

### B. Spermiogenesis

- is a series of **maturational changes** in spermatids that results in the formation of **spermatozoa**; these include formation of the **acrosome**, condensation of the **nucleus**, and formation of **head, neck, and tail**.
- the **total time of sperm formation** (from spermatogonia to spermatozoa) is **64 days**.

### C. Capacitation of sperm

- is a reversible process whereby freshly ejaculated sperm develop the **capacity to fertilize a secondary oocyte**.
- normally occurs in the **female reproductive tract** and takes **7 hours**.
- involves the following:
  1. **Unmasking of glycosyltransferases** on the sperm cell membrane
  2. **Removal of surface-coating proteins** derived from seminal fluid

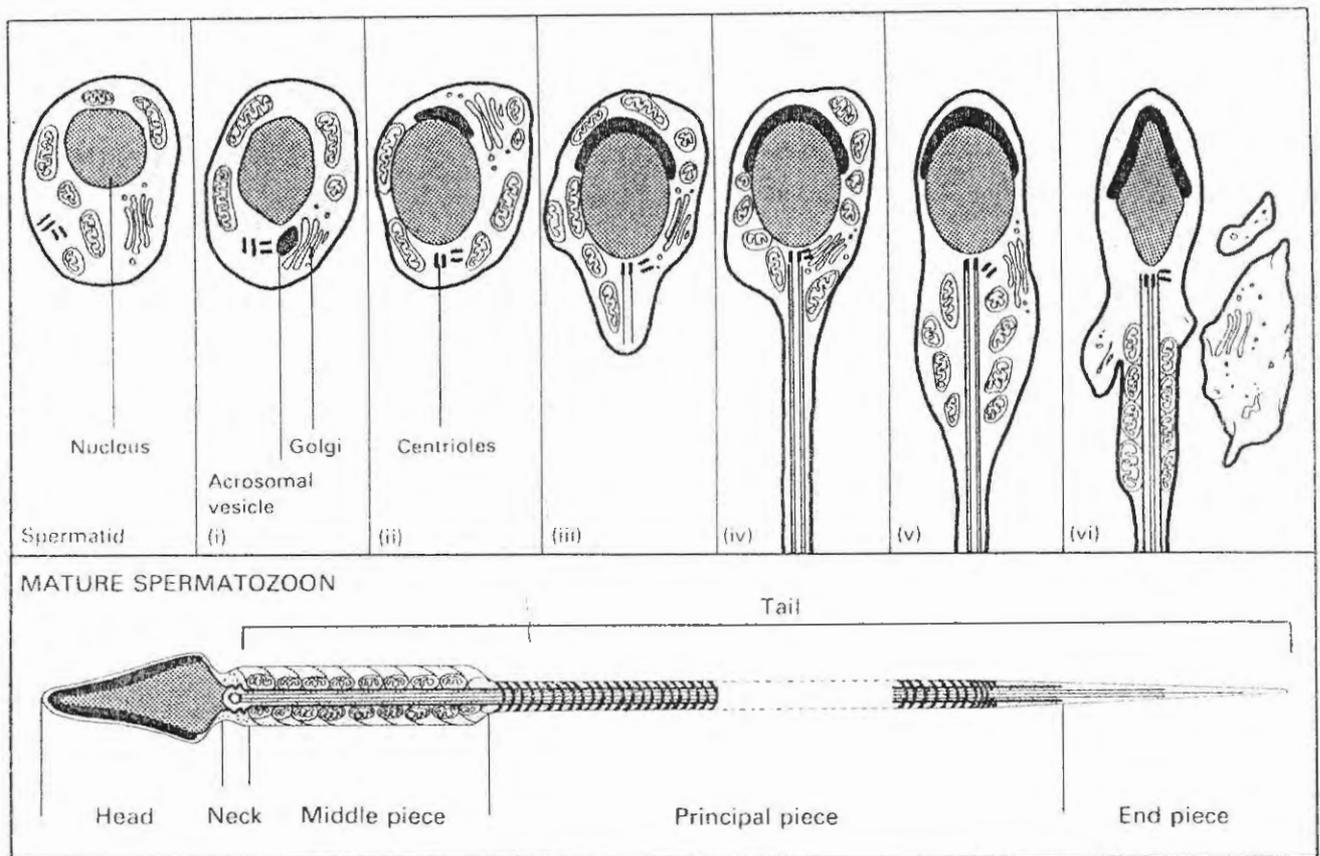


Fig. 18.7 Spermiogenesis

Spermiogenesis is the process by which spermatids, the gametes produced by meiotic division, are transformed into the potentially motile forms, the mature spermatozoa. This involves the following major stages:

1. The Golgi apparatus elaborates a large vesicle, the **acrosomal vesicle**, which accumulates carbohydrates and hydrolytic enzymes.
2. The acrosomal vesicle becomes applied to one pole of the progressively elongating nucleus to form a structure known as the **acrosomal head cap**.
3. Both centrioles migrate to the end of the cell opposite to the acrosomal head cap and the centriole aligned parallel to the long axis of the nucleus elongates to form a flagellum which has a basic structure similar to that of a cilium (see Fig. 5.21).
4. As the flagellum elongates, nine coarse fibrils, which may contain contractile proteins, become arranged

longitudinally around the core of the flagellum. Further rib-like fibrils then become disposed circumferentially around the whole flagellum.

5. The cytoplasm migrates to surround the first part of the flagellum with the remainder of the flagellum appearing to project from the cell but in fact remaining surrounded by plasma membrane. This migration of cytoplasm thus concentrates mitochondria in the flagellar region.

6. As the flagellum elongates, excess cytoplasm is cast off and phagocytised by the enveloping Sertoli cell. The mitochondria become arranged in a condensed, helical manner around the fibrils which surround the first part of the flagellum.

The structure of fully formed spermatozoa varies in detail from species to species, but conforms to the basic structure seen in this diagram of a human spermatozoon.