**Project Resume – Updated**

**Lead Supervisor**: Dr Ciara Murphy

**Co-Supervisor**: Professor Clive Lee

**Student**: Ms Eavan Pakenham

**Institution**: Royal College of Surgeons in Ireland (RCSI)

**Title**: Investigating Selenium (Se) and Magnesium (Mg) doped collagen-nanohydroxyapatite scaffolds as a novel treatment strategy for bone cancer

This PhD project focuses on developing a new therapeutic strategy to treat bone defects caused by cancer, particularly osteosarcoma, and bone metastasis. Bone, a dynamic tissue, consists of both organic components, like collagen, and inorganic elements, such as hydroxyapatite (HA), which provide structural support and biological functions. The balance between bone-building cells (osteoblasts) and bone-resorbing cells (osteoclasts) is vital for bone health, but this process is disrupted in cancer. Osteosarcoma, a highly malignant bone cancer, and cancers like breast and prostate, which often spread to bone, overstimulate osteoclasts, leading to bone destruction and fractures.

Current treatments, such as surgery, chemotherapy, and radiation, may leave behind cancer cells, causing further bone damage. Additionally, surgery can result in large bone defects that are difficult to heal. Traditional bone grafts, using either the patient’s bone or donor bone, are limited by risks and complications.

To address these challenges, this project aims to develop a new biomaterial scaffold made from collagen and nano-hydroxyapatite (nHA), modified with magnesium (Mg) and selenium (Se). Mg and Se have shown potential for bone regeneration and anti-cancer effects. By incorporating these elements into nHA, the project aims to create a dual-functional platform that supports bone healing while also targeting cancer cells. This innovative approach could improve outcomes for patients with bone defects following cancer treatment

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