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 (Daiichi Pure Chemicals, Tokyo, Japan) for triglycerides, Determiner HDL-C (Kyowa Medex) for HDL-C, and Cholestest LDL (Daiichi 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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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 2: Calculate the standard error of difference (SEdiff).

\[ SE_{diff} = \sqrt{S_1^2 + B_{diff}^2} \]

Step 3: Calculate the RC score

\[ RC = \frac{(x_2 - x_1)}{SE_{diff}} \]

where \( x_1 \) is the baseline score, \( x_2 \) is the post-concussion score, and \( SE_{diff} \) is the standard error of difference.

Clinicians, neuropsychologists, and statisticians working with RC techniques soon realized that "true" changes in test scores could be obscured by performance changes due to factors such as practice and test anxiety. These phenomena are generally considered as the "stochastic" and "systematic" deviations from the mean, respectively. The RC index was introduced to help determine whether changes in test scores are due to true changes in cognitive function or are simply due to practice or other factors.

The RC index is defined as the ratio of the test-retest difference score to the standard error of difference. A value of 1.65 indicates that true change has occurred. One advantage of RC statistics is that they can be applied immediately to individual level data, and therefore interpreted on an individual basis. This makes them applicable to clinical situations such as sports related concussion.

RC analyses were designed in accordance with conventional models of neuropsychological assessment—that is, to determine whether the change observed in the individual is true by comparing it with change that occurs normally in some matched normative data set. The problem with currently applied RC calculations is that the normal amount of variance in change over time within individuals is estimated on the basis of differences between individuals assessed at a single time point! There is no reason to believe that variation between individuals at one time point accurately represents the variation in individuals within two time points. If there is no true estimate of change in the denominator, the relative change observed in the individual is not meaningful.

The RC equation can be interpreted as a z score, with a change of greater than 1.65, indicating significant decline from baseline using a one tailed hypothesis. RC scores may also be interpreted as “effect size” calculations, very similar to Cohen’s d scores as described by Zakarevicius. Our research group applies this calculation to neuropsychological test data gained in concussed athletes in many sports world wide and in many other medical applications 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.

Summary

RC analyses have the potential to inform return to play decision making in cases of sports related concussion, when applied to serially acquired neuropsychological test data. However, to be applied appropriately, such calculations should endeavour to assess the magnitude of change in an individual's test score relative to change in a control group assessed at similar test-retest intervals. Previsously described RC calculations do not meet this basic criterion, despite such control data being available.

References

Accessory nerve injury during amateur wrestling: silent but not overlooked

A 17 year old youth 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 asymmetric 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 patient was given a regimen of shoulder strengthening exercises and followed up.

The superficial course of the spinal accessory nerve from 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; and sprains—which may be anything but trivial to 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 should always be cautious which message to transmit.

In his second comment, Dr Webborn reasonably queries the hydration status of our subjects. Naturally, on working with saline flow, we had considered this also, in terms of fluid and electrolyte behaviour at 24, 12, and 8 hours before testing, as is indicated in our experimental design. There were no “dry mouths”.

However, overall, Dr Webborn has a possible point about media misuse of take home messages, and perhaps the editorial board could discuss this, if it is felt to be an issue.

References


Applying elite research to the general population

We are writing in response to the letter by Dr Webborn about our circadian research on competition swimmers. His first comment, namely that the media may wrongly slant a “take home message”, is understandable. Had he read our message more carefully, he would have seen that we noted our observation—that there is a morning lowering of lA and an increase in cortisol—“might be acceptable to elite competitors”, and that we strongly qualify it by considering that early morning sessions should: “perhaps be avoided by those returning to training after injury or illness, those close to periods of important competition (which are more associated with the underperformance syndrome) and possibly those at altitude, which itself imposes a degree of immunosuppression.” All very carefully displayed in the take home message. We three authors have been involved in the preparation of elite competitors collectively for many years, and we stand by those cautionary statements.

Dr Webborn is, importantly, interested in the potential health benefits of recreational exercise to an “active population”, and makes it very clear that the patients’ take home message as it might be investigated in elite athletes, should not deflect exercise for the vastly greater public good. However, our work was concerned with well trained competition swimmers, a point that we emphasised to the media. A major thrust of sports medicine is that it sometimes looks at clinically trivial conditions—for example, ankle or wrist sprains—which may be anything but trivial to 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 should always be cautious which message to transmit.

In his second comment, Dr Webborn reasonably queries the hydration status of our subjects. Naturally, on working with saline flow, we had considered this also, in terms of fluid and electrolyte behaviour at 24, 12, and 8 hours before testing, as is indicated in our experimental design. There were no “dry mouths”.

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References


Editor’s response

The role of the Journal’s “take home message” had been under review for some time before this correspondence. It has already been decided that it will be changed to a highlighted box encapsulating “what is known about the topic” and “what this paper adds to the body of knowledge”. This will be similar to the current layout in the British Medical Journal, and our technical editors have been developing a format to suit the Journal style. This correspondence has simply highlighted an important consideration of the Journal, 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 21st 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 strength training and therapy have added credence and support to these words by employing multiple sets in their practice and research. In my opinion, most professionals today recognize multiple sets because they have experientially 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 far exceed 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 zealfulness, 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

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 ruling 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 ruling, 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 the 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 common for the ball to be hit less accurately and directed just outside a defender’s reach. 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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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 therapies 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 perusing 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**

- **Presentation**: 16/20
- **Comprehensiveness**: 17/20
- **Readability**: 15/20
- **Relevance**: 6/20
- **Evidence basis**: 3/20
- **Total**: 57/100

R Benecke, 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 minor 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 learning success. A conclusion briefly summarizes the take away message, and “key points” enable the reader to check the covered topics.

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**The Crop of the European Society for the Shoulder and the Elbow (ESSSE)**

24–27 September 2003 at the Convention Hall “Stadthalle” Heidelberg, Germany

Congress Chairman: Professor Dr med. habil. Peter Habelmann; President of the Society: University-Professor Dr Herbert Resch. Abstract deadline: 31 March 2003

Further details: INTERCONGRESS GmbH. Tel: +49 61 97716-35; fax: +49 61 97716-16; email: kathrin.volkland@intercongress.de; website: www.intercongress.de

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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 EH3 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, Mariastaat 38, B-8000, Brugge, Belgium; email: bruocosport@azbrugge.be; website: www.bruocosport.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, 15–21 Webster Street, Liverpool 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 Quebec Street, London W1H 7DD, UK. Tel: +44 (0)207 723 8020; fax: +44 (0)207 723 8060; email: rob.grant@kinexlog.com; website: www.medicare-expo.com and www.kinexlog.com
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 Cateriona E I Boyle
- Dr Susan J Brick
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- Dr Alan J Dawson
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- Dr Lisa A McConnell
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- Dr Ronan M McKeown
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- Dr Cristyn G G Rhys-Dillon
- Dr Martin O Rochford
- Dr Hungerford A T Rowley
- Dr Shaun A Sexton
- Dr Jason E Smith
- Dr Aravanthan 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

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NCPAD NEWS

A monthly publication of the National Center on Physical Activity and Disability. NCPAD is the leading source for information about organizations, programmes, and facilities nationwide providing accessible physical activity and recreation. NCPAD also has a large and growing online library of fact sheets, monographs, and contact information on physical activity and recreation for people with disabilities.

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