**Meeting Report for Symington Bequest Award, Round 5, 2013**

The following is a brief report based on the presentations which I delivered at the Orthopaedic Research Society annual meeting, which was held in San Antonio, Texas between January 26-29th, 2013. For this meeting, three of my abstracts were accepted on to the program in poster presentation format. Each of the study titles are shown below:

*1) Osteocyte Apoptosis is Required for Initiation of Intracortical Bone Remodelling Following Acute Focal Microdamage in Mouse Long Bones*

*2) Reductions in Serum IGF-1 During Aging Protect Against Metabolic Deterioration, but Compromise Bone Quality*

*3) Serum IGF-1 is Insufficient to Restore Skeletal Growth in the Absence of Growth Hormone Receptor*

The first study was phase-2 of work which was presented at the same meeting last year. It details our development of a new in vivo mouse model which can be used to probe the effects of mechanical loading, and microdamage, on bone tissue at very small length scales. The novel feature of this model is that the effects of mechanical perturbation can be confined to a very small amount of tissue – which contains a discrete and manageable number of bone cells. Thus, when used in conjunction with immunohistochemistry, and other histological techniques, we can begin to answer questions about specific cell-signaling mechanisms that occur among cell populations near microdamage.

The second and third studies listed above represent a new direction which my research has taken recently. While these are quite separate studies, they have similarities in that they both relate to the Growth Hormone (GH)/ Insulin-like Growth Factor (IGF-1) axis as it relates to skeletal metabolism. In human development, serum IGF-1 peaks during puberty and then reduces to low levels. In mice, and other rodents IGF-1 remains high, even after puberty. Surprisingly, when we used transgenic modifications to reduce IGF-1 levels in mice, this results in a robust lifespan extension and protects against oxidative stress and other stressors – our study sought to understand the mechanisms behind this.

The last study listed above used a recently developed mouse model to simulate the underlying state behind a condition known as ‘Laron Dwarfism’. In this condition, the system is insensitive to Growth Hormone, due to a genetic defect in its receptor, thus the system does not grow to ‘normal’ levels. Our model mimicked this by ‘knocking out’ the GH receptor. IGF-1 is normally ‘triggered’ or ‘activated’ when GH reaches its receptor. Since this will not happen in our case, as described here, our experiment re-introduced it to assess whether this would rescue the system from its growth defect.

Each of these presentations generated much interest and discussion at the meeting, and many potentially useful ideas emerged from those discussions. Thus, I am particularly grateful to the Anatomical Society for selecting me for the Symington Bequest Award, which facilitated my travel to this important meeting in the field of Orthopaedic Research.