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A factor of sperm transport is the **cervix**. The cervical entrance is not only very small, but it is blocked by cervical mucus. During most times in the menstrual cycle, cervical mucus is highly sticky and represents an almost impenetrable barrier to sperm penetration. Around the time of

ovulation, however, the estrogenic environment of the female reproductive system brings about a change in cervical mucus, rendering it more watery and more amenable to penetration by sperm. The swimming speed of human sperm in fluid is approximately 5 mm/min, so in theory, sperm could swim through the cervical canal in a matter of minutes or hours. In reality, some sperm have been found in the upper reaches of the uterine tubes within minutes of coitus. These pioneers are likely to have been swept up the female reproductive tract during muscular contractions occurring at the time of or shortly after coitus.

- The openings of the uterine tubes into the uterus (**uterotubal junction**) represent another barrier to sperm transport. With two uterine tubes and usually only one ovulated egg, any spermatozoon that enters the empty uterine tube is automatically doomed to reproductive failure. Roughly 10,000 or fewer sperm cells of the millions in the ejaculate enter the correct tube. These sperm cells collect in the lower part of the uterine tube and attach to the epithelium of the tube for about 24 hours.

Two critical events occur during this period of attachment. The first is called **capacitation**, a reaction necessary for a spermatozoon to be able to fertilize an egg.

second phenomenon occurring while the sperm are attached to the distal tubal lining is **hyperactivation** of the sperm.

Hyperactivation is manifest by the increased vigor in their swimming movements and allows the sperm to break free from their binding with the tubal epithelial cells.

- During coitus in the human, semen is deposited in the upper **vagina** close to the cervix. The normal environment of the vagina is inhospitable to the survival of sperm, principally because of its low pH (<5.0). The low pH of the vagina is a

protective mechanism for the woman against many sexually transmitted pathogens, because no tissue barrier exists between the vagina (outside) and the peritoneal cavity (inside). The acidic pH of the vagina is bacteriocidal and is the reflection of an unusual functional adaptation of the vaginal epithelium. Alone among the stratified squamous epithelia in the body, the cells of the vaginal lining contain large amounts of **glycogen**.

Anaerobic lactobacilli within the vagina break down the glycogen from shed vaginal epithelial cells, with the production of **lactic acid** as a byproduct. The lactic acid is responsible for the lowered vaginal pH.

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