

Title: Morphological features associated with knee osteoarthritis

Background: Osteoarthritis (OA) affects a substantial proportion of people aged over 40 years. The knee is the most common large joint affected by OA and the burden of the disease is likely to rise due to ageing and increased prevalence of obesity. Morphological variation in the hip is now known to predispose to development of hip OA, but currently there are very few morphological characteristics associated with risk of developing knee OA e.g. varus/valgus knee alignment.

Objectives: The overall aim of this PhD project is to examine the radiographic phenotype associated with knee OA. The objectives of this study are:

- 1) to examine the association between existing and novel radiographic measurements on knee radiographs and knee OA
- 2) to examine the association between novel radiographic measurements on knee radiographs and the radiographic phenotype of knee OA, for example compartmental localization and severity (patello-femoral joint vs tibio-femoral joint; medial versus lateral tibio-femoral joint involvement) and presence of radiographic changes like joint space narrowing, osteophytosis, and attrition.
- 3) to examine their interaction with other established risk factors of OA including demographic and genetic risk factors.

Methods: This will be a cross-sectional study using existing data from the Genetics of Osteoarthritis and Lifestyle (GOAL) study. GOAL is a case control study of 45 - 80 year old Caucasians involving 1042 knee OA cases, 1007 hip OA cases, and 1121 asymptomatic controls without radiographic knee or hip OA, and details of this study have been published before (16). In brief, participants underwent an extensive questionnaire, had musculoskeletal examination, functional assessments,

anthropometric measurements, and gave blood and urine samples. They had postero-anterior weight-bearing semi-flexed knee radiographs using the SynaFlexer positioning frame (Synarc^R); skyline views of patello-femoral joints (PFJs); supine pelvis radiographs for hips and symphysis pubis; and antero-posterior hand views (including wrists), and had dual energy x-ray absorption (DEXA) scan of the calcaneum (Apollo). Radiographs have been scored for global OA severity, and structural changes of OA. Varus and valgus alignment have already been measured on knee radiographs. DNA has been collected and genotyped. The prospective student will undertake a literature search for morphological variants that have been associated with knee OA. Those that are applicable to plain radiographs, together with new measurements that will be devised through discussion within the Unit, will then be examined within the GOAL radiographs for risk of knee OA using advanced statistical methods.

Training/supervision: A standard PhD training package will be provided including training in epidemiology, STATA, literature review, study design, analysis and writing up of the thesis. Additional training will be added according to individual needs.

The successful applicant will be jointly supervised by Professor Michael Doherty (Professor of Rheumatology), Professor Weiya Zhang (Professor of Epidemiology) and Dr A Abhishek (Associate Professor in Rheumatology), and will work in the team including clinicians, nurses, academics and other PhD students.