

NATURE OF SCIENCE

In Section 6.2 you learnt about the work of William Harvey and how he provided the first valid explanation of how blood circulates in the body. William Harvey was also responsible for much of the early knowledge of a branch of biology that we now call embryology. Embryology is the study of the early development of embryos from fertilized egg to birth. William Harvey's insights were considerable, but lacked information about the earliest embryonic development stages. This was because William Harvey carried out his studies before the microscope had been invented. William Harvey died 17 years before the invention of the microscope.



Role of sex hormones during puberty

When females and males reach puberty, the same hormones that first determined their physical sex are produced and secreted in higher amounts. The increased production of hormones at this time results in the secondary sex characteristics (the attributes that are characteristic of a sex that only appear at puberty).

The secondary sex characteristics of females that arise as a result of increased oestrogen and progesterone production at puberty are:

- enlargement of breasts
- growth of pubic and underarm hair
- widening of hips.

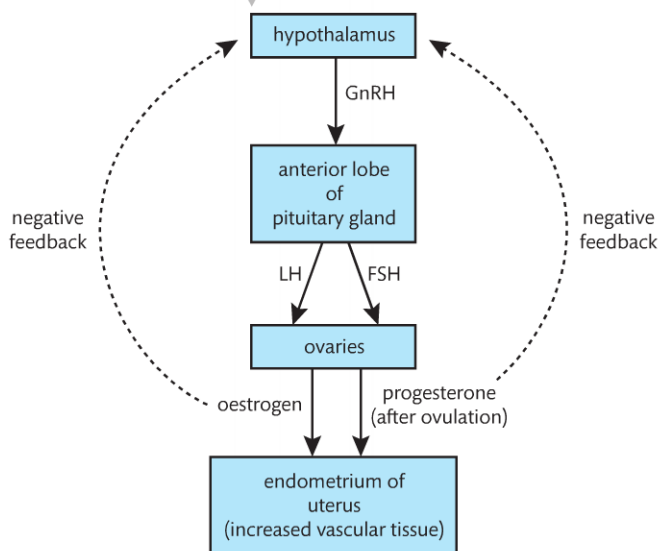
The secondary sex characteristics of males that arise as a result of increased testosterone production at puberty are:

- growth of facial, underarm, chest, and pubic hair
- enlargement of the larynx and associated deepening of the voice
- increased muscle mass
- enlargement of the penis.

The menstrual cycle

Starting at puberty, human females begin a hormonal cycle known as the menstrual cycle. Each cycle lasts, on average, 28 days. The purpose of the menstrual cycle is to time the release of an egg or ovum (ovulation) for possible fertilization and later implantation into the inner lining of the uterus. This implantation must occur when the uterine inner lining (the endometrium) is rich with blood vessels (i.e. highly vascular). The highly vascular endometrium is not maintained if there is no implantation. The breakdown of the blood vessels of the endometrium leads to the menstrual bleeding (menstruation) of a typical cycle. This menstruation is a sign that no pregnancy has occurred.

Figure 6.26 Hormonal summary of the menstrual cycle.



Hormones from the hypothalamus and pituitary gland

A part of a female's brainstem known as the hypothalamus is the regulatory centre of the menstrual cycle. The hypothalamus produces a hormone known as gonadotropin-releasing hormone (GnRH). The target tissue of GnRH is the nearby pituitary gland, and it results in the anterior pituitary producing and secreting two hormones into the bloodstream. These two hormones are follicle-stimulating hormone (FSH) and luteinizing hormone (LH). The target tissues for these two hormones are the ovaries.