THE MOLECULAR BASIS OF EPIDIDYMAL SPERM MATURATION

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The mammalian epididymis represents the site where functionally incompetent spermatozoa originating from the testes undergo their final maturation enabling them to engage in the complex cascade of sperm-egg interactions that culminate in fertilization. The extent to which this process is actively driven by the epididymis or reflects properties intrinsic to the gamete remains largely unknown. However, recent studies within our laboratory have demonstrated that sperm transit through region 4 (corpus) of the mouse epididymis is associated with an acquired ability to exhibit coordinated movement, capacitate and engage in sperm-zona binding. Furthermore, we have demonstrated that immature mouse sperm recovered from region 3 (caput) of the epididymis are able to display similar attributes following brief co-culture with region 4 epididymal plasma. Interestingly, immunohistological studies of the epididymal lumen within region 4 have revealed the presence of a number of dense bodies containing the molecular chaperones, heat shock protein 60 (HSP60) and endoplasmin (GRP94). Although the nature and origin of such inclusions remains to be resolved, these collective findings raise the intriguing possibility that the molecular chaperones are involved in the delivery of critical signaling molecules to the surface of spermatozoa. In light of this data, we have commenced a proteomic analysis of region 4 epididymal fluid with a view to identifying proteins which interact with the chaperones, HSP60 and GRP94. Such studies will provide an extremely important insight into the molecular basis of sperm maturation.

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