Medical > In Vivo > Small animal research

6

Novel Virtual Biopsy of the Kidney With Near Infrared, Reflectance Confocal Microscopy: A Pilot Study In Vivo and Ex Vivo

ABSTRACT

PURPOSE: Current diagnostic strategies for the kidney combine noninvasive imaging techniques with invasive procedures such as needle biopsy. However, renal needle biopsy is not devoid of risks, such as bleeding or infection. Additionally, histology studies are limited to ex vivo morphology and processing induces tissue artifacts, is time-consuming and limits the performance of further studies. Near infrared, reflectance CM is a novel technique that allows high resolution optical sectioning through intact tissues without using any exogenous fluorescent stains. Contrast between structures is based on the natural differences in refractivity. In this pilot study we assessed the usefulness of CM in the study of the kidney in vivo and ex vivo.

MATERIALS AND METHODS: Kidneys of live rats were imaged with CM. Contrast in images is based on native properties of the tissue upon being shone with a near infrared laser. By convention hyperrefractile structures are seen as white and hyporefractile structures are seen as black. CM imaging planes varied along the x, y and z axes of space. Images of live kidney were compared with those from ex vivo CM imaging and standard histology procedures.

RESULTS: The tubules, glomeruli, vessels and interstitium were readily identified, revealing intracellular detail. Differences between the kidney in vivo and ex vivo were also observed. Experimental contrast agents further highlighted the nuclei.

CONCLUSIONS: CM is a useful noninvasive imaging technique that is an adjunct to current techniques for 3-dimensional study of the kidney in vivo and ex vivo. Future technical developments will provide key applications during surgical intervention, transplantation and rapid tissue assessment.