**Spermatogenesis**

The gametogenic function of the testes is to produce the male gametes or spermatozoa. This process is termed, spermatogenesis.

 **Spermatogenesis** is the process of producing sperm with half the number of chromosomes (haploid) as somatic cells. The process of spermatogenesis then allows the recombination of male and female haploid gametes at fertilization. Spermatogenesis occurs in medullary sex cords which are called **seminiferous tubules** (totaling about 3 miles in length in the bull).

The spermatozoa originate from precursor cells that are called spermatogonia, and these cells line the basement membrane of the seminiferous tubule. Spermatogenesis can be divided into three portions:

* **spermatocytogenesis** -- proliferative phase
* **meiosis** -- production of the haploid gamete
* **spermiogenesis** -- "metamorphosis" of spermatids into spermatozoa.

**Spermatocytogenesis and Meiosis**

This phase begins with the division of the **spermatogonia,** that line the seminiferous tubule, near the basement membrane. Spermatogonia originate at puberty by the proliferation of the **gonocytes** and are the descendants of the **primordial germ cells**. One or two divisions of spermatogonia occur to maintain their population in a stem cell pool. Of the cells resulting from these **mitotic** divisions, some spermatogonia stay in the "resting" pool, while the remaining type A spermatogonia proliferate(by mitotic divisions) several times and undergo 1 to 5 stages of division and differentiation. After the last division, the resulting cells are termed **primary** spermatocytes and this ends spermatocytogenesis. The primary spermatocytes then undergo the first of the two division that constitute **meiosis**. The first meiotic division produces two **secondary** spermatocytes. Division of the secondary spermatocytes completes meiosis and produces the spermatids.

**Spermiogenesis**

This part of spermatogenesis is defined as the nuclear and cytoplasmic changes in the spermatid that results in the **spermatozoa**. Some aspects of the restructuring of the cell are:

* condensation of nuclear material
* formation of the acrosome
* formation of tail structures
* mitochondrial spiral formation
* removal of extraneous cytoplasm.

The process of spermiogenesis ends in the testis with release of the spermatozoa from the **Sertoli cell.** The spermatozoa has been embedded up until now in the Sertoli cell. The process by which spermatozoa are shed into the lumen of the seminiferous tubule for transport out of the testis is **spermiation**.

The overall results of spermatogenesis process is:

* cell proliferation
* maintenance of a reserve germ cell population
* reduction in chromosome number
* genetic variation through meiosis
* shaping of the spermatid into the spermatozoa