Artificial intelligence (AI) has been a hot topic in radiology for several years, inspired by impressive achievements in non-medical image analysis over the past decade. The motivations for applying AI in radiology are numerous; AI may be able to complement the radiologists' expertise and result in improved accuracy of detection and characterization of findings, aid interpretation, and increase efficiency via automation.

Despite the boon AI could be for radiologists (and the large capital investment that has funded algorithmic development), most practices do not use AI in routine workflow. The reasons are many, including regulatory hurdles, financial constraints, difficulty integrating with RIS / PACS, and resistance to change. However, one of the most important problems is the lack of high-quality imaging data required to train, test, and validate algorithms. Generating such databases is labor intensive, requiring identification of salient scans, image anonymization, labelling / segmentation, and subsequent upkeep. Moreover, algorithms trained and validated on one dataset may fail when applied to similar images with slightly different parameters such as intravenous contrast timing or image resolution. Therefore, before a particular AI application can be confidently applied at a particular site, it should be tested on local data to ensure satisfactory performance.

My objective is to accelerate AI algorithmic development and adoption at Western by building a robust imaging database of common pathologies. As an abdominal radiologist my focus is on abdominopelvic disease, but the pipelines my team develops could be equally applied to any body part. Our initial project focused on segmentation of kidney tumors, for which we collected over 150 CT scans of pathologically proven renal masses. Each case was also manually segmented by two observers. From this study, we identified several inefficiencies of the data collection process. We have streamlined our approach and are testing it in our second project involving the collection of 300 CT and MRI cases of histologically confirmed hepatocellular carcinoma. Ultimately, our goal is to automate data collection such that it is performed prospectively. When a sample is processed by pathology, it would trigger a search for the most recent prior cross-sectional imaging study of the salient organ(s), which would then be automatically anonymized, categorized by histopathological diagnosis, and downloaded to a research server. There would be a suite of tools on this server to facilitate automated or semi-automated labelling and segmentation. Additionally, salient patient data could be pulled from the electronic medical record, enabling clinical / radiological / pathological cross-correlative studies.

This data would be available to all researchers affiliated with the university in order to accelerate clinically relevant AI development in London through inter-disciplinary collaboration. With such a system in place, Western would be poised to be at the forefront of AI in radiology.