

# Physical Activity Review

ISPAPOFF

September 2005  
Issue 7

## The Official Newsletter of the International Society of Physical Activity for the Prevention of Osteoporosis Falls and Fractures

It was my great honour to be elected as President of the Society by the International Council at the end of 2004. I have a hard act to follow. On behalf of the Society I'd like to thank the outgoing Present, Dr Öle Simonsen (Denmark) for all his hard work for the past few years. It was Öle's vision back in 1999 at an Osteoporosis meeting in Xian, China, which led to the formation of the Society. Several countries now have their own branches of PAPOFF and one of the more pleasing aspects of the Society's work has been to facilitate collaborative work in the field. IsPAPOFF has developed close links with PROFANE (Prevention of Falls Network Europe) and plans to joint the IOF (International Osteoporosis Federation) later this year.



Prof. Tash Masud  
University of Derby

We held a successful working group on Physical Activity and Falls at the 2<sup>nd</sup> Joint Meeting of the European Calcified Tissue Society and the International Bomed and Mineral Society in Geneva, June 2005. I plan to work closely with Mark Lissens (Vice-President) and the rest of the Council to continue the good work started by Dr Öle Simonsen. I'd also like to acknowledge the dedicated work of Jayne Mowson in the Secretariat Office who keeps everything ticking over like clockwork. Jayne has been working closely with Chris Hughes to develop the website which will be fully operational by 1<sup>st</sup> November 2005 – [www.ispapoff.org](http://www.ispapoff.org).



Chris Hughes  
Web-consultant

In this Newsletter Dr Mark Lissens outlines some of the work of the Belgium Branch of IsPAPOFF. On pages 2-5, Dr Kathernine Brooke-Wavell has produced an excellent literature search and critique of recently published studies.

### Professor Tash Masud

IsPAPOFF President  
Nottingham City Hospital and The University of Derby, UK



Jayne Mowson  
Co-ordinator

### News from Belgium IsPAPOFF Branch

In April 1997, we presented at the ECTS (European Calcified Tissue Society) Congress in Harrogate, UK, our data regarding the low bone mass in young adults (age 20 – 40 yr.) with low back pain, and related this to poor diet and a lack of physical activity. (*Lissens MA: Osteoporosis in young adults as a cause of low back pain. Bone, 1997, 4: 22S.*)



Mark A. Lissens  
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Belgium

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This was also presented later that year at the ASBMR (American Society for Bone and Mineral Research) in Cincinnati, USA (*Lissens MA: Osteoporosis in young adults as a cause of low back pain: the result of a new life style? J Bone Mineral Research, 1997, 12, Suppl.1: S368*).

In 1999 we presented a study in conjunction with Gülseren Akyuz M.D., Ph.D. from Marmara University in Istanbul, Turkey, at the ISPAPOFF working group in October 2001 in Phoenix, Arizona, USA, (*Lissens MA, Akyuz G: Osteoporosis in Young Adults: The Result of a Changing Life Style? Journal of Bone and Mineral Research, 2001, S395*). There I met for the first time Öle Simonson from Denmark, first president of ISPAPOFF. We decided to set up branches in Belgium and Turkey (G.Akyuz) and organized the first workshop in Belgium in March 2002. Our work was presented also at the World Congress on Osteoporosis in Lisbonne, Portugal, in May 2002 (*Lissens MA, Akyuz G: A lack of physical activity and low calcium intake leads to osteoporosis in young adults. Osteoporosis International, 2002, Vol.13, Suppl 1, S87*). At the 5<sup>th</sup> Mediterranean Congress of Physical Medicine and Rehabilitation in Antalya, Turkey, in October 2004, an ISPAPOFF satellite symposium was organized

Nowadays, it is generally accepted that physical activity is very important at all ages, as well to prevent as to treat osteoporosis, as shown in many lectures and studies presented at several international congresses by scientists from several different specialties and laboratories. This year's main topic of the IOF (International Osteoporosis Foundation) is *Physical Activity*, proving once more that ISPAPOFF was and still is very useful, and helped to initiate and stimulate research about the importance of physical activity throughout the world.

**Mark A. Lissens, M.D., Ph.D.**

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## Selected Recent Papers

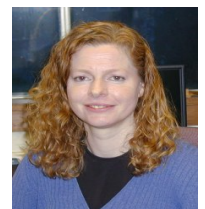
**Binkley T., B. Specker. Increased periosteal circumference remains present 12 months after an exercise intervention in preschool children.**

*Bone* 35 (2004) 1383– 1388

A previous randomized controlled trial observed that pre-school children randomized to high impact exercise with calcium supplementation showed greater gains in leg BMC and tibial cortical area and thickness. These children were monitored again 12 months after the end of the intervention. At this time, periosteal circumference was still greater in children who had exercised. Surprisingly, total and arm BMD increased to a greater extent in the group that had performed the bone-loading intervention. However, this group were still more physically active (as assessed by accelerometers) at 12 and 18 months. It is possible that the maintained improvement in periosteal diameter indicates that some benefits of exercise continue after cessation in this age group, although this could be due to continued higher activity.

**Laing E. M., A. R. Wilson, C. M. Modlesky, P. J. O'Connor, D. B. Hall, R. D. Lewis. Initial Years of Recreational Artistic Gymnastics Training Improves Lumbar Spine Bone Mineral Accrual in 4- to 8-Year-Old Females. *Journal of Bone and Mineral Research* 2005;20:509–519.**

Girls aged 4-8 years who were taking up gymnastics or controls, were monitored for two years. Changes were compared between the 9 gymnasts who started training at high level, the 35 who continued at a lower level, and controls. At baseline, gymnasts were smaller and lighter with lower bone area, BMC and



Katherine Brooke-Wavell

BMD. Gymnasts had greater increases in spine and total body BMD, and forearm BMC and bone area. Bone area increased more in high level than low level gymnasts. Because of lower initial values, gymnasts still had lower BMD after their early training despite greater increases during follow-up. Previous studies had reported higher BMD in gymnasts, but it was difficult to determine whether this related to the training or to differences present before training. This study is interesting in trying to dissociate these effects, although as gymnasts selected, rather than being randomised to, training it is impossible to rule out genetic differences.

**K.A. Ward, S.A. Roberts, J.E. Adams, M.Z. Mughal Bone geometry and density in the skeleton of pre-pubertal gymnasts and school children.** *Bone* 36 (2005) 1012 – 1018

BMD and BMC were greater in gymnasts but bone size did not differ. Cortical thickness was greater at radial and tibial diaphyses although volumetric BMD did not differ. Conversely, at the distal tibia and radius volumetric BMD was greater in gymnasts although bone area did not differ. This study is consistent with loading having different effects in cortical and trabecular sites.

**Courteix, D., C. Jaffre, E. Lespessailles, and L. Benhamou, Cumulative effects of calcium supplementation and physical activity on bone accretion in premenarchal children: A double-blind randomised placebo-controlled trial.** *International Journal Of Sports Medicine*, 2005. 26(5): p. 332-338

Girls aged 8-13y were randomized to calcium supplement or control. Weight bearing activity was assessed by questionnaire and used to group children according to activity. The response to the calcium supplement was greatest in the most active group, whose total body, lumbar spine and hip BMD increased more than the less active and/or placebo groups (despite a high dietary intake of calcium). This study is interesting as it involved assessment of the types of activities habitually conducted by children, but this increases the chance that findings are caused by selection bias. Another problem is that some of the groups ended up rather small. However it demonstrates an interesting interaction between calcium and activity.

**Ginty, F., K.L. Rennie, L. Mills, S. Stear, S. Jones, and A. Prentice, Positive, site-specific associations between bone mineral status, fitness, and time spent at high-impact activities in 16- to 18-year-old boys.** *Bone*, 2005. 36(1): p. 101-110.

Bone mineral content and physical activity were assessed in 128 boys aged 16-18. Boys in the highest third of high impact activity (who participated in jogging, tennis, football, rugby, basketball, exercising with weights for over 8 hours per week) had the highest size-adjusted BMC, which was significantly greater than those in the lowest third (<2.53 hours per week). This difference amounted to 3.4% for the whole body and 8% at total hip. This finding could partly be related to selection bias, but is consistent with findings from intervention studies of high impact activity in children.

**Petit M. A., T. J. Beck, Hung-Mo Lin, C. Bentley, R. S. Legro, and T. Lloyd. Femoral bone structural geometry adapts to mechanical loading and is influenced by sex steroids: The Penn State Young Women's Health Study** *Bone* 35 (2004) 750– 759

This study assessed changes in bone density and geometry in young women from ages 17 to 22. Hip BMD and cross-sectional area did not increase but there was an increase in section modulus. Lean mass or sports activity score were the main predictors of this increase in hip section modulus, whilst hip BMD, cortical thickness and bone width were related to both lean mass and sex steroid levels. Disadvantages are that physical activity was only assessed until age 18. Increases in estimates of bone strength thus seemed to be related to the level of mechanical loading even after cessation of growth in bone size and density.

**Valdimarsson, O., H.G. Alborg, H. Duppe, F. Nyquist, and M. Karlsson, Reduced training is associated with increased loss of BMD.** *Journal Of Bone And Mineral Research*, 2005. 20(6): p. 906-912.

Young (18±4 y) female soccer players and controls, and older (40±5y) retired soccer players and controls were followed up over 8 years. In young players, hip BMD was higher than controls at baseline. Those that remained active at follow-up (n=13) had a higher increase in femoral neck BMD (~1%) than controls. The 35 who retired lost BMD, but after 8 years their BMD was still higher than controls. The older retired players lost BMD relative to controls whose BMD was maintained- although this finding might be explained by the increase in body mass (~4kg) in controls but not retired players. This study is interesting for the long follow-up, but its observational nature carries some disadvantages- possible selection bias, and some subjects (both active and retired) also took part in some recreational exercise that might confuse findings. The study indicates that there are still continued increases in BMD in girls continuing activity past 18y, but bone is lost on cessation of activity. Whether the higher BMD in retired players than controls is related to selection bias or whether there is a residual benefit is hard to ascertain.

**Nikander, R., H. Sievanen, A. Heinonen, and P. Kannus, Femoral neck structure in adult female athletes subjected to different loading modalities.** *Journal Of Bone And Mineral Research*, 2005. **20(3)**: p. 520-528.

DXA-derived estimates of hip strength were compared in 255 premenopausal women athletes of different sports. The “high impact” (hurdling, volleyball) and “odd impact” (squash, soccer, speed-skating, step-aerobics instructing) athletes had higher BMD, cross-sectional area and section modulus than athletes in high load (weight lifting) and repetitive low and non-impact loading (orienteering, cross country skiing, swimming, cycling) after adjustment for age, height and weight. Sub-periosteal width did not differ. Body size explained half variance, and loading type 13% of variance. This study could be subject to selection bias, but is interesting for the range of sports compared. These findings are consistent with intervention studies that suggest that high-impact sports, or those with variable strain distribution, can produce improvements in structural parameters related to bone strength.

**Nordstrom, A., T. Olsson, and P. Nordstrom, Bone gained from physical activity and lost through detraining: a longitudinal study in young males.** *Osteoporosis International*, 2005. **16(7)**: p. 835-841.

Young male athletes (soccer and ice hockey) who retired lost more BMD at femoral neck and lumbar spine than controls (and gained less at total body than active athletes) over 5y follow-up, but BMD was still higher than that of a control group. In an older cohort, the proportion with history of fragility fracture was lower in 400 former soccer and ice hockey players (age >60) than 800 controls. Current physical activity and most other assessed lifestyle variables did not differ between groups although a higher proportion of former athletes drank alcohol. This study is particularly interesting for examining the associations between young adult sporting activity and fracture risk. It may be liable to selection bias but this could not be avoided without a decades long intervention which would be unfeasible.

**Kuh, D., E.J. Bassey, S. Butterworth, R. Hardy, and M.E.J. Wadsworth, Grip strength, postural control, and functional leg power in a representative cohort of British men and women: Associations with physical activity, health status, and socioeconomic conditions.** *Journals Of Gerontology Series A-Biological Sciences And Medical Sciences*, 2005. **60(2)**: p. 224-231.

Of 2894 British adults aged 53 y, around half engaged in no active leisure activities in the last month, whilst only a third had been moderately active 5 times or more. The mildly and moderately active men and women had better balance and chair rise times, whilst handgrip strength was higher in men only. These effects persisted after inclusion of musculoskeletal and health problems in regression models. This study highlights the low level of physical activity in British adults and indicates that even mild, relatively infrequent activity is associated with better physical performance.

**Nevitt, M.C., S.R. Cummings, K.L. Stone, L. Palermo, D.M. Black, D.C. Bauer, H.K. Genant, M.C. Hochberg, K.E. Ensrud, T.A. Hillier, and J.A. Cauley, Risk factors for a first-incident radiographic vertebral fracture in women >= 65 years of age: The study of osteoporotic fractures.** *Journal Of Bone And Mineral Research*, 2005. **20(1)**: p. 131-140.

This study examined prospectively factors associated with first vertebral fracture in 5822 women aged 65+ from the Study of Osteoporotic Fractures and examined a range of potential risk factors. Low

physical activity (walking less than one block or doing less than one hour household chores per day) was associated with increased risk of fracture, whilst participating in recreational physical activity (at moderate or high intensity, at least monthly) was associated with a halved risk of fracture. These effects were independent of BMD. Spending less than four hours per day on feet was not significantly associated with vertebral fracture risk (in contrast with previous findings for hip fracture). This study is important for its size and prospective nature, although the size means that physical activity measures must be subjective and somewhat crude. The focus on first fractures improves validity- in those with existing fractures, pain or disability from could reduce physical activity thus confusing relationships.

**Devine A., S. S. Dhaliwal, I. M. Dick, J. Bollerslev, R. L. Prince. Physical Activity and Calcium Consumption Are Important Determinants of Lower Limb Bone Mass in Older Women** *Journal of Bone and Mineral Research* 2004;19:1634—1639.

Physical activity, dietary calcium, hip and heel BMD and heel QUS were assessed in 1363 women aged over 70y. The women in the highest physical activity tertile had energy expenditure greater than 169 kcal per day, whilst those in the highest tertile for calcium intake consumed >1053 mg/day. Bone measures increased progressively between tertiles of both physical activity and calcium in a dose-response relationship. Women in highest tertiles for physical activity and calcium intake had bone values 4-6% higher than those in lowest tertiles. It would have been interesting to see more detail on types of activities performed by these older Australian women. Furthermore, the method for assessing activity was estimated energy expenditure rather than bone loading, which might have weakened effects. The analysis is based on physical activity volume and does not consider type or intensity. It is likely that those women with the highest volume of exercise also participated in higher intensity activity, so it is hard to assume that volume of exercise is necessarily the most important parameter.

**Lord, S.R., A. Tiedemann, K. Chapman, B. Munro, S.M. Murray, and C. Sherrington, The effect of an individualized fall prevention program on fall risk and falls in older people: A randomized, controlled trial.** *Journal Of The American Geriatrics Society*, 2005. 53(8): p. 1296-1304.

620 people aged >75 were randomised to extensive intervention, minimal intervention or control. Subjects had physiological profile assessments of balance, strength, vision and sensation. Those in the extensive intervention group received an individualised exercise intervention twice weekly for 12 months and advice for coping with visual or sensation decrements. Those in the minimal intervention group received brief advice only. The physiological profile assessment falls risk score declined significantly more in the extensive intervention than control group, but fall rate not differ between groups. Authors suggest that the lack of effect on falls may be due to the sample not being at sufficiently high risk of falling or due to difficulties implementing individualised exercise.

**Li, F.Z., P. Harmer, K.J. Fisher, and E. McAuley, Tai Chi: Improving functional balance and predicting subsequent falls in older persons.** *Medicine And Science In Sports And Exercise*, 2004. 36(12): p. 2046-2052.;

**Li, F.Z., P. Harmer, K.J. Fisher, E. McAuley, N. Chaumeton, E. Eckstrom, and N.L. Wilson, Tai Chi and fall reductions in older adults: A randomized controlled trial.** *Journals Of Gerontology Series A-Biological Sciences And Medical Sciences*, 2005. 60(2): p. 187-194.

Inactive patients aged over 70 were randomised to Tai Chi or stretching control for 1 hour, 3 times per week for 6 months. The proportion who fell was lower in the Tai Chi group (28%) than the control group (46%). Tai Chi participants also showed improvement in several measures of balance. Furthermore those whose balance improved had a lower risk of falls. This study confirms some previous reports that Tai Chi can reduce fall incidence and provides some evidence that this could be through improved balance,

## Forthcoming Events

### 2005

**October 5**, Educational Update on the Management of Osteoporosis and Falls.

Location: Willerby Manor Hotel, Willerby, UK.

Contact: Julia Harrison – 01482 675 302 Email: [juliaa.Harrison@hey.nhs.uk](mailto:juliaa.Harrison@hey.nhs.uk)

**October 5-7**, The 4<sup>th</sup> International Congress on Glucocorticoids Induced Osteoporosis.

Location: Trieste, Gorizia, Italy.

Contact: [www.symposium.it/gio2005](http://www.symposium.it/gio2005) Tel: +39 0119211467.

**October 7**, The 11<sup>th</sup> Annual Interdisciplinary Women's Health Research Symposium: the Bare Bones: A Symposium on Bone Health and Osteoporosis.

Location: Marriott Inner Harbor, Baltimore, Maryland, USA.

Contact: Email: [whrg@epi.umaryland.edu](mailto:whrg@epi.umaryland.edu) Tel: (410) 7-6-2866 Fax: (410) 706-8013.

**October 14**, The Osteoporosis Explosion.

Location: Post Graduate Centre, Royal Devon & Exeter Hospital, Barrack Road, Exeter, UK.

Contact: Mrs Christine Pankhurst – 01395 272010.

**October 28**, Osteoporosis Study Day.

Location: Post Graduate Centre, Poole General Hospital, Poole, UK.

Contact: 01202 443064.

**November 24-25**, Conference on Osteoporosis and Falls.

Location: University of Derby.

Contact: [angie.snow@derby.ac.uk](mailto:angie.snow@derby.ac.uk)

**December 8-11**, The Osteoarthritis Research Society International 10<sup>th</sup> World Congress on Osteoarthritis.

Location: Massachusetts, USA.

Contact: [www.oarsi.org](http://www.oarsi.org)

### 2006

**January 12-14**, Paget's Disease of Bone/Fibrous Dysplasia: Advance and Challenges.

Location: Sheraton Yankee Trader Hotel, Fort Lauderdale, Florida, USA.

Contact: Email: [pagetsym@aol.com](mailto:pagetsym@aol.com) Tel: (212) 509-5335 Fax: (212) 509-8492 [www.paget.org](http://www.paget.org)

**February 1-4**, ISCD Annual Meeting.

Location: San Diego, CA, USA.

Contact: [www.ISCD.org](http://www.ISCD.org) Tel: +1 860 586 7563 Fax +1 860 586 7550 Email: [iscd@iscd.org](mailto:iscd@iscd.org)

**March 18-22**, Frontiers of Skeletal Biology, Eleventh and Valedictory Workshop on Cell Biology of Bone and Cartilage in Health and Disease.

Location, Davos, Switzerland.

Contact: Congress Secretariat. Tel: +41 31 389 92 76. Fax: +41 31 389 92 84.

Email: [secretariat@hfleisch.ch](mailto:secretariat@hfleisch.ch) [www.ibmsonline.org/cellbiology.htm](http://www.ibmsonline.org/cellbiology.htm)

**March 29-31**, Tenth Conference on the International Society of Fracture Repair.

Location: Adelaide, Australia.

Contact: [www.markitmedia.com.au/ISFR/index.htm](http://www.markitmedia.com.au/ISFR/index.htm)

**May 26**, East Midlands and Trent Falls Symposium.

Location: Royal Albert Hall, Nottingham, UK.

Contact: Sue Pinkett – Tel: 0044 (0) 115 840 2608 Fax: 0044 (0) 115 962 7937.

Email: [spinkett@ncht.trent.nhs.uk](mailto:spinkett@ncht.trent.nhs.uk)

**June 25-28**, National Osteoporosis Society 11<sup>th</sup> Conference on Osteoporosis.

Location: Harrogate International Centre, Harrogate, North Yorkshire, UK.

Contact: [s.phillips@nos.org.uk](mailto:s.phillips@nos.org.uk) Tel: 01761 473106

**September 15-19**, American Society for Bone and Mineral Research Annual Meeting.

Location: Philadelphia, USA

Contact: [asbmr@smithbucklin.com](mailto:asbmr@smithbucklin.com) Tel: +1 202 236 1161 Fax: +1 202 367 2161

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**MEMBERSHIP**  
*There is no membership fee at present.*

**Please return to:**  
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I would like to become a member of IsPAPOFF [  ]

I am interested in developing a branch of the Society in my own Country [  ]

Name: ..... Occupation: .....

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