Accepted Manuscript

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PII: S1084-9521(15)30034-3
DOI: http://dx.doi.org/doi:10.1016/j.semcdb.2015.12.019
Reference: YSCDB 1907

To appear in: *Seminars in Cell & Developmental Biology*

Received date: 23-12-2015
Accepted date: 23-12-2015

Please cite this article as: Kidder Gerald M, Cyr Daniel G.Roles of connexins in testis development and spermatogenesis.*Seminars in Cell and Developmental Biology* http://dx.doi.org/10.1016/j.semcdb.2015.12.019

Roles of connexins in testis development and spermatogenesis

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Abstract

The development and differentiation of cells involved in spermatogenesis requires highly regulated and coordinated interactions between cells. Intercellular communication, particularly via connexin43 (Cx43) gap junctions, plays a critical role in the development of germ cells during fetal development and during spermatogenesis in the adult. Loss of Cx43 in the fetus results in a decreased number of germ cells, while the loss of Cx43 in the adult Sertoli cells results in complete inhibition of spermatogenesis. Connexins 26, 32, 33, 36, 45, 46 and 50 have also been localized to specific compartments of the testis in various mammals. Loss of Cx46 is associated with an increase in germ cell apoptosis and loss of the integrity of the blood-testis barrier, while loss of other connexins appears to have more subtle effects within the seminiferous tubule. Outside the seminiferous tubule, the interstitial Leydig cells express connexins 36 and 45 along with Cx43; deletion of the latter connexin did not reveal it to be crucial for steroidogenesis or for the development and differentiation of Leydig cells. In contrast, loss of Cx43 from Sertoli cells results in Leydig cell hyperplasia, suggesting important cross-talk between Sertoli and Leydig cells. In the epididymis connexins 26, 30.3, Cx31.1, 32, and 43 have been identified and differentiation of the epithelium is associated with dramatic changes in their expression. Decreased expression of Cx43 results in decreased sperm motility, a function acquired by spermatozoa during epididymal transit. Clearly, intercellular gap