Physical Activity Review

IsPAPOFF

September 2004
Issue 6

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

In this issue of Physical Activity Review, Dr Dawn Skelton, Co-ordinator of ProFaNE (Prevention of Falls Network Europe) summarises the aims of ProFaNE. Relevant abstracts presented at The IOF World Congress on Osteoporosis in RIO, Brazil, May 2004, are discussed, and Dr Katherine Brooke Wavell, Loughborough University, summarises her latest review of recent published literature. IsPAPOFF will once again be organising this year's Physical Activity Working Group at the American Society for Bone and Mineral Research. Invited speakers will include Professor Lance Llanyon (Royal Veterinary School, London), Dr Heike Bischoff, (Harvard), Dr Charles Turner (Indianapolis), and Dr Dawn Skelton (Manchester, UK).

Katherine Brooke-Wavell

Debbie Clarke has now retired from IsPAPOFF Secretariat Office. I would like to thank Debbie for her hard work over the past year. Jayne Mowson, who worked in the Secretariat Office prior to Debbie, has now returned. Jayne helped to establish IsPAPOFF at the start of the Society in 1999, and we are delighted she has decided to return, as her presence will provide much continuity.
Dr T Masud (Secretary to IsPAPOFF).

Dr T Masud

Preventing Osteoporotic Fractures

Preventing osteoporotic fractures has now become an important issue in health services at an international level. Until recently fracture prevention measures were often confined to treatments which strengthened bone mineral density and bone strength. Now it has become apparent however that the optimisation of fracture prevention measures requires not only improvement in bone strength but also fall prevention and improvement in balance. Any patient above the age of 40 presenting with a low energy fracture should now be examined for osteoporosis but also be evaluated for falls risk and be given preventive lifestyle advice including sufficient calcium and vitamin D intake and appropriate physical activity and exercise measures. With regards to fall prevention, a new concept being debated is that of primary balance insufficiency compared to secondary balance insufficiency. For example, poor balance due to over-medication or alcoholism can be regarded as secondary balance insufficiency whereas primary balance insufficiency is proposed to be that caused by changes related to the ageing process. The challenge for the future is to combine a method of assessing balance by means of the best tests available, with other fall prediction and fracture prediction measures. The other important challenge for the future is to develop the appropriate programmes to treat primary and secondary balance insufficiency. An important aim of ISPAPOFF for the next few years will be to encourage international co-operation and inspiration to develop further some of these ideas. Dr Ole Simonsen (President of ISPAPOFF).

Jayne E Mowson

Dr Ole Simonsen

Table of Contents:

Introduction	1
PROFANE (Prevention of Falls Network Europe)	2
Selected Recent Papers Reviewed	2
Selected Abstracts from the IOF World Congress on Osteoporosis	8
Membership Form	9

Dawn Skelton

ProFaNE, Prevention of Falls Network Europe, a four-year project, was funded by the European Community Framework 6 in January 2003. It is a thematic network, co-ordinated by the University of Manchester, UK, with 25 partners across Europe. There are also Network Associates from a number of EU and non-EU countries who give their advice and experience at steering meetings, seminars and conferences. www.profane.eu.org

The aim is to bring together workers from around Europe to focus on a series of tasks aimed at developing multi-factorial prevention programmes to reduce the incidence of falls and fractures amongst elderly people. The work of ProFaNE is practical, both in terms of developing the evidence base for implementation of effective interventions and encouraging best practice across Europe. The task of each work package is to convene workshops, undertake personnel exchanges and set up collaborative studies, data sharing in order to develop evidence based protocols and publications, which can be used to implement change.

Work Package 1 – Fall prevention trials – Taxonomy of interventions and agreed set of outcomes.
An agreed and standardised set of outcome definitions and measures is important to improve the robustness of data from intervention studies, will enable comparison across studies, good quality measurement in multi-centre trials, and facilitate meta-analysis of trial results. A taxonomy of interventions will facilitate comparisons between studies, help to determine the most effective components or sub-components of interventions, and aid the decision making process of policy makers and health insurance plans. A Consensus taxonomy and outcome measures statement, Trial design statement, Meta – analysis protocol and Self-help materials will be produced.

Work Package 2 – Clinical Assessment and Outcomes.
Aims to gain an understanding of the current issues surrounding falls prevention across Europe and to embrace at national and international level, the different political and health service agendas in each country such that recommendations can ultimately be translated into working models of practice. They will establish a robust network of key members across Europe to facilitate the effective and efficient promulgation of evidence likely to influence service developments at national and local level and derive a consensus approach to assessment and management of older people at risk of falling in a variety of clinical settings using the existing evidence base as well as inviting expert opinions in the field.

Work Package 3 – Assessment of balance function and prediction of falls.
Measurement tools are needed that predict the risk of falling and give objective assessment of balance function needed for daily life performance. The ultimate goal of the activities within this work package is to combine the expertise of different disciplines for the development of balance assessment tools that meet the requirement for large-scale intervention studies and routine-use in clinical settings. The knowledge needed to develop these instruments and measures is scattered over a wide range of disciplines (ranging from physiology to electrical engineering).

Work Package 4 – Psychological aspects of falling.
This work package will co-ordinate efforts to investigate the psychosocial factors which affect the benefit of falling prevention programmes for older people. These include attitudes to falling (such as fear) and factors that promote or reduce uptake or and adherence to a range of falling-related interventions, including exercise. Understanding of attitudes and behaviour will inform guidelines for the design of interventions, and development of measures to assess relevant attitudes. We will also co-ordinate development of self-test indices that older people can use to evaluate their own risk of falling, together with guidance as to the actions they should take to prevent falling.

Selected Recent Papers

Effects of physical activity on bone in children

MacKelvie, K. J., M. A. Petit, K. M. Khan, T. J. Beck and H. A. McKay (2004). "Bone mass and structure are enhanced following a 2-year randomized controlled trial of exercise in prepubertal boys." Bone 34(4): 755-764.

Three 12-minute sessions per week of bone loading activity (circuit training involving jumping and high impact moves) were incorporated into the timetable of randomized schools, each term-time week over 2 school years (20 months) in boys aged 8-12 years. Femoral neck area and BMC increased more in the intervention than control group, whilst changes in total body, lumbar spine and greater trochanter regions were not significant. DXA derived estimates of bone strength revealed that the intervention increased cross-sectional moment of inertia and section modulus at the narrow neck region, related to increased periosteal and endosteal expansion. Changes in femoral shaft properties did not differ between groups. A feasible, school based programme of exercise thus seemed to confer benefits at particular regions of the hip, although benefits were not evident elsewhere.

Johannsen, N., T. Binkley, V. Englert, G. Neiderauer and B. Specker (2003). "Bone response to jumping is site-specific in children: a randomized trial." Bone** 33**(4): 533-539.

A randomised controlled trial of jumping (25 jumps per day from block, 5 days per week) was carried out in 54 children ages 3-5, 7-8, 11-12 and 15-18. Jumpers showed greater increases in total body and leg BMC than controls, whilst spine and femoral neck BMD and tibial pQCT responses did not differ between groups. There was an indication that response to jumping may differ according to pubertal stage, with benefits to tibial BMC amongst pubertal (Tanner stage 2-3) children, although the short duration and modest sample size of each group may limit the power of the study to examine this issue.

Janz, K. F., T. L. Burns, S. M. Levy, J. C. Torner, M. C. Willing, T. J. Beck, J. M. Gilmore and T. A. Marshall (2004). "Everyday Activity Predicts Bone Geometry in Children: The Iowa Bone Development Study." Medicine And Science In Sports And Exercise** 36**(7): 1124-1131.

Duration of vigorous physical activity was significantly associated with DXA- derived estimates of hip strength in a sample of 467 children aged 4-7 years. Children in the highest tertile for vigorous activity duration (>42 min/day) had values 7-12 % greater on average than those in the lowest tertile, who completed <30 min/d vigorous activity. Strengths of the study are the large sample size and use of an objective measure of physical activity. It is possible that selection bias may play a part, with larger/more mature children (who may have higher bone values) being more likely to choose to participate in vigorous activities. This study demonstrates that a higher duration of the vigorous activities habitually conducted by young children is associated with appreciably higher bone strength.

Nurmi-Lawton, J. A., A. D. Baxter-Jones, R. L. Mirwald, J. A. Bishop, P. Taylor, C. Cooper and S. A. New (2004). "Evidence of sustained skeletal benefits from impact-loading exercise in young females: A 3-year longitudinal study." Journal Of Bone And Mineral Research** 19**(2): 314-322.

Bone variables were compared in gymnasts and controls, who were aged 8-17y at the start of the study and followed for 3 years. Gymnasts were smaller, lighter and of lower biological age than controls, but had consistently higher BMC (by 24-51%) and BMD (by 13-28%) at all ages. A novel aspect of this study is that volunteers' mothers were also assessed, to determine to whether differences could be genetically determined. Gymnasts' mothers were smaller, lighter and leaner then those of controls but the only difference in bone parameters was a higher calcaneal ultrasound measurement. This study demonstrates that impact-loading activity in childhood is associated with substantial increments in bone, which do not appear to be entirely explained by heredity. Benefits appeared to be consistent to across all pubertal stages

Gustavsson, A., K. Thorsen and P. Nordstrom (2003). "A 3-year longitudinal study of the effect of physical activity on the accrual of bone mineral density in healthy adolescent males." Calcified Tissue International** 73**(2): 108-114.

Changes in BMD between ages 16 to 19 were compared in athletes (ice hockey and badminton players) and controls. Athletes had higher BMD at baseline, and showed greater increases in BMD over 3 years. This study suggests that athletic training could increase bone gains in post pubertal boys. This study benefits from a relatively long-term follow-up. As athletes were self-selected, presumably on the basis of athletic ability and/or size, selection bias might contribute to findings- it is possible that these boys would have shown greater increases even without exercising. It would be interesting to have some assessment of bone/cortical dimensions as well as BMD.

Effects of physical activity on bone in adults

Eser, P., A. Frotzler, Y. Zehnder, L. Wick, H. Knecht, J. Denoth and H. Schiessl (2004). "Relationship between the duration of paralysis and bone structure: a pQCT study of spinal cord injured individuals." Bone** 34**(5): 869-880.

This study examined bone density, size and strength in 89 spinal cord injured adults, compared to 21 controls. Spinal cord injured patients had substantially reduced femur and tibia bone mass (~50% at epiphyses and 30% at shafts). At the shafts, the reduced bone mass was explained by reduced cortical thickness, whilst cortical BMD was largely unaffected. At epiphyses, bone geometry was unaltered but BMD showed a consistent reduction. By fitting an exponential relationship between time since injury and deficit in bone, it was estimated that a new steady state was not reached until 4 and 6 years after injury respectively for femoral and tibial epiphyses (5 and 7 years for femoral and tibial shafts). This study is cross-sectional, but in this case inter-individual differences are relatively smaller compared to the magnitude of effect under study, so it seems unlikely that differences between groups would substantially influence findings. The study is of interest not only for adding more information regarding this specific group who are at increased risk of fracture, but also for its broader implications regarding immobilisation related bone loss and effects of loading. Particularly interesting findings are the cortical thinning but maintained cortical BMD, the lengthy time before steady state is achieved, and the differences in magnitude and duration of response between epiphyses and shafts.

Gustavsson, A., T. Olsson and P. Nordstrom (2003). "Rapid loss of bone mineral density of the femoral neck after cessation of ice hockey training: A 6-year longitudinal study in males." <u>Journal Of Bone And Mineral Research</u> 18(11): 1964-1969.

Bone variables were compared in athletes (ice hockey players) and controls at ages 16, 19 and 22 (by which time some ice hockey players had ceased training). At baseline, BMD did not differ significantly between groups, but a greater increase between ages 16 and 19 resulted in players having higher total body and femoral neck BMD at age 19. By age 22 active players again had higher values than controls- at total body, femoral neck and spine. Former players lost more femoral neck vBMD than active players and controls between ages 19 and 22, so at age 22 values did not differ significantly from those of controls. This study confirms that training can result in greater bone gain, which is reversed on cessation.

Kontulainen, S., A. Heinonen, P. Kannus, M. Pasanen, H. Sievanen and I. Vuori (2004). "Former exercisers of an 18-month intervention display residual aBMD benefits compared with control women 3.5 years post-intervention: a follow-up of a randomized controlled high-impact trial." <u>Osteoporosis International</u> 15(3): 248-251.

A previous randomized controlled trial had observed increased BMD in women aged 35-45 participating in an 18-month high impact exercise intervention. This study examined BMD in 34 of the original exercisers, and 31 controls, 5 years after the start (and 3.5 years after the end) of the exercise intervention. At this time, only 4 former exercisers and 5 controls were participating in impact training although the majority of the remainder did some moderate activity. A slightly greater proportion of controls (23%) than former exercisers (17%) reported being inactive. The improvements in strength and jump performance which had been observed during the excise intervention had been reversed by the five-year follow-up. Both groups showed similar losses in BMD over the post intervention period and former exercisers still had significantly higher BMD at the femoral neck, distal femur, patella, proximal tibia and calcaneus.

This study thus indicates that exercise induced bone gains could be maintained after cessation of exercise in premenopausal women. This finding conflicts with some previous studies where bone gains have been reversed on cessation. It is possible that some of the women were approaching menopause and any accelerated bone loss in these women could have confounded findings. Estrogen replacement therapy, hysterectomy or oral contraceptive use in a minority of subject could also be confounders.

Zanker, C. L., C. Osborne, C. B. Cooke, B. Oldroyd and J. G. Truscott (2004). "Bone density, body composition and menstrual history of sedentary female former gymnasts, aged 20-32 years." <u>Osteoporosis International</u> 15(2): 145-154.

BMD was compared between 18 former national level gymnasts who did not now participate in regular physical activity, and 18 controls matched for weight, height and age. Gymnasts had significantly higher BMD (by 6-11%). This study suggests that bone gains acquired from high impact activity commenced before puberty might have residual effect after cessation. Selection bias might have exaggerated effects despite attempts to match controls for body size.

Kaptoge, S., N. Dalzell, R. W. Jakes, N. Wareham, N. E. Day, K. T. Khaw, T. J. Beck, N. Loveridge and J. Reeve (2003). "Hip section modulus, a measure of bending resistance, is more strongly related to reported physical activity than BMD." <u>Osteoporosis International</u> 14(11): 941-949.

Bone size, strength and area estimated from DXA scans were compared according to physical activity participation in over 850 elderly men and women. Lifetime physical activity was associated with hip diameter. Heavy physical activity after the age of 50 was associated with section modulus and cross-sectional area at all hip sites, but with BMD at one site only. Duration of current “no-impact” activity were associated with BMD, section modulus and cross-sectional area. This study indicates that physical activity could have greater effects on hip geometry than BMD, and authors suggest that BMD could thus be an unreliable indicator of fracture risk in exercise studies. Drawbacks of the study are that the measures of physical activity relied on self-report and were rather crude, and that the hip was measured only in one plane. Furthermore low physical activity could be a correlate of poor health status, which could be a confounding factor.

Bainbridge, K. E., M. Sowers, X. H. Lin and S. D. Harlow (2004). "Risk factors for low bone mineral density and the 6-year rate of bone loss among premenopausal and perimenopausal women." <u>Osteoporosis International</u> 15(6): 439-446.

Factors associated with BMD and bone loss were examined in 664 women initially aged 24-44y. High school sports participation was associated with lower bone loss at the femoral neck. Current activity was not associated with BMD or bone loss, although the method used for assessing physical activity assessed energy expenditure during activity rather than specifically bone loading activity which might have reduced the likelihood of an effect being observed.

MacInnis, R. J., C. Cassar, C. A. Nowson, L. M. Paton, L. Flicker, J. L. Hopper, R. G. Larkins and J. D. Wark (2003). "Determinants of bone density in 30-to 65-year-old women: A co- twin study." Journal Of Bone And Mineral Research 18(9): 1650-1656.

Differences in lifestyle between twins were compared to differences in bone. Sporting activity was associated with higher BMD- 2h per week sporting activity was associated with nearly 2% higher hip BMD, with smaller effects at other sites. Walking was not associated with BMD. Comparing twins reduces genetically determined differences between active and inactive women and hence selection bias.

Effects of physical activity on bone in older people

Uusi-Rasi, K., P. Kannus, S. Cheng, H. Sievanen, M. Pasanen, A. Heinonen, A. Nenonen, J. Halleen, T. Fuerst, H. Genant and I. Vuori (2003). "Effect of alendronate and exercise on bone and physical performance of postmenopausal women: a randomized controlled trial." Bone 33(1): 132-143.

In this carefully designed blinded, randomized controlled trial, 164 early postmenopausal women were assigned to alendronate and/or exercise. The exercise programme consisted of supervised sessions incorporating multidirectional jumping. Nineteen women (nearly a quarter of exercisers) reported musculoskeletal complaints. Although numbers of dropouts were low, women completed on average only 1.6 exercise sessions per week. Alendronate was associated with increased bone mass at lumbar spine and femoral neck. No interaction effects between alendronate and exercise were reported. The exercise programme did not influence lumbar spine, femoral neck or radial BMC, neither in the group as a whole nor in the subgroup of good attendees. Exercise did however increase section modulus and ratio of cortical to total bone at the distal tibia. Other benefits of exercise included improved dynamic stability (although not static postural stability), leg extensor power and aerobic capacity, changes which might be important in reducing fall risk and maintaining functional capacity. This study is useful in examining the combination of exercise and alendronate. Exercise was found to have some benefits as regards strength of the most loaded bones, and improved balance, but these benefits might have been limited by the relatively low compliance and come with the cost of musculoskeletal complaints in a proportion of exercisers.

Going, S., T. Lohman, L. Houtkooper, L. Metcalfe, H. Flint-Wagner, R. Blew, V. Stanford, E. Cussler, J. Martin, P. Teixeira, M. Harris, L. Milliken, A. Figueroa-Galvez and J. Weber (2003). "Effects of exercise on bone mineral density in calcium-replete postmenopausal women with and without hormone replacement therapy." Osteoporosis International 14(8): 637-643.

A group of 320 women, half of whom used hormone replacement therapy, were randomized into exercise or control groups. The exercise group took up a 12-month program of supervised exercise incorporating resistance training, moderate impact and weight bearing activities. Greatest improvements were seen in exercisers who used HRT, whose BMD increased at lumbar spine, femoral neck, trochanter and total body. Exercisers who did not use HRT increased BMD at the femoral trochanter. Amongst the control group, those using HRT increased lumbar spine and total body BMD, whilst those not using HRT lost bone at the trochanter and total body. Changes in trochanter BMD were significantly greater in exercisers than controls in both HRT and non HRT users. At other sites, BMD changes did not significantly between exercisers and controls matched for HRT use. This study demonstrates that exercise can increase trochanter BMD in postmenopausal women, both in HRT users and non-users.

Bakhireva, L. N., E. Barrett-Connor, D. Kritz-Silverstein and D. J. Morton (2004). "Modifiable predictors of bone loss in older men - A prospective study." American Journal Of Preventive Medicine 26(5): 436-442.

The predictors of bone loss were examined in 507 men aged 45-92y over 4y. Predictors of bone loss were age >75y, low BMI (<24 kg m-2), weight loss > 5%, current smoking and physical inactivity. Compared to men who exercised “sometimes”, men who exercised “never/rarely” showed increased bone loss at the femoral neck and lumbar spine compared to those who exercised “sometimes”. This difference was in the order of 1.5% over 4 years. Exercising “often” did not confer any greater advantage than exercising “sometimes”. This study confirms that inactivity can modestly increase bone loss. Effects might be underestimated as the measure of physical activity was necessarily rather crude and not specific to types of exercise thought to have greatest skeletal effect. Conversely, it could be argued that inactivity may be a result of poor health status, and it could be the poor health status, which is associated with bone loss.

de Jong, Z., M. Munneke, W. F. Lems, A. H. Zwinderman, H. M. Kroon, E. K. J. Pauwels, A. Jansen, K. H. Ronday, B. A. C. Dijkmans, F. C. Breedveld, T. Vlieland and J. M. W. Hazes (2004). "Slowing of bone loss in patients with rheumatoid arthritis by long-term high-intensity exercise - Results of a randomized, controlled trial." Arthritis And Rheumatism 50(4): 1066-1076.

Patients with rheumatoid arthritis were randomized to exercise (n=136) or usual treatment (n=145) for 2 years. The exercise intervention consisted of a twice-weekly 75-minute group session incorporating weight bearing warm up activities, cycling, an exercise circuit and a sport. Exercisers showed significantly less loss of total hip BMD, although changes in lumbar spine BMD did not differ between groups. The study benefits from a large sample size,

low dropout rate and relatively good attendance at exercise sessions (a median of 74% of sessions were attended). The exercise programme was not specifically designed to maximise bone loading however, perhaps explaining the lack of significant effect at the spine. The study demonstrates that exercise can slow the increase bone loss associated with RA at the hip if not the spine.

Effects of physical activity on fall incidence and/or fall risk factors

Lord, S. R., S. Castell, J. Corcoran, J. Dayhew, B. Matters, A. Shan and P. Williams (2003). "The effect of group exercise on physical functioning and falls in frail older people living in retirement villages: A randomized, controlled trial." Journal Of The American Geriatrics Society 51(12): 1685-1692.

551 people aged 62-95, living in retirement villages, were randomized to group exercise or control. Around half of eligible residents agreed to participate. The exercise programme consisted of warm up, aerobic, strengthening, balance and co-ordination exercises. Although delivered to a group, exercises were tailored to individuals' capabilities. Of the control group, two thirds did not exercise whilst one third took part in a flexibility and relaxation programme. In the exercise group, 93% completed the study, and attendance averaged 39 classes over 12 months. Fall incidence was 22% lower in the group exercisers than control group. Exercisers showed more improvement than controls in reaction time and walking speed but not strength or balance. This study was well powered to detect an effect, but attendance at exercise classes was only moderate. Despite this, the study demonstrates that group delivered exercise can reduce fall incidence in older people.

Haines, T. P., K. L. Bennell, R. H. Osborne and K. D. Hill (2004). "Effectiveness of targeted falls prevention programme in sub acute hospital setting: randomised controlled trial." British Medical Journal 328(7441): 676-+.

Patients were randomised to a multifactorial falls prevention intervention or control. The intervention included fall risk alert cards, physical activity (a weekly individualised session of Tai Chi and functional activities such as transferring, stepping and reaching) and/or fall education sessions administered by occupational therapists as considered appropriate. The incidence of falls was 30% lower in the intervention group than in controls. The benefit was greatest after 45 days of intervention. This study demonstrates that fall incidence can be reduced in sub acute hospital settings, although the relative effectiveness of each component of the intervention is unclear.

Wolf, S. L., R. W. Sattin, M. Kutner, M. O'Grady, A. I. Greenspan and R. J. Gregor (2003). "Intense tai chi exercise training and fall occurrences in older, transitionally frail adults: A randomized, controlled trial." Journal Of The American Geriatrics Society 51(12): 1693-1701.

Participants aged over 70 and "transitioning to frailty " i.e. with some reduction in function, were randomised to Tai Chi or wellness education. The Tai Chi intervention consisted of two sessions per week, each of total duration 60 to 90 minutes, including slow rhythmic movements emphasizing trunk rotation, weight shifting coordination and narrowing of lower extremity stance. Although the number of falls was smaller in the Tai Chi group, this difference did not reach statistical significance. The sample size (291 women and 20 men) was large for an exercise intervention but did not reach the predetermined estimate which did somewhat reduce power of the study. Whilst it is possible that Tai Chi does have beneficial effects a reduction in fall incidence was not observed in this study. This was a frailer group than studied previously and it is possible that a more multifactorial intervention might be necessary in this population.

Liu-Ambrose, T., K. M. Khan, J. J. Eng, P. A. Janssen, S. R. Lord and H. A. McKay (2004). "Resistance and agility training reduce fall risk in women aged 75 to 85 with low bone mass: A 6-month randomized, controlled trial." Journal Of The American Geriatrics Society 52(5): 657-665.

Changes in fall risk factors over 6 months were compared between 32 women who took up resistance training, 34 who took up agility training, and 32 who followed a stretching programme. Each class lasted 50 minutes (including 15 min warm up and 15 min cool down). The resistance-training programme consisted of progressive training to 75-85% of 1 repetition maximum. Agility training consisted of activities designed to improve co-ordination, dynamic balance and reaction time - ball games, races, dance movements and obstacle courses, with hip protectors being worn. There were 6 falls during agility training but none resulted in injury. Both resistance and agility groups showed improvements in postural stability and physiological profile assessment (PPA) fall risk score relative to the stretching group, but changes in strength and reaction time did not differ significantly between groups. Both training programmes were feasible in this population with good supervision and had benefits as regards postural stability, which indicates they might reduce fall risk but the study failed to detect any differences in efficacy between the programmes and was not powered to assess fall incidence.

Hauer, K., M. Pfisterer, M. Schuler, P. Bartsch and P. Oster (2003). "Two years later: A prospective long-term follow-up of a training intervention in geriatric patients with a history of severe falls." Archives Of Physical Medicine And Rehabilitation** 84**(10): 1426-1432.

A group of women who had previously participated in a 3-month, randomized controlled training intervention following an injurious fall were followed up two years later. One third of women had lost independence and some measurements of functional performance showed substantial declines. The improvements which had been observed in exercisers following the intervention were decreased, but several parameters were still significantly better in those that had participated: leg press strength, gait, stair climbing and timed up and go speed. Balance and most other strength measurements no longer differed significantly between groups. The study had a relatively small sample size (42 after 2 years) so was not powered to investigate fall incidence. It is encouraging that some benefits were still noticeable two years after a training programme despite there being no differences in physical activity between groups. However some of the initial improvements were no longer evident which highlights the importance of continuing training.

Papaioannou, A., J. D. Adachi, K. Winegard, N. Ferko, W. Parkinson, R. J. Cook, C. Webber and N. McCartney (2003). "Efficacy of home-based exercise for improving quality of life among elderly women with symptomatic osteoporosis-related vertebral fractures." Osteoporosis International** 14**(8): 677-682.

74 women with vertebral fractures were assigned to control group or a home based exercise programme consisting of stretching, strengthening and aerobic activities. 62% of exercisers completed at least 80% of the required 3 sessions per week. Exercisers showed improvements in responses to a quality of life assessment, with reductions in pain, tiredness and anger about their illness, and improvement in ability to exercise and travel. Static balance improved more in the exercise group, but there was no significant effect on BMD. Home based exercise programmes may thus improve symptoms in women with vertebral fractures and could play a role in reducing falls.

Tsang, W. W. N. and C. W. Y. Hui-Chan (2004). "Effect of 4- and 8-wk intensive Tai Chi training on balance control in the elderly." Medicine And Science In Sports And Exercise** 36**(4): 648-657.

Changes in balance in 22 elderly volunteers who took up Tai Chi training for 1.5 hours per day, 6 days per week were compared with those in 27 controls. The Tai Chi group showed a greater improvement in postural stability in the most challenging condition (eyes closed, standing on a sway referenced platform) and in directional control (precision of leaning in a specified direction). Effects were evident after only 4 weeks, by which time values were comparable to those reported in experienced Tai Chi practitioners in previous studies. Unfortunately the study was not randomized but the study does provide interesting indication that improvements in balance might occur in only a few weeks when a large volume of training (9 hours per week) is employed.

LaStayo, P. C., G. A. Ewy, D. D. Pierotti, R. K. Johns and S. Lindstedt (2003). "The positive effects of negative work: Increased muscle strength and decreased fall risk in a frail elderly population." Journals Of Gerontology Series A-Biological Sciences And Medical Sciences** 58**(5): 419-424.

This study compared traditional to eccentric resistance training in small groups of frail elderly men and women. Eccentric training was carried out on a computerised eccentric recumbent cycle ergometer. The traditionally resistance trained group performed lower body resistance exercises using free weights and weights machines. Both groups exercised for 10-20 minutes, 3 times per week for 11 weeks, and progressively increased exercise intensity. The eccentrically trained group reported a little muscle soreness in the first 3 weeks but not subsequently. They showed significantly greater increases in strength, timed up and go and stair descent times relative to the traditionally trained group. Disadvantages of the study are that the experimental groups were small and results for both mean and women are combined. The traditional and eccentric training programmes might have exercised different muscle groups so results might not be directly comparable. This study provides a preliminary indication that eccentric training could be useful in improving strength and balance in older people, which could reduce their fall risk. Larger studies are needed.

Sherrington, C., S. R. Lord and R. D. Herbert (2004). "A randomized controlled trial of weight-bearing versus non- weight-bearing exercise for improving physical ability after usual care for hip fracture." Archives Of Physical Medicine And Rehabilitation 85(5): 710-716.

This randomized controlled trial compared the effects of weight bearing exercise, non-weight bearing exercise, or no exercise in 120 women after hip fracture. Exercise interventions consisted of home exercises prescribed by a physical therapist: weight bearing exercises were performed standing, with supports being available where necessary, whilst non weight bearing exercises were performed supine. The weight bearing exercise group showed the greatest improvements in measures of balance and functional performance. There were no differences between groups in self-reported functional ability, health or activity levels. Weight bearing exercise may offer advantages over non-weight bearing exercise after hip fracture.

Selected Abstracts Presented at The IOF World Congress on Osteoporosis, May 2004, Rio de Janeiro, Brazil.

Influence of Physical Activity and vitamin D on bone mineral gain among peripubertal Finnish girls: A 3-year prospective stud. Osteoporosis International 15 (1): OC25

Lehtonen-Veronmaa M[1], Mőttőnen T[2], Heinonen OJ[1], Irjala K[3], Viikari J[1,2]
[1]University of Turku, Turku, Finland, [2]Turku University Central Hospital, Turku Finland, [3]Mehilainen Turku, Turku, Finland
This Finnish study investigated the influence of physical activity on bone mineral content (BMC) accrual at the hip and spine in 171 healthy peripubertal girls. High-impact loading during the peripubertal years was shown to be extremely important and beneficial for the growing skeleton, and particularly for the acquisition of BMC of the femoral neck. Vitamin D was also shown to have an effect on BMC at the lumbar spine.

The effect of short duration of low intensity exercise on quantitative ultrasound measurements in healthy young adults. Osteoporosis International 15(1): P156MO

Oral A[1]Tarakci D[2], [1]Instabul University, Instanbul Medical Faculty, [2]School of Physical Therapy and Rehabilitation, Istanbu, Turkey.
This Turkish study, studied the influence of a short duration of low intensity exercise on calccalcaneal quantitative ultrasound (QUS), on 40 non-athletic young adults. No favourable effect on bone parameters were found.

Effects of Exercise and Nutrition on balance and risk of falling in elderly people with decrease Bone Mineral Density . Osteoporosis International 15(1): P363SU

Swanenburg J. Stauffacher M, Knols R, Baschung P, Ueblehart D; Department of Rheumatology and Institute of Physical Medicine, University Hospital Zurich, Zurich, Switzerland.
This RCT from Switzerland aimed to determine if the risk of falling can be influenced by exercise and nutrition in a population of elderly people diagnosed with severe osteopenia or osteoporosis. The “Berg Balance Test” was used to assess the risk of falling. At the end of the first 3 months the intervention group presented with a significant decrease in the risk of falling (-7%), a significant increased muscle strength (+22%) and aerobic capacity (+39%) as compared to controls.

IsPAPOFF

President	**Dr Ole Simonsen** Orthopaedic Surgeon Hjørring Hospital, Denmark. Email: 2202@hjs.nja.dk	Administrator: **Ms Jayne Mowson** Postgraduate Education Centre Nottingham City Hospital NHS Trust Hucknall Road, Nottingham NG5 1PB United Kingdom Tel: 0044 (0)115 840 2643 Fax: 0044 (0)115 9627937 Email: jmowson@ncht.trent.nhs.uk
Secretary & Newsletter Co-editor:	**Dr Tahir Masud** Consultant Physician Nottingham City Hospital NHS Trust Email: tm@nchhce.demon.co.uk	
Newsletter Co-editor	**Dr Katherine Brooke-Wavell** Loughborough University, UK Email: k.s.f.brooke-wavell@lboro.ac.uk	

MEMBERSHIP

There is no membership fee at present.

Please return to:
Ms Jayne Mowson, Post Graduate Education Centre, Nottingham City Hospital NHS Trust
Hucknall Road, Nottingham NG5 1PB **or** email: jmowson@ncht.trent.nhs.uk

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: ....

Address: ....

....

....

....

....

Telephone No: .... Email ....