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JOURNAL ARTICLE

The inter-Sertoli tight junction permeability barrier is regulated by the interplay of protein phosphatases and kinases: an in vitro study

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The timely opening and closing of inter-Sertoli cell tight junctions in the rat testis are essential cellular events in the completion of spermatogenesis. They permit the passage of preleptotene and leptotene spermatocytes to cross the blood-testis barrier from the basal compartment to the adluminal compartment of the seminiferous epithelium so that these cells can continue their further development into spermatids. However, the mechanism by which these events is regulated remains a mystery in male reproductive physiology. As part of our long-term goal of understanding the biology of this event and its regulation, transepithelial electrical resistance (TER) across the Sertoli cell epithelia when inter-Sertoli tight junctions were being assembled in vitro was quantified to assess the effects of different inhibitors of phosphatases and kinases on the inter-Sertoli tight junction permeability barrier. It was shown that inhibitors of protein tyrosine phosphatases (PTPase) and inhibitors of protein Ser/Thr phosphatases (PSPase) could perturb the assembly and maintenance of the inter-Sertoli tight junction permeability barrier. Moreover, the inhibitory effects of PTPase were abolished by pretreating Sertoli cells with protein tyrosine kinase inhibitor (PTKi), which illustrates the specificity of the PTPase treatment. A cyclic adenosine monophosphate-dependent protein kinase A (PKA) activator and inhibitors of calcium-diacylglycerol-dependent protein kinase C (PKC) can also perturb the inter-Sertoli tight junction permeability barrier, which suggests that opening and closing of the inter-Sertoli tight junctions during spermatogenesis is likely regulated, at least in part, by the PKA/PKC pathways. Needless to say, these results illustrate that the interplay of protein kinases and phosphatases, which regulate the intracellular phosphoprotein content of Sertoli cells possibly via PKA and PKC signal transduction pathways, plays a crucial role in modulating the assembly and maintenance of inter-Sertoli tight junctions in the testis.

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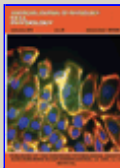
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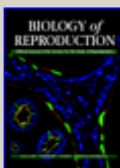
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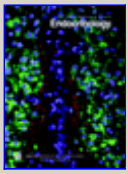
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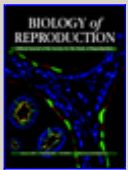
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