

Aquaporins in Mouse Male Reproductive Tracts

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In the male reproductive tract, fluid secretion as well as absorption is important for spermatogenesis and sperm maturation. Furthermore, alterations in the fluid homeostasis in epididymis may affect male fertility. Aquaporins (AQPs) are transmembrane channel proteins, and function as molecular water channel in the direction of osmotic gradients. In an effort to uncover the functional involvement of AQPs in spermatogenesis and sperm maturation, expression of AQP-1, -7, -8, and -9 was investigated together with the effect of estrogen on the AQPs expression in testis and different regions of epididymis in mice. In testis, AQP9 was largely expressed in Leydig cells in which AQP9 mRNA level increased according to sexual maturation. Furthermore, in Leydig cells primary culture, hCG increased AQP9 expression. This suggests close relationship between AQP9 expression and steroidogenic activity in Leydig cells. In epididymis, AQP-1, -7, -8, and -9 were detected in epithelia from all three regions. AQP-1 mRNA level was a little lower in corpus epididymis compared with other regions. Conversely, AQP-7 and -8 mRNA level was significantly higher in corpus epididymis compared with other regions. AQP-9 mRNA level was increased along the length of the epididymis. Following exposure to 17beta estradiol (0.1 ug/kg), AQP-1, -7, -8 and -9 mRNA level increased in testis. In epididymis, AQP-1 mRNA level increased a little in caput. In corpus and cauda, AQP-8 mRNA level increased by E2. Estradiol affected epididymal expression of AQP-1 and -8. Expression of AQPs was different according to the segment of mouse epididymis. Taken together, this suggests that fluid homeostasis through AQPs may play a important role in spermatogenesis, steroidogenesis and sperm maturation in estrogen dependent manner in mice.