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arthritis - types, symptoms and modifiable risk factors
Professor Jackie Oldham, Director of the Centre for Rehabilitation Science, and MIMIT, at the University of Manchester, discusses types, symptoms and modifiable risk factors as arthritis is often cited as the major cause of pain and disability in the elderly.

depression after hip fracture among older adults
Dr Anna C. Phillips, Reader in Behavioural Medicine at the School of Sport, Exercise & Rehabilitation Sciences, University of Birmingham, is currently looking at why older people are far more prone to infection after suffering a hip fracture than a young patient with the same injury. She also looks at how depression may affect walking independence and be associated with reduced rehabilitation participation, increasing the risk of repeat falls.

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Welcome to the 5th issue of Innov-age and thanks for all of your contributions and feedback during our first year of operation.

This has been invaluable and has helped us to develop a publication that summarises some of the best research in a given field and to distil it into a practical guide to promote excellence in health and eldercare.

This issue focuses on arthritis and musculoskeletal conditions, an area of particular personal interest. A familial history has developed into a passion to improve healthcare practices and enhance technologies to optimise rehabilitation and promote independence.

Since the early 1980s I’ve had the privilege to work with some of the foremost academics in the field of musculoskeletal healthcare and I’m proud to welcome their contribution to this issue. We have tried to present a range of perspectives from nursing, physiotherapy, rehabilitation and clinical medicine, though collaboration across disciplines is the key to optimal healthcare, and Tracey Howe shares her experience of a multidisciplinary online discussion forum.

Other topics are wide ranging. Michael Callaghan tells us how bone lesions can be reversed if you change the pressure point on a joint with, for example, bracing technologies. For those of us unfortunate enough to fracture a bone, new technologies such as injection of cement can accelerate the recovery process, as described by Chris McCarthy. Caroline Greig helps us to widen our knowledge base to include the musculoskeletal system and management of pain.

Until I read the contributions to this issue I had not appreciated the extent to which research in the field has advanced over the last five years despite this being my own area of research interest. The excellent summaries provide us with an exciting glimpse into the future with a focus on improved care for people with musculoskeletal disorders.

Jackie Oldham
Honorary Director, Edward Centre for Healthcare Management Research
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Summer Issue - Stroke
Arthritis - types, symptoms and modifiable risk factors

Professor Jackie Oldham

Professor Jackie Oldham is the Director of the Centre for Rehabilitation Science and Manchester: Integrating Medicine and Innovative Technology (MIMIT) at the University of Manchester and Honorary Director of the Edward Centre for Healthcare Research.

Musculoskeletal conditions are many and varied with arthritis forming one of the broadest sub groups. Some forms of arthritis, particularly osteoarthritis, are associated with getting older and result in painful joints and reduced movement. Indeed, arthritis is often cited as the major cause of pain and disability in the elderly. The resulting social and economic burden is huge with more than a third of UK residents over 50 having some form of osteoarthritic pain at any one time (Thomas et al., 2004).

Arthritic conditions all have major features in common including pain, swelling, stiffness, restricted movement, disability and sometimes deformity resulting from wear and inflammation of the joints. There are over a hundred different types of arthritis with the two most common being osteoarthritis and rheumatoid arthritis.

Osteoporosis, literally meaning porous bones, is another type of musculoskeletal condition but it is not part of the group of arthritides.

Over 10,000 people in the UK are affected by either rheumatoid and osteoarthritis. They suffer from many different symptoms summarized succinctly by NHS Choices (2012) as:

- joint pain, tenderness and stiffness
- inflammation in and around the joints
- restricted movement of the joints
- warmth and redness of the skin over the affected joint
- weakness and muscle wasting

Rheumatoid Arthritis

Rheumatoid arthritis is the more severe but less common form of arthritis. It can present at any age, affects women more than men and tends to develop rapidly. It is an autoimmune disease occurring when the body’s own immune system attacks and destroys the tissues lining the joints. It is a chronic condition that can flare up at any time affecting many joints and on both sides of the body. As an autoimmune disease its effects can be systemic, having an impact on other body organs such as the heart, lung and eyes and resulting in a general feeling of ill health and fatigue. A considerable focus of current treatment relates to the development of new drugs to treat the disease itself or to help with the symptoms. The former include corticosteroids, oral and biologic disease-modifying anti-rheumatic drugs (DMARDs). For a detailed comparison of effectiveness see Singh & Cameron, 2012.

Osteoarthritis

More than a million adults per year in the UK consult their General Practitioner with osteoarthritis (Royal College of General Practitioners, 2007). The main complaint relates to osteoarthritis of the spine, with knees being a close second, followed by the hips. 25% of people over 55 experience a persistent episode of knee pain (Peat et al., 2001). Historically the condition has been referred to as the arthritis of middle age or degenerative arthritis i.e. characterized by degeneration of the joints. It is now recognised this is an over simplification as it results from a complex interplay between a number of factors including: integrity of the joint, mechanical factors, genetic predisposition, local inflammation and biochemical / cellular processes (Kalunian, 2013).

Obesity

There is a strong causative association between people who are overweight and osteoarthritis of the knee. This is dose / response related i.e. the heavier you are the greater the problem (Anderson & Felson, 1988). In effect an increased weight puts more pressure on the cartilage between the joints causing it to erode faster than usual. In addition obesity can lead to metabolic changes that can exacerbate the osteoarthritis. Interestingly, preventative
Many of the risk factors are modifiable including obesity, repetitive joint use, lack of exercise, joint malalignment, alcohol and tobacco.

strategies can have a profound effect. Losing approximately 5kg of weight over a 10-year period decreases the odds of developing osteoarthritis by over 50% (Felson et al., 1992).

**Repetitive joint use and lack of exercise**

Occupational demands on the knee are common with many jobs requiring constant bending. Indeed, for people aged between 55 and 64 there is a direct correlation between knee bending demands and osteoarthritis (Anderson and Felson, 1988). Furthermore, the greater the physical demands of the job, the greater the risk of developing osteoarthritis (Toivanen et al., 2010). The picture in relation to leisure activity is inconclusive, though relatively moderate exercise is believed to be good for joints whereas repetitive strenuous exercise is believed to be detrimental (Aroski et al., 2000). Regular exercise helps to build strong muscles around the joints and thereby adds stability as well as increasing flexiblity and endurance. Weight bearing exercise has also been shown to help maintain bone mass and prevent osteoporosis. Finally, lack of exercise also contributes to an increased weight gain leading to the detrimental effects on joint function described previously.

**Joint malalignment**

Some recent interesting research in the field of osteoarthritis arises from the work of the Research in OsteoArthritis Manchester (ROAM) group. The pain experienced with osteoarthritis is frequently associated with cartilage damage. However, cartilage has no nerve endings, so the degradation of cartilage cannot be the cause of the pain and it must be originating from another source (Felson et al., 2007). The ROAM group have been able to demonstrate that bone marrow lesions associated with knee osteoarthritis can fluctuate (enlarge and shrink) over short periods of time i.e. a few weeks (Felson et al., 2012). Bone marrow lesions have also been shown to have an association with pain i.e. as bone marrow lesions shrink, pain is reduced (Zang et al., 2011). Furthermore, knee malalignment has been shown to be associated with an increased number and size of bone marrow lesions (Hayashi et al., 2012). This has large implications for future treatment strategies, as if knee alignment can be changed, then bone marrow lesions and associated pain can be reduced. Indeed Felson et al (2013) have demonstrated that knee bracing can offer such an approach (see the article by Michael Callaghan in this issue). Other members of the ROAM team are looking at the use of foot orthotics to adjust the mechanical function of the knee (Tadman, 2013).

**Smoking and Alcohol**

A recently reported large study undertaken in the USA (Wang et al., 2014) showed that smoking and alcohol consumption were positively correlated with arthritis. The study also noted that the influence of alcohol consumption increased towards middle and older age. The amount of alcohol consumption is, however, important and Lu et al (2014) have actually shown that light to moderate alcohol intake can have a beneficial effect. In terms of smoking, in addition to the frequently reported health problems, it has also been shown that smoking can have a direct effect on the genes responsible for promoting the auto immune response in patients with rheumatoid arthritis (Vasallo et al., 2014). People who carry the susceptible gene(s) are at increased risk therefore, of developing arthritis.

...continued on next page
In summary, arthritis is a devastating disease in whichever form it takes, leading to considerable pain and disability. In the main, rheumatoid arthritis is managed through drug intervention and life style modification. In terms of osteoarthritis, certain risk factors can be modified through weight reduction, moderate exercise and reducing repetitive joint activities, addressing joint malalignment, stopping smoking and avoiding excessive alcohol intake.


Vassallo, R., Lucky, D., Behrens, M., Madden, B., Luthra, H., David, C., Taneja, V., (2014) Cellular and humoral immunity in arthritis are profoundly influenced by the interaction between cigarette smoke effects and host HLA-DR and DQ genes, Clinical Immunology, 152, 1-2, 25-35.


Professor Jackie Oldham
Flexible knee brace for symptomatic osteoarthritis

Michael Callaghan is a Post Doctorate Research Associate in Rehabilitation Science at Manchester University’s Arthritis Research UK Epidemiology Research Group and a Clinical Specialist Physiotherapist in Emergency Medicine at Manchester Royal Infirmary. He undertook an M.Phil at the University of Liverpool and a Ph.D. at The University of Manchester. He is currently involved in a number of research projects including a 5 year study of patellofemoral bracing on synovitis and bone marrow oedema in patellofemoral osteoarthritis (OA) funded by Arthritis Research UK, under the Chief Investigator Professor David Felson.

Symptomatic OA is the most common form of arthritis and has a large impact on the NHS. 12% of people aged 55 and over with radiographic knee OA have knee pain and disability with 1.6% describing this as severe pain (Peat, McCarney, & Croft, 2001). The prevalence of knee OA is expected to grow dramatically due to an ageing of the population and increasing rates of obesity (see the lead article in this issue).

Knee OA is a mechanically driven disease in which all three compartments (medial, lateral and patellofemoral) can be affected due to increased loading and stress that causes joint damage and pain. Nearly 60% of knee pain in the community comes from OA on the medial (inner) compartment of the knee (Sharma et al., 2010). This often gives a person a ‘bow-legged’ appearance that puts pressure and increased load on the inner side of the knee. However, there is usually a combination of OA in all three compartments.

Pain in knee OA is not (as is often thought) solely due to loss of the cartilage. One source is bone which can have deep ‘bruising’ due to focal stress and loading and can be seen on MR scans as a white, cloudy shadowing which can be assessed for its position, and measured for size and volume. These so called ‘bone marrow lesions’ are not fixed features of the knee. They wax and wane, altering their size within a 12 weeks’ period with a corresponding change in pain. Work by the Research in OsteoArthritis Manchester (ROAM) group is leading the way to find out if it is possible to target and change the size of these lesions with non-surgical treatments.

A brace is one of over 50 non-surgical treatments available for OA knee (Feehan, Trexler, & Barringer, 2012) and the rationale for their use is that they may ease the bone loading and stress points in the knee. Studies by the ROAM group on subjects between 40-70 years with patellofemoral OA have shown that braces can reduce pain. Further investigations have found that the reductions in pain were linked to shrinking in the sizes of bone marrow lesions. In addition, the use of a weight bearing MR scanner showed that the brace made fine biomechanical adjustments in the position of the patella that may have eased the stress behind the knee cap by enlarging the contact area and distributing the load. These subtle alterations due to the brace mean that large corrections in knee position are not necessary to see and feel an improvement.

One major problem with persuading doctors and patients to consider using a brace for treating knee OA is the commonly held belief that ‘braces will make your muscles weak’. Because there is little or no scientific evidence for this, the first brace study took measures of quadriceps muscle strength and inhibition to see if this was true. This study found that a flexible knee brace neither decreased muscle strength nor worsened inhibition after 12 weeks of daily wearing for over seven hours a day in subjects with OA predominantly behind the patella. In fact, knee braces modestly increased quadriceps strength and decreased inhibition of the quadriceps. This new evidence refutes the received wisdom and means that knee braces can produce benefits for patients with knee OA without any concerns about muscle weakness or inhibition. This finding alone has major implications for the recommendation of knee braces as a treatment option for knee OA and coupled with the decrease in pain and size of bone marrow lesions means that knee braces are a real treatment options for knee OA.

References:


Fragility Fractures – Vertebral Compression Fractures – Rapid Assessment and Pain Relief

Dr Chris McCarthy is a Physiotherapist and Orthopaedic Spinal Fellow at Imperial College Healthcare NHS Trust, London. After qualifying as a Physiotherapist in 1989 he undertook post-graduate training in Biomechanics and Manipulative therapy at Strathclyde and Coventry Universities before undertaking a PhD degree at The University of Manchester.

Following post-doctoral studies, investigating the sub-classification of non-specific low back pain, he became an Assistant Professor of Rehabilitation within the Clinical Trials Unit of the Medical School of Warwick University attracting over a million pounds of funding in two years. For the last six years he has worked at Imperial College Healthcare (the first Academic Health Science Centre, in the UK) as a clinician and researcher.

The vertebral body fracture is the most frequent type of osteoporotic fracture (Beckett et al., 1996). Approximately 30-50% of women and 20-30% of men develop vertebral fractures and half of them develop multiple fractures during their lifetime, compared with a 15.6% lifetime risk of a hip fracture.

A rising incidence of elderly people with osteoporosis and a higher frequency of falls have been suggested as reasons for this increase (Kanis, 2002). Once a vertebral compression fracture occurs, it can be a risk factor for future fractures, including non-spinal fragility fractures (Johnell et al., 2001). The occurrence of a vertebral fracture has also been found to be associated with an increased mortality (Center, 1999).

Vertebral Compression Fractures (VCF) are common, extremely debilitating and lead to serious comorbidities. The annual incidence of vertebral compression fractures is a staggering 1% in those over 65, (twice that of hip fracture) with an annual cost to the NHS of over £2 billion. An effective pathway for treating these fractures involves the rapid assessment of patients suitable for balloon kyphoplasty, a method of cement augmentation of the fractured bone that has excellent evidence for its effectiveness and is recommended by NICE as a treatment for these fractures (NICE, 2013). See Figure 1.

Figure 1: The Balloon Kyphoplasty Surgical Procedure

![Diagram of the Balloon Kyphoplasty Surgical Procedure]

- Balloon inserted into fractured vertebra
- Balloon inflated inside damaged vertebra
- Special material injected into fractured vertebra
- Special material hardens, stabilizing vertebra
The management of this group of patients can be very fragmented and patients can be admitted under various clinical teams and end up with extended lengths of hospital stay or with ongoing disability in the community.

A one stop shop approach to management can coordinate and accelerate the appropriate treatment. Patients with fragility fractures need bone health management, pain relief and rehabilitation.

Less severe patients can be helped with physiotherapy (exercise and manual therapy) however patients with severe, unremitting pain often need rapid fracture fixation.

The pathway below details the key risk factors for vertebral compression fractures, clinical signs and symptoms and the process of identification of patients likely to benefit from balloon kyphoplasty.

The pathway is being used successfully at Imperial College Healthcare, by the Spinal Orthopaedic Team and is run by a team of Extended Scope Physiotherapists, in collaboration with the spinal surgeons. Similar services may be available local to you.

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**Pathway for Acute Vertebral Compression Fracture (VCF)**

**1. Acute VCFs**

<table>
<thead>
<tr>
<th>Key risk factors</th>
<th>Clinical History &amp; Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post menopausal &gt;55</td>
<td><strong>History</strong></td>
</tr>
<tr>
<td>Known osteoporosis</td>
<td>Sudden onset of acute back pain</td>
</tr>
<tr>
<td>Low weight</td>
<td>Pain improves with lying down</td>
</tr>
<tr>
<td>Steroid use</td>
<td>Minimal / major trauma</td>
</tr>
<tr>
<td>Previous VCF</td>
<td>Recent fall</td>
</tr>
<tr>
<td>Recent height loss &gt;2cm</td>
<td></td>
</tr>
<tr>
<td>Risk of myeloma</td>
<td></td>
</tr>
</tbody>
</table>

**Physical examination**

| Thoroacic hyper-kyphosis |
| Percussion tenderness |
| Unable to lie supine on a bed |

**2. Presenting with Acute Radiculopathy or Myelopathy?**

| Yes | No |
| Order | Standing / Sitting AP |
| X ray and Urgent MRI | And Lateral X-ray |
| Urgent Referral | To Imperial Spinal Clinic |

**3. VCF painful at the clinical level?**

| Yes | No |
| Order | If high level of pain persists |
| Urgent MRI with STIR View | Consider alternative diagnosis |
| (if contraindicated | Order |
| SPECT Scan) | MRI |
| Refer | To Imperial Spine Clinic |

**4. Acute Fracture Reported on MRI?**

| Yes | No |
| Order | Non-surgical management |
| MRI | Pain management |
| Refer | Exercise |
| To Imperial Spine Clinic | Physical therapy |

**5. High level of Pain / Disability?**

| High disability and/or pain score ≥4 (0-10) | Low disability and/or pain score ≥4 (0-10) |
| Refer for surgical opinion | All patients |
| Kyphoplasty | DEXA scan to Ac OP |
| Vertebroplasty | Add calcium & Vit D |
| Open surgery | Add Bisphosphonates |
| | Dietary changes |
| | refer to falls clinic? |

---


Levels of depression and anxiety in people with severe rheumatoid arthritis are higher than previously reported

A multi-centre team led by researchers at the Arthritis Research UK Centre for Genetics and Genomics at The University of Manchester, say that patients with severe active disease, who are waiting to go onto a biological therapy, should be routinely screened for depression by their doctors.

The team, led by Professor Anne Barton, National Institute for Health Research (NIHR) Manchester Musculoskeletal Biomedical Research Unit theme lead for Inflammatory arthritis in adults, also suggest that the way that disease activity in rheumatoid arthritis is currently recorded should be changed in order to improve the way that patients are managed.

The team carried out an observational study of 322 patients with severe rheumatoid arthritis who were waiting to go on biological therapy. New biological therapies have transformed the treatment of people with severe disease in the past decade, although some patients do not adequately respond to these drugs.

The aim of the study was to investigate the impact of psychological factors upon each of the different parts of the current measure of disease called the DAS28. The DAS28 score takes into account the number of tender and swollen joints and the level of inflammation in the body. It also includes a subjective, patient-reported measure based on how well the patient is feeling.

The team found that subjective measures of response were more likely to be influenced by psychological factors such as mood or beliefs about their illness and the therapies used.

Professor Barton added, “This is the first study of its kind in patients with high levels of active disease, and suggests that routinely assessing a patient’s moods and beliefs – separate to their physical state – would be useful in guiding patient management. As rheumatologists we need to be aware that depression may occur more commonly in patients with severe rheumatoid arthritis than we had realised.”

To find out more please visit www.manchestermskbru.org

Over 100 genetic risk markers for rheumatoid arthritis now identified

Researchers from Arthritis Research UK Centre for Genetics and Genomics at The University of Manchester and NIHR Manchester Musculoskeletal BRU have helped discover a further 42 genetic markers associated with rheumatoid arthritis in the largest international study to date on the topic.

The study involved academics from Cambridge, USA, Japan, Australia, Canada, South Korea, Sweden, France, Spain, China, the Netherlands and Estonia.

38 separate institutions across seven countries who contributed data from their own studies so that a much more powerful single combined analysis could be performed. It examined over 10 million genetic markers in over 100,000 individuals, 29,880 of whom have rheumatoid arthritis.

As a result of the analysis, DNA variations at 42 regions of the genome were found to be associated with rheumatoid arthritis adding to the 61 that were already known about.

Professor Jane Worthington, Director of the Centre for Genetics and Genomics and Director of the Centre for Genetics and Genomics and National Institute for Health Research (NIHR) Manchester Musculoskeletal Biomedical Unit theme lead, said: “What’s exciting about this study is that in addition to dramatically increasing our knowledge of genetic susceptibility to rheumatoid arthritis, for the first time we have found some similarities between rheumatoid arthritis and some cancers affecting the blood.

Arthritis Research UK medical director Professor Alan Silman commented: “Combining data from a large number of national and international genetic studies into one single and extremely powerful analysis has revealed 42 new genetic regions associated with rheumatoid arthritis. This almost doubles the number of previously-known risk regions and adds a significant amount to the current knowledge and understanding of the genetic basis of this condition.”

To find out more please visit www.manchestermskbru.org
Developing earlier interventions for painful osteoarthritis

Researchers at the University of Leeds are aiming to develop practical ways to help people suffering from painful osteoarthritis, following the establishment of a new experimental treatment centre.

Currently, treatments for osteoarthritis are limited to pain killers and physiotherapy until joints reach a stage where a joint replacement becomes possible. Researchers at the Arthritis Research UK Experimental Osteoarthritis Treatment Centre at the University of Leeds aim to fill this treatment gap by developing better and earlier interventions.

The centre is being jointly funded by £150,000 from medical research charity Arthritis Research UK and Össur, a global leader of non-invasive orthopaedics, over three years. The centre will focus on osteoarthritis of the knee, which causes pain and disability to approximately six million people in the UK and is increasing as the population ages. Professor Conaghan, professor of musculoskeletal medicine, who is leading the research, will investigate new and emerging methods of treating knee braces, special orthotic footwear, and looking at the effects of changing patients’ gait and posture. New imaging techniques such as MRI and ultrasound will be used to measure effectiveness.

To find out more please visit www.leeds.ac.uk

Study shows total hip replacement surgery safe for nonagenarian patients

Despite advanced age and preoperative morbidity rates, risks of surgery for people in their 90s are comparable to those of younger patients who require hip surgery due to an arthritic condition.

Data from the study "Total Hip Arthroplasty Proves Safe for Nonagenarian Patients," was presented at the American Academy of Orthopaedic Surgeons (AAOS) 2014 Annual Meeting. Led by Dr Alexander Miric, an orthopaedic surgeon at Kaiser Permanente in Los Angeles, the study reinforces the safety of total hip replacement surgery even among extremely elderly patients.

Researchers reviewed patient characteristics and rates of postoperative morbidity, mortality and readmission among patients who underwent elective total hip replacement surgery between April 2001 and December 2011. Of the 43,543 total hip replacement surgeries performed during this period, only 183 were performed on nonagenarians. Before surgery, nonagenarians had the highest prevalence of peripheral vascular disease, hypertension and valvular heart disease, increasing their risk of surgical complications. However, the length of hospital stay for nonagenarians, 3.4 days, was comparable to the 3.3 average stay recorded among octogenarians, while patients in their 90s showed no significant differences in the incidence of surgical site infection or pulmonary embolisms. The authors of the study concluded that nonagenarian patients can safely undergo total hip replacement surgery, despite advanced age and a higher prevalence of comorbidities. Overall, the nonagenarian patients experienced a complication rate comparable to those of younger patients, and the higher mortality rate is well within expectations for individuals aged 90 and older.

To find out more please visit www.aaos.org

Upcoming Events...

Rheumatology 2014 29 April 2014 - 01 May 2014
Rheumatology 2014 in Liverpool is a world-class conference for all health professionals with an interest in musculoskeletal conditions providing the opportunity for colleagues to learn, network and hear about the latest developments in the field. Innovative sessions are designed to engage the audience through lectures, workshops and networking seminars and the broad programme ensures that there is something for attendees of all disciplines. If you missed this event – please go to the website to find out more. www.rheumatology.org.uk/conference

Hip Fracture: Meeting the National Quality Standard and Learning from NHFD 1st May 2014
This event in London focuses on meeting the new national Quality Standard for Hip Fracture and Learning from the National Hip Fracture Database findings in your service and organisation. The conference will also cover the development of the Falls and Fragility Audit Programme and local exemplar case studies of improving the hip fracture pathway. www.healthcareconferencesuk.co.uk

Nursing in Practice Manchester 3rd June 2014
With a wide variety of topics and specifically designed for public health professionals, this event features an impressive collection of speakers delivering highly topical and relevant presentations including the latest developments in COPD, depression, wound care and diabetes. www.nursinginpractice.com/Manchester

Great British Care Shows 2nd April - 2nd July 2014
A series of regional care shows appealing to everyone in the care sector. Delegates range from the service user living in the community to commissioners of local authorities and care associations, fellow traders, managers and directors, providing a unique networking opportunity. Take the chance to see all the latest ideas for improving life as a carer, including practical solutions and innovative products and services for achieving outcomes and excellence. There will be dementia workshops and dementia cafes demonstrating the latest innovative solutions for dementia care to better support those people living with dementia. www.rheumatology.org.uk/conference
It is well established that the immune system functions less well in old age. It is also well known that stress, whether physical or psychological, can suppress the immune system making adults more susceptible to infection. Hip fracture is a common physical stress in older adults, with almost 80,000 over 65 year olds falling and fracturing their hip each year. Hip fracture has a high 1 year mortality rate, with 1 in 4 patients dying within a year of their injury and the majority never gaining their previous physical function.

The factors contributing to poor outcome after hip fracture remain poorly understood although depression often develops in older adults with previous studies in the UK and US reporting incidence of depression of 9-47%. Importantly, depression may affect the recovery of walking independence, as well as being associated with poorer rehabilitation participation, increased risk of falling again, increased susceptibility to infectious disease and higher mortality rates.

Depression coincident with the physical trauma of hip fracture may therefore accelerate progression from health to frailty. It is well documented that ageing is accompanied by poorer function of the immune system. There is also evidence suggesting that the effects of stress and age are interactive, with long term stress worsening the effects of ageing in older adults with many negative outcomes in the immune system.

Our New Dynamics of Ageing study set out to consider whether the stress of a hip fracture would further reduce the efficacy of the immune system in older adults and if the presence of a psychological stress (depression) would make the situation even worse.

The study looked also at how these factors affected physical recovery from hip fracture and whether the stress hormones discussed above played a role in any differences seen.

101 patients aged over 60 who were admitted to hospitals in the Birmingham area were recruited to the study and classified into two groups on the basis of their Geriatric Depression Scale scores: hip fracture patients with a GDS score of five or less were classified as non-depressed, those with a score of six or greater were categorised as depressed. Any patients with a history of depression were excluded from the study, as were any patients with other chronic conditions. In this study we observed that 38 (37%) of the hip fracture patients had developed new onset depression by 6 weeks after their injury. Most patients remained in a depressed state six months later. The depressed and non-depressed patient groups were comparable on age, type of fracture, occupational status, body mass index and health behaviours e.g., smoking, alcohol intake, sleep, diet, and exercise.

Depressed hip fracture patients were less able to engage in activities of daily living than non-depressed patients at six weeks and six months, although this improved over time in both groups. At both time points, depressed and non-depressed patients did not significantly differ in hand grip strength but those with depression took significantly longer to complete a test of walking speed.

Both groups were far slower than would be expected for their age at both time-points. Depressed patients also had poorer balance at six weeks than non-depressed patients but this had recovered to similar levels for both groups by six months. Depressed patients also spent a significantly longer time in hospital.
The ability of the immune cells, neutrophils, to engulf bacteria was not different between hip fracture patients with or without depression. However, the ability of neutrophils to produce superoxide, which is important in killing bacteria, was impaired in hip fracture patients with depression compared to non-depressed hip fracture patients and healthy older adult control participants. Further, those patients with worse depressive symptoms had poorer neutrophil killing ability.

In addition, Natural Killer cells, whose function is to kill virus infected or tumour cells, had significantly lower killing ability in the depressed patients compared with non-depressed patients or healthy control subjects. These findings were not affected by patient age or body mass index.

To try to determine the mechanisms underlying poor immunity and poor physical recovery from hip-fracture we measured levels of stress hormones in the blood. Hip fracture patients with depression had higher levels of the stress hormone cortisol compared with healthy controls and patients with hip fracture alone. Cortisol has suppressive effects on many immune cells including neutrophils and can also cause loss of muscle and bone potentially leading to loss of physical function.

Patients with depression also had lower dehydroepiandrosterone sulphate (DHEAS) levels, which is a hormone that suppresses the negative effects of cortisol. This means that hip fracture patients who were depressed had a significantly higher serum cortisol:DHEAS ratios, which could have a negative effect on immune function and physical function.

The long-term effect of hip fracture and depression on immune function was also measured. On examining hip fracture patients six weeks and six months after injury, neutrophil function improved in both depressed and non-depressed groups, such that by six months, it did not differ between the groups. However, the hormone ratios (cortisol:DHEAS) remained higher in the depressed group at six months. The higher ratio seen in depressed hip fracture patients was related to a slower walking speed at both six weeks and six months. This means that the change in hormone balance may be the link between the development of depression and effects on walking ability and physical function in these patients.

These findings suggest that development of depression after a hip fracture in older adults is the main driver of immune suppression, as we failed to find immune decline as a result of hip fracture alone.

They also imply that in order to speed recovery of physical function and independence following hip fracture, patients should be assessed and treated for depressive symptoms. Addressing the cortisol:DHEAS imbalance through DHEA supplementation may be one means of improving depressed mood and contributing to better physical function.

**Publications from this research:**


In April 2012, European Union health ministers discussed how empowerment of citizens and patients can help prevent and control the epidemic of chronic disease, estimated to account for 86% of deaths and 77% of the total burden of disease in Europe. The burden of disease and hence healthcare provision will further increase with the rise in the older population. The health ministers suggested the prime focus should be on health promotion, disease prevention, and chronic care — not acute (reactive) care — and on changing ‘the relationship between patients and professionals’. However, without high quality evidence based information, people cannot make informed decisions about health issues, lifestyle choices impacting on health, self-management of existing health conditions and the wide range of local healthcare provision. With awareness, people are in a better position to form opinions and develop strategies on the ways to change their lifestyle and self-manage their health conditions.

Musculoskeletal conditions are long-term conditions and include; arthritis, osteoporosis, low back pain, joint pain and soft tissue injuries. There are reported to be more than 10 million family doctor consultations for musculoskeletal conditions each year in the UK costing £141M and more than 7.6 million working days are lost in the UK due to musculoskeletal related conditions.

Management of musculoskeletal conditions traditionally takes place in clinical environments. However, patients have to travel to these clinical centres to attend sessions dictated by capacity constraints of the healthcare system, which often take no account of timing, access and financial issues for patients. Furthermore, healthcare services tend to focus on acute episodes rather than chronic cases. Thus many people are left to manage their chronic conditions at home.

Technological advances have enabled the introduction of telemedicine (remote monitoring of physiological data) and the dramatic growth of the number of individuals with access to the internet via personal computers and smart phones is enabling the introduction of eHealth. As an approach this opens up major opportunities for socially isolated groups, individuals with mobility issues and older age groups who have embraced technology. Despite this dramatic rise in seeking and exchanging information using the internet and social media there is little research exploring the development and effectiveness of web-based information exchange between health professionals and people with musculoskeletal conditions.

To address this gap in knowledge, we ran a project called Joint Exchange using social media, with the aim of engaging with people in Glasgow, Scotland, who had an interest in musculoskeletal health. The Joint Exchange online discussion ran from July to December 2013 and 36 people registered. Registered project members were provided with a user name and password to access the member-only discussion.

Tracey Howe is Professor of Rehabilitation Sciences at Glasgow Caledonian University, Editor for the Cochrane Musculoskeletal Review Group, Convenor for the Cochrane Health Care of Older People Field and Deputy Chairman at Glasgow City of Science.

Elspeth Donaldson is currently working on her PhD, exploring the use of social media for musculoskeletal health with NHS clinics at Glasgow Caledonian University. She has dipped in and out of clinical physiotherapy with stints in health projects and research both in the UK and abroad. As a diplomatic wife she has ventured to Indonesia (and completed her Master’s degree in Community Based Rehabilitation), and while in Switzerland worked for a charity promoting criminal justice in Asia.

Joint Exchange – Resources for Musculoskeletal Problems
So what happened?
We provided short, interesting and informative evidence based information based on questions about the musculoskeletal system and prevention / management of musculoskeletal conditions. Twenty-four weekly posts were written and published online by the research team, health care professionals and discussion members.

What do we know about the people who took part?
Although 69% of participants had personal musculoskeletal problems, most (80%) wanted to use Joint Exchange to gain professional knowledge or clinical skills in contrast to 33% seeking self-management support.

What did they get out of the project?
Amongst the participants, knowledge about musculoskeletal issues improved by 77% and knowledge about self-management strategies improved by 90%. 40% of participants recorded improvements in understanding and self-managing their own musculoskeletal problem.

We analysed the comments that were posted and these revealed five main activities for which the participants used the social media discussion. These included, sharing experience, giving advice, asking questions, engagement and behaviour change.

Overall the online discussion, Joint Exchange, was considered useful, usable and safe. The benefits of receiving therapy via the internet are clear; it can reach more people, in more places, and is flexible. This is likely to be beneficial for certain populations and more research is needed to determine which group of chronic pain adults would benefit most.

For more information regarding Joint Exchange please visit: www.glasgowcityofscience.com/jointexchange

Resources for Musculoskeletal Problems
My friends who work in health and social care tell me that they want to keep up to date with all of the latest evidence, but they don’t have the time to find or read all the information! The Musculoskeletal Elf finds just what you need to keep up-to-date with all of the important and reliable health research and guidance relevant to musculoskeletal conditions, critically appraising it and asking subject experts to summarise it in simple and clear blogs. You don’t have to waste time looking at dozens of websites and articles every week. The Musculoskeletal Elf posts updates with short and snappy summaries that highlight evidence-based publications that are relevant to musculoskeletal practice. You can be the first to hear about key guidance, systematic reviews and high quality patient information. No jargon, no misinformation, no spin, just what you need!

Available at www.themusculoskeletalelf.net

Follow us on Twitter or Instagram @MSK_EIf

Like us on Facebook: the Musculoskeletal Elf.

The team behind The Musculoskeletal Elf is: Prof Tracey Howe, Dr Lesley Dawson, Elspeth Donaldson & Minervation Ltd.

NHS Inform MSK Zone
A library of self-management resources is now available for people with musculoskeletal problems. They have been developed and endorsed by a UK wide expert panel with input from patient groups, NHS inform and the Plain English Campaign. You can find this information in a variety of formats: web, digital TV, smartphone app and paper.

These resources are useful for anybody with a musculoskeletal problem, their carers, family doctors, nurses and allied health professionals. On the website there is access to advice on common musculoskeletal problems and some simple exercises. The information can also be printed by people with musculoskeletal problems or for people they know, on one piece of paper via the links on the right side of each problem page.

www.nhsinform.co.uk/musculoskeletal
Digital TV via the NHS 24 Digital TV Channel
MSK smartphone app via itunes

Physiotherapy works
The Chartered Society of Physiotherapy produces a leaflet outlining the evidence for physiotherapy and musculoskeletal conditions. This is available on their website at:
www.csp.org.uk/publications/physiotherapy-works-musculoskeletal-disorders-msds
Cochrane Corner

The Cochrane Collaboration is an international network of more than 28,000 dedicated people from over 100 countries. They work together to help healthcare providers, policy-makers, patients, their advocates and carers, and the general public make well-informed decisions about health care, by preparing, updating, and promoting the accessibility of Cochrane Reviews.

Cochrane Reviews are internationally recognised as the highest standard in evidence-based health care. This article summarises a selection of Cochrane Reviews assessing exercise and arthritis.

Arthritic conditions frequently have an adverse influence on health and quality of life, and cause more functional limitations than any other group of disorders within the adult population in most developed countries.

Estimates from global data indicate that one in four people will experience chronic musculoskeletal pain at some time. Exercise therapy is considered an important component of the treatment of musculoskeletal conditions with the aims of reducing pain, improving joint stability, functional ability, quality of life and aerobic capacity.

In people with hip OA, exercise may reduce pain slightly but may not improve physical function and on average, in people with knee OA, exercise results in a modest reduction in pain and a modest improvement in physical function.

Aquatic exercise is sometimes known as ‘pool therapy’ or ‘hydrotherapy’. It involves exercises in water that is heated to about 32 to 36 degrees Celsius. Exercises may include aerobic activities, stretching and strengthening, and range of motion.

There is high level evidence that for osteoarthritis of the hip or knee, aquatic exercise slightly reduces pain and slightly improves function over 3 months. Aquatic exercise may not cause harm, but there is not enough evidence to be certain.

When you have rheumatoid arthritis (RA), your immune system, which normally fights
infection, attacks the lining of your joints. This makes your joints swollen, stiff and painful. The small joints of your hands and feet are usually affected first. There is no cure for RA at present, so treatments such as exercise aim to relieve pain and stiffness and improve your ability to move.

Dynamic exercise therapy programs means activities with enough intensity, duration, and frequency to improve stamina or muscle strength. Exercise can be any activity that enhances physical fitness. Exercise which gives you more energy, endurance or stamina is often called aerobic exercise. In people with rheumatoid arthritis, aerobic exercise and muscle strength training on land probably slightly improve pain and physical function in the short term. There were no harmful side effects (such as increased pain or damage to joints) of exercise found in this review. This was true for exercising on land or in the water, although most of the studies were not long enough to tell if exercise might cause joint damage.

**Chronic musculoskeletal pain**
is on-going pain in the bones and joints of the body, for example in the back or knees. It may be the result of a musculoskeletal disease or injury or the cause may not be known.

Sometimes it can be difficult to continue with the exercise program that your doctor, nurse or physiotherapist recommends. One way of helping people stick to exercise is called ‘graded exercise activity’. This means the exercise is targeted to weaker muscles or painful areas and gets increasingly more challenging. Other ways include supervising exercise sessions, providing ‘refresher’ sessions to go over the exercise program again, and providing audio or videotapes of the exercises to take home.


Can vitamin D supplementation enhance the effects of strength training in frail older adults?

Dr Carolyn Greig is a Senior Lecturer in Nutrition and Ageing at the School of Sport, Exercise & Rehabilitation Sciences, University of Birmingham. Carolyn graduated from Newcastle University (BSc Hons Physiology in 1981) and obtained an MSc in Human and Applied Physiology at King’s College London (1982) and a Sports Council funded PhD from the Polytechnic of North London (1988). Her present position is within the prestigious MRC-ARUK Centre for Musculoskeletal Ageing Research at the University of Birmingham.

Vitamin D deficiency is widespread among older adults (reaching 80-90% in residential care) and is associated with an increased risk of falls and fractures as well as skeletal muscle weakness. That vitamin D is essential for calcium and phosphorous homeostasis and is central to bone health is well established, but what is less well known is its role in skeletal muscle function. There are only two human studies in the literature reporting direct effects of vitamin D supplementation on human skeletal muscle structure, although both indicate potential benefit.

In an uncontrolled study in older women with osteomalacia (bone softening) increased muscle fibre type IIIX cross-sectional area (CSA) along with a decrease in the time to dress was shown after 3-6 months of vitamin D supplementation (Sorensen et al., 1979). In the other study of stroke survivors there was a significant increase in muscle strength and fibre CSA after supplementation, as well as reduction in falls and fractures (Sato et al., 2005).

In terms of the mechanism of effect, the majority of evidence is based mainly upon animal data which are suggestive of an increase in muscle protein synthesis in response to vitamin D supplementation (Birge and Haddad, 1975) but which may not mimic the human condition (Visser, Deeg, and Lips, 2003). Although it is well known in human studies that bone health is associated with muscle strength and physical performance, a number of recent reviews and meta-analyses actually have failed to show strong evidence for benefit of vitamin D supplementation on these functional indicators as well as on osteoporotic fractures/hip fracture aftercare (Stockton et al., 2011). However the exception may be in the supported housing/residential care home setting, where vitamin D deficiency is common and supplementation may be effective.

Physical activity (resistance exercise training (RET) in particular) is the most potent stimulus for skeletal muscle hypertrophy (growth) in both young and older adults. We and others have shown that even in very old adults (>75 years) and frail patient groups, RET improves muscle strength and functional outcomes (Greig et al., 2011). Combined RET with chronic vitamin D supplementation may be even more effective. Remarkably there is a considerable lack of research examining this regimen, with only one study (400 IU cholecalciferol per day for 9 months) reporting an additive effect of training on a timed-up-and-go functional test but not on other functional measures such as gait speed (Bunout et al., 2006).

In Birmingham, we are about to embark on a 4-year National Osteoporosis Society (www.nos.org.uk) funded exploratory study of vitamin D supplementation ± RET on musculoskeletal health and function in frail older adults (EVXITD). Our hypothesis is that vitamin D3 supplementation will significantly improve musculoskeletal health compared with RET alone. This may be due to its influence not only on bone but also on muscle, via mechanisms which are as yet unclear. Frailer older adults in supported housing/residential care homes will be randomised to RET (x3 per week) + 800 IU vitamin D3 (daily) or RET + placebo for six months. The resistance exercise training programme has been developed by our team and includes elements of established programmes for falls prevention/core stability and can be tailored to a range of abilities.

The primary outcome measure will be lower limb power. Secondary outcomes will include measures of physical performance and activity, knee extensor strength, body composition, balance, perception of musculoskeletal comfort/pain, falls as events and quality of life. All assessments will take place in the study team’s Health Research Bus housing a DXA scanner and strength/power testing equipment which will enable measurements in situ.

A finding that RET and vitamin D supplementation is effective compared with RET alone could support the development of future multimodal interventions to maintain bone and muscle health in old age and pave the way for further mechanistic and intervention studies examining the effects of RET/vitamin D in conjunction with other promising anabolic agents.

Dr Anna C. Phillips

What is your current position and what was your career path that took you there?

I completed a Psychology degree in 1998 and then worked in a private school for learning difficulties followed by the NHS as a Research Assistant. Alongside my full-time research post I did a part-time MSc Health Psychology. In 2002 I was offered a PhD studentship in stress, cardiovascular reactivity and vaccination responses at University of Birmingham. In 2006 I won a prestigious Roberts Research Fellowship at Birmingham, was promoted to Senior Research Fellow and then to Reader in Behavioural Medicine in 2012.

What challenges do you face in your current position and which has been the greatest one?

Having somewhat fast tracked as well as diversified into a range of multi-disciplinary areas, I find it really difficult to keep on top of the developments in all of my fields.

In your opinion, what are the top 3 issues affecting the care of older people?

Respect: they were young once, and family/staff/researchers sometimes forget that. Finance: with NHS cuts, care available at home is not what it might ideally be, nor is it on the wards in hospital. I appreciate the hard work of the staff involved but being under-resourced, means under-staffed, means under-cared for, and important issues like mental health can be missed. Nuclear families: means support systems are often not on hand to care for relatives when they need it, or children are under immense pressure themselves with work.

What changes in elderly care do you anticipate in the next few years?

Less resource for the continued care at home that older adults need e.g. extended physiotherapy at home after hip fracture, but potentially more awareness of this early on, so more advance planning and provision for later life.

What experience has influenced your career the most?

Winning two early career awards for research from international societies in 2010.

What advice would you give to someone contemplating following in your footsteps?

Be prepared for a non-9-5 job, don’t do it unless you love writing, do do it if you like working with people but also relish working on your own quite a lot too.

What do you enjoy doing when you are not working?

The list is endless: eating at new restaurants, dancing when I get the chance, wine tasting, visiting distilleries, doing up my VW camper and camping in it, reading, travelling, going to art galleries, drawing, painting, playing the piano, singing in my choir or just in the kitchen.

What do you do in a typical working day?

I never have one, but a few common activities would be: a 100 emails, tweet at least one thing, prepare or give a lecture or seminar, write grant proposals, write or comment on a draft of one of my students’/post-docs’ manuscripts for a scientific journal, catch up writing a book chapter, journal editing, attend or Chair numerous meetings, plan and support undergraduate and postgraduate research projects, mark essays/exams, deal with any lab project requirements.

What do you do in case you were stranded on a desert island?

Something to read, probably the Bible, it’s long and there is always something new in it that you haven’t noticed before.

What do you do when you are not working?

I never have one, but a few common activities would be: a 100 emails, tweet at least one thing, prepare or give a lecture or seminar, write grant proposals, write or comment on a draft of one of my students’/post-docs’ manuscripts for a scientific journal, catch up writing a book chapter, journal editing, attend or Chair numerous meetings, plan and support undergraduate and postgraduate research projects, mark essays/exams, deal with any lab project requirements.

If you hadn’t become a Health Psychologist/Behavioural Scientist, what might you have done?

Become a fiction author. I love writing, it’s a key part of my job and apparently I am quite good at it.

Who would you most like to work with?

Paul Oberist – he invented the cardiovascular reactivity hypothesis (that continued large cardiac reactions to stress will eventually give you heart disease, put simply). I’d like to show him my work in that area and also our work that challenges it.

What do you enjoy doing when you are not working?

The list is endless: eating at new restaurants, dancing when I get the chance, wine tasting, visiting distilleries, doing up my VW camper and camping in it, reading, travelling, going to art galleries, drawing, painting, playing the piano, singing in my choir or just in the kitchen.
In our next quarterly issue of Innov-age we will be focusing on stroke care and research. Over 65 years olds are most at risk from having strokes. Every year over 150,000 people in England have a stroke, and it is the third largest cause of death after heart disease and cancer. The Innov-age team will be summarising the research behind the work to improve and provide excellent patient care, as well as other important eldercare issues...

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