## Medical > Ex Vivo > Urology

# 2 | Feasibility study for ex vivo fluorescence confocal microscopy (FCM) on diagnostic prostate biopsies

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**ABSTRACT**

Background: Fluorescence confocal microscopy (FCM) is a novel micro-imaging technique providing optical sections of examined tissue. The method has been well established for the diagnosis of tumours in dermatological specimens. Preliminary results found good feasibility when this technique was used to examine prostate cancer (PCa) specimens. Methods: We report on the application of FCM in magnet resonance imaging (MRI)-fused prostate biopsies (10 patients, total number of biopsy specimens: n=121) and compare the results to conventional histology. Results: Specific structures of the prostatic tissue were very well represented in the FCM images comparable to conventional histology. Prostate carcinoma was diagnosed with good sensitivity (79/68%) and high specificity (100%) by two pathologists with substantial/almost perfect levels of agreement with the results of conventional histology (kappa 0.79/0.86). Depending on the quality of the scans, malignant lesions of 1.8 mm and more in diameter were reliably diagnosed. Smaller lesions were rated as suspect for malignancy, but could not be consistently differentiated from reactive changes. Optimal image qualities were achieved in focus depths of up to 50 µm, whereas deeper scans led to insufficient representation of cytological features. Pre-treatment with acridine orange (AO) did not alter immunoreactivity of the tissue or its feasibility for fluorescence in situ hybridization (FISH) analyses and adequate amounts of DNA could be extracted for further polymerase chain reaction (PCR)-based examinations. Conclusions: FCM seems to be a promising tool for the timely diagnosis in cases of PCa in patients requiring therapy. In particular, this technique is a material-sparing method that conserves the biopsies as unfixed material for further analysis such as molecular tumour companion diagnosis. Keywords: Confocal microscopy; digital pathology; prostate biopsies; prostate cancer (PCa).2021 Quantitative Imaging in Medicine and Surgery.  PMID: 33816171 PMCID: PMC7930678 DOI: 10.21037/qims-20-895 Free PMC article