**Investigating selenium doped collagen-glycosaminoglycan scaffolds as a novel treatment strategy for bone cancer**

This project aims to develop a dual function, anti-cancer and pro-regenerative, scaffold for the treatment of bone defects resulting from tumour resection, by combining nano-therapeutics and biomaterial technologies. The current standard of care for bone cancer is to surgically resect the tumour and bone tissue around it, resulting in non-union bone defects that do not heal spontaneously. A major concern in post-surgery treatment is the presence of residual cancer cells. There has been extensive research on the development of biomaterials for bone regeneration however the use of scaffolds for bone cancer applications is an emerging field. Yet these scaffolds are designed to treat cancer, not to support bone regeneration. In this project, we will strive to address the deficit in treatment modalities for tumour resected bone by harnessing expertise in biomaterials development and nano-engineering and bone biology as well as anatomical/ultrastructural expertise to engineer anti-cancer pro-regenerative matrices to repair and restore bone function for patients. Selenium (Se) has recently emerged as an anti-cancer material for a number of tissue types including bone, but has more recently shown to have bone regenerative capabilities. Dr Murphy has extensive experience in the development of collagen-based scaffolds for bone. This project will utilise this experience and develop a collagen-glycosaminoglycan (Col-GAG) scaffold incorporating selenium nano-hydroxyapatite particles (Se-nHAp) to simultaneously promote bone regeneration and destroy cancer cells.