

Joint function throughout the life course

Supervisory team:

Main supervisor: Prof Emily Rayfield (University of Bristol)

Second supervisor: Dr Chrissy Hammond (University of Bristol)
Dr Emma Blain (Cardiff University)

Collaborators: Dr Danielle Paul (University of Bristol)

Host institution: University of Bristol

Project description:

A majority of people (and many domestic pets) experience painful joint disorders such as osteoarthritis as they age. We know that mechanical loading of the joint plays a major role in joint health, yet we still have a limited understanding of how joint loading changes through life as the different tissues of the joint (including bone, cartilage, connective tissues and muscle) develop, are maintained and begin to degenerate. In this project using computational modeling (particularly Finite Element Analysis) along with advanced in vivo imaging (computed tomography, lightsheet, confocal and multi photon microscopy) you will study how joints are made, and maintained throughout the whole lifespan of a model organism, the zebrafish.

Using transgenic reporter lines you will study how the tissues of the joint come together. Using computational modeling you will test how strain patterns change through life so that we can identify which cells are under high and low strain, and begin to unpick (using transgenic reporters and genetic mutant lines) why cells behave in certain ways in the joint as they repair damage and as they age. The project will suit someone with an interest in genetics, in vivo imaging and computational modeling. You will work with groups who have pioneered use of the techniques that the project will use. The project will give you an interdisciplinary skill set that should benefit you in your further career.

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.