527 3409; email: y.gilbert@rcsed.ac.uk

Diploma in Sport and Exercise Medicine for Great Britain and Ireland

Details for the above exam can be found on the Royal College of Surgeons of Edinburgh Website at http://www.rcsed.ac.uk alternative applicants can write to: The Royal College of Surgeons of Edinburgh, Eligibilities Section, Careers Information Services, 3 Hill Place, Edinburgh, UK; tel: +44 (0)131 668 9222 or Mrs Yvonne Gilbert, Intercollegiate Academic Board for Sport and Exercise Medicine, Royal College of Surgeons of Edinburgh, Nicolson Street, Edinburgh EH8 9DW, UK; tel: +44 (0)131 527 3409; email: y.gilbert@rcsed.ac.uk

Visit the site for more information about the educational opportunities in sport and exercise medicine and advice to those wishing to become involved in this area.

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Will the new field hockey rules lead to more injuries?

Mark A Tully

Br J Sports Med 2003 37: 373
doi: 10.1136/bjsm.37.4.373

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