

Spermatogenesis

Degree-II

Spermatogenesis

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Gametogenesis is the process which produces a haploid cell from a diploid cell. Gametogenesis in the male is called spermatogenesis and produces spermatozoa. Gametogenesis in the female is called oogenesis and results in the formation of ova.

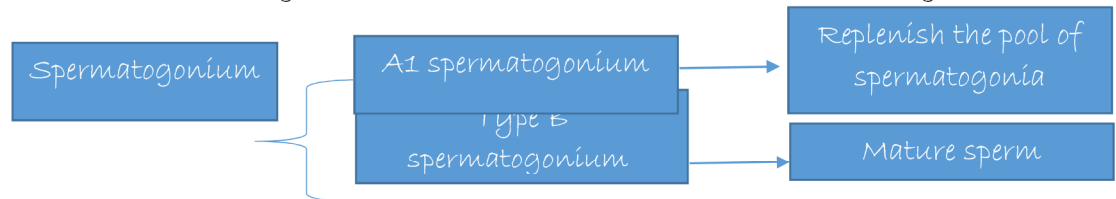
Spermatogenesis

Spermatogenesis occurs in seminiferous tubules of testes in male. Seminiferous tubules remain separate from systemic circulation by blood-testis barrier. Walls of the seminiferous tubules are lined by two type of cells- primitive germ cells and Sertoli cells. Sertoli cells are large, complex glycogen-containing cells and stretch from the basal lamina of the tubule to the lumen. Tight junctions between adjacent Sertoli cells near the basal lamina form a blood-testis barrier that prevents many large molecules from passing from the interstitial tissue and the part of the tubule near basal lamina to the region near the tubular lumen and the lumen. The barrier protects germ cells from blood borne noxious agents, prevents antigenic products of germ cell division and maturation from entering the circulation and generating an autoimmune response.

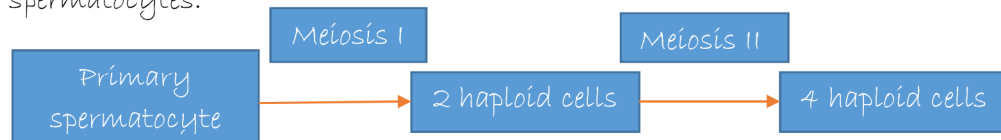
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Spermatogonia are the primitive germ cells that mature into primary spermatocytes. This begins during adolescence. The primary spermatocytes undergo meiotic division. Meiotic division is a two stage process, they divide primary spermatocytes into secondary spermatocytes and then into spermatids. Spermatid contains the haploid number of chromosomes. The spermatids mature into spermatozoa (sperm). A spermatogonium divides and matures; its descendants remain tied together by cytoplasmic bridges until

late spermatid stage. This ensures synchrony of the differentiation of each clone of germ cells. The estimated number of spermatids formed from a single spermatogonium is 512 in human. The formation of a mature sperm from a primitive germ cell by spermatogenesis in humans takes about 74 days.



Type B spermatogonia undergo mitosis several times to form diploid cells that are linked together by cytoplasm bridges. These linked are known as primary spermatocytes.



Spermiation: During spermiation, cytoplasmic bridges dissolve and the spermatids are freed into the lumen of the seminiferous tubule. Now, spermatids undergo spermiogenesis as they move along the seminiferous tubules.

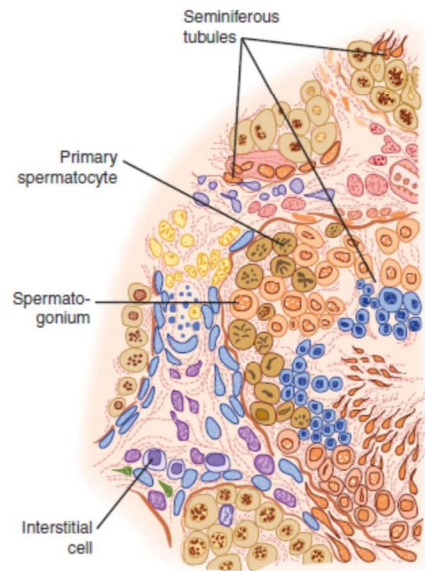


Figure 1. Human testis in section

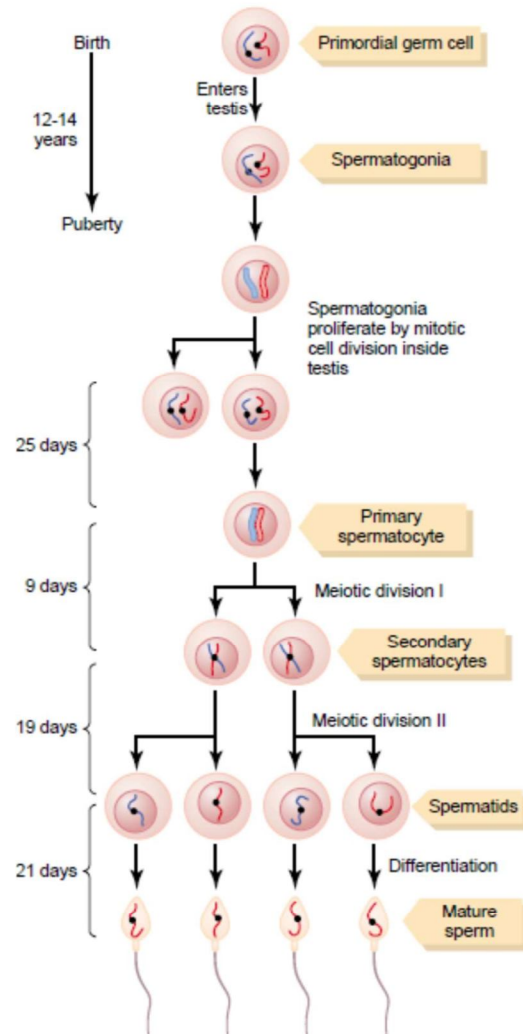


Figure 2. Spermatogenesis

References:

- Ganong's review of Medical Physiology
- Medical Physiology by Guyton and Hall
- Developmental Biology by Gilbert
- Gametogenesis by Reshma Joseph