The role of Colgalt2 during skeletal development and ageing

Supervisory team:
Main supervisor: Prof Chrissy Hammond (University of Bristol)
Second supervisor: Dr Emma Blain (Cardiff University)
Dr Beck Richardson (University of Bristol), Dr Sarah Rice (University of Newcastle)

Collaborators: Dr Sarah Rice (University of Newcastle)

Host institution: University of Bristol

Project description:
Musculoskeletal ageing conditions such as osteoarthritis and osteoporosis affect hundreds of millions of people worldwide. Currently our understanding of how natural ageing occurs and how the interplay between genetic modifications such as epigenetic changes, load and other environment stimuli affect the cells of the joint is incomplete, hindering our ability to develop treatments for these common diseases.

In this project you would join a highly interdisciplinary, inclusive and friendly team, using zebrafish as an animal model to investigate the function of Colgalt2 in the musculoskeletal system. Colgalt2 is an enzyme that post-translationally modifies collagen and is genetically linked to osteoarthritis risk. Using CRISPR gene editing you would knock down and over express colgalt2 in zebrafish and test the effects on tissues and cells of the joint. Using live imaging fluorescent transgenic reporter lines you will study cell behaviour (of skeletal cells e.g. chondrocytes, osteoblasts and osteoclasts, and of immune cells e.g. neutrophils and macrophages) during patterning and ageing of the joint. Using single cell sequencing you will identify changes to different cell populations upon dysregulation of Colgalt2. You will test the mechanics of the joints in the mutants using computational methods such as Finite Element analysis. This project would give you a desirable interdisciplinary skill set and there is lots of scope to shape the project around your own interests.

Our aim as the SWBio DTP is to support students from a range of backgrounds and circumstances. Where needed, we will work with you to take into consideration reasonable project adaptations (for example to support caring responsibilities, disabilities, other significant personal circumstances) as well as flexible working and part-time study requests, to enable greater access to a PhD. All our supervisors support us with this aim, so please feel comfortable in discussing further with the listed PhD project supervisor to see what is feasible.