WTDTP Projects for September 2022

Project Reference: T1/38

Project Title: **Applying machine learning to find clinical and genetic predictors for radiotherapy side**

**effects**

Theme(s): Theme 1: Genomics for drug development & pharmacogenetics

Primary Supervisor: Dr Chris Talbot (University of Leicester)

Secondary Supervisor(s): Dr Tim Lucas (University of Leicester) Dr Tim Rattay (University of Leicester)

Department: Genetics and Genome Biology

Project Summary: Radiotherapy is effective at killing tumours but can cause side effects that impair quality of life. Efforts are underway to find predictive factors for radiotherapy toxicity, which would then allow alterations to treatment. Known predictive factors include genetics, co-morbidities, radiation dose distribution, chemotherapy and others. Additional complexity comes from there being different side effects in different body tissues, even if the underlying biology has common pathways.

The REQUITE project has collected treatment and outcome data on radiotherapy patients treated for breast, lung and prostate cancer. Some genetic studies have been carried out using conventional statistical approaches, but this project aims to apply machine-learning methods to the problem. The student will compare different methods to conventional statistical approaches, working closely with an existing PhD student. The outcome will be an improved ability to predict radiotherapy side effects and understanding of the factors that cause them. The results will allow personalised medicine approaches to improve cancer treatment outcomes.

The student will be co-supervised by academics with experience in genetics, statistics, machine learning and oncology, with other collaborators who are experts in artificial intelligence. Therefore, full training will be given and the project is suitable for students from a range of backgrounds.