

Super Resolution and Ultra-Resolution Microscopy Contrast Ultrasound in GU Imaging

The lecture will encompass the fundamental principles of super-resolution and ultra resolution microscopy imaging, including the physics, microbubble localisation and tracking, velocity mapping, and the image acquisition protocols.

The discussion will include clinical applications in renal imaging, encompassing the differentiation of solid-appearing renal lesions, the assessment of infective and inflammatory renal pathology, and the evaluation of enhancement patterns in complex renal cysts.

Applications in bladder and scrotal imaging will subsequently be addressed, including microvascular characterisation of urinary bladder neoplasms and its implications for staging. The role of SRU and URM in scrotal imaging will be explored in detail, with clinical case demonstrations illustrating the evaluation of testicular lesions, perfusion abnormalities, and torsion — a domain in which these techniques play a particularly important role.

The lecture will further examine emerging applications, notably the potential URM in medical renal disease as a non-invasive alternative to renal biopsy.

The lecture will also include the limitations and technical considerations that presently constrain clinical adoption, including acquisition time and motion artefact constraints, hardware and software requirements and challenges of reproducibility and standardisation.