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Significance of mammalian epididymal morphology in sperm maturation

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The mammalian epididymis is a highly convoluted tubule, which can be divided into several regions depending either on its functional capability or its morphology. Epididymal duct is narrow and long. It is lined by a pseudostratified epithelium and in general the tubule diameter increases from the caput to the cauda. The absorptive and secretory activities of the epididymis are performed by the epithelium of the epididymis and this is therefore the functional unit of the epididymis. Epithelium of the epididymis is active with synthesis and secretion of various proteins and constituents that promote sperm maturation. However, significance of the morphological variations and sperm motility has not been studied previously. Objective of the present investigation was to study morphological variations and functional maturation of sperm in the epididymis of rat. Rat epididymis were isolated and total sperm number, sperm motility were recorded using mammalian saline as the medium. Tissue samples were fixed in Bouin's and histology was carried out. Epididymal duct diameter (mm) and epithelium width (mm) measured. Data were statistically analyzed. According to the data tubule diameter of the duct increases from caput region (0.233 ± 0.002) to the cauda region (0.299 ± 0.002). However, tubule epithelium thickness decreases from caput region (0.030 ± 0.007) to the cauda region (0.018 ± 0.003). Results were significant ($P < 0.05$) with compared to data from caput region. Since the concentration of sperm also varies from proximal to the distal end of the epididymis (937×10^6 in caput to 1670×10^6 in distal cauda; $P < 0.001$) it is clear that increase in diameter is mainly to accommodate more sperm. Cauda epididymis is more important in the storage of sperm. During this time, sperm remain viable in a quiescent state and their membranes are protected. Nevertheless, sperm motility increases while they pass through the epididymis. Whether this motility is purely depend on services from the epididymal epithelium or whether it is due to another fact is not clear from the present findings. However, evidence of the present study shows that morphology of rat epididymis has a relation to the development of sperm motility.

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