

# Female and Male: Reproductive anatomy & physiology

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## Overview

### Female

- Anatomy
- Physiology
- Relevance physiology to infertility treatment

### Male

- Anatomy
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## Overview

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- **Anatomy**
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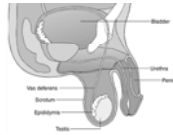
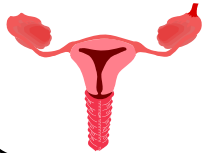
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## Female and Male Anatomy



### Similarities & Differences



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## How many oocytes ovulate?

- In utero over 5,000,000 oocytes develop
- By birth typically only 2,000,000 oocytes remain
- By puberty typically 400,000 oocytes remain
- Usually only 1 oocyte is released each month from puberty to menopause
- So in a life time around 400 oocytes ovulate

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## How many sperm are ejaculated?

- From puberty stem cells in testicles produce 10-30 billion sperm per month.
- These move through seminiferous tubules to epididymis.
- Sperm production takes a few months then mature in epididymis in a few days
- Typically 40,000,000 sperm per ml in 5 ml ejaculate ie 200,000,00 sperm released in a single ejaculate.

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## Overview

### Female

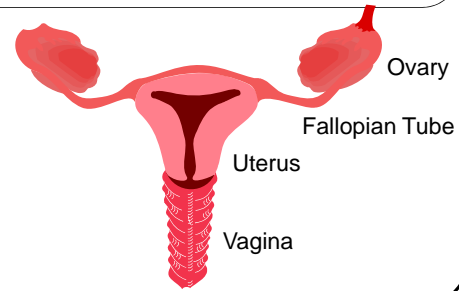
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## Female Reproductive Organs



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## Laparoscopy



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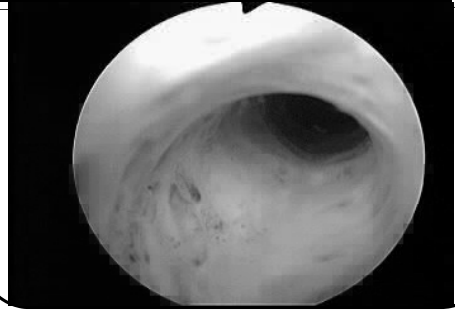
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### Hysteroscopy



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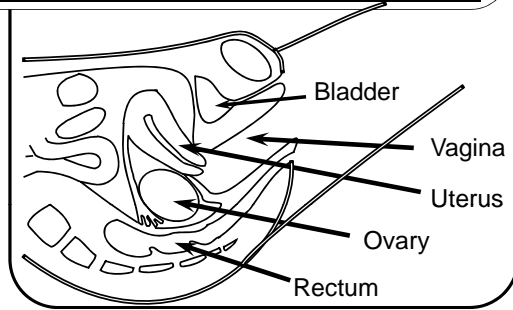
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### Female Anatomy



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### Transvaginal Ultrasound



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## Overview

### Female

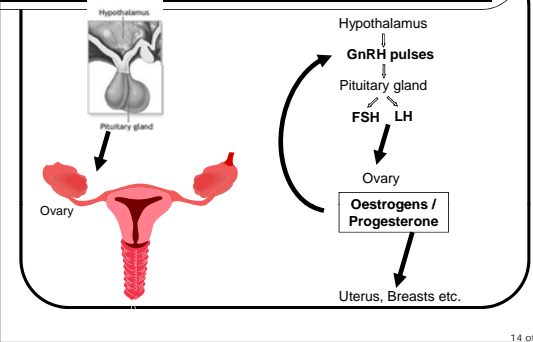
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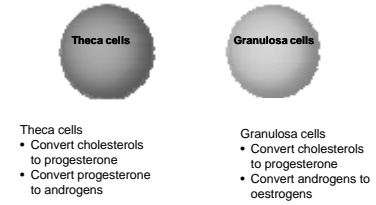
## Hypothalamic pituitary ovarian axis



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## Two-cell, two-gonadotrophin theory

Hormone production in ovarian follicle is due to co-ordinated action of two cells acting together.



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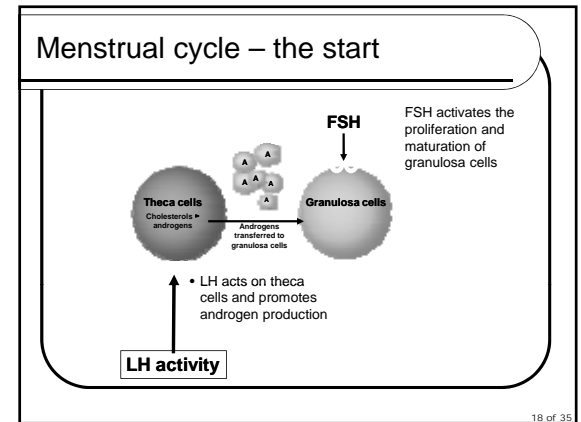
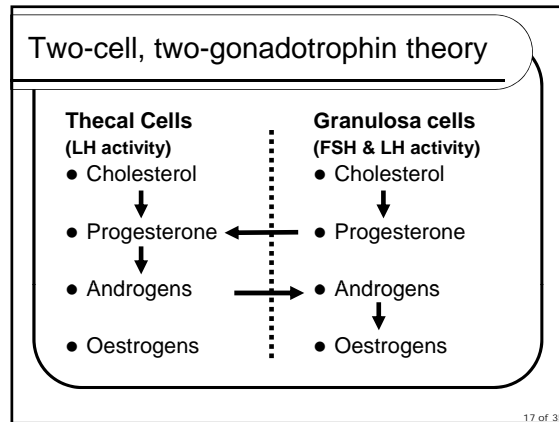
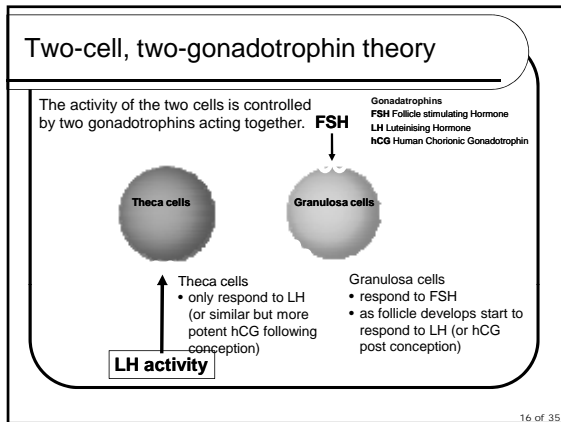
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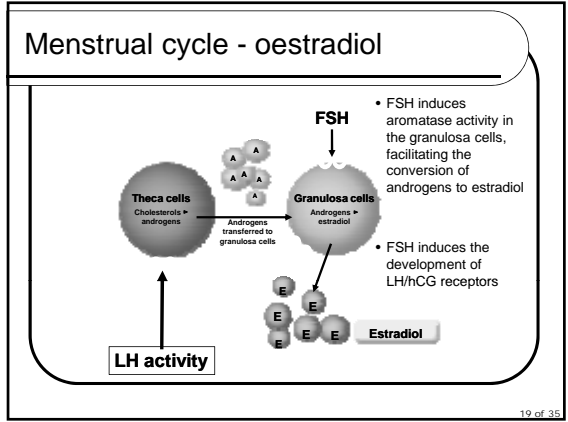
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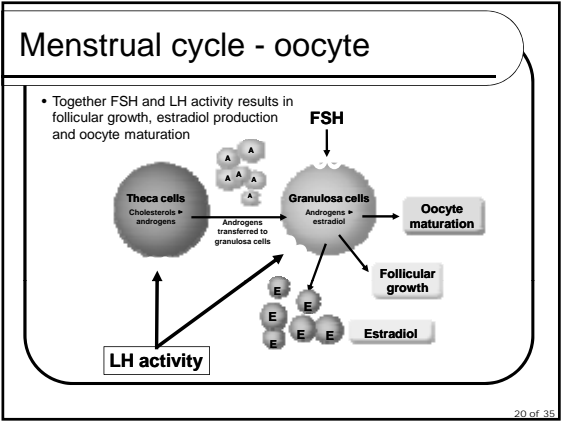
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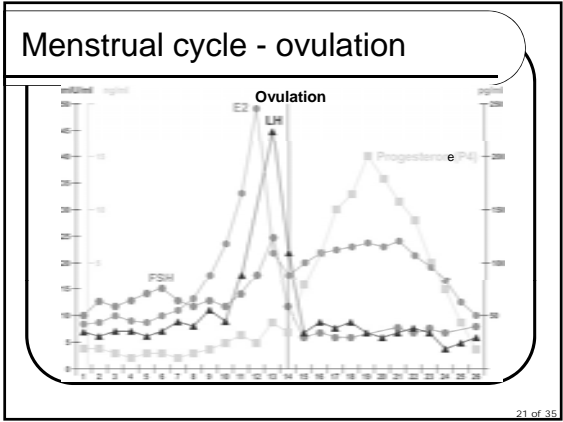
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## Menstrual cycle - progesterone

### Following ovulation

- ovarian follicle forms corpus luteum
- producing large amounts of progesterone
- lasts 2 weeks then menstruation follows ... *unless*

### Following embryo implantation

- embryo produces human Chronic Gonadotrophin (hCG)
- hCG stimulates LH/hCG receptors on corpus luteum to continue to produce progesterone, which prevents menstruation and supports early pregnancy.

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Insufficient LH activity to balance FSH hyperstimulation will lead to excess progesterone, too soon.

### Thecal Cells (LH activity)

- Cholesterol

↑ Progesterone

• Androgens

• Oestrogens

### Granulosa cells (FSH & LH activity)

- Cholesterol

↓ Progesterone

• Androgens

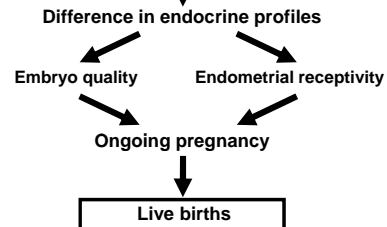
• Oestrogens

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Hence different gonadotrophins used for ovarian stimulation could affect clinical outcome.

**Different composition of gonadotrophins**



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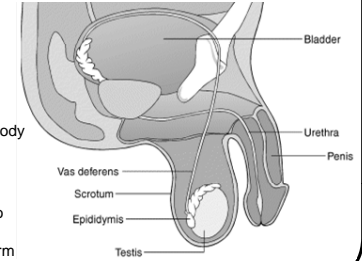
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## Male Reproductive Organs

- Testes outside body to keep cool
- Barrier between blood & sperm to prevent immune response to sperm



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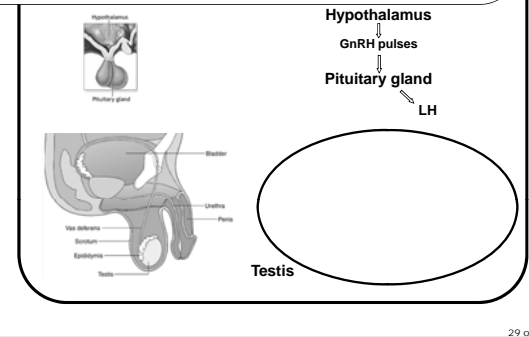
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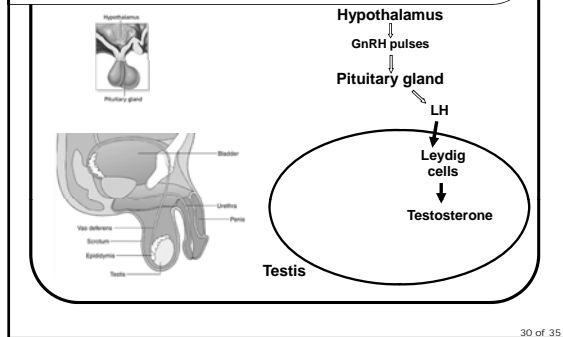
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## Male reproductive system



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## Male reproductive system



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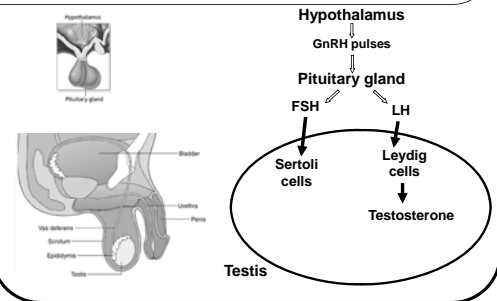
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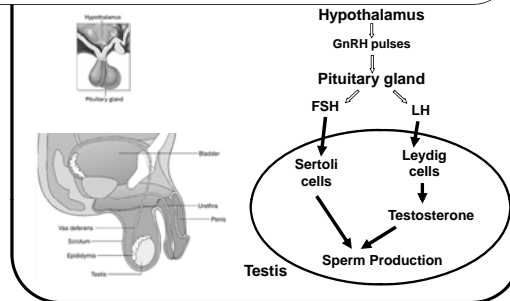
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## Male reproductive system



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## Male reproductive system



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### Stimulating sperm production in men, who lack gonadotrophins (Male hypogonadism)

Initial phase to raise serum testosterone

- hCG stimulation (because LH half life too short) for LEYDIG CELLS
- Injections thrice weekly for few months

Then stimulate sperm production

- Then also add FSH stimulation for SERTOLI CELLS
- Injections thrice weekly may take 6 months or longer

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### Conclusions

- Although similarities exist between females and males, there are big differences
  - e.g. 1 oocyte vs over 10 billion sperm per month.
- Understanding gonadotrophin physiology helps to plan optimal treatment of infertile couples.

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