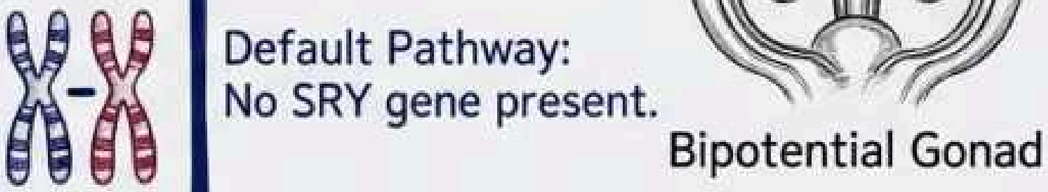
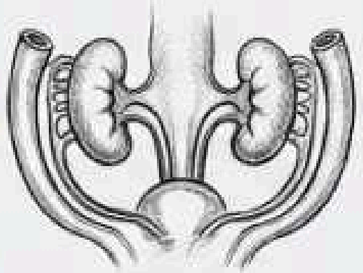
Chromosomes and the SRY gene determine the fate of the bipotential gonad

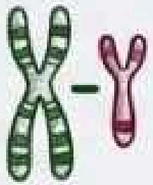


Default Pathway:
No SRY gene present.



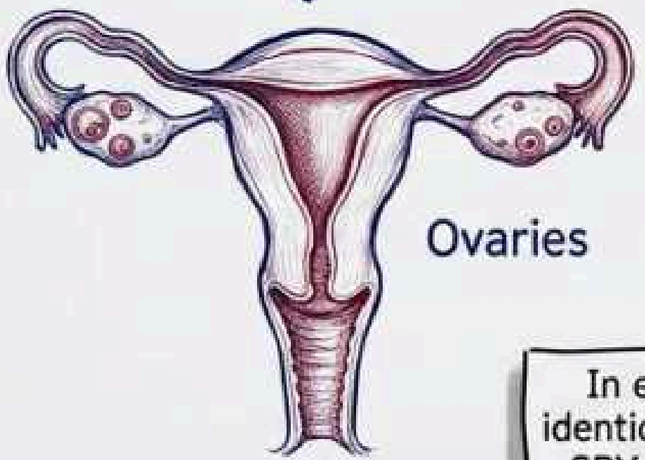
Bipotential Gonad

Path B



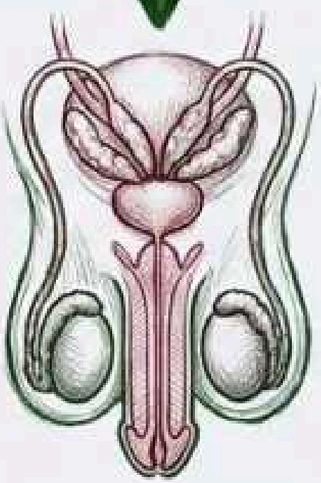


SRY Gene
(Identified 1990)



Ovaries

Testes

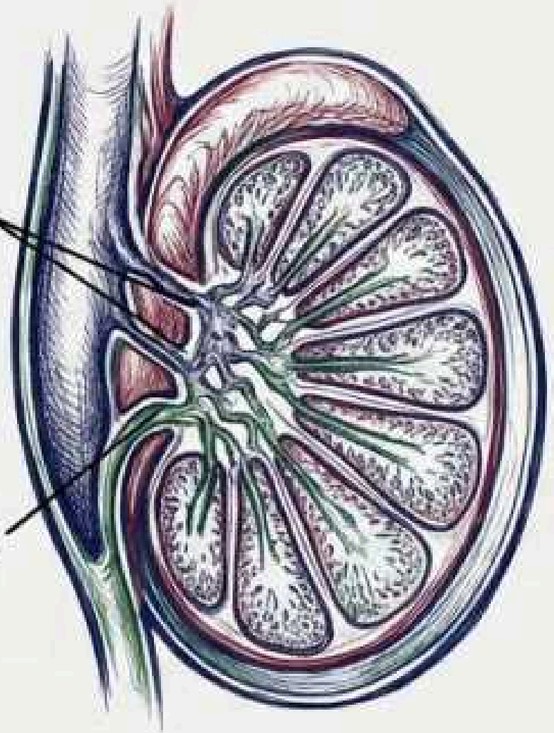


In early development, embryonic gonads are identical. The genetic presence or absence of the SRY pathway dictates the primary divergence.

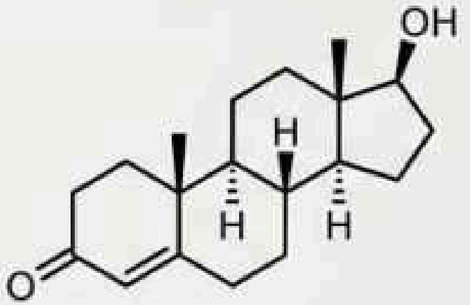
Gemini Notebook

Testicular hormones actively drive male internal and external development

¶ 1.2

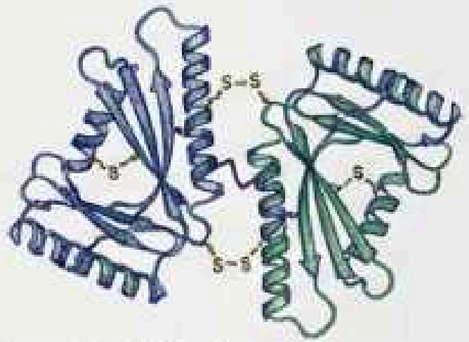


Formed Testes



Testosterone & DHT
($C_{19}H_{28}O_2$)

Drives the formation of male internal ducts and external genitals.



Anti-Müllerian Hormone
(AMH)

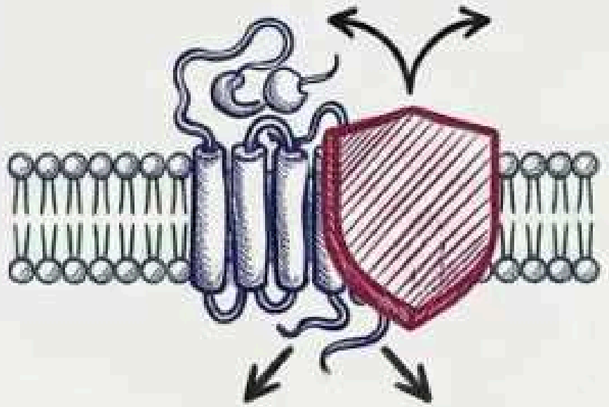
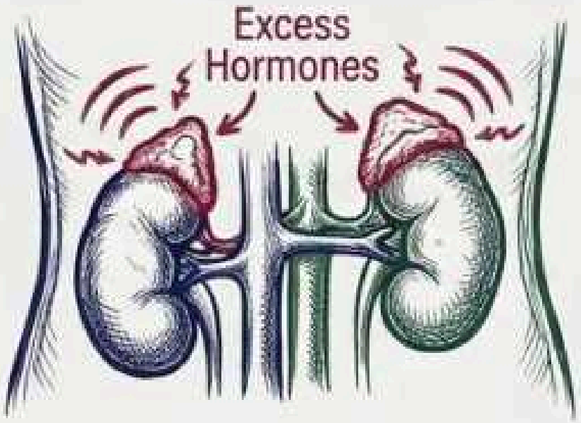
Actively causes the regression and disappearance of ducts that would otherwise become the uterus and fallopian tubes.

Without these specific hormonal drivers, embryonic development naturally follows the female anatomical pattern.

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Hormonal variations shape specific differences in sex development

¶ 1.3

Condition & Genetics	Mechanism & Phenotype Outcome
Complete Androgen Insensitivity Syndrome (CAIS) XY chromosomes + Internal testes	 Mechanism: Receptors cannot respond to testosterone. Phenotype: External body develops in a female pattern.
Congenital Adrenal Hyperplasia (CAH) XX chromosomes	 Mechanism: Excess male-type hormones from adrenal glands. Phenotype: Alters and affects genital development in babies.

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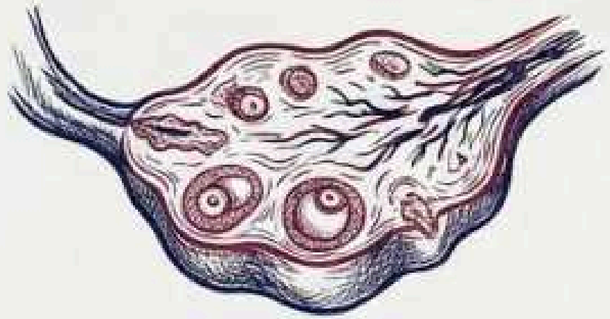
Chromosomal variations directly impact gonadal function and fertility

¶ 1.4

Turner Syndrome (45, X)

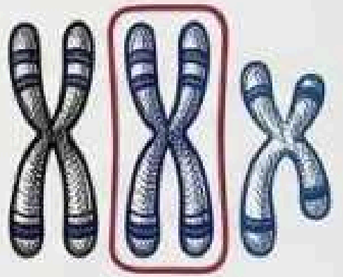


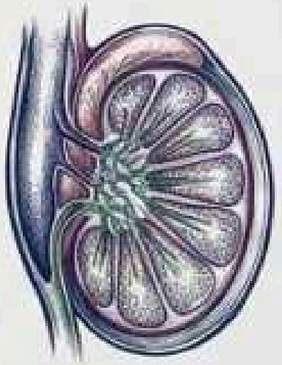
Missing X



- Early ovarian failure
- Short stature
- Infertility

Klinefelter Syndrome (47, XXY)

Extra X  Y



- Small testes
- Severely limited sperm production

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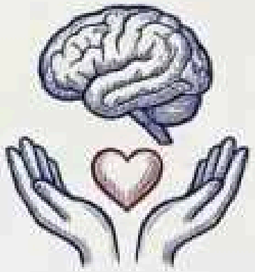
Modern clinical care for DSDs prioritizes patient autonomy and multidisciplinary support

¶ 1.5

1. Specialist Multidisciplinary Team guiding comprehensive care.

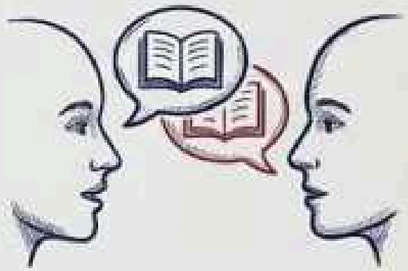


3. Dedicated psychological support structures.





2. Honest, transparent dialogue with patients and families.



4. Caution regarding non-medically necessary infant surgery.

Delayed intervention ensures individuals can actively participate in decisions about their own bodies when they are older.

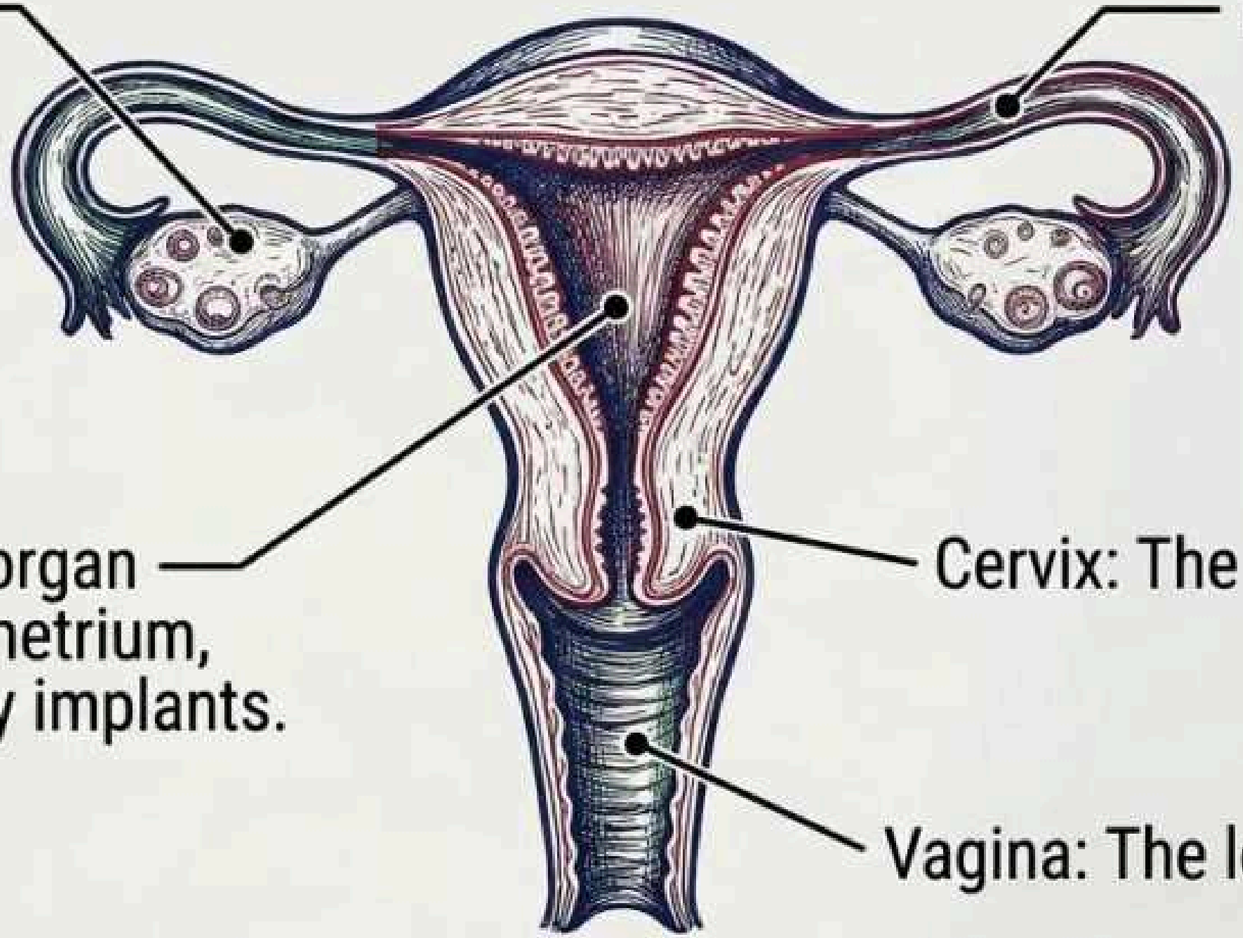
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The female reproductive system is structured for egg transport and pregnancy implantation

¶ 1.6

Ovaries (x2): Contain eggs; synthesize oestrogen and progesterone.

Fallopian Tubes (x2): Carry eggs toward the uterus; primary site of fertilisation.



Uterus: Muscular organ lined by the endometrium, where a pregnancy implants.

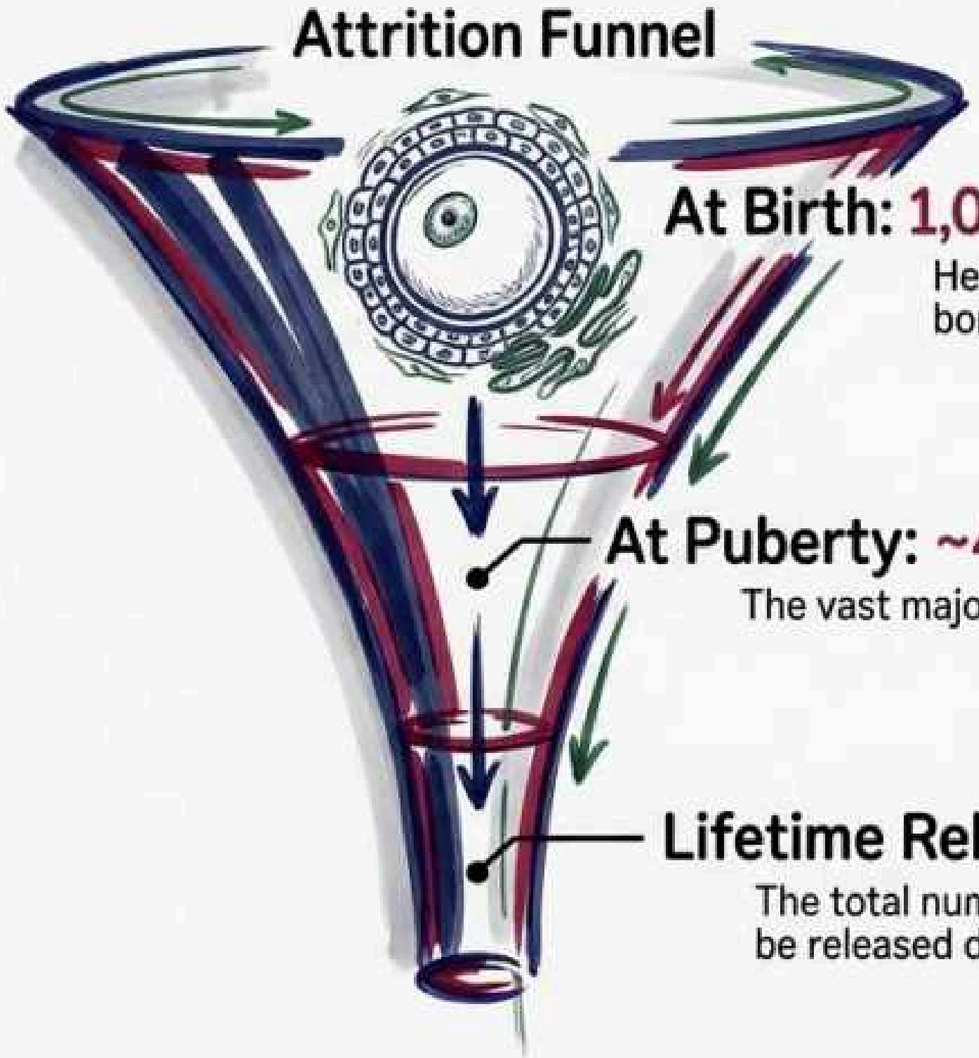
Cervix: The neck of the uterus.

Vagina: The lower tract entrance.

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¶ 1.7

The female biological clock relies on a strictly finite, depleting ovarian reserve



At Birth: 1,000,000 to 2,000,000 eggs

Held in early-stage follicles. A female is born with all the eggs she will ever have.

At Puberty: ~400,000 eggs remain

The vast majority are lost naturally over childhood.

Lifetime Release: ~400 eggs

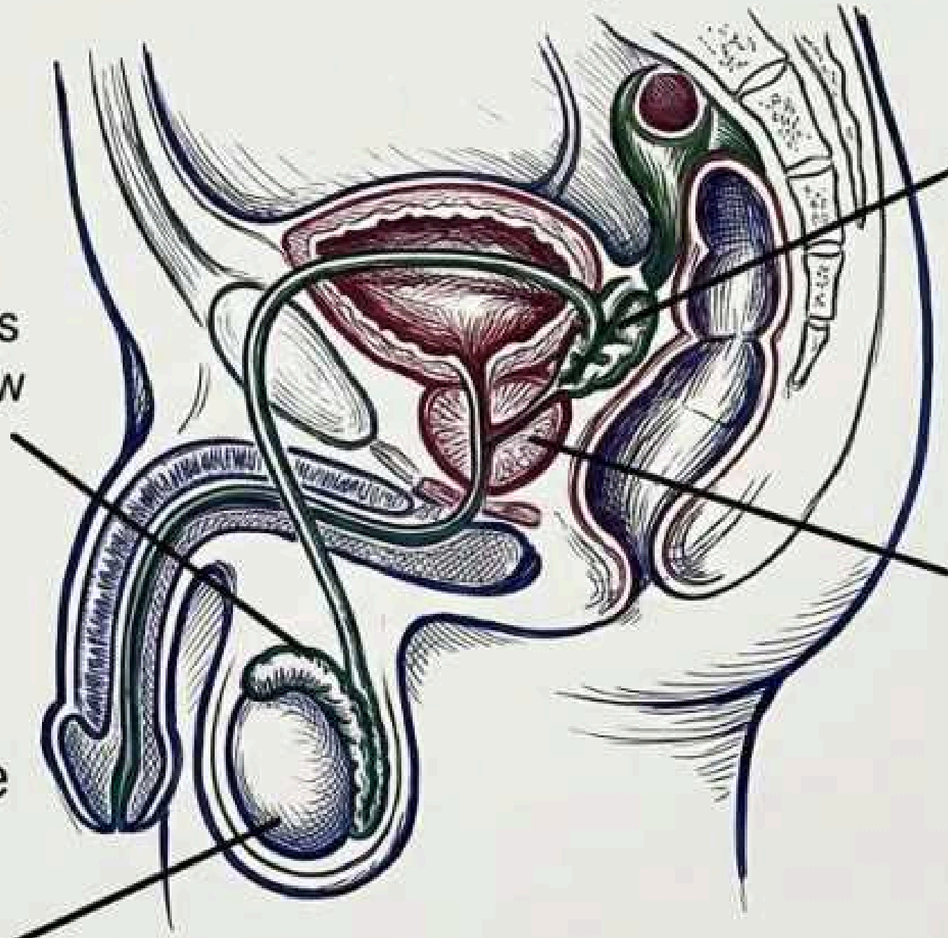
The total number of eggs that will ever actually be released during a lifetime of menstrual cycles.

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The male reproductive system is optimized for temperature control and sperm transport

¶ 1.8

Testes & Scrotum:
Produce sperm and testosterone. Held outside the body because optimal sperm production requires temperatures a few degrees below body temperature.



Epididymis & Vas Deferens:
Sperm mature in the coiled epididymis before traveling up through the vas deferens tube.

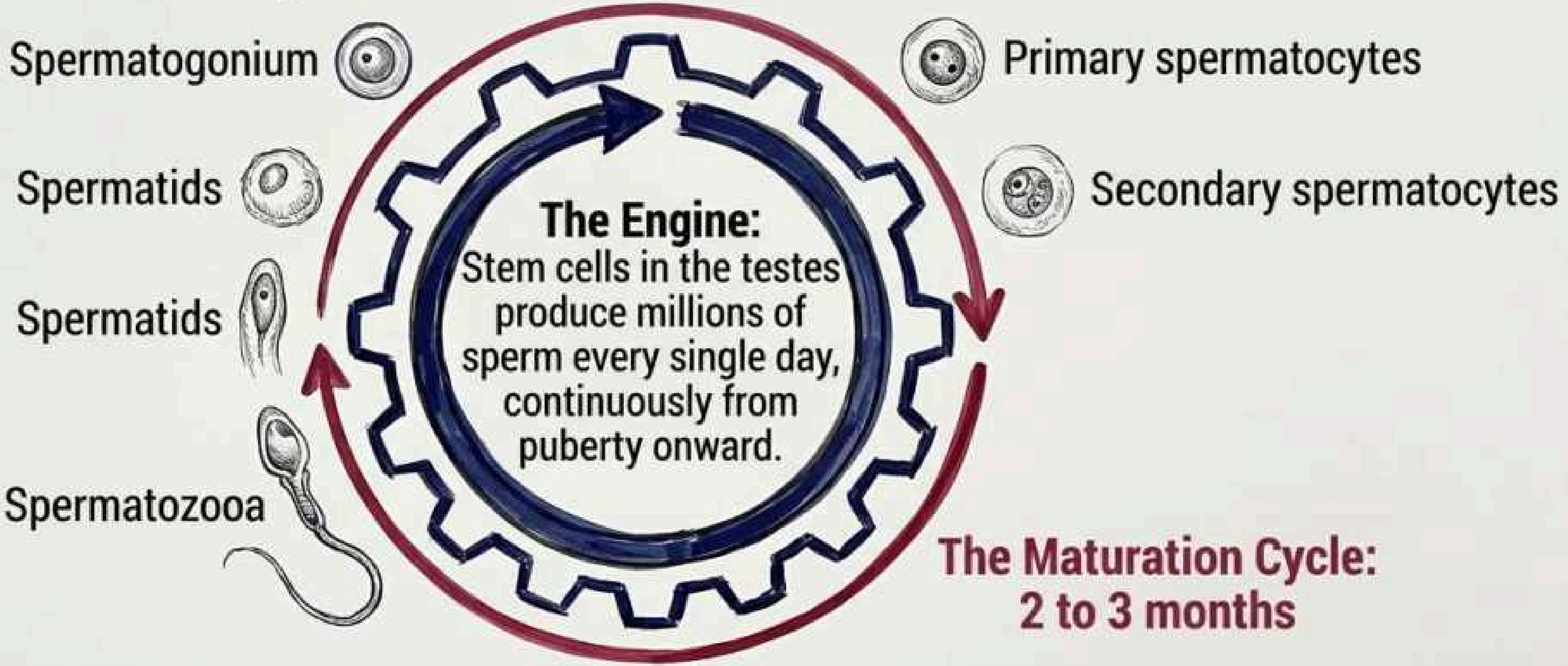
Prostate & Seminal Vesicles:
Glands that add the specific fluids comprising the vast majority of semen volume.

Testes & Scrotum:
Produce sperm and testosterone. Held outside the body because optimal sperm production requires temperatures a few degrees below body temperature.

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Sperm production is a continuous, multi-month engine driven by testicular stem cells

¶ 1.9

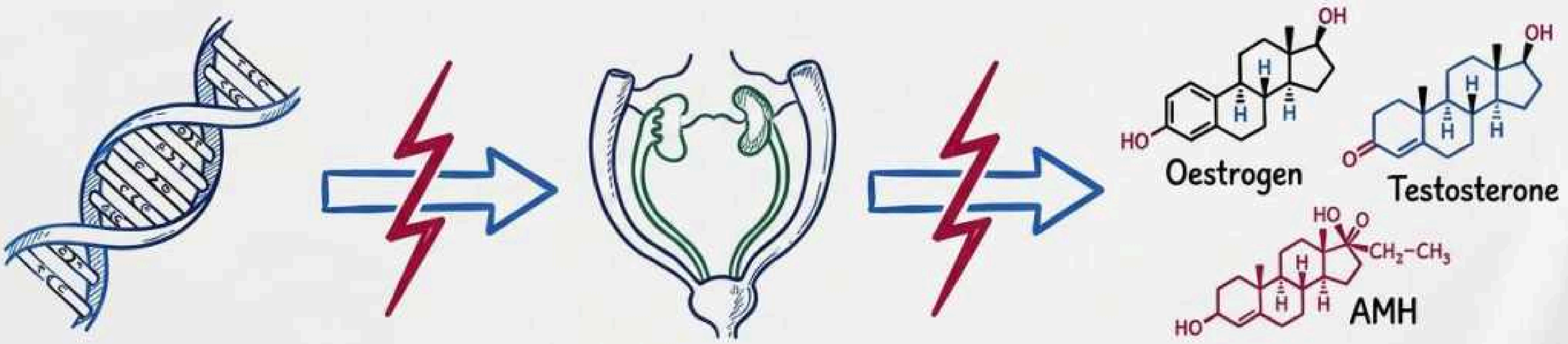


Clinical Implication: Because of this prolonged maturation cycle, any changes in a patient's health, diet, or lifestyle will take 2 to 3 months to be reflected in their sperm quality.

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¶ 1.10

Sex development follows a strict biological chain from chromosomes to active hormones



Step 1: Chromosomes
XX or XY

Step 2: Gonads
Ovaries or Testes

Step 3: Hormones
Oestrogen / Testosterone / AMH

Interruptions or variations at any distinct step in this chain explain the origins of DSD conditions.

Up Next — MED 532 B - Lecture 2: Female Hormones and the Menstrual Cycle.

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