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Old age should be enjoyed not endured

Professor Janet Lord

“Ten million people in the UK live with the debilitating pain and disability caused by arthritis. With the news that the Universities of Birmingham and Nottingham have been awarded several million pounds in research funding by the Medical Research Council (MRC) and Arthritis Research UK to explore ways to reduce the pain and disability caused by ageing, Professor Janet Lord explores the factors involved in age-related musculoskeletal decline.

Ageing is a complex process that results in the reduced functioning of most of the body’s organ systems, with the musculoskeletal system (muscle, bone, tendon and cartilage) significantly affected.

The musculoskeletal system is compromised not only by loss of muscle, bone and cartilage with age, but also by the decline in function of the nervous system which results in reduced control of movement and balance.

Poor musculoskeletal health has a significant impact upon quality of life, work productivity and health costs. According to Arthritis Research UK’s 2008 ‘Arthritis in the UK’ factsheet, ten million working days were lost through musculoskeletal conditions in 2006/7 and the annual cost to the NHS of musculoskeletal decline is £5.7 billion. The two greatest factors in the development of musculoskeletal pathology are age and obesity.

The newly-awarded Medical Research Council (MRC)-Arthritis Research UK Centre for Musculoskeletal Ageing Research will integrate the work of world-class researchers, clinicians and health professionals at the Universities of Birmingham (UoB) and Nottingham (UoN) to focus on understanding the age-related loss of musculoskeletal function and the role played by obesity in this process.

A cross-cutting theme integrating the basic research is consideration of inflammatory and hormonal environments, which we believe are key mediators of the effects of ageing and obesity and crucially represent tractable targets for modification via pharmacological or lifestyle interventions.

Physical activity and diet-based interventions aimed at improving musculoskeletal function and tailored to older adults will be developed and evaluated. Such interventions are notoriously difficult to implement, and the Centre will be unique in its ability to apply world leading expertise in lifestyle-oriented motivational psychology to develop programmes achieving good adherence in and uptake in older adults and in different settings (home, rest home, hospital etc).

Key areas to be tackled and on-going research include:

1. What are the key factors driving ageing of the component tissues of the musculoskeletal system, both individually and as an integrated system? This will include the role of genetics and lifestyle, allowing us to understand individual variations in musculoskeletal decline; the role of inflammation, physical activity and changes in tissue steroid hormones; age-related loss of neuromuscular function and its contribution to reduced coordination, balance and reduced ability to perform complex motor tasks such as driving. For the latter UoB have pledged to raise £2m through their alumni campaign to build a virtual reality laboratory that would be unique to the UK. The lab will allow scientists to analyse co-ordination and movement in older adults who fall regularly and also in stroke patients to try and reduce fall risk and improve rehabilitation.

2. Assessment of interventions to improve musculoskeletal function in old age. It is well established that physical activity reduces the loss of muscle and bone mass with age. In young subjects dietary supplements can increase muscle mass, improve metabolism and reduce inflammation, but efficacy in older adults is largely unknown. The Centre will determine optimal exercise and nutritional supplementation regimes for musculoskeletal maintenance in older adults, both healthy and frail. One current focus is trying to determine if High Intensity Training (short 30 second bursts of high intensity exercise such as cycling on an exercise bike) will benefit older adults and may thus persuade those who do not want to spend hours in a gym to increase their physical activity. Interventions will also include pharmacological approaches aimed at reducing inflammation and adjusting hormone balance in favour of musculoskeletal maintenance. This theme will also attempt to improve neuromuscular function.

3. Overcoming barriers to adoption of lifestyle changes. Identifying psychological and environmental (practical) barriers to increased physical activity or weight loss in older adults will be a key question addressed by the Centre, with the aim of developing interventions that will be practical and attractive to older adults. One ongoing study is working with an exercise video, “Move it or Lose It” designed for use by older adults who cannot do a classic exercise class and who need chair based exercises they can do at home. The study will determine if the video based exercises improve physical ability, are adhered to, and also improve quality of life in the end users.

Centre objectives for the first five years are to:

- Increase understanding of molecular and cellular processes underlying musculoskeletal ageing and their systems-level effects;

- Establish a national technology platform for research and training in stable isotope tracer methods to study metabolism in musculoskeletal tissues in humans;

- Develop pharmacological and lifestyle interventions to attenuate age-related musculoskeletal decline in humans;

- Develop protocols to achieve adherence to lifestyle interventions in humans;

- Increase research and training capacity at UoB and UoN in musculoskeletal ageing through a dedicated PhD programme for clinicians and non-clinicians."

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