

In vitro investigation of the osteogenic properties of osteoblast-like cells derived from normal and osteoporotic sheep

Principal Supervisor: Dr Cindy Bottema

Phone: 8303 7641

Email: Cynthia.Bottema@adelaide.edu.au

Co-supervisor: Dr Reza Zarrinkalam (Institute of Medical & Veterinary Sciences)

BACKGROUND

Osteoporosis is a generalised condition of decreased bone mass and quality that is characterised by an increased likelihood of fractures especially in the spine. To address this growing health issue in the world's aging population, several animal models have been utilised to explore the pathological mechanism of this disease. Sheep are being used increasingly as a large animal model to study osteoporosis. However, there is scant information about the mechanism of bone loss and the molecular pathways associated with ovine bone physiology. It has been highlighted that in vitro studies are invaluable in elucidating some of the pathomechanisms of osteoporosis. The aim of this in vitro study is to compare the osteogenic potential of primary bone cell (osteoblast) cultures derived from normal and osteoporotic sheep using modified human bone cell assays established by our group.

METHODS

Osteoblast-like cells sourced from trabecular bone biopsies of osteoporotic sheep and control sheep and then stored at -80°C will be defrosted and re-cultured in order to measure their osteogenic properties using the following assays:

- 1) CFSE labelling and flow cytometry for cell proliferation;
- 2) a colorimetric assay at days 14, 21 and 28 for mineralization
- 3) energy dispersive spectroscopy X-ray microanalysis for mineralized matrix quality
- 4) microscopy and image analysis to assess the extent of cell attachment
- 5) alkaline phosphatase to test the specificity and maturation of osteoblasts
- 6) rt-PCR for gene expression of candidate genes (e.g. OPG, RANKL, IL1, IL6 and TNF- α).

POTENTIAL OUTCOME

This study will improve our understanding of the pathophysiologic mechanisms of osteoporosis in the sheep model and ultimately will assist us to develop and/or test new treatments for osteoporosis in humans. Furthermore, this project provides excellent opportunities to gain some experience in cell and molecular biology.