

The ageing spine and healthcare technologies

Abstract:

In this lecture, we shall examine the changes in the bone, intervertebral discs and muscles of the spine as a result of ageing and osteoporosis, and how these changes are related to the loss of functions. Osteoporosis does not affect the bone only, but also non-osseous tissues, leading to the loss of functions such as balance. Sarcopenia has emerged as an important risk factor for osteoporosis, and may contribute to the risk of falling. Recent evidence has suggested that sarcopenia may decrease bone strength due to the decreased muscle contraction and the subsequent reduction in mechanical stimulus on the bone.

This lecture will review the current opinions and scientific evidence regarding how physical activity and exercise may influence bone mineral density and muscle strength. Technology may play a key role in promoting musculoskeletal health. Skin-mounted miniature sensors such as accelerometers are potentially useful to monitor the dose-response relationship of physical activity. However, this can be challenging as the sensors may be subjected to errors due to deformation of soft tissues. A correction algorithm will be presented. We shall also discuss how mechanical stimuli are transmitted through the spine during everyday activities such as walking. Ageing may lead to an attenuation of signal transmission, and walking exercise may not provide sufficient stimuli to maintain or improve spine health.

Biography:

Professor Raymond Lee is Dean of our School of Applied Sciences and holds a Chair in Biomechanics in London South Bank University. He won the British Council Fellowship to complete his PhD degree in Bioengineering at the University of Strathclyde, Glasgow. He was also awarded the Association of Commonwealth Universities Development Fellowship, which supported his research work at King's College London.

As the Dean of the School of Applied Sciences, Professor Lee is committed to provide leadership to establish the School as an internationally recognised centre of academic excellence. He brings substantial international experience with previous roles at the University of Sydney and Hong Kong Polytechnic University, and has been involved in e-learning development throughout his career.

His main research areas lie in biomechanics of the spine, kinematics and dynamics of human motions. His work has examined the biomechanical mechanisms underlying back pain, osteoporosis and ageing of the spine. He is interested in the applications of inertial sensor technologies in monitoring physical activity, human motions, spine posture, mechanical signal transmission in the body, and falls in the elderly.

Externally, he has been invited to act as referee for national and international research funding bodies. He has served as member of the Research Sub-Committee of Arthritis Research UK, and a research grant panel member of Fundação para a Ciência e a Tecnologia, Portugal.