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# 13 Evaluation of Morphology and Microcirculation of the Pancreas by Ex Vivo and In Vivo Reflectance Confocal Microscopy

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**ABSTRACT**

**BACKGROUND**: Near-infrared reflectance confocal microscopy (CM) provides non-invasive real-time images of thin virtual horizontal tissue sections with high resolution and contrast.

AIM: Aim of the study was to characterize morphology,

microcirculation and leukocyte-endothelial interaction (LEI) in normal pancreas by in vivo and ex vivo CM.

**METHODS**: For CM we used water immersion objective lenses of high numerical aperture and near-infrared wavelengths. Experimentally measured lateral optical resolution is 0.5-1 micron and the axial resolution is 3-5 microns. The maximum depth of resolution was 300-400 microns. For ex vivo imaging, freshly excised pancreatic tissue from rats was studied by reflectance CM and conventional histopathology. For in vivo CM, the pancreatic head was exteriorized on a specially constructed stage for imaging the microcirculation and LEI. Images were obtained in real time at rates of 30 frames/s and later analyzed off-line to evaluate LEI and functional capillary density (FCD).

**RESULTS**: CM allowed high resolution visualization of normal pancreas acinar cells, ducts, islets, capillaries and LEI in postcapillary venules. Histological images and optical sections from ex vivo CM can be correlated. Cellular morphology is better analyzed by conventional histology, but angioarchitecture and connective tissue structure are better evaluated by CM. FCD (265.7 +/- 16.6 cm-1) and LEI (rolling leukocytes 5.3 +/- 1.6/100 microns/sticking leukocytes 1.5 +/- 0.9/100 microns) were evaluated by in vivo CM in the normal pancreas.

**CONCLUSIONS**: CM findings in tissues ex vivo correlate with those of classical histology but add informative details of connective tissue structure and angioarchitecture. Potential future applications for in vivo CM include real-time analysis of microcirculation, leukocyte-endothelial interaction and angiostructure in inflammatory and malignant pancreatic diseases.