

Publication

Morphology of urethral tissues

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Author(s) Mueller, Bert; Schulz, Georg; Herzen, Julia; Mushkola, Shpend; Bormann, Therese; Beckmann, Felix; Pueschel, Klaus

Author(s) at UniBasel [Müller, Bert](#) ;

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Micro computed tomography has been developed to a powerful technique for the characterization of hard and soft human and animal tissues. Soft tissues including the urethra, however, are difficult to be analyzed, since the microstructures of interest exhibit X-ray absorption values very similar to the surroundings. Selective staining using highly absorbing species is a widely used approach, but associated with significant tissue modification. Alternatively, one can suitably embed the soft tissue, which requires the exchange of water. Therefore, the more recently developed phase contrast modes providing much better contrast of low X-ray absorbing species are especially accommodating in soft tissue characterization. The present communication deals with the morphological characterization of sheep, pig and human urethras on the micrometer scale taking advantage of micro computed tomography in absorption and phase contrast modes. The performance of grating-based tomography is demonstrated for freshly explanted male and female urethras in saline solution. The micro-morphology of the urethra is important to understand how the muscles close the urethra to reach continence. As the number of incontinent patients is steadily increasing, the function under static and, more important, under stress conditions has to be uncovered for the realization of artificial urinary sphincters, which needs sophisticated, biologically inspired concepts to become nature analogue.

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