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DEPARTMENT: NURSING SCIENCE

**ASSIGNMENT:**

Discuss the factors facilitating the movement of sperm in the female reproductive tract.

**ANSWER:**

Passage of sperm through the female reproductive tract is regulated to maximize the chance of fertilization and ensure that sperm with normal morphology and vigorous motility will be the ones to succeed.

Oocytes are usually fertilized within hours of ovulation On the other hand, in some species, sperm may be inseminated days (horses, cattle and pigs) or even months (some bat species) before the arrival of the oocyte. In humans, there is evidence that fertilization occurs when intercourse takes place up to five days before ovulation). Because sperm are terminally differentiated cells, deprived of an active transcription and translation apparatus, they must survive in the female without benefit of reparative mechanisms available to many other cells. Sperm are subjected to physical stresses during ejaculation and contractions of the female tract, and they may sustain oxidative damage. Furthermore, because sperm are allogenic to the female, they may encounter the defenses of the female immune system meant for infectious organisms 3). Thus, sperm must somehow use their limited resources to maintain their fertility in the face of numerous impediments. As it is, of the millions of sperm inseminated at coitus in humans, only a few thousand reach the Fallopian tubes and, ordinarily, only a single sperm fertilizes an oocyte.

Site of semen deposition

The site of semen deposition is not easy to establish in many species because it must be determined by examining the female immediately after coitus and by considering the anatomy of the penis, vagina and cervix during coitus. However, it has been accomplished for humans, in which semen has been observed pooled in the anterior vagina near the cervical os shortly after coitus. Within minutes of vaginal deposition, human sperm begin to leave the seminal pool and swim into the cervical canal). In contrast, rodent sperm deposited in the vagina are swept completely through the cervix into the uterus along with seminal plasma within Some species, such as pigs, bypass the vagina altogether and deposit semen directly into the uterine cavity, where sperm may quickly gain access to the oviduct

Whereas most of the semen of murine rodents is rapidly transported into the uterine cavity, some remains in the vagina where it coagulates to form a copulatory plug. The plug forms a cervical cap that promotes sperm transport into the uterus .Ligation of the vesicular and coagulating glands of rats prevented the formation of plugs and the transport of sperm into the uterus (Blandau, 1945). The plugs formed by semen of guinea pigs and mice extend into the cervical canals and thus could form a seal against retrograde sperm loss Male mice deficient for the gene encoding the protease inhibitor known as protease nexin-1 (PN-1) show a marked impairment in fertility). Vaginal plugs formed in females after mating with PN-1 null males were small, soft and fibrous and did not lodge tightly in the dual cervical canals. No sperm could be found in the uterus 15 min after mating with PN-1 null males, demonstrating the importance of the plug for promoting transport of mouse sperm into the uterus.

Human semen coagulates, but it forms a loose gel rather than the compact fibrous plug seen in rodents. The coagulate forms within about a minute of coitus and then is enzymatically degraded in to 1 h . The predominant structural proteins of the gel are the 50 kDa semenogelin I and the 63 kDa semenogelin II, as well as a glycosylated form of semenogelin II, all of which are secreted primarily by the seminal vesicles. The gel is degraded by prostate-specific antigen (PSA), a serine protease secreted by the prostate gland (Watt et al., 1986). It has been proposed that this coagulum serves to hold the sperm at the cervical os and that it protects sperm against the harsh environment of the vagina.

Seminal gels are not fully successful at holding sperm at the cervical os. The fate of spermatozoa that are ejaculated or inseminated into the vagina, but that do not enter the cervix, has not been studied extensively in humans. However, in a 5 year study of 11 female volunteers Baker and Bellis (1993) examined the characteristics of sperm loss from the vagina following coitus (‘flowback’). They found that flowback occurred in 94% of copulations with the median time to the emergence of ‘flowback’ of 30 min (range 5–120 min). Furthermore they estimated that a median of 35% of spermatozoa were lost through flowback but that in 12% of copulations almost 100% of the sperm inseminated were eliminated. This suggests that less than 1% of sperm might be retained in the female reproductive tract and this supports the notion that only a minority of sperm actually enter cervical mucus and ascend higher into the female reproductive tract.