ENDOMETRIUM

The innermost layer of uterus forming the uterine lumen where the implantation of an oocyte happens.

About Endometrium

Function

The endometrium is the only tissue where a fertilized oocyte implantation and consequent development can happen, so it has utmost importance for the human reproduction. During pregnancy, the glands and blood vessels of endometrium provides nutrients and other necessary substances for an embryo to continue its development. Later some part of endometrial epithelium, called decidua, forms the placenta together with the outer layer (trophoblast) of an early embryo (blastocyst). The endometrium has also a structural function, since it prevents the adhesion of opposed walls of the myometrium (Pic. 1) so the lumen of a uterus does not collapse.

Histological structure

Structurally, the endometrium consists of two layers: the stratum basalis and the stratum functionalis (the basal and functional layers).

The stratum basalis layer is the deepest tissue of endometrium and is adjacent to the myometrium. It is the constant layer of endometrium, that does not undergo conformational changes during the uterine cycle and its purpose is to replace the tissue loss during the menstruation.

On the other part, the thicker stratum functionalis (Pic. 2), is the layer that provides actual proper site for implantation of the fertilized egg, and if the
fertilization should not occur, it is only the stratum functionalis layer that sheds during menstruation. This superficial layer of endometrium contains the stroma, glandules and the epitelial tissue that lines the uterine lumen.

The epithelial tissue is formed by a single layer of columnar epithelium and it rests on the endometrial stroma where simple tubular uterine glandules can be found. The stroma is supplied by blood through spiral arteries, that develop during secretory phase under the influence of progesterone. They are derived from uterine arteries and they regress under the influence of prostaglandins if the pregnancy does not occur.

**Uterine Cycle**

The epithelial tissue of endometrium goes through a cyclic regeneration. The endometrium initially proliferates under the influence of estrogen. That's called the proliferative phase. The end of the proliferative phase is induced by changes in the sex hormones production and concentration and its end is marked by ovulation. The next phase of uterine cycle is called the secretory phase, which is characterized by the preparation of the endometrium for the implantation of an embryo. This means that the glands of endometrium become more active in production of specific nutritive fluids. If the pregnancy does not occur within approximately 10 to 12 days, the corpus luteum will degrade into the corpus albicans. As the consequence the levels of both estrogen and progesterone will fall, the endometrium will grow thinner, a menstruation will happen so new menstrual cycle will start. In humans, the uterine cycle lasts an average of 28 days.

**Proliferative Phase**

Once menstrual flow ceases, the endometrium begins to proliferate again, marking the beginning of the proliferative phase of the menstrual cycle. It occurs when the granulosa and theca cells of the tertiary follicles and later the dominant (antral) follicle begin to produce increased amounts of estrogen. These rising of estrogen concentrations stimulate the stratum functionalis (epithelial tissue or endometrial lining) to rebuild. In the late proliferative phase, the ovulation of antral follicle is triggered under the influence of the luteinizing hormone (LH) surge. In a typical 28-day menstrual cycle, ovulation occurs on day 14 and it marks the end of proliferative phase.

**Secretory Phase**

In the ovary, the luteinization of the granulosa cells of the collapsed follicle forms the progesterone-producing corpus luteum, marking the beginning of the luteal phase of the ovarian cycle. In the uterus, the progesterone begins the secretory phase of the menstrual cycle, in which the stratum functionalis
prepares for implantation. Over the next 10 to 12 days, the endometrial glands secrete a fluid rich in glycogen. If fertilization has occurred, this fluid will nourish the ball of cells now developing from the zygote. At the same time, the spiral arteries develop to provide blood to the thickened stratum functionalis. If no pregnancy occurs within approximately 10 to 12 days, the corpus luteum will degrade into the corpus albicans. As consequence, levels of both estrogen and progesterone will fall, and the endometrium will grow thinner. Prostaglandins will be secreted that cause constriction of the spiral arteries, reducing oxygen supply. The endometrial tissue will die, resulting in menses.

Pathological conditions

- **Adenomyosis** is the growth of the endometrium into the muscle layer of the uterus (the myometrium).
- **Endometriosis** is the growth of endometrial tissue outside the uterus.
- **Endometrial cancer** is the most common cancer of the human female genital tract.
- **Asherman's syndrome**, also known as *intrauterine adhesions*, occurs when the basal layer of the endometrium is damaged by instrumentation or infection resulting in endometrial sclerosis and adhesion formation. It is leading to a partial or complete obliteration of the uterine cavity.
- **Endometrial hyperplasia** is a condition of excessive proliferation of the cells of the endometrium, or inner lining of the uterus.

**Find more about related issues**

- **Anorexia Nervosa**
  An eating disorder characterized by the maintenance of a body weight below average, fear of gaining weight, and a distorted body image.
  Learn more at: [www.fertilitypedia.org/therapy/diag/anorexia-nervosa](http://www.fertilitypedia.org/therapy/diag/anorexia-nervosa)

- **Menstrual cycle disorders**
  An abnormal condition in a woman’s menstrual cycle.
  Learn more at: [www.fertilitypedia.org/therapy/diag/menstrual-cycle-disorders](http://www.fertilitypedia.org/therapy/diag/menstrual-cycle-disorders)

- **Endometrial polyp**
  The finger like overgrowths attached to the inner wall of the uterus that extend into the uterine cavity which are made of endometrial tissue
  Learn more at: [www.fertilitypedia.org/therapy/diag/endometrial-polyp](http://www.fertilitypedia.org/therapy/diag/endometrial-polyp)
Endometriosis
A state in which pieces of the tissue alike to the lining of the uterus (endometrium) grow in other parts of the body.
Learn more at: www.fertilitypedia.org/therapy/diag/endometriosis

Thyroid disorders
A medical condition impairing the function of the thyroid.
Learn more at: www.fertilitypedia.org/therapy/diag/thyroid-disorders

Repeated implantation failure
The absence of implantation after three or more transfers of high quality embryos or after placement of 10 or more embryos in multiple transfers.
Learn more at: www.fertilitypedia.org/therapy/diag/repeated-implantation-failure

Asherman’s syndrome
A medical condition, where the walls of the uterus stick to one another due to bands of scar tissue.
Learn more at: www.fertilitypedia.org/therapy/diag/asherman-s-syndrome

Uterine malformations
A type of female genital malformation resulting from an abnormal development of the Müllerian duct(s) during embryogenesis.
Learn more at: www.fertilitypedia.org/therapy/diag/uterine-malformations

Uterus septus
A form of a congenital malformation where the uterine cavity is partitioned by a longitudinal septum. It is one of Müllerian duct anomalies.
Learn more at: www.fertilitypedia.org/therapy/diag/uterus-septus

Uterus duplex
Congenital uterine malformation where both Müllerian ducts develop but fail to fuse, thus the woman has a "double uterus".
Learn more at: www.fertilitypedia.org/therapy/diag/uterus-duplex

Uterus subseptus
A form of a congenital malformation where the uterus is partially divided by a longitudinal septum. It is one of Müllerian duct anomalies.
Learn more at: www.fertilitypedia.org/therapy/diag/uterus-subseptus
Menopause
The time in most women's lives when menstrual periods stop permanently, and the woman is no longer able to have children.
Learn more at: www.fertilypedia.org/therapy/diag/menopause

Endometrial cancer
Cancer that arises from the endometrium, the lining of the uterus.
Learn more at: www.fertilypedia.org/therapy/diag/endometrial-cancer

Endometrial hyperplasia
Thickening of the lining of the uterus.
Learn more at: www.fertilypedia.org/therapy/diag/endometrial-hyperplasia

Oligomenorrhea
Light or infrequent menstrual flow at intervals of 39 days to 6 months or 5–7 cycles in a year.
Learn more at: www.fertilypedia.org/therapy/diag/oligomenorrhea

Pelvic adhesions
A form of abdominal adhesions in the pelvis.
Learn more at: www.fertilypedia.org/therapy/diag/pelvic-adhesions

Gallery

Pic
A micrograph of the stratum functionalis during the secretory phase of uterine cycle.

Pic. 1: The inner mucous layer of the uterus
An illustration of uterus with its innermost layer – endometrium.

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