Abstract

Osteoarthritis (OA) is a chronic degenerative disease of diarthroidal joints that most commonly affects people over the age of forty. The aim of this project was to produce a reproducible *in vitro* model of OA using porcine osteochondral (cartilage on bone) plugs, validated using selected markers. The project also aimed to propose a biochemical signature for OA based on an extensive literature search. Osteochondral plugs were harvested from porcine stifle joints and stimulated in the absence or presence of 10ng/ml, 25ng/ml and 50ng/ml of IL-1β and TNF-α over a 25-day period. Supernatant was collected at multiple time points during the experiment and tested using three colorimetric assays for lactate dehydrogenase (LDH) to assess cell death, alkaline phosphatase (ALP) to measure osteoblastic activity and glycosaminoglycan (GAG) as a marker of cartilage degradation.

The results showed no increase in LDH activity between cytokine stimulated plugs and controls, therefore IL-1β and TNF-α stimulation of plugs did not induce an increase in cell death compared to controls. Cytokine stimulated plugs showed an increase in ALP activity compared to controls, suggestive of increased osteoblastic activity in the plugs. Finally, whilst there was no difference in GAG concentration between IL-1β and control plugs, there was decreased GAG release from TNF-α stimulated plugs compared to controls, suggesting that TNF-α induced cartilage degradation in the plugs. With further refinement of the protocol this model could be adapted and tested in human