

# SEXUAL AND REPRODUCTIVE HEALTH

**FOURTH EDITION**

PRE-SUMMARIZED  
READY-TO-STUDY  
HIGH-YIELD NOTES

FOR THE TIME-POOR  
MEDICAL, PRE-MED,  
USMLE OR PA STUDENT



**164 PAGES**

PDF



## A Message From Our Team

Studying medicine or any health-related degree can be stressful; believe us, we know from experience! The human body is an incredibly complex organism, and finding a way to streamline your learning is crucial to succeeding in your exams and future profession. Our goal from the outset has been to create the greatest educational resource for the next generation of medical students, and to make them as affordable as possible.

In this fourth edition of our notes we have made a number of text corrections, formatting updates, and figure updates which we feel will enhance your study experience. We have also endeavoured to use only open-source images and/or provide attribution where possible.

**If you are new to us, here are a few things to help get the most out of your notes:**

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## Table Of Contents:

**What's included:** Ready-to-study anatomy, physiology and pathology notes of various sexual & reproductive health topics presented in succinct, intuitive and richly illustrated downloadable PDF documents. Once downloaded, you may choose to either print and bind them, or make annotations digitally on your iPad or tablet PC.

## Clickable Hyperlinks Below:

- **REVIEW OF MALE UROGENITAL ANATOMY**
- **REVIEW OF BASIC FEMALE REPRODUCTIVE ANATOMY**
- **BREAST MASSES**
  - **\*FIBROADENOMA ("BREAST MOUSE")**
  - **"PHYLLODES TUMOUR"/GIANT FIBROADENOMAS**
  - **INTRADUCTAL PAPILLOMA:**
  - **FIBROCYSTIC DISEASE**
  - **DUCT ECTASIA**
  - **GALACTOCOELE**
  - **ACUTE MASTITIS**
  - **BREAST CANCERS**
- **AMENORRHOEA CAUSES**
  - **POLYCYSTIC OVARIAN SYNDROME (PCOS)**
- **DYSMENORRHOEA CAUSES**
  - **ENDOMETRIOSIS**
- **MENORRHAGIA CAUSES**
  - **ADENOMYOSIS**
  - **EG. DYSFUNCTIONAL UTERINE BLEEDING**
  - **ENDOMETRIAL HYPERPLASIA (POLYPS)**
  - **UTERINE FIBROIDS**
- **UTERINE CANCERS**
  - **ENDOMETRIAL ADENOCARCINOMA**
  - **UTERINE LEIOMYOSARCOMA**
- **CONDITIONS OF THE VAGINA**
  - **BARTHOLIN GLAND CYST (or Greater Vestibular Gland Cyst)**
  - **VULVAL CANCER (Squamous Cell Cancer)**
  - **DIFFERENTIALS FOR MALIGNANCY**
  - **VAGINAL CANDIDIASIS/"THRUSH"/"YEAST-INFECTION"**
  - **VAGINOSES/VAGINITIS**
- **CONDITIONS OF THE CERVIX**
  - **CERVICITIS**
  - **ENDOCERVICAL POLYPS**
  - **CERVICAL CANCERS: CIN 1 (LSIL) & CIN2-3 (HSIL)**
- **CONDITIONS OF THE OVARIES**
  - **OVARIAN CYSTADENOMA (Benign)**
  - **OVARIAN CANCER (CYSTADENOCARCINOMA)**
  - **DERMOID CYSTS/TERATOMAS**
- **PELVIC ORGAN PROLAPSE**
- **URINARY INCONTINENCE**
  - **OVERFLOW INCONTINENCE**
  - **STRESS INCONTINENCE**
  - **URGE INCONTINENCE**

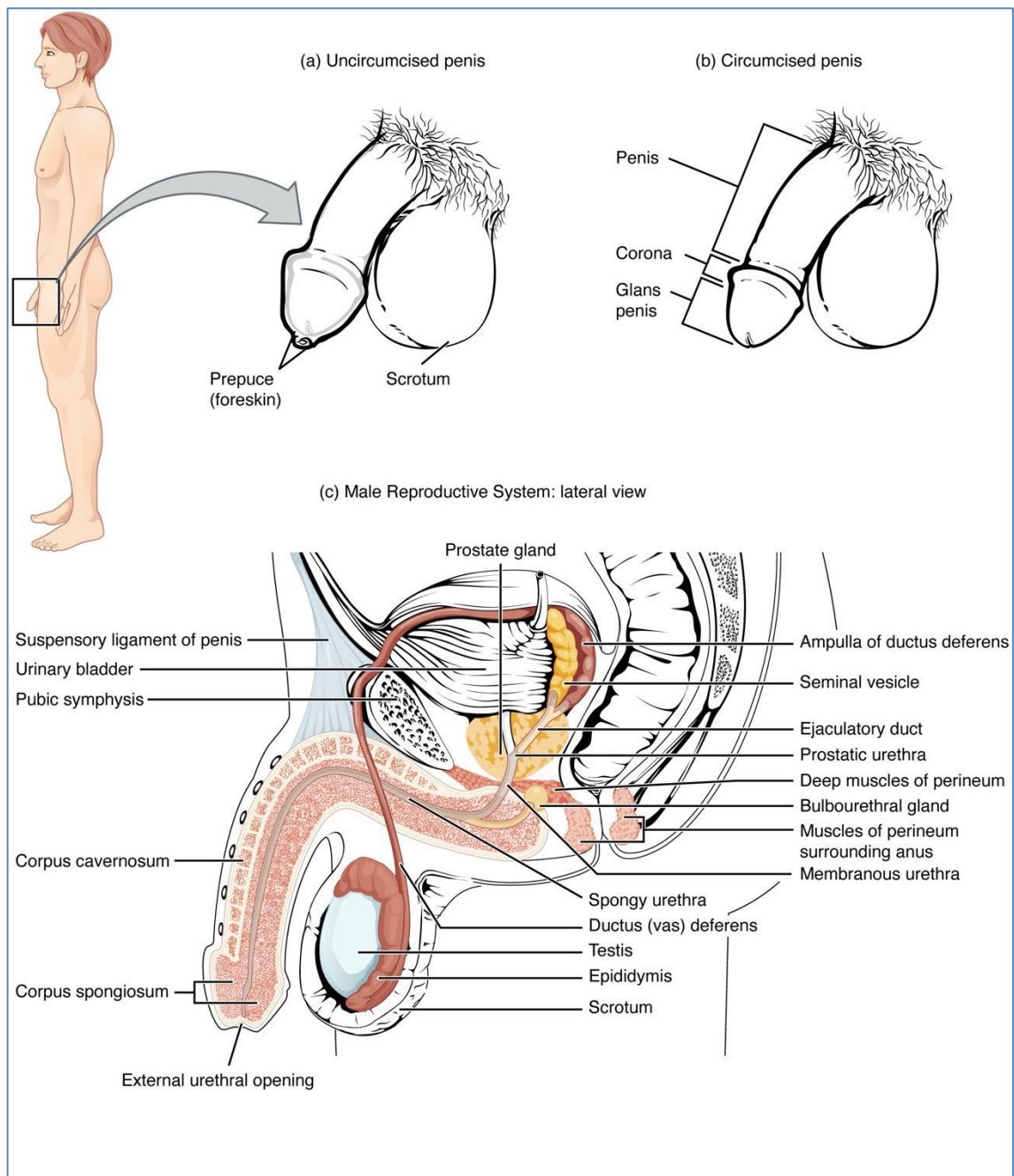
- CONDITIONS OF THE MALE GENITALIA
  - CONGENITAL PENILE ABNORMALITIES
  - CRYPTORCHIDISM
  - BALANITIS & BALANOPOSTHITIS
  - DYSPLASIAS OF THE PENIS
  - CARCINOMA OF THE PENIS
  - PEYRONIE'S DISEASE
- CONDITIONS OF THE PROSTATE
  - PROSTATITIS
  - PROSTATE ADENOCARCINOMA
  - BPH – (BENIGN PROSTATIC HYPERTROPHY)
- CONDITIONS OF THE TESTES
  - EPIDIDYMO-ORCHITIS
  - TESTICULAR ATROPHY
  - TORSION OF THE TESTIS
  - SCROTAL ACCUMULATIONS
  - TESTICULAR TUMOURS
  - (GYNECOMASTIA)
- SEXUALLY TRANSMITTED INFECTIONS
  - GENITAL HERPES SIMPLEX
  - HUMAN PAPILLOMA VIRUS
  - SYPHILIS
  - CHLAMYDIA
  - GONORRHOEA
  - PELVIC INFLAMMATORY DISEASE (PID)
  - DONOVANOSIS
  - HEPATITIS C
  - HUMAN IMMUNODEFICIENCY VIRUS
- MORE ON HIV
- SEXUAL DYSFUNCTIONS & TREATMENT
- CONTRACEPTION
- INFERTILITY
- BREASTFEEDING
- QUIZ QUESTIONS

## **REVIEW OF MALE UROGENITAL ANATOMY**

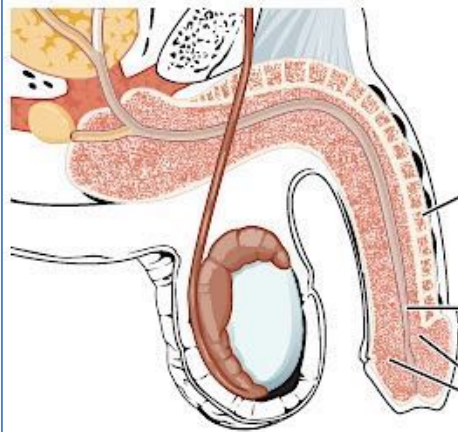
## REVIEW OF MALE UROGENITAL ANATOMY

### Normal Male Reproductive Anatomy:

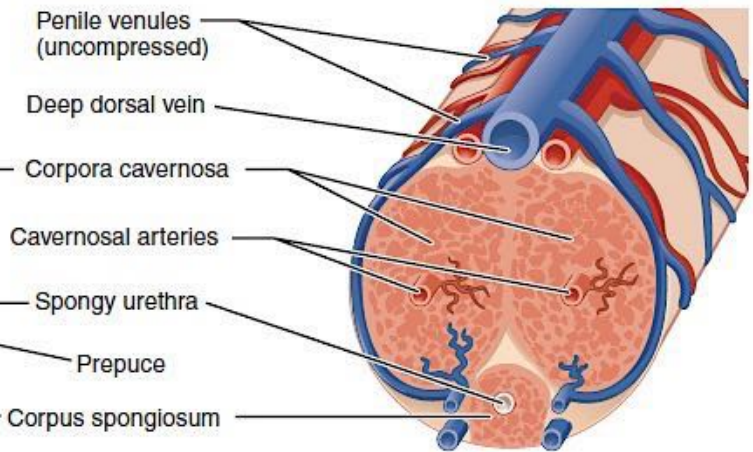
- **Ducts** – (receive/transport gametes):
  - **1: Epididymis** – (5% of ejaculate)
  - **2: Ductus (vas) Deferens**
  - **3: Urethra** - (Prostatic → Membranous → Spongy (penile) → External Orifice)
- **Penis:**
  - **3 Sections** – Root, Body & Glans Penis.
  - **Corona** – Neck sulcus
  - **Erectile Tissues:**
    - **2x Corpus Cavernosum** – Central Arteries
    - **1x Corpus Spongiosum** – Central Urethra
  - **Tunica Albuginia** – Fibrous capsule encasing the Testis & Penis (Note: Does NOT encase the Epididymis)
  - **Urethra** – Transitional Epithelium
  - **Prepuce** (foreskin)



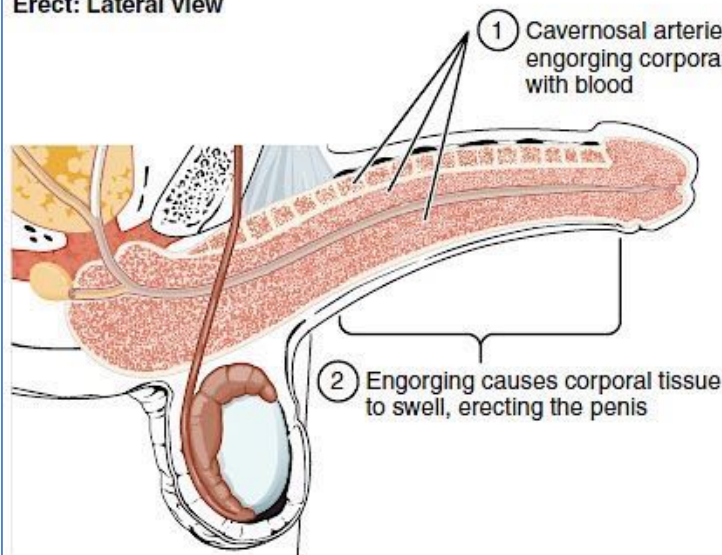
**Flaccid: Lateral view**



**Flaccid: Transverse view**



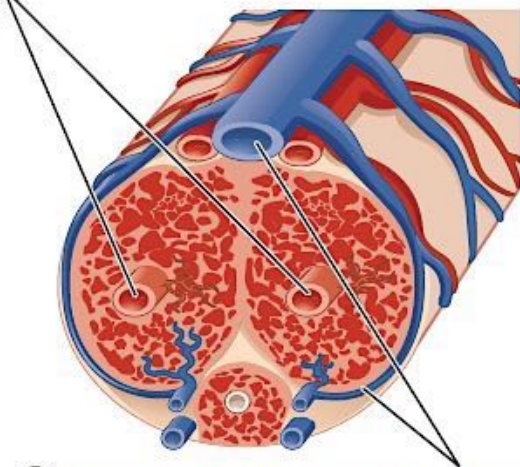
**Erect: Lateral view**



① Cavernosal arteries dilate, engorging corporal tissue with blood

② Engorging causes corporal tissue to swell, erecting the penis

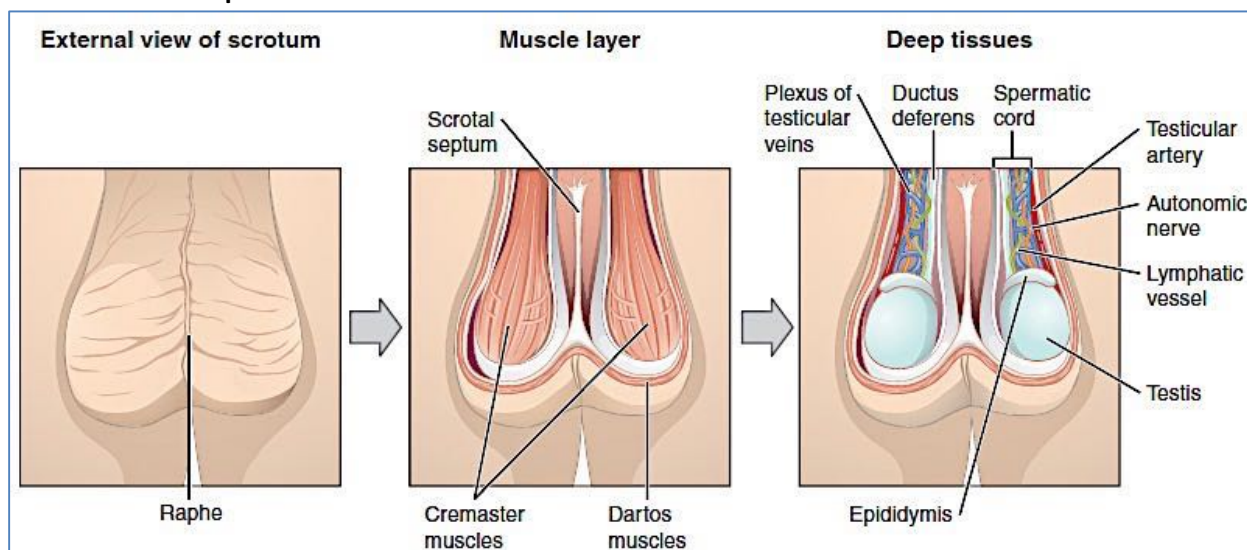
**Erect: Transverse view**



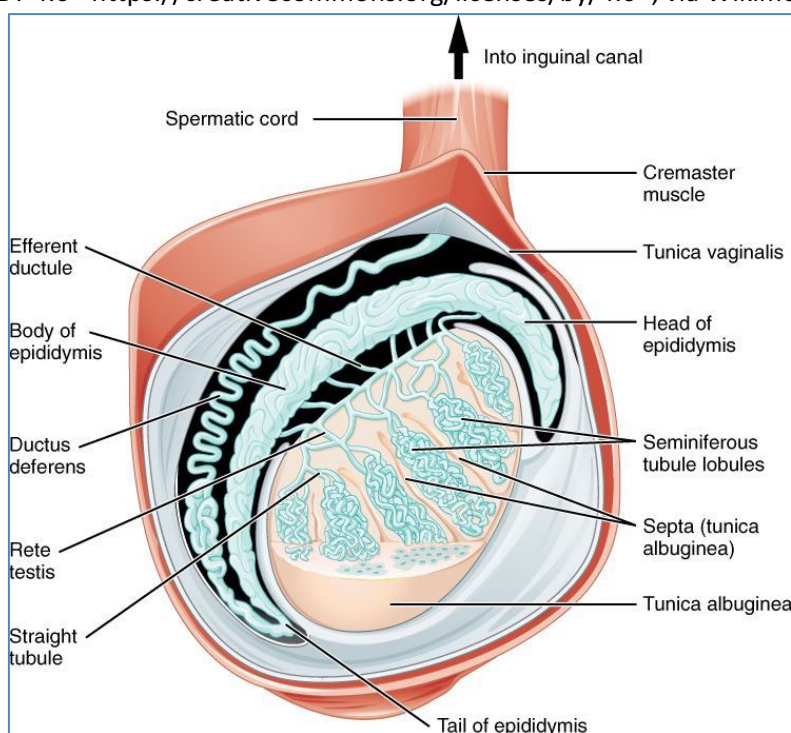
③ Engorged corporal tissue compresses penile veins and venules, maintaining erection

- **Testicles & Scrotum:**

- **Testes - Gonads (produce gametes)**
  - **Testis (Albuginea of testes)**
    - **Seminiferous tubules** – sperm production
    - **Leydig Cells** – testosterone production
  - **Epididymis** - Highly coiled tubules.
- **Spermatic Cord** – Spermatic Artery, Vein & Vas-Deferens (+ Lymphatics).
- **Tunica Vaginalis** – Remnants of the foetal peritoneum dragged into the scrotum by descending testes.
  - **Obliterated Processus Vaginalis** – The obliterated peritoneal remnants from descending of the testes. Note: If not fully obliterated, can → Indirect Inguinal Hernias.
- **Tunica Albuginea** – Fibrous capsule encasing the Testis & Penis (Note: Does NOT encase the Epididymis)
- **Thermoregulation:**
  - **Why descended?** – Spermatogenesis requires a lower temperature than core temperature.
  - **Cremaster Muscle:** Lifts testicles closer to body when cold. (thermoregulation)
  - **Dartos Muscle:** Increases/decreases surface area of the scrotum (thermoregulation)
- **Pampiniform Plexus:** Network of blood vessels



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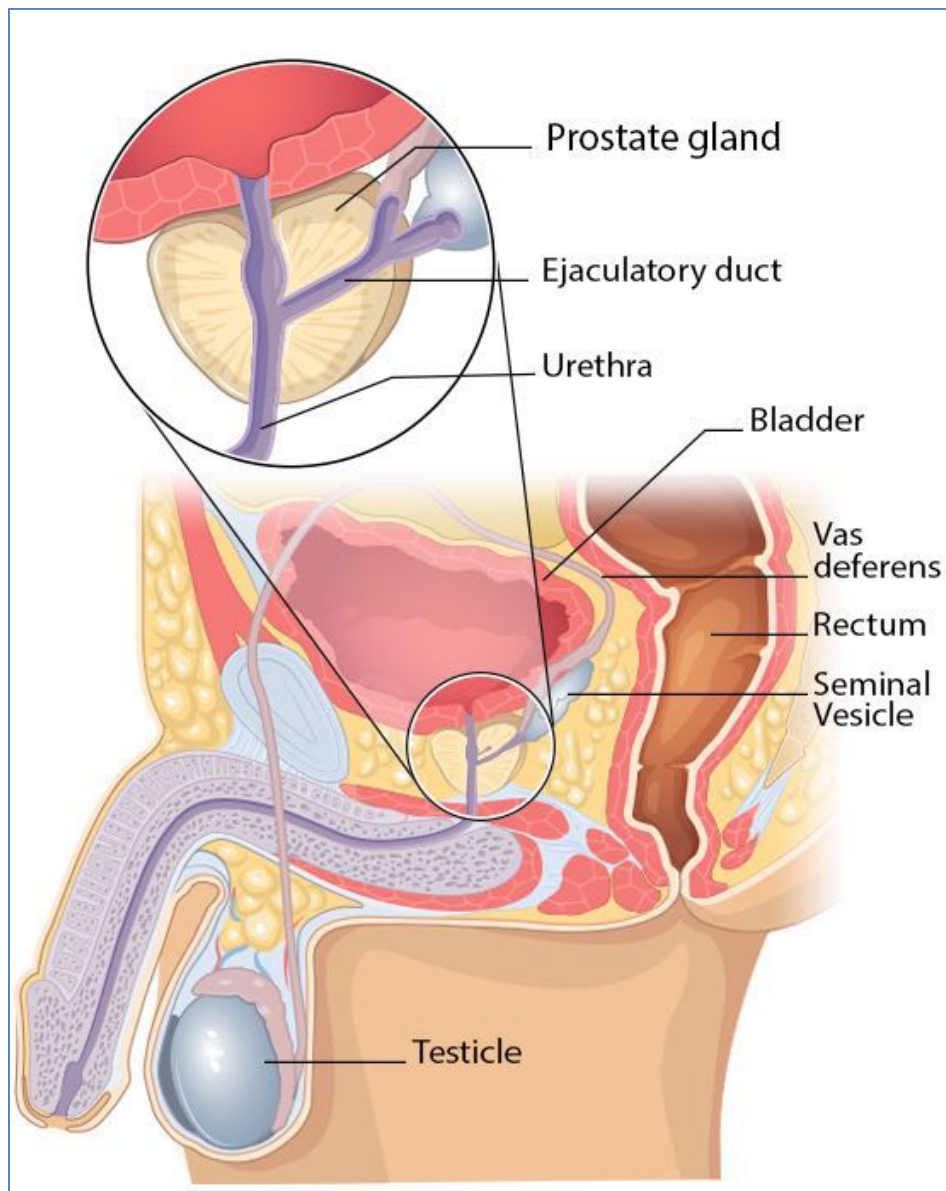
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- **Accessory Glands:**

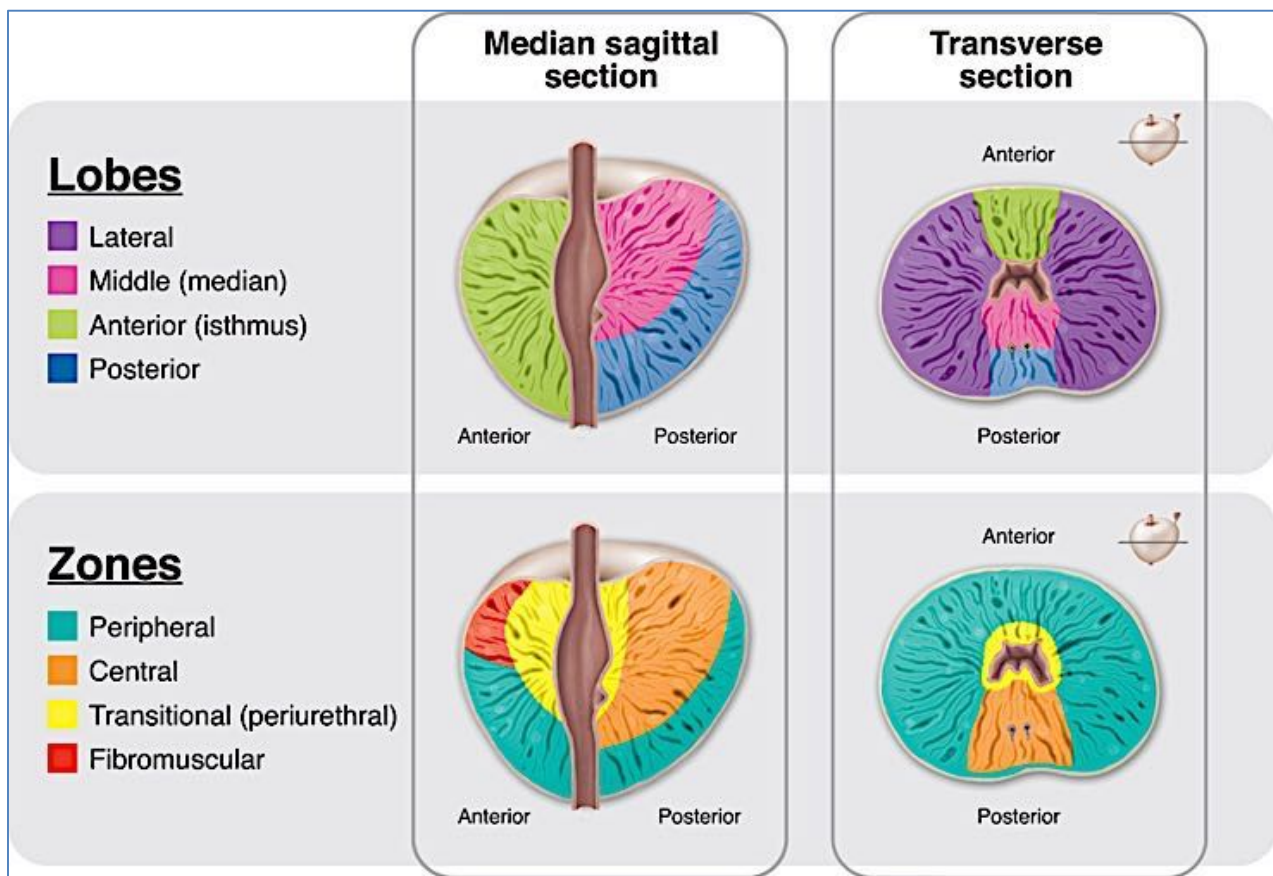
- **Seminal vesicles** - (60% of ejaculate) – Reduces Acidity of Semen
- **Prostate gland** - (30% of ejaculate) - Helps activate sperm & keep it viable
- **Bulbourethral glands** – (5% of ejaculate) - Neutralises traces of urine in urethra.

- **The Prostate Gland:**

- **Anatomy:**
  - 5 lobes (2 Laterals, Anterior, Median & Posterior)
  - Inferior to Bladder, Posterior to Penis
  - Periurethral (Encases Urethra)
  - Also encases Ejaculatory Ducts from Seminal Vesicles
- **Function:**
  - Adds bulk to Semen
  - Acid phosphatase - Proteolytic Enzyme - Maintains liquidity of prostate
  - Prostate Specific Antigen (PSA) – Proteolytic Enzyme - Maintains liquidity of prostate.
  - Hormone responsive - Androgens
- **Normal Histology:**
  - Fibro-Muscular Organ – Plenty of Smooth Muscle Fibres
  - Glands *Normally* have a *Double Layer* Epithelium (Note: Prost.Ca. is a *Single Layer* Epithelium)



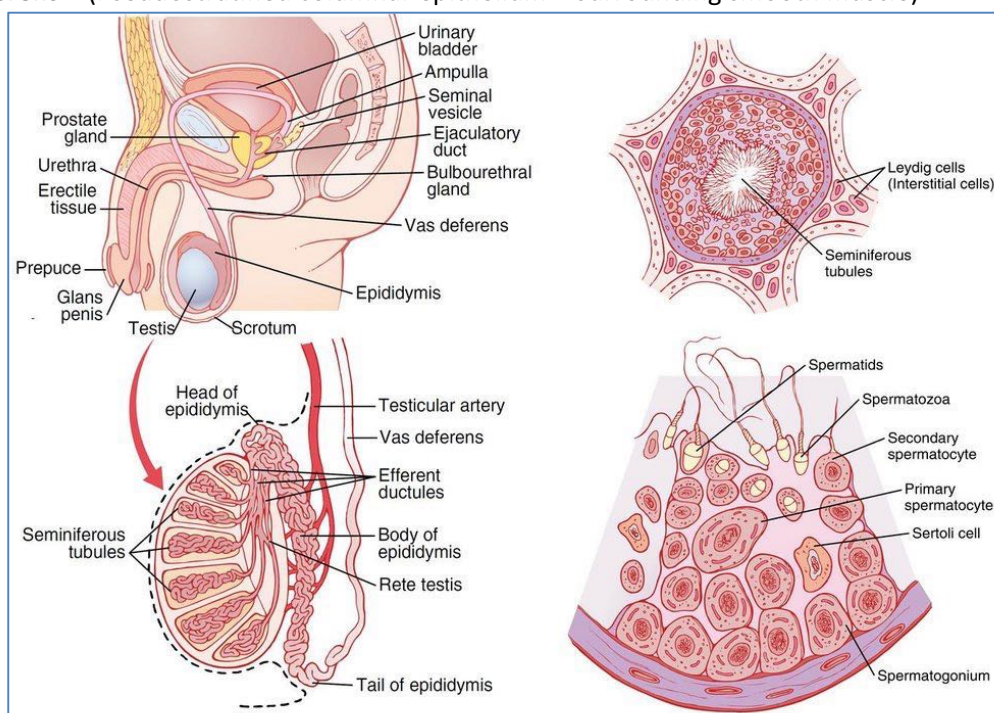
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[https://shri.public-health.uiowa.edu/wp-content/uploads/2019/10/Prostate-1-Intro\\_Anatomy.pdf](https://shri.public-health.uiowa.edu/wp-content/uploads/2019/10/Prostate-1-Intro_Anatomy.pdf)

#### Structures Involved in Spermatogenesis & Transport:

- **Seminiferous Tubules** – Consist of:
  - o **Sertoli Cells** – Make up the walls of the Seminiferous Tubules (+ Form the Blood-Sperm Barrier) (+ Produce Androgen-Binding Protein in response to **FSH** → Sperm Receptive to Testosterone)
  - o **Germ Cells (Spermatogonia)** – Immature sperm at different stages of development and different levels within the Seminiferous Tubules. (Note: Only luminal spermatogonia have tails)
- **Interstitial Leydig Cells** – (Outside the tubules) – Produce Testosterone in response to **LH**
- **Epididymis** – Series of tubules where sperm undergo final maturation. (Pseudostratified columnar epithelium)
- **Vas Deferens** – (Pseudostratified columnar epithelium + Surrounding smooth muscle)

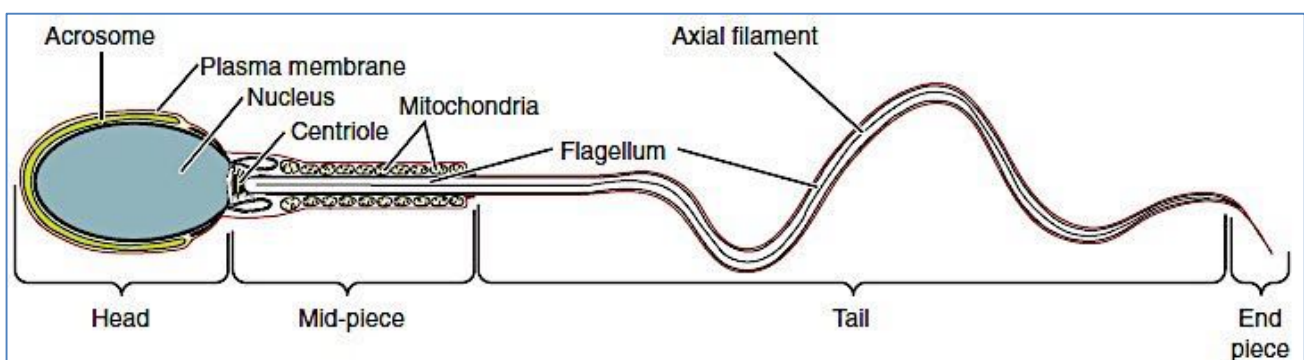


Credit: <https://www.toppr.com/ask/content/concept/gonadal-hormones-201182/>

## PHYSIOLOGY OF THE TESTES:

### Spermatogenesis:

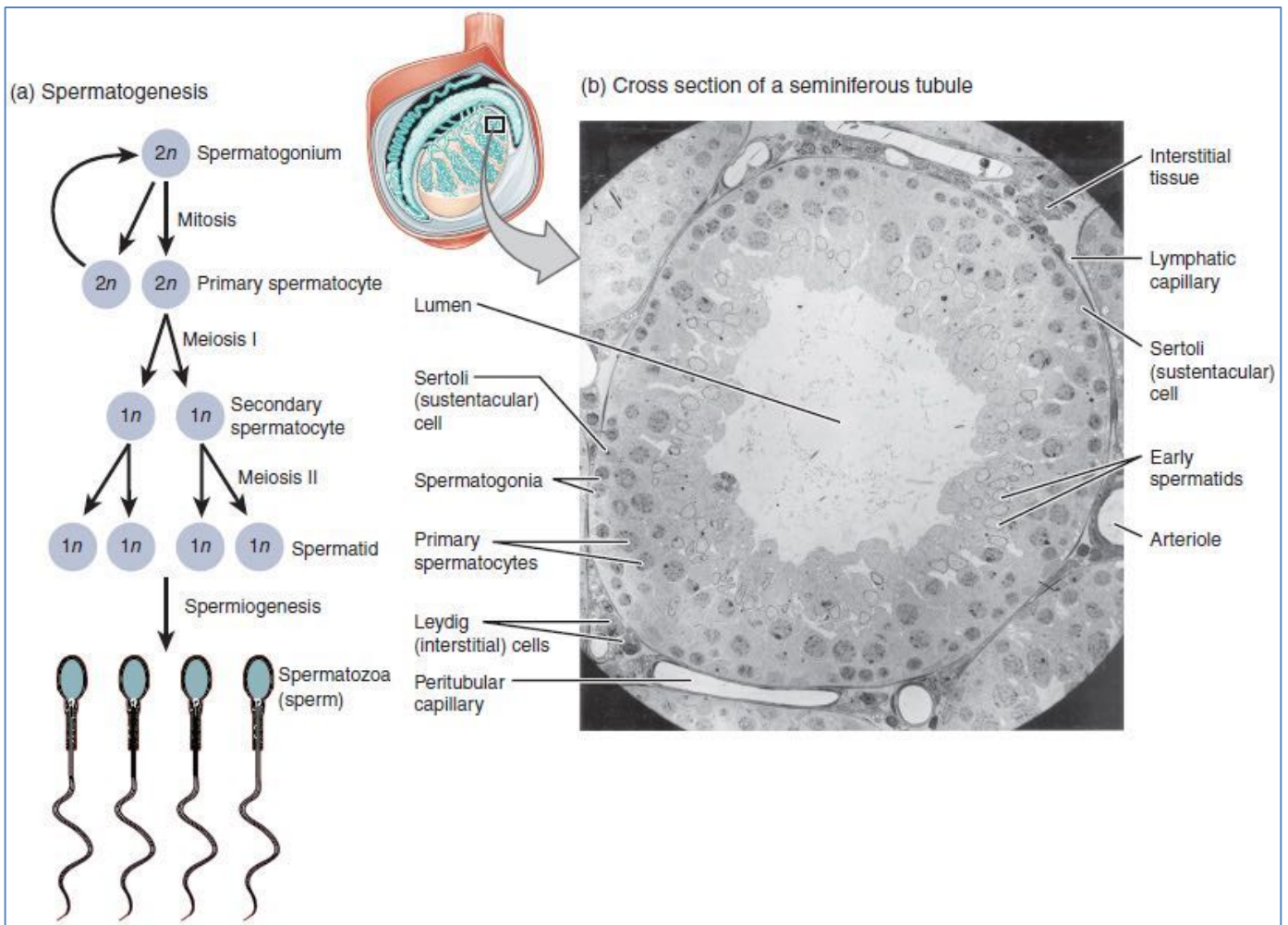
- The overall process of sperm formation – from **spermatagonium** (stem cells) to **spermatozoa** (sperm).
- Takes place inside the walls of the Seminiferous tubules
  - o Walls of S.Ts are made of various sperm-forming cell types, all at different stages of development.
- **Mitosis:**
  - o **#1 Spermatogonia (2n):**
    - The outermost tubule cells, in direct contact with the basal lamina.
    - Divide by mitosis into 2 spermatagonium.
      - Type A & Type B
        - o Type A remains on the basement membrane – for future mitotic divisions.
        - o Type B is pushed toward the lumen, where it becomes a **primary spermatocyte**.
- **Meiosis:**
  - o **#2<sub>(a)</sub> Primary Spermatocyte (2n):**
    - Undergoes meiosis I, forming two smaller haploid cells called **secondary spermatocytes**.
  - o **#2<sub>(b)</sub> Secondary Spermatocytes (n):**
    - Continue into meiosis II producing 4 daughter cells called **spermatids**
  - o **#3 Spermatids (n):**
    - Small, round cells with large nuclei.
    - Closer to the lumen of the Seminiferous tubule.
- **Spermiogenesis:**
  - Spermatids elongate
  - Shed excess Cytoplasmic baggage
  - Forms a tail (flagellum)
  - Result in potentially motile **spermatozoa (sperm)**
- o **# 4 Spermatozoa:**
  - **Head:**
    - Flattened nucleus → compacted DNA
    - Helmet-like **acrosome** on top of nucleus.
      - o Contains hydrolytic enzymes for egg penetration.
  - **Mid-piece:**
    - Spiralled Mitochondria around contractile filaments of tail.
  - **Tail:**
    - **Flagellum** produced by the **centriole** near the nucleus
    - Whip-like movements of tail **propel** the sperm once **activated by prostate**.



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### Sustentacular Cells (Sertoli Cells):

- Extend from basal lamina to the lumen of S.T.
- Bound by **tight-junctions**:
  - o Defines the **basal & adluminal** compartments.
  - o Forms the **blood-testes barrier** → stops sperm's membrane antigens from escaping into bloodstream & activating immune system



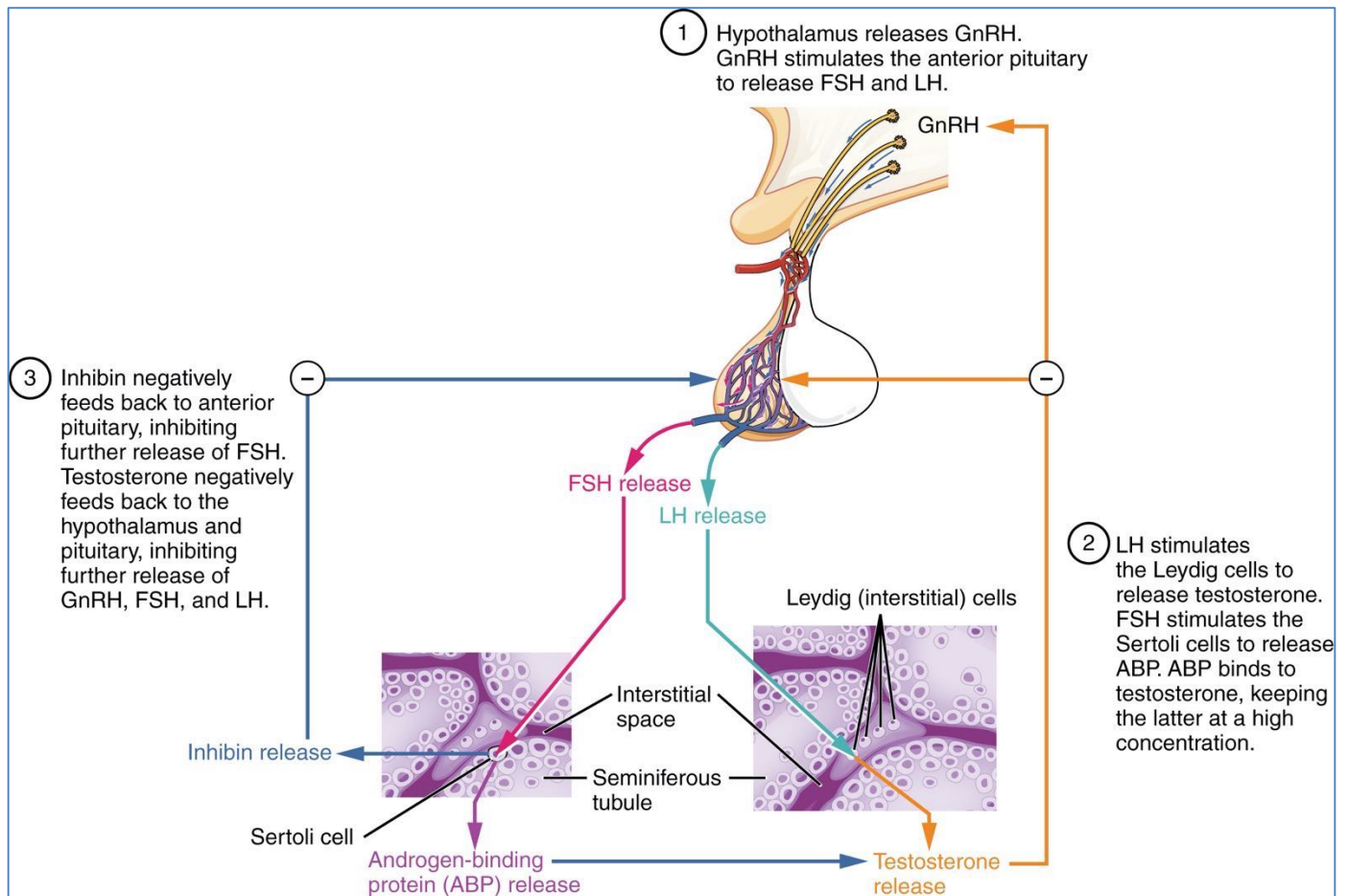
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## Neuroendocrine Control; "Brain-Testicular Axis":

- 1) **Hypothalamus** releases **GnRH (gonadotropin-releasing hormone)** which →
- 2) **Anterior Pituitary** → release gonadotropins: **FSH** (Follicle stimulating hormone) & **LH** (Luteinizing hormone).
- 3) **FSH**: stimulates **Sertoli** (Sustentacular) cells to release **Androgen-binding protein (ABP)** → Makes spermatagonium, spermatocytes, and spermatozoa **receptive to the androgen: Testosterone**.
- 4) **LH**: stimulates the **Leydig cells** [Basally external to Seminiferous tubules] to **produce testosterone** which **triggers & maintains spermatogenesis**.
- 5) **Testosterone** produced by Leydig (interstitial) cells **inhibits GnRH** production; as does **Inhibin**, produced by the sustentacular (sertoli) cells. → **Neg. Feedback to Hypothalamus** → **↓GnRH**

- When testosterone is at its peak → **sperm count is high (20Mil<sup>+</sup>)** → inhibin levels rise → GnRH decreases → FSH & LH levels decrease → Testosterone & ABP levels decrease → **spermatogenesis slows**.

- When **sperm count is low (20Mil<sup>-</sup>)** → inhibin & testosterone levels are low → no negative feedback to hypothalamus → hypothalamus Releases GnRH → Ant. Pituitary releases LH & FSH → FSH stimulates sustentacular (sertoli) cells to produce ABP; LH stimulates the interstitial (Leydig) cells to produce testosterone → Testosterone + ABP stimulates spermatogenic cells → **Spermatogenesis increases**.



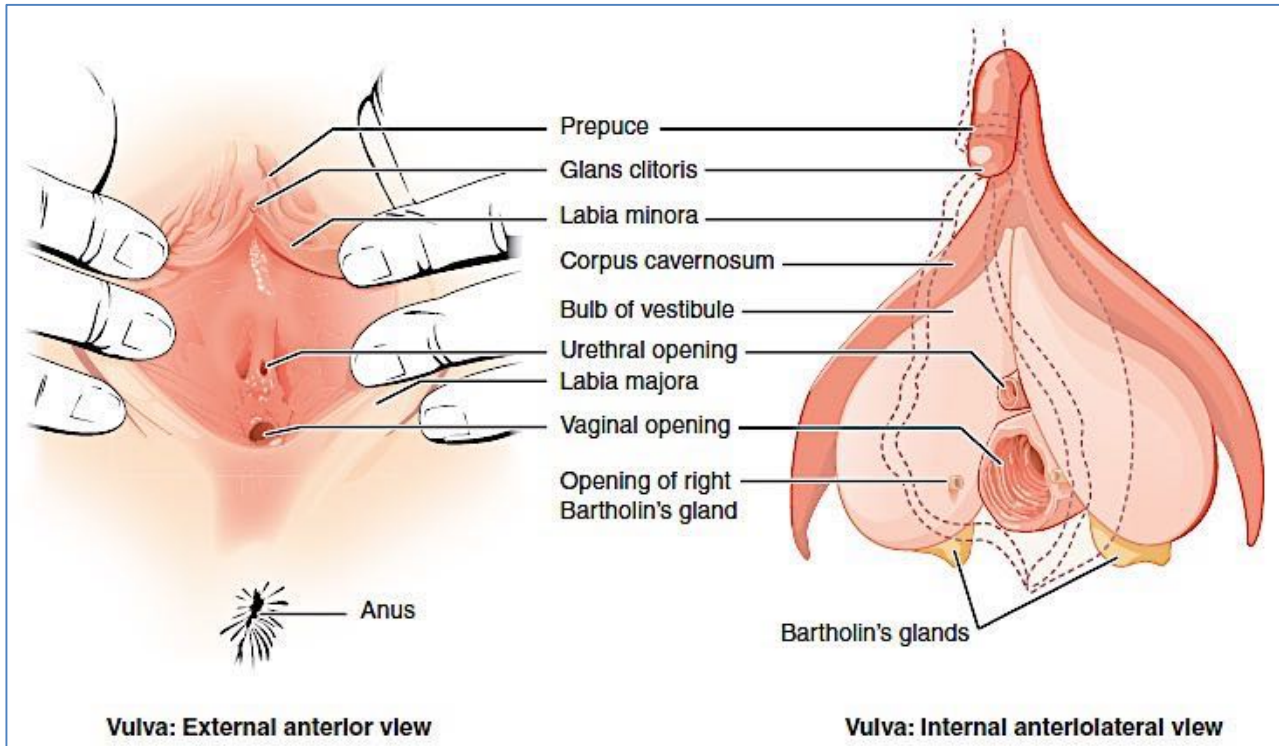
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## REVIEW OF BASIC FEMALE REPRODUCTIVE ANATOMY

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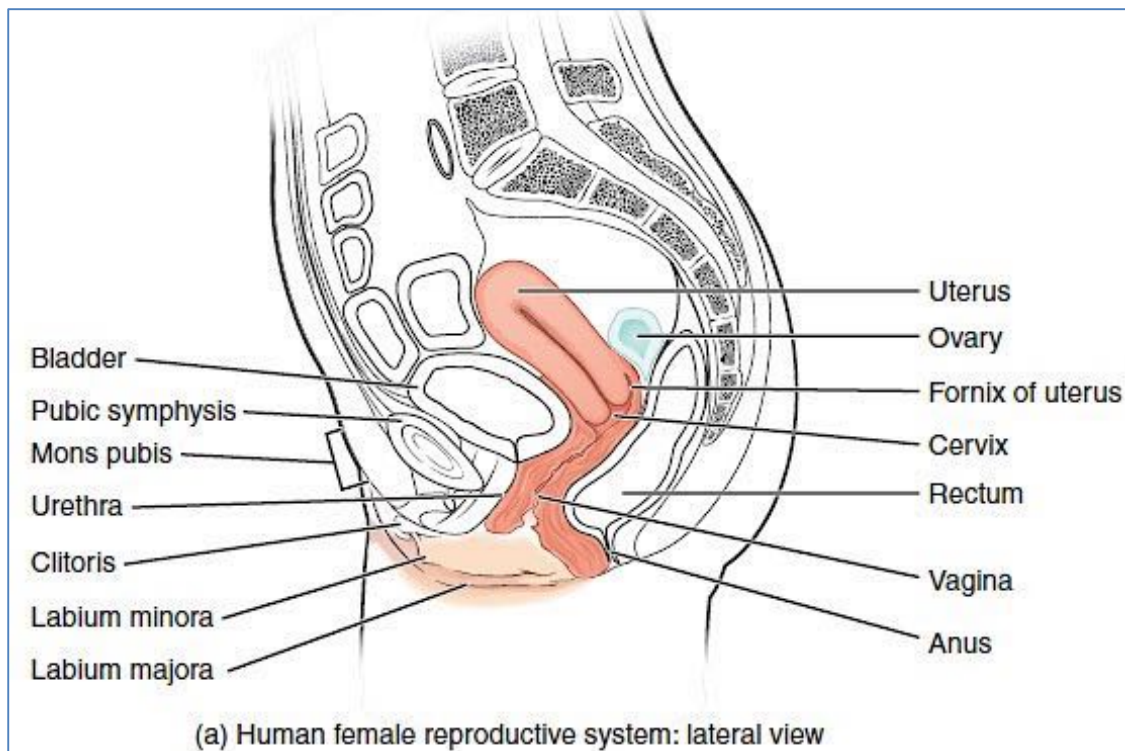
### Review of Female Reproductive Structures:

- **Anatomy:**
  - **Vagina/Vulva:**
    - Labia Majora & Minora
    - Clitoris & prepuce of clitoris
    - Urethral orifice

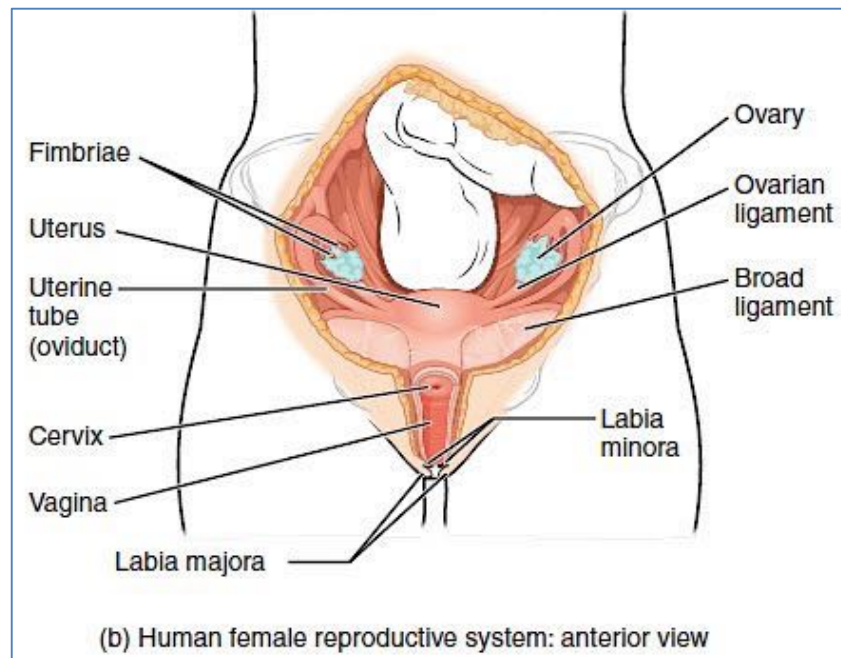


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- **Uterus** - Fundus (top / head), Body, Cervix (external os, canal, internal os), Lumen (internal cavity)
  - **Perimetrium** – Outer wall
  - **Myometrium** – Middle of wall
  - **Endometrium** – Inner wall

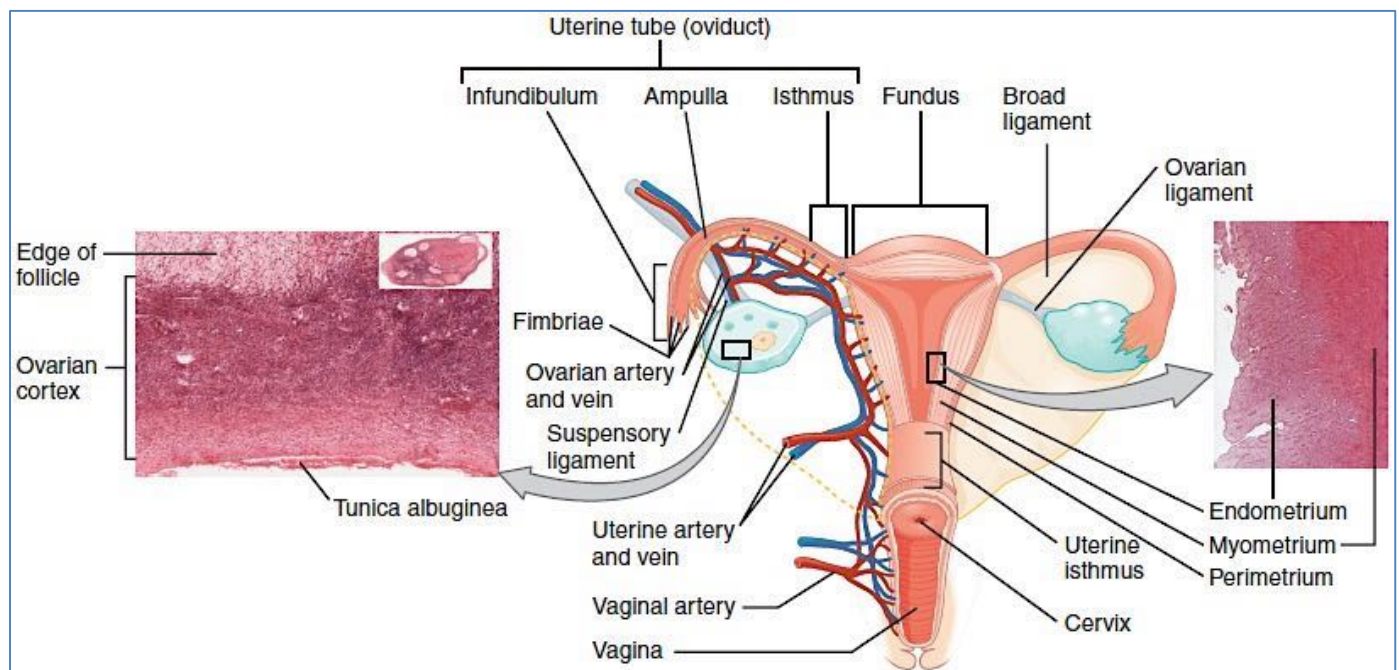


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- **Uterine (fallopian) Tubes**
  - Common site of fertilisation
  - Infundibulum – projections = fimbriae (closest to ovary) → Receives oocyte
- **Ovaries (gonads)**
  - Produce female gametes (oocytes)
  - Secrete female sex hormones – (Oestrogen & Progesterone)
  - Held in place by ligaments & muscles

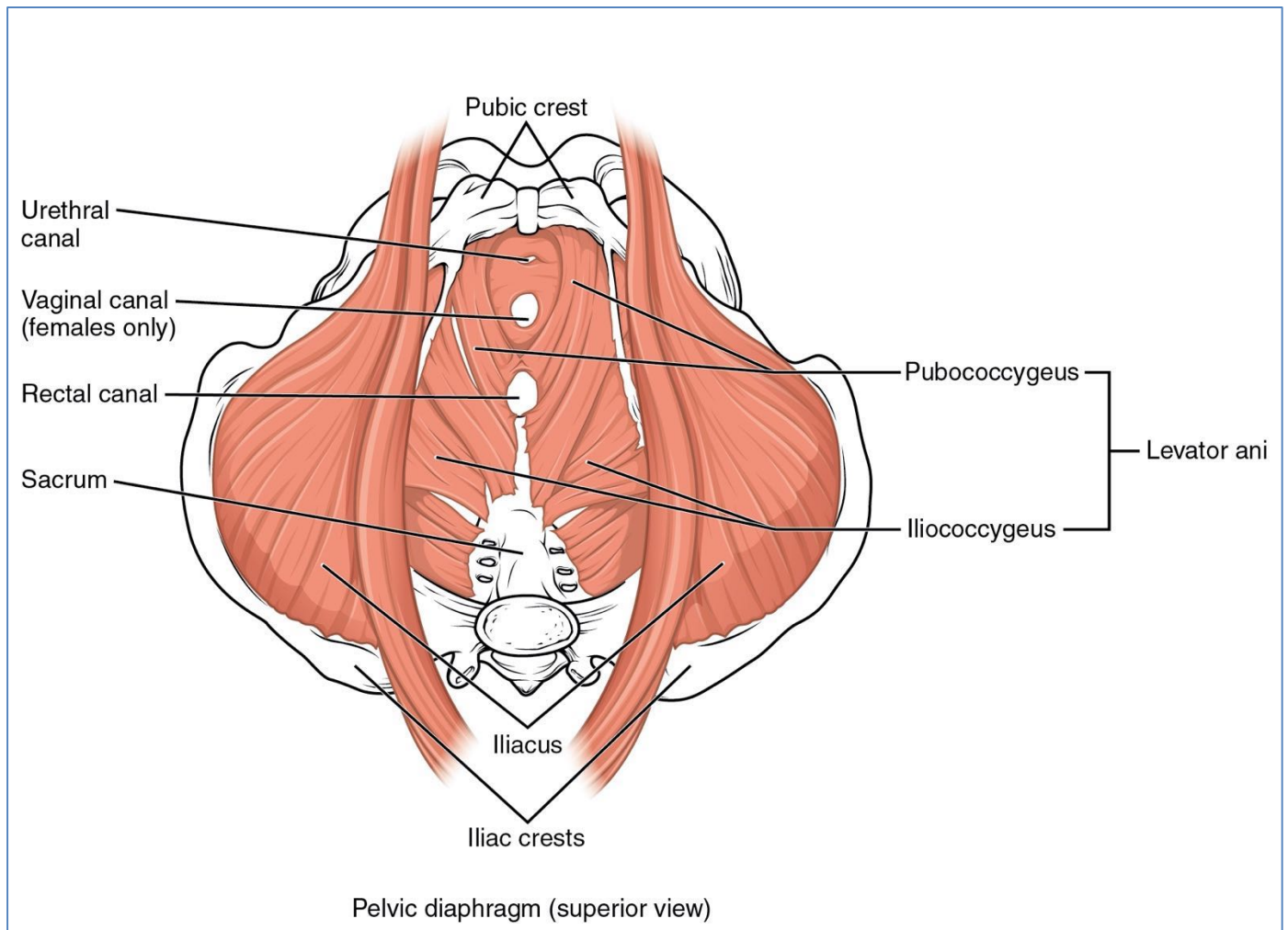


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#### - **Blood Supply:**

- **Internal iliac artery:**
  - Branches from common iliac artery.
  - Uterine Artery
  - Vaginal Artery
  - To external genitalia
- **Ovarian Artery:**
  - To ovaries, uterine tubes and uterus

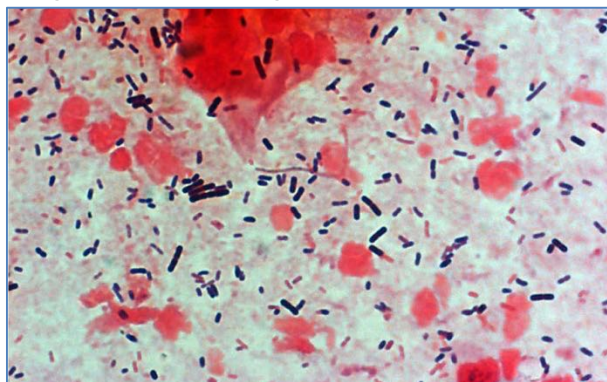
- **Pelvic Diaphragm:**
  - **Levator Ani (anterior half)**
    - Iliococcygeus
    - Pubococcygeus
  - **(posterior) Coccygeus (ischiococcygeus)**
  - **(posterior) Piriformis**



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### Normal Flora of the Genital Tract

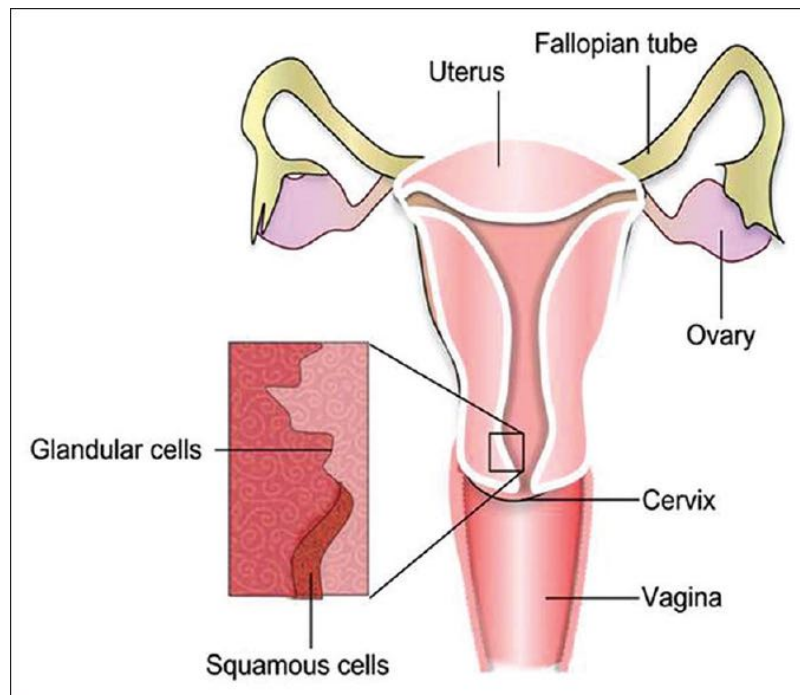
- **Male:**
  - **Urethra** – Few Organisms - (*Staph. epidermidis*, Streptococci, *Ureaplasma urealyticum*)
- **Female:**
  - **Vagina** – High Numbers of Bacteria – (*Lactobacillus* - Blue Gram Positive Rods, + Some Anaerobes)
    - → Produce lactic acid
    - → Protects against Bacterial Vaginosis & Yeast Infections.



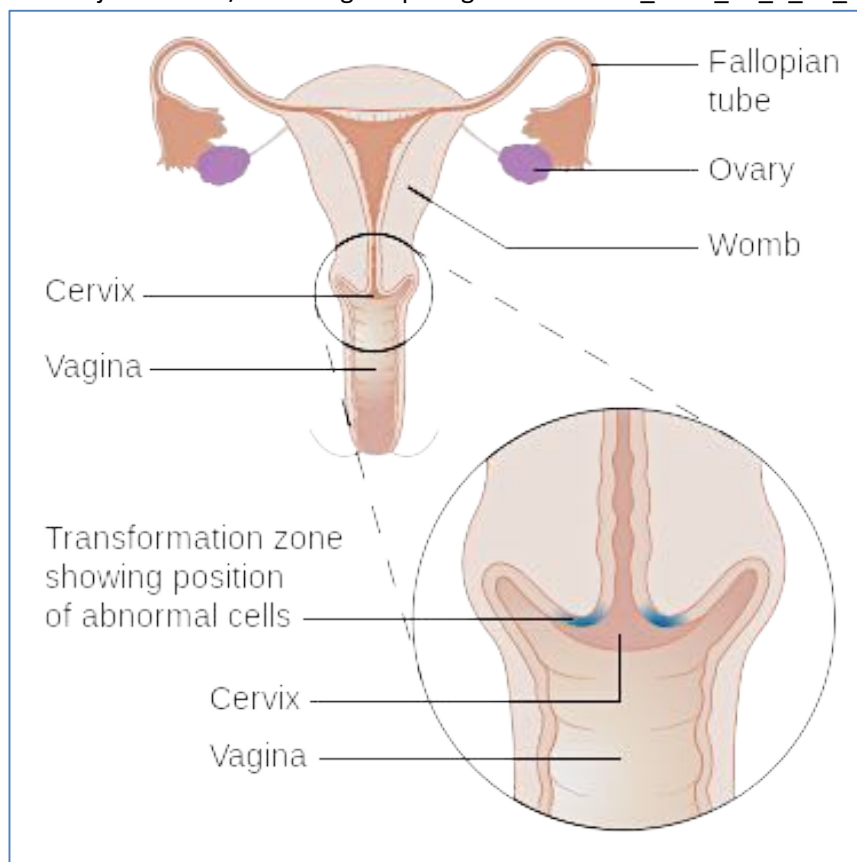
[https://embryology.med.unsw.edu.au/embryology/index.php?title=File:Bacteria\\_-\\_gram-stained\\_vaginal\\_smear\\_05.jpg](https://embryology.med.unsw.edu.au/embryology/index.php?title=File:Bacteria_-_gram-stained_vaginal_smear_05.jpg)

### Background Information on the Cervix:

- **Note: The Transformation Zone – Commonest location of Cervical Cancer.**
  - **TZ** = The location of Transition from Squamous to Columnar Epithelium.
  - The most common location from where pre-cancerous cells arise.
  - **Note:** During puberty, Columnar Epithelium Migrates out of the os → Exposed to Vaginal Acidity → Metaplasia to Squamous Epithelium
  - This is the area Predisposed to Cancer.

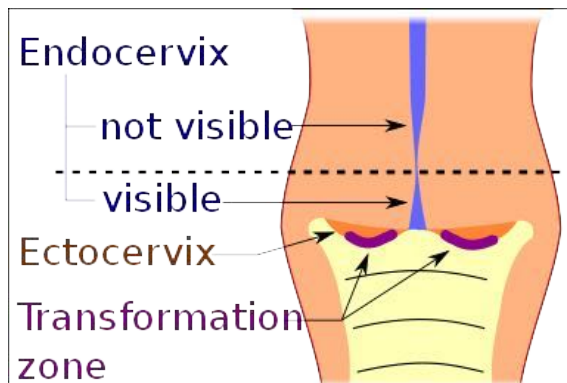


[https://www.cancerjournal.net/viewimage.asp?img=JCanResTher\\_2015\\_11\\_1\\_10\\_154065\\_f2.jpg](https://www.cancerjournal.net/viewimage.asp?img=JCanResTher_2015_11_1_10_154065_f2.jpg)

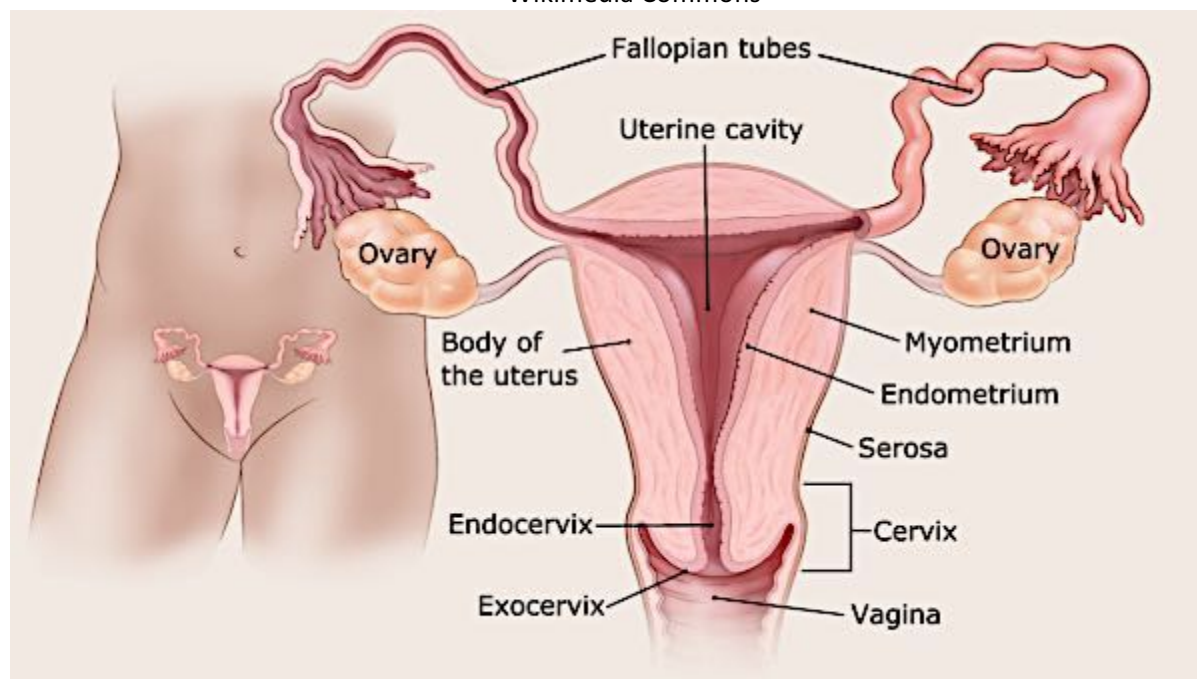


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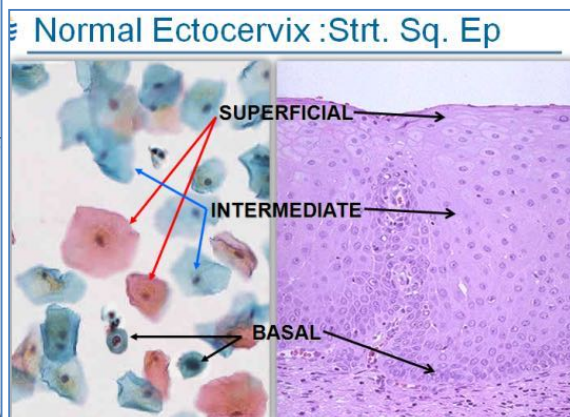
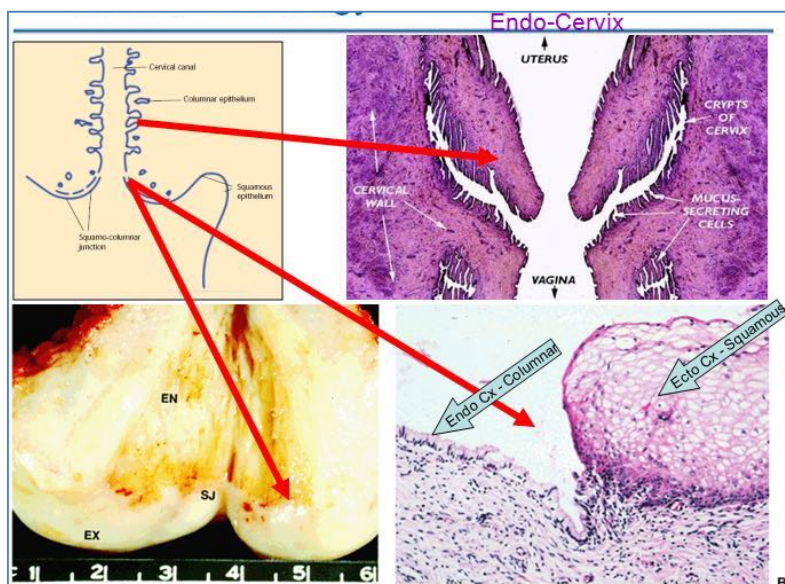
- **Note: The Normal Cervix – Anatomy & Histology:**
  - **Endocervix** = Simple Columnar Epithelium
  - **Ectocervix** = Stratified Squamous Epithelium



Mikael Häggström, M.D. - Author info - Reusing images- Conflicts of interest: None Mikael Häggström, CC0, via Wikimedia Commons

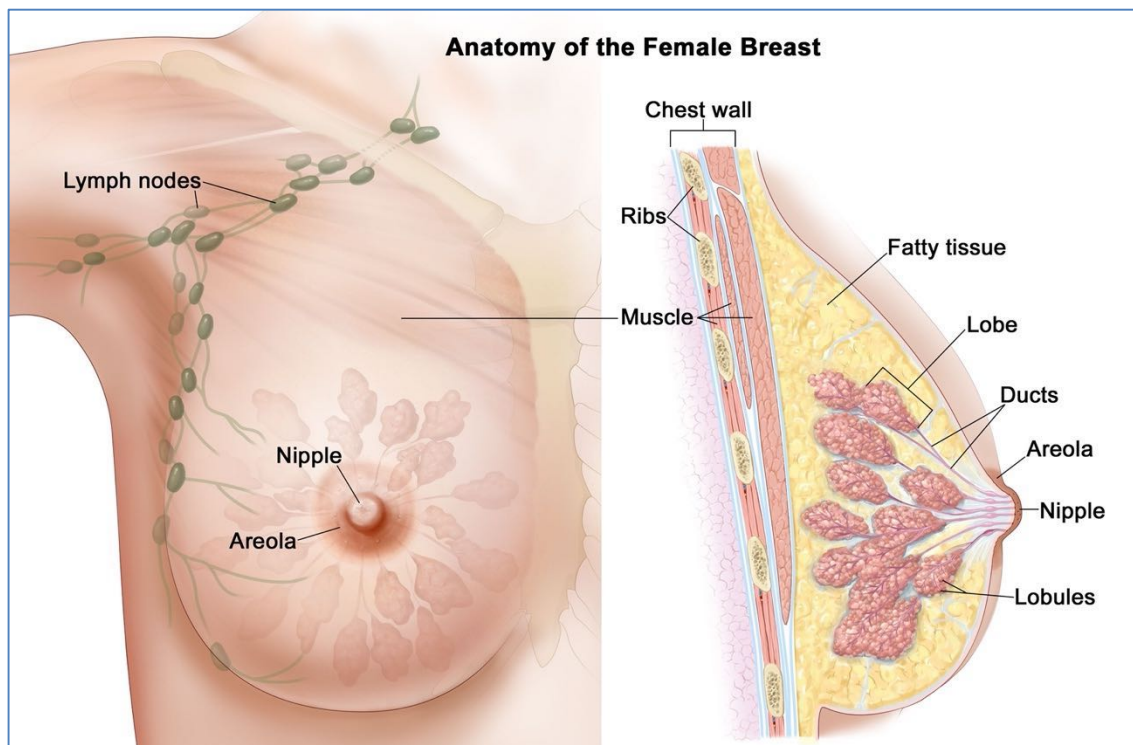


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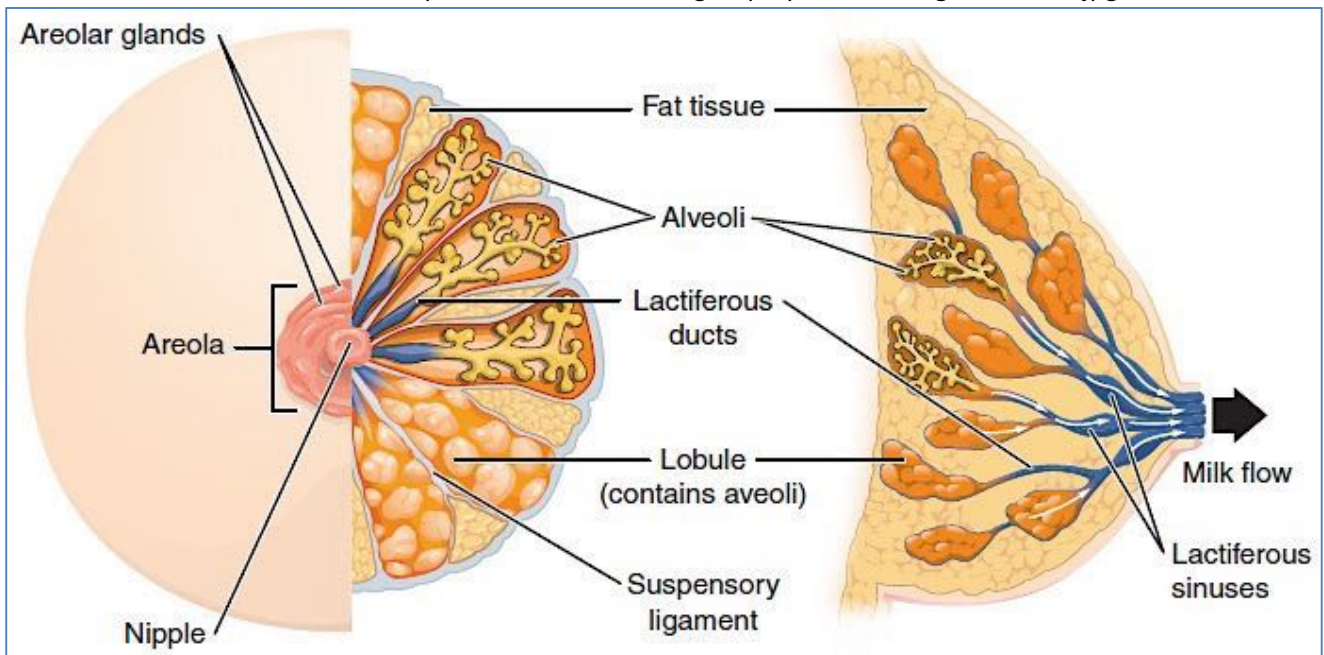


## Overview of The Breast:

- **Mammary glands:**
  - o Exist in both sexes – only functional in females
  - o Contained within the breast – within the hypodermis (superficial fascia), anterior to pectoral muscles of the thorax.
- **Areola** – ring of pigmented skin surrounding nipple – contains large sebaceous glands (stop chapping)
- **Nipple** – protrudes from centre of areola
- Attached to Pec-Major by Suspensory Ligaments
- **Glandular Breast Tissue:**
  - o Approx 20 lobes/lobules → Converge to Lactiferous Ducts → Lactiferous Sinuses → Nipple
  - o Padded and separated from each other by connective tissue (suspensory ligaments) and fat
  - o Within the lobes are smaller lobules – containing glandular alveoli – produce milk during lactation.
  - o Compound alveolar glands pass milk into the lactiferous ducts → accumulates in a lactiferous sinus.
- **Lymphatic Drainage:**
  - o Supraclavicular, Infraclavicular, Parasternal, Pectoral, Axillary, Central, Subscapular



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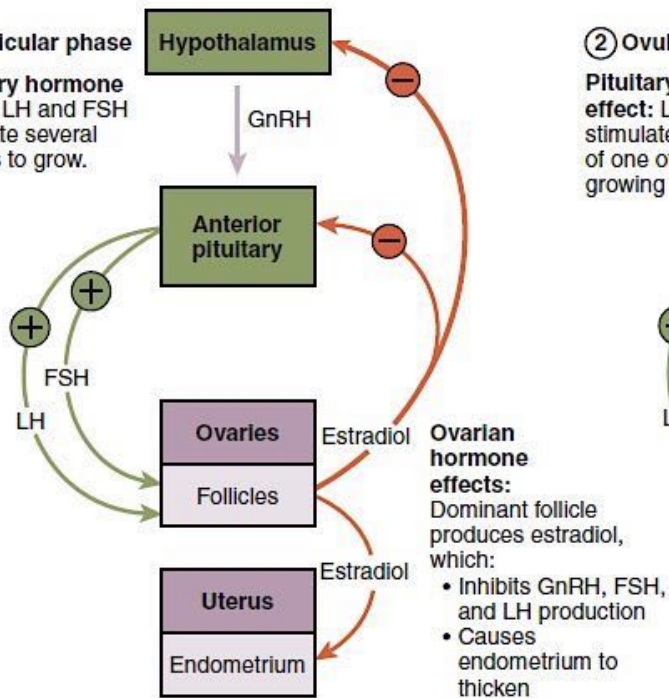
## Review of Female Reproductive Physiology:

- **Puberty:**
  - A gradual series of events that transform a child into a sexually mature adult.
  - **Female:** Marked by first menstrual period (average age 13)
  - **(Male:** Marked by physical development of Male Sex Characteristics)
- **Initiation:**
  - Activation of **Hypothalamo-Pituitary-Gonadal Axis** → establishes regulation of gonadal function.
    - **At puberty** → ↓ Sensitivity of the hypothalamus to Inhibitory Steroid Hormones → ↑ GnRH → ↑ FSH & LH → ↑ Gonadal Testosterone/Oestrogen/Progesterone → Sexual Maturation.
- **The Female Reproductive Cycle:**
  - The monthly series of events associated with the maturation of an egg.
  - Typically 28 days long.
  - **Days 1-5: \*Menstruation\*:**
    - **Shedding of the Endometrium**
    - Low levels of all hormones (FSH, LH, Oest. & Prog).
  - **Days 5-14: The Follicular/Proliferative Phase:**
    - **Follicular Recruitment & Growth**
    - **+ Endometrial Proliferation**
    - Rising levels of Oestrogen as Follicle/s get larger.
  - **Day 14 (Mid-Cycle): \*Ovulation\*:**
    - Surge of FSH & LH → Ovulation into peritoneal cavity → Oocyte enters Fallopian Tubes.
    - **FERTILE**
  - **Days 14-28: The Luteal Phase:**
    - **Transformation of Follicle → Corpus Luteum**
    - Corpus Luteum Secretes Mainly Progesterone (& Some Oestrogen)
      - Degenerates (Unless pregnancy occurs → C.L. persists until the placenta can take over).
    - **FERTILE**
  - **Day 28: End of Cycle:**
    - **Corpus Luteum Degenerates** → No Oestrogen/Progesterone to sustain Thick Endometrium → Endometrial Arteries become Spastic & Tortuous → Menstruation.

(Diagram over the page)

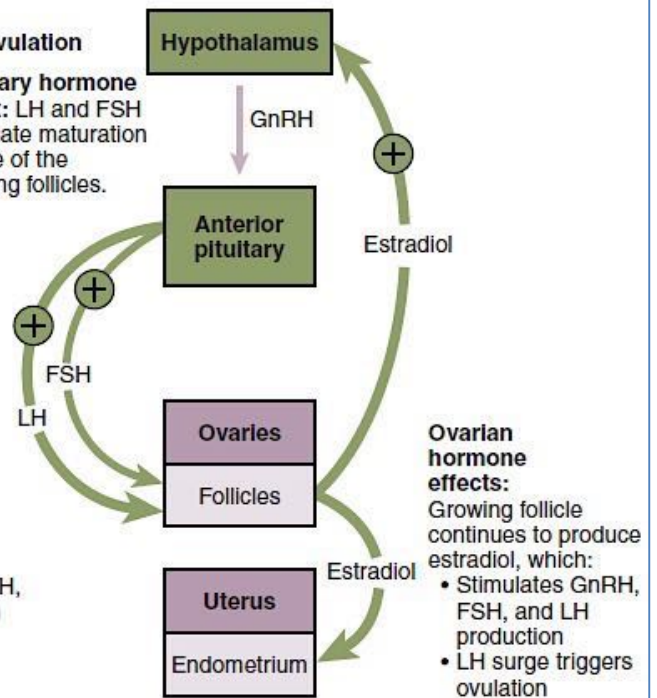
### ① Follicular phase

**Pituitary hormone effect:** LH and FSH stimulate several follicles to grow.



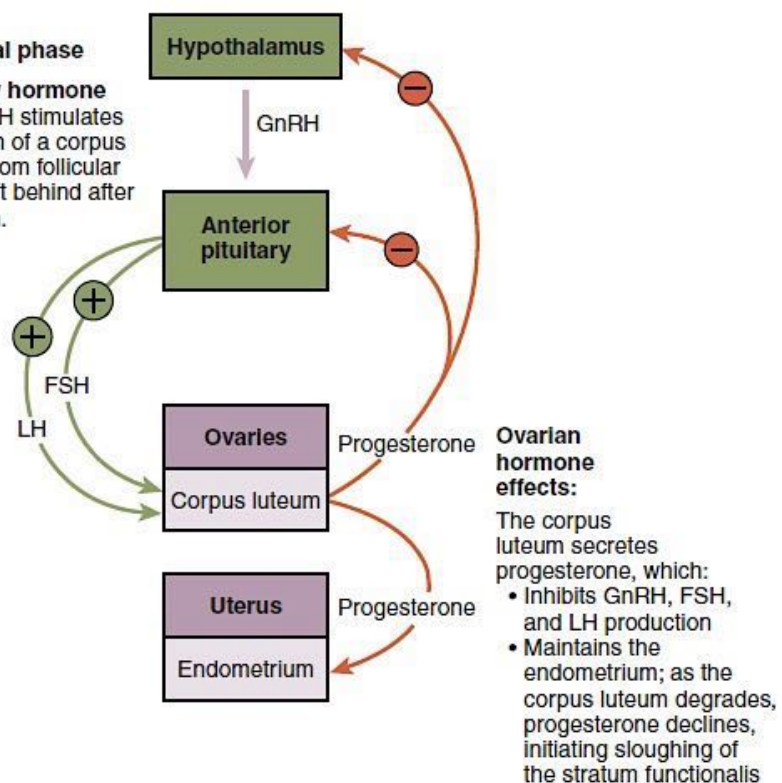
### ② Ovulation

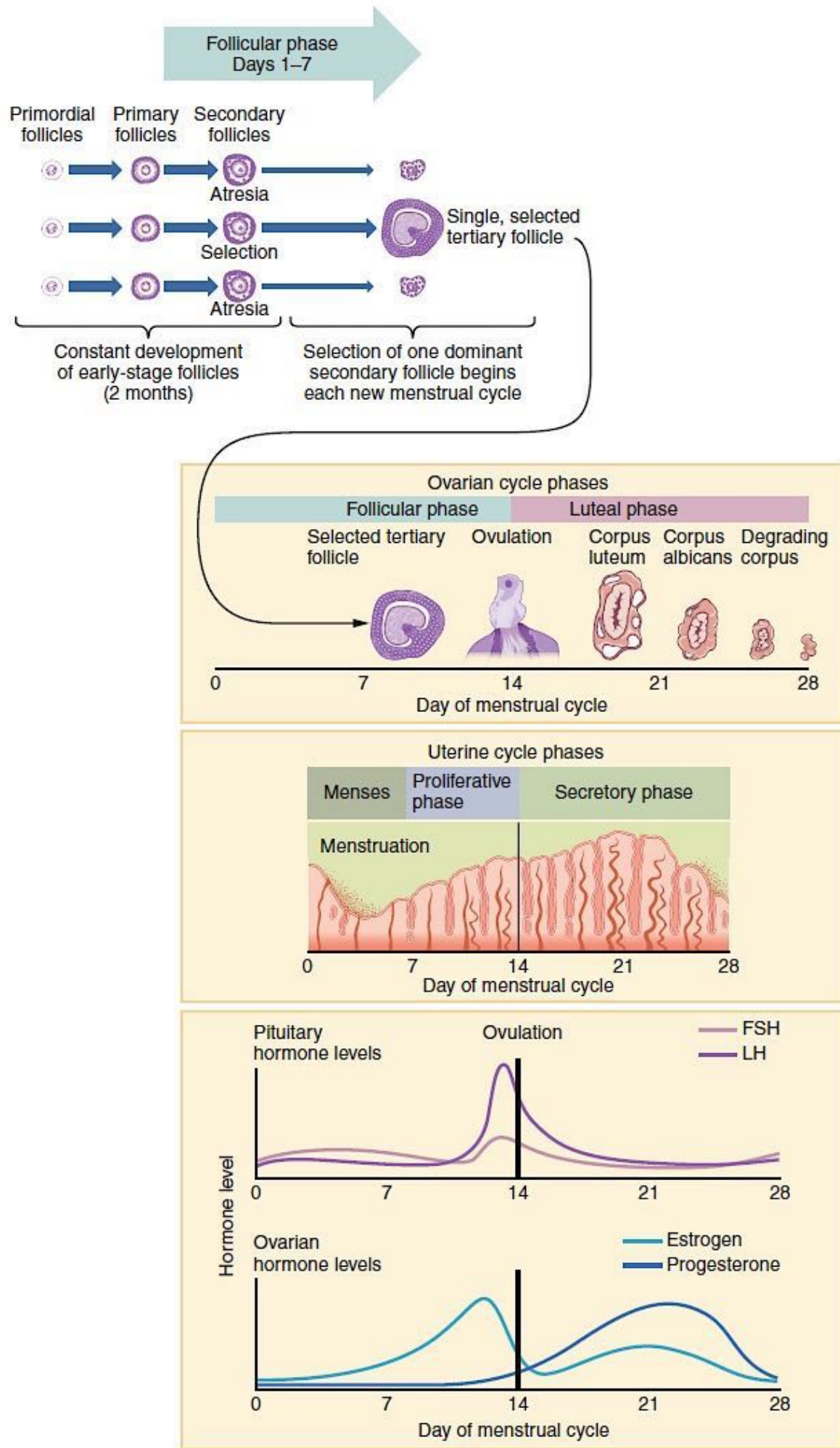
**Pituitary hormone effect:** LH and FSH stimulate maturation of one of the growing follicles.



### ③ Luteal phase

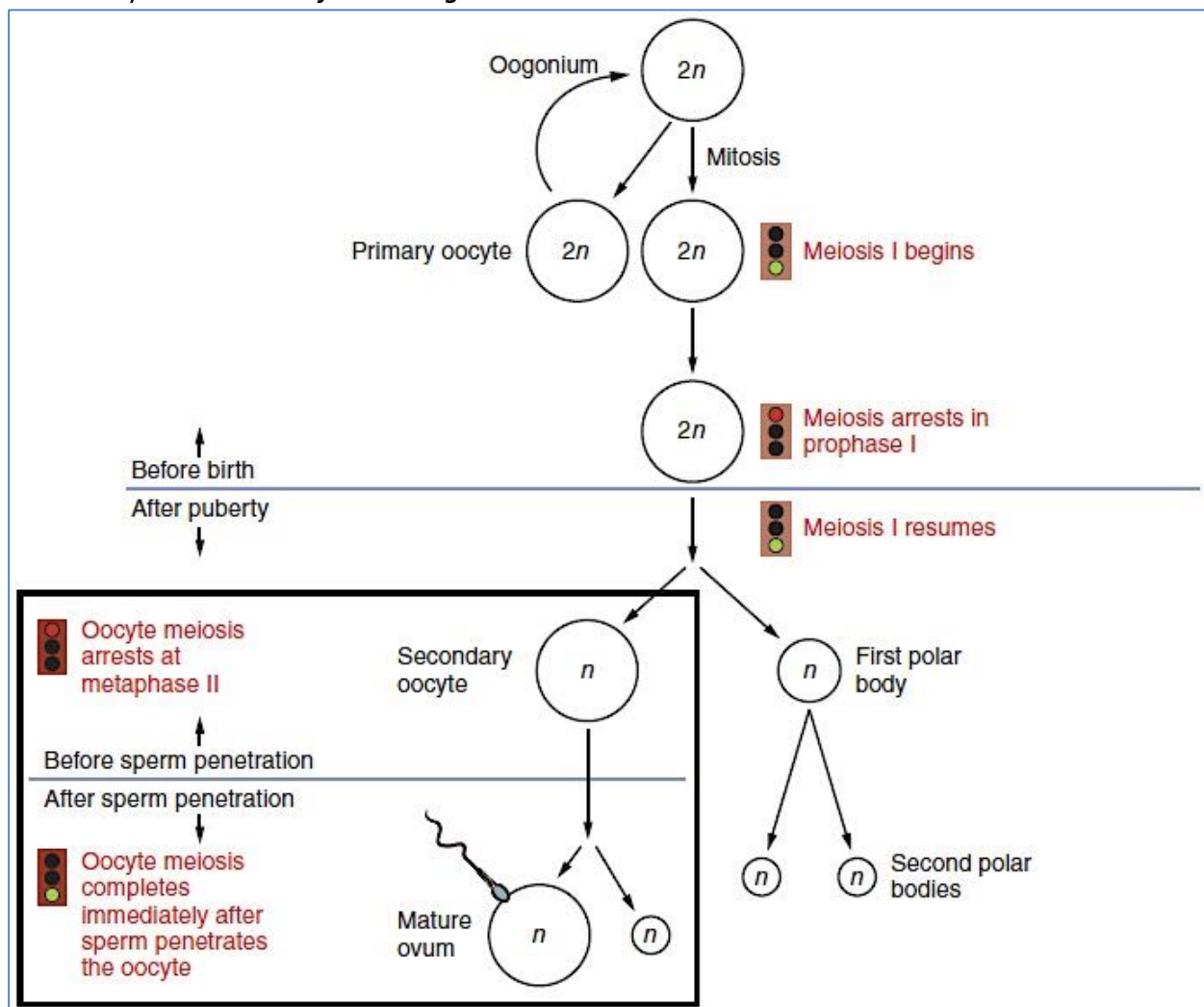
**Pituitary hormone effect:** LH stimulates formation of a corpus luteum from follicular tissue left behind after ovulation.



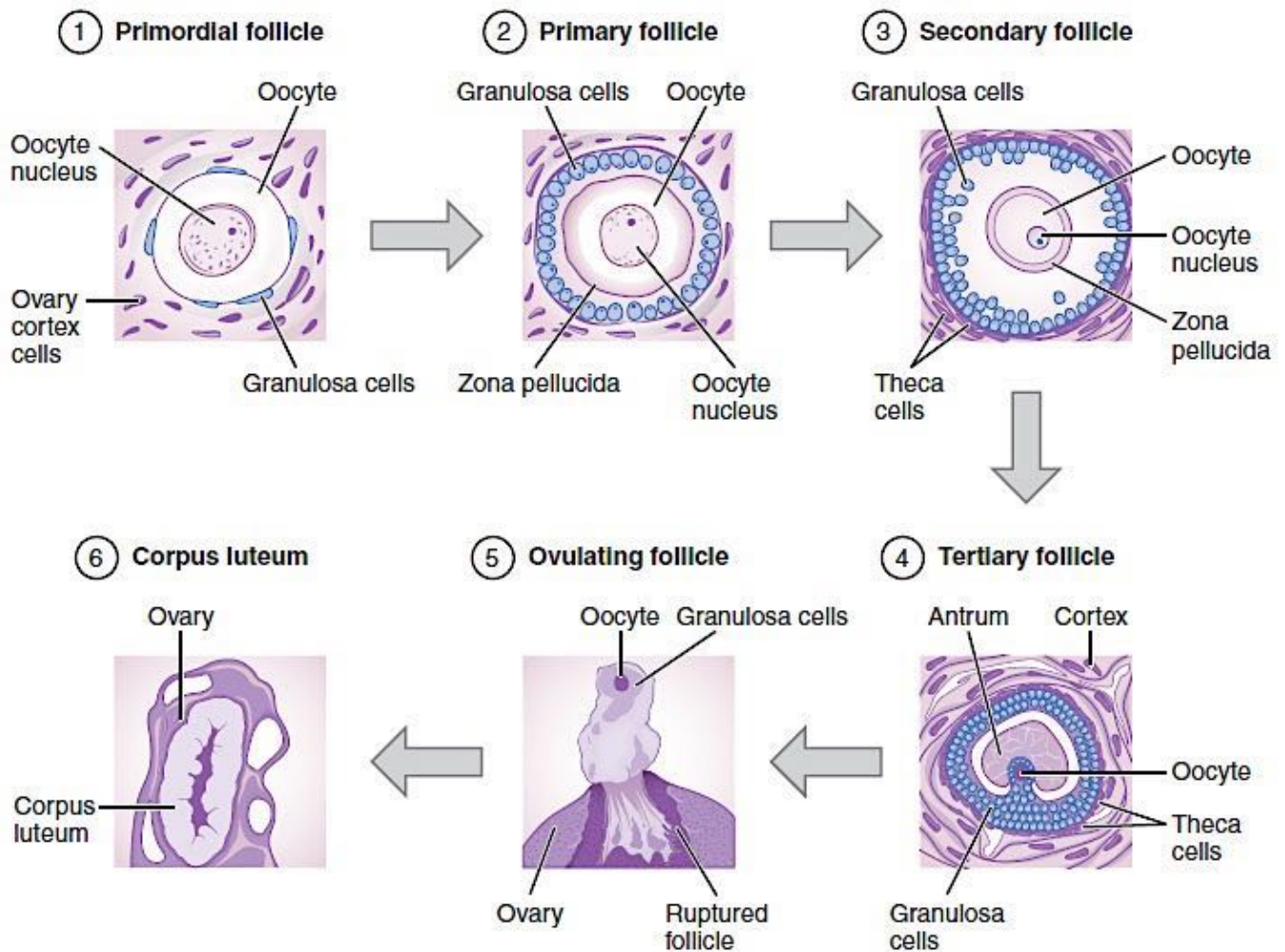


### Meiosis (Female) – Oogenesis:

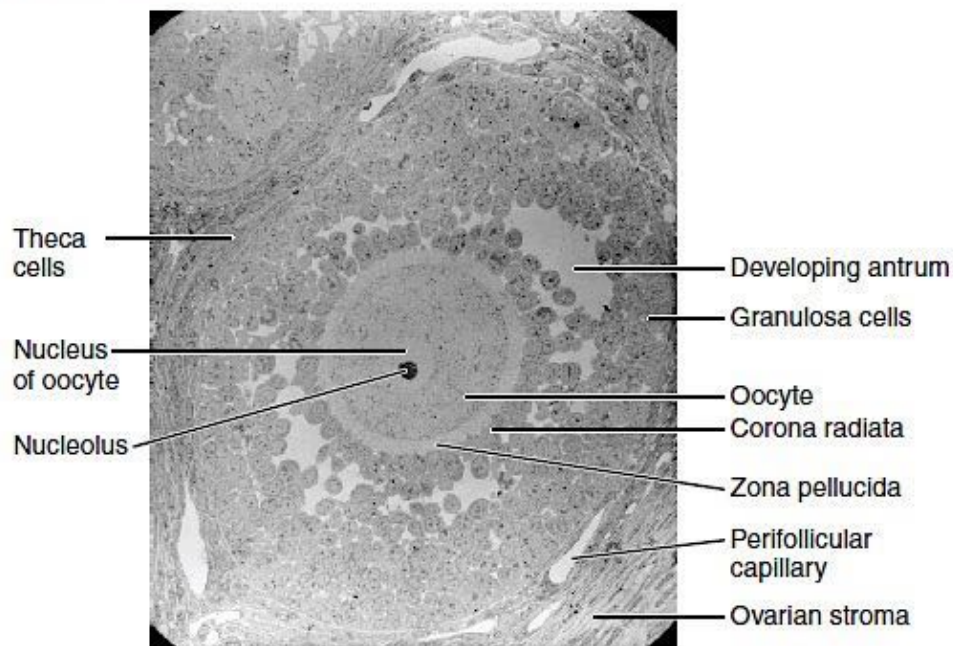
- It is thought that in general, the total number of eggs in a female is predetermined at birth.
  - **Female gamete production = Oogenesis.**
    - o Done through **meiosis**
      - Specialized cell division
      - Usually produces 4 haploid cells.
- 1) **Foetal period** - the, **Oogonia** (diploid ovarian stem cells) multiply rapidly by mitosis, then enter a growth phase and lay in nutrient reserves as **Primary Oocytes**.
  - 2) These **Primary Oocytes** then become **surrounded by** a single layer of **Follicle Cells** forming a **Primordial Follicle**.
  - 3) **Primary Oocytes** (of the primordial follicles) then begin the **first meiotic division**. However, they are **arrested in prophase I**.
  - 4) Female is born with approx. 2million primary oocytes. By puberty, 250000 primary oocytes are left.
  - 5) **Puberty—Menopause:** Each month, a small number of **primary oocytes** are recruited in response to the LH surge midway through the menstrual cycle. (Luteinising Hormone) As these **primary oocytes** prepare to divide, a spindle forms on its edge, creating a small “nipple” where half of the chromosomes will be cast during division.
  - 6) Only **one of the primary oocytes** is selected to **continue meiosis I**. Produces **2 haploid cells** (23 chromosomes each) **dissimilar in size**. The smaller cell is the “**first polar body**” (little->no cytoplasm) and the larger cell is the **secondary oocyte**. → The **secondary oocyte** is then arrested in **metaphase II** and **OVULATED**. (unequal Cytoplasmic divisions ensure that a fertilised egg has ample nutrients for its week-journey to the uterus.)
  - 7) The **ovulated secondary oocyte MUST be penetrated by a SPERM** for it to complete **MEIOSIS II**, yielding one large **OVUM** and a “**Second polar body**”
- \*Note:** - The potential products of oogenesis are 3 small polar bodies and one large ovum. (3 polar bodies aren't always formed – first polar body often perishes before meiosis II)  
-Only the **OVUM** is a **functional gamete**.



(a) Stages of Folliculogenesis



(b) A Secondary Follicle



## Menopause:

### - Terminology:

- **"Menopause"** = >12mths of Amenorrhoea since the Last Menstrual Period.
  - (Note: And not accounted for by any other cause)
- **"Pre-Menopause"** = Early symptoms of Menstrual Irregularity
- **"Perimenopause"** = From onset of *Pre-Menopausal Symptoms (ie: >2skipped Cycles)*, to 12mths since the Last Menstrual Period.

### - Types:

- **Physiological:** Spontaneous menopause ~45-55yrs
- **Premature:** <40yrs (Due to Premature Ovarian Failure)
- **Iatrogenic:** Medically Induced (Eg: Chemotherapy/Radiotherapy)

### - Mechanism:

- ↓Follicle Sensitivity to FSH → ↓Follicles Recruited → ↓Oestrogen Levels Production → Progressive Oligomenorrhoea → Amenorrhoea
- (Note: Gradual process over 3-5yrs)

### - Clinical Features:

- **Epidemiology:**
  - **Average ages:** 45-55
- **Symptoms:**
  - **Menstrual Irregularity:**
    - Oligomenorrhoea (Irregular/Lighter Periods)
    - (Occasionally Intermittent Menorrhagia/DUB)
  - **Hormonal Symptoms - (Note: Can persist for <5yrs Post-"Menopause"):**
    - **Hot/Cold Flashes/Night-Sweats (Pathognomonic):**
      - 75% of Women
      - Onset @ Pre-Menopause (<2yrs before); Last for <2yrs after Menopause.
    - **Mood Changes:**
      - Mood Swings – Depression/Anxiety/Irritability
      - (+ Poor Concentration/Memory/Insomnia)
      - ↓Libido
    - **Associated Syx:**
      - Palpitations/Dizziness/Headaches
  - **Genitourinary:**
    - Vaginal Dryness →
      - Itching/Burning
      - Dyspareunia
    - Urethral Atrophy → ↑UTIs
    - ↓Ovulation → Infertility
- **Anatomical Changes:**
  - **Uterus/Cervix:** Atrophy (Note: Any pre-existing Fibroids shrink as well)
  - **Vagina:** Dryness, ↑pH (and Lactobacilli ↓), Mucosal Atrophy, ↓Elasticity
  - **Vulva:** Atrophy
  - **Pelvic Floor:** ↓Muscle Tone (→ Uterovaginal Prolapse)
  - **Ovaries:** Atrophy, Stop producing follicles.
- **Complications:**
  - **\*\*Osteoporosis\*\*** (Loss of Oestrogen-Mediated Ca-Deposition in Bone)
  - **↑Risk of Heart Disease** (Protective effects of oestrogen is lost)

### - Diagnosis:

- **Clinical Hx:**
  - Symptoms
  - Lifestyle Impact
- **Examination:**
  - Complete Physical (including Breast & Pelvic)
- **(Definitive Dx - ↑FSH & ↓Estradiol = Ovarian Failure)**

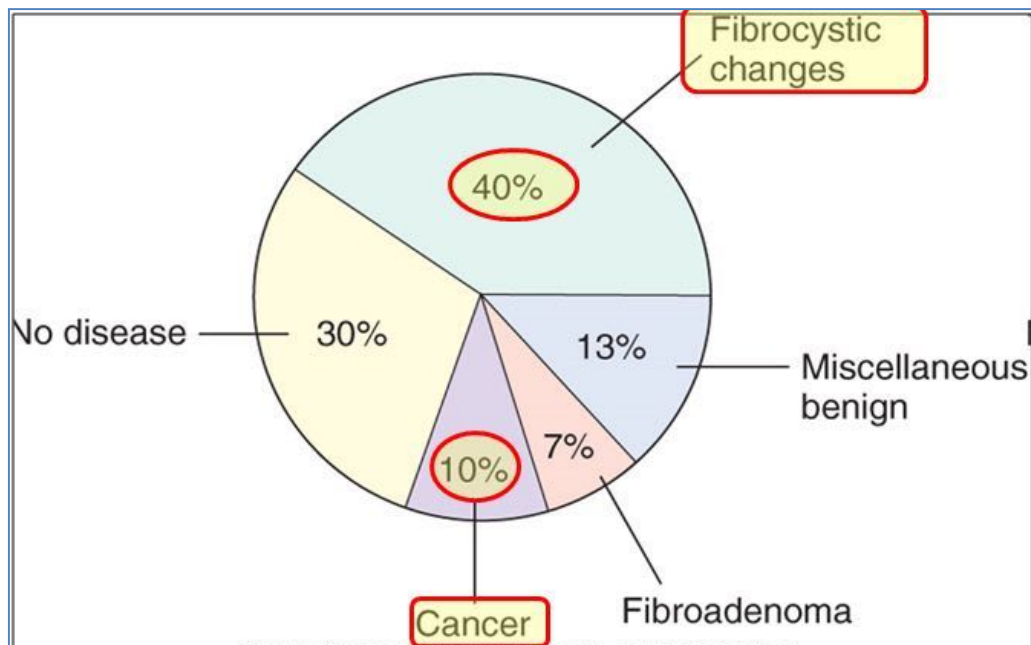
- **Baseline Investigations:**
  - FBC/LFTs/TFTs/Lipids/Coags
  - Bone-Mineral Density Scan (?Osteoporosis)
  - Mammogram & Pap Smear
- **Non-Pharmacological Management:**
  - Advise healthy lifestyle (Diet, Weight Loss, Weight-Bearing Exercise)
  - Calcium & Vit-D Supplements
  - **+ Breast/Colon Cancer Screening:**
    - Annual Mammograms
    - Annual FOBT; 5yrlly Colonoscopy
    - 2yrlly Pap-Smears
- **Pharmacological Management:**
  - **HRT (Pharmacological):**
    - **Strategy:**
      - **Duration:** Only for SHORT TERM Symptomatic Relief (1e: 2-3yrs MAX)
      - **Smallest Dose:** Titrated to symptom relief
      - **Taper Doses:** To avoid “Rebound Menopause” when ceased
    - **Options:**
      - **\*\*Combined Oestrogen +Progesterone** (If Intact Uterus – To prevent Endometrial Cancer)
        - **Cyclical** – For *Peri-Menopausal*
        - **Continuous** – For *Post-Menopause*
      - **Oestrogen Only** (For women without a Uterus; Or Mirena Inserted)
    - **Benefits:**
      - ↓Hormonal Symptoms (Flushes/Mood)
      - ↓Vaginal Dryness
      - ↓Risk of Osteoporosis
    - **Side Effects:**
      - Breakthrough Bleeding
      - Breast Tenderness
      - Headaches/Nausea/Mood Swings
      - Small ↑Risk of Cardiovascular Disease
      - Small ↑Risk of Breast & Colorectal Cancers
      - (↑ Risk of Endometrial/Ovarian Ca ONLY IF Unopposed Oestrogen Therapy)
      - Small ↑Risk of VTE & Stroke
    - **CONTRAINDICATIONS:**
      - Hx of Thromboembolism (DVT/PE/CVA)
      - Hx of Stroke
      - Unexplained Post-Menopausal Bleeding – (Suspected Endometrial/Breast Ca.)
      - Acute Liver Disease
      - Hx of Breast Cancer
      - Pre-Existing Cardiovascular Disease – (Incl. Hypertension & ↑Cholesterol)
      - Migraine Suffers
  - **+/- Bisphosphonates (Eg: *Alendronate [Fosamax]*):**
    - To prevent Osteoporosis

## **BREAST MASSES**

## BREAST MASSES

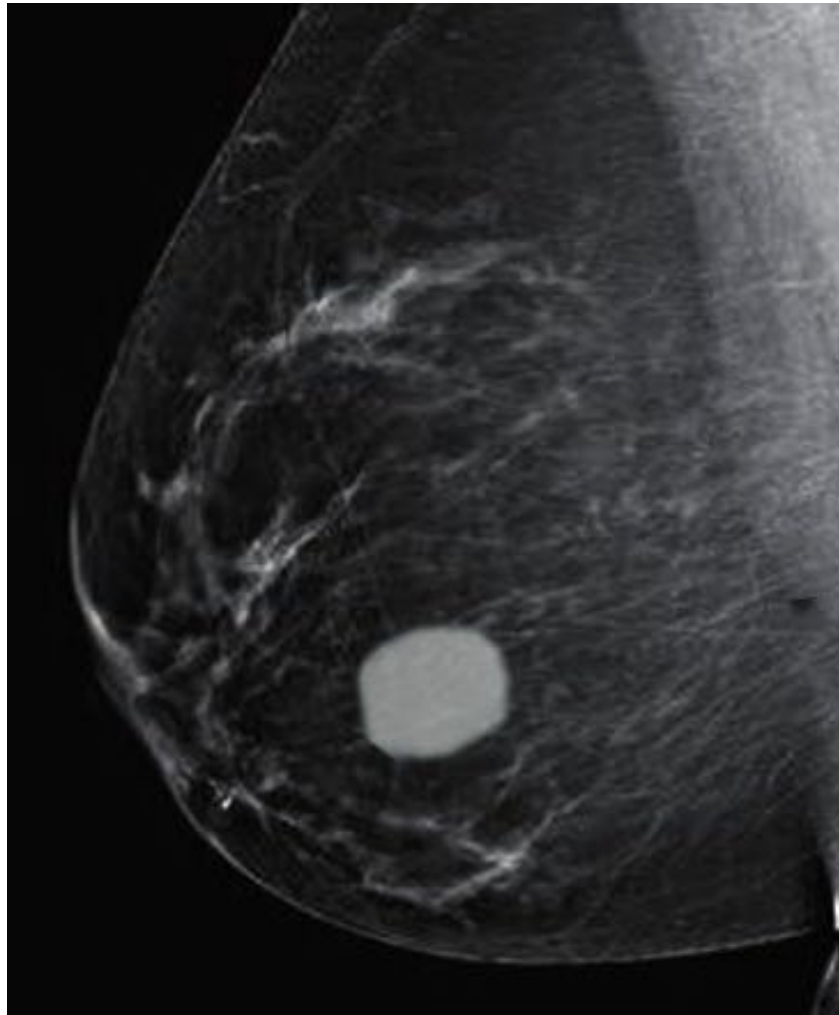
### Breast Lump Diagnostic Features:

<u>Clinical Presentation:</u>	<u>Most Common Dx:</u>	<u>DDx:</u>
Single, Mobile Lump	<i>Fibroadenoma</i>	<i>Phyllodes Tumour (if &gt;55yrs)</i>
Multiple, Irregular Lumpy Areas + Cyclical Pain	<i>Fibrocystic Change</i>	-
Firm, Tethered Lump	<i>Carcinoma</i>	-
Clear/Pus Nipple Discharge	<i>Duct Ectasia</i>	-
Bloody Nipple Discharge	<i>Duct Ectasia</i>	<i>Duct Papilloma</i> <i>Ductile Ca. In Situ (DCIS)</i>
Nipple Ulceration & Eczema	<i>Paget's Disease of the Breast</i>	<i>Nipple Adenoma</i>
Milky Discharge + Visual Changes + Headaches	<i>Prolactinoma</i>	<i>Pituitary Adenoma</i>

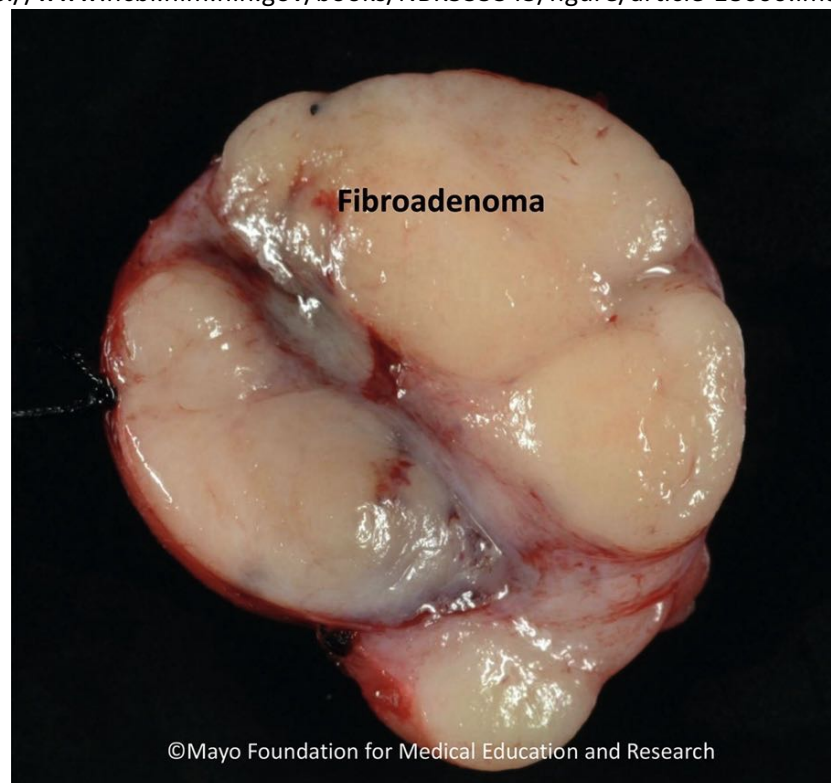


### \*FIBROADENOMA ("BREAST MOUSE"):

- **Aetiology:**
  - o Benign Tumour of Intralobular Stroma (Loose Connective Tissue)
- **Pathogenesis:**
  - o Benign Tumour of Intralobular Stroma (Loose Connective Tissue) + Some Acinar (Gland) Proliferation
- **Morphology:**
  - o Capsulated, Firm, Homogenous, Grey, Nodular Tumour, *Without* Cysts.
- **Clinical Features:**
  - o **Most common *Benign Tumour of the Breast***
    - Note: 50% Involute Spontaneously
    - NO risk of Malignancy.
  - o **Presentation:**
    - Typically 20-40yrs
    - Typically Multiple & Bilateral
    - Palpable Mass Or Mammographic Density/s or Calcifications
    - Variable Size – Typically <5cm Rounded Tumour
    - Highly Mobile ("Breast Mouse")
    - Hormonal Stimulation - (May increase with pregnancy or HRT)
- **Treatment:**
  - o Excision = Cure. But not necessary.



<https://www.ncbi.nlm.nih.gov/books/NBK535345/figure/article-18600.image.f1/>



Fibroadenoma of the Breast, Lori A. Erickson, MD; Beiyun Chen, MD, PhD, DOI:  
<https://doi.org/10.1016/j.mayocp.2020.08.040>

### **"PHYLLODES TUMOUR"/GIANT FIBROADENOMAS:**

- Basically same as Fibroadenomas, except Typically occur in 50-60yrs (Cf. 20-40yrs for Fibroadenomas)
- **Aetiology:**
  - o Benign Tumour of Intralobular Stroma (Loose Connective Tissue)
- **Pathogenesis:**
  - o Benign Tumour of Intralobular Stroma (Loose Connective Tissue) + Some Acinar (Gland) Proliferation
- **Morphology:**
  - o Capsulated, Firm, Homogenous, Grey, Nodular Tumour, *Without Cysts*.
  - o ***PLUS*** – "*Phyllodes*" ("*Leaf-Like*") clefts and slits *throughout Tumour*.
- **Clinical Features:**
  - o Typically Benign **BUT Requires Excision** to avoid Local Recurrences.
    - Metastasis is Rare.
    - Note: can be premalignant in older people
  - o Note: An expanding lesion ∴ No retraction
- **Management:**
  - o **Excision** to avoid Local Recurrences



1. Giant breast fibroadenomas in adolescents: Diagnostic and therapeutic procedures; Beatriz Corredor Andrés, María Márquez Rivera; DOI: [10.1016/j.anpede.2018.01.013](https://doi.org/10.1016/j.anpede.2018.01.013)

2. Credit: <https://radiopaedia.org/articles/giant-fibroadenoma>



**Figure 1:** Gross specimen of the mass.

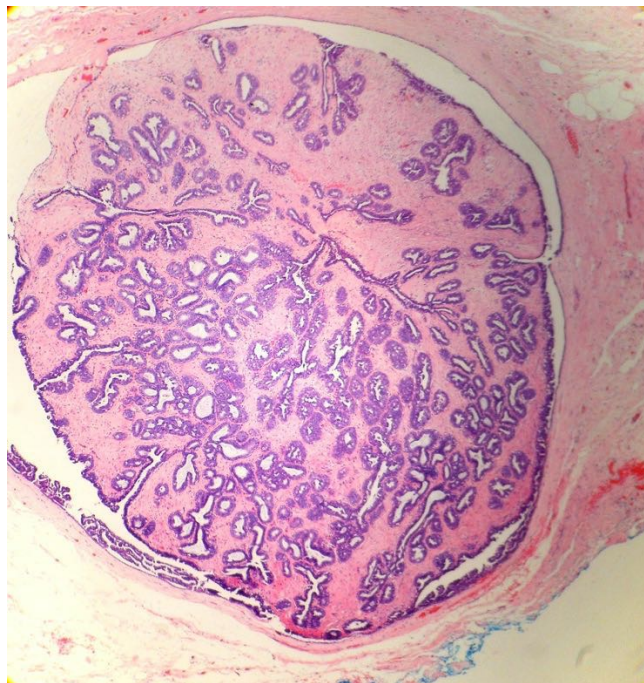


**Figure 2:** Microscopy showing the leaf like pattern (H&E 10×).

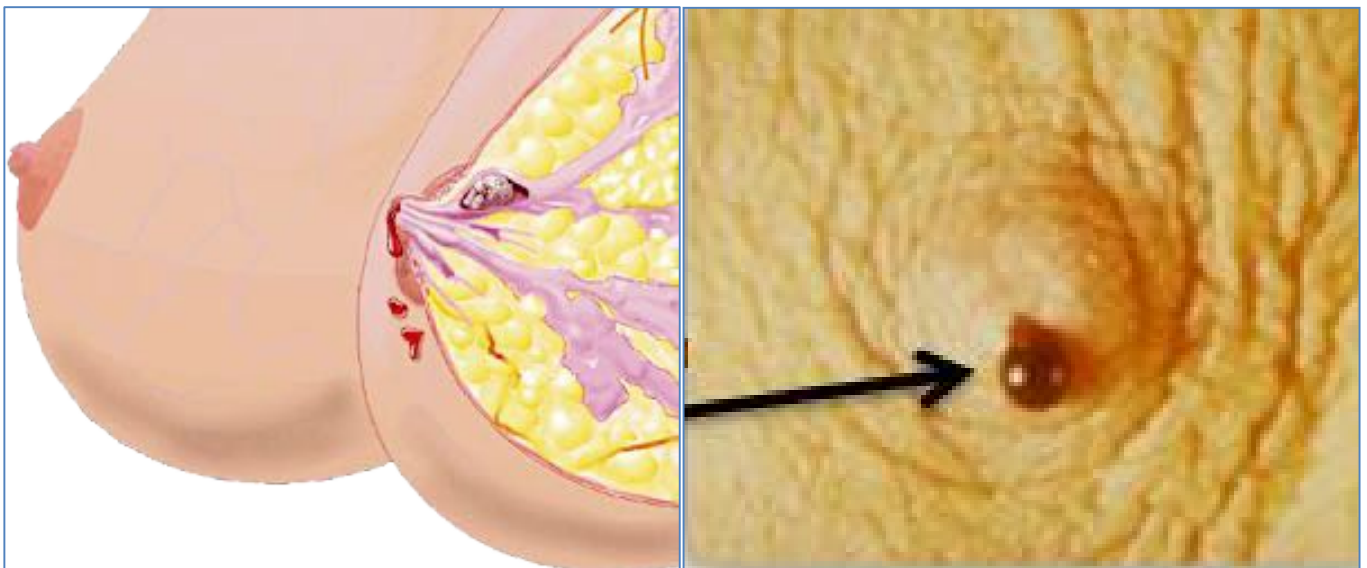
1. Giant Fibroadenoma of Breast in an Adolescent Girl, Nithya Thuruthiyath,<sup>1\*</sup> Purna Chandra Das,<sup>2</sup> K Shreedhara  
2. Avabratha,<sup>1</sup> Vanessa Mascarenhas,<sup>1</sup> Nisha Marla<sup>3</sup>; DOI [10.5001/omj.2012.77](https://doi.org/10.5001/omj.2012.77)

## INTRADUCTAL PAPILLOMA:

- **Aetiology:**
  - Benign Tumour of Duct Epithelium
- **Pathogenesis:**
  - Benign Tumour of Duct Epithelium → Papillary Projections *Within* a Dilated Duct
- **Morphology:**
  - Solitary, Intra-ductal Papillary Proliferation.
  - Typically Occur in the Lactiferous Sinuses of the Nipple (∴ Sub-Areolar)
- **Clinical Features:**
  - Middle age
  - **Bloody Nipple Discharge** (Commonest cause of Bloody Nipple Discharge)
  - Small Sub-Areolar Lump. (Irregular, small, Sub-Areolar lump)
- **Management:**
  - **Core Needle Biopsy**
  - **Excisional Biopsy** → Once Confirmed Intraductal Papilloma, no need for further Rx.
- **Prognosis:**
  - Recurrent, but NO risk of malignancy. (rare)



Sarahkayb, CC BY-SA 4.0 <<https://creativecommons.org/licenses/by-sa/4.0>>, via Wikimedia Commons



Credit: <https://sydneybreastclinic.com.au/patient-information/papilloma/>

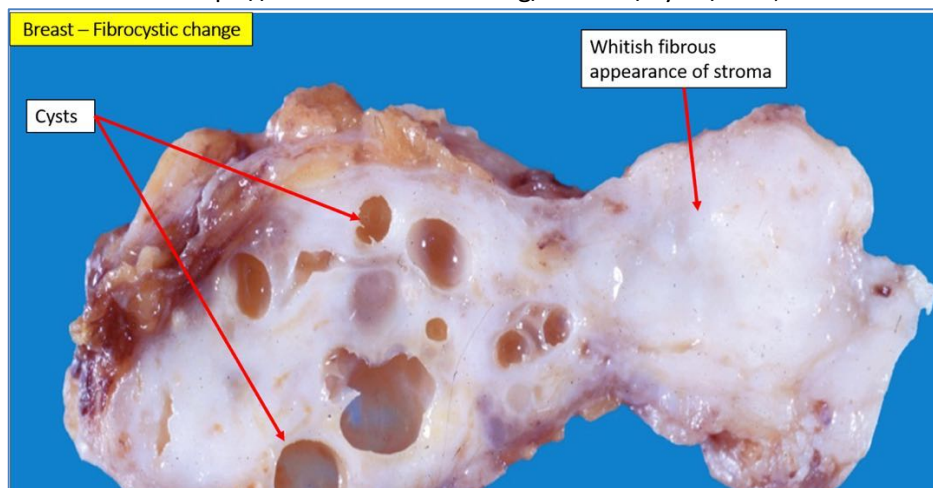
## **FIBROCYSTIC DISEASE:**

- **Aetiology:**
  - Hormone-Induced ***Acinar & Fibrous Hyperplasia***
- **Pathogenesis:**
  - Oestrogens → ***Acinar & Fibrous Hyperplasia*** → Multiple, Bilateral, Irregular Lumpy Breasts.
  - (May be cyclical)
- **Morphology:**
  - Grey-white Scar Tissue (Fibrosis)
  - Multiple Cystic Lesions.
  - **Proliferative:** When there is Epithelial Hyperplasia → **PREMALIGNANT**
  - **Non-Proliferative:** No Epithelial Hyperplasia → Not Premalignant.
- **Clinical Features:**
  - **Commonest (40%) cause of lumps in 20-40y.**
  - Multiple, Bilateral, Irregular “Lumpy Bumpy” Breasts.
  - (Note: UNLIKE Malignancy, they are multiple, bilateral, highly mobile)
  - Cyclical Pain/Discomfort.
  - Mammogram – Diffuse Fibrosis with Cystic Spaces
  - **Proliferative:** Epithelial Hyperplasia (>2 Cell Layers) → **PREMALIGNANT → DCIS → Ca.**
  - **Non-Proliferative:** No Epithelial Hyperplasia → Not Premalignant.
- **Management:**
  - **Optional Biopsy**
  - **Excision if Pre-Malignant**
- **Proliferative FCD: Epithelial Hyperplasia** May → Dysplasia → DCIS – (once the cells fill the whole duct).



1.<https://www.saintlukeskc.org/health-library/what-are-fibrocytic-breasts>

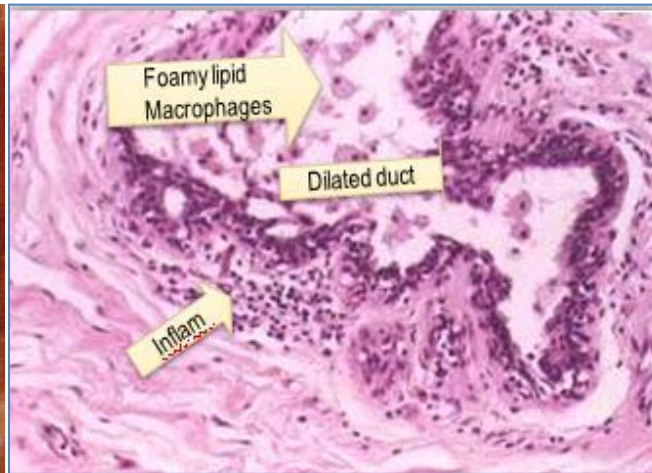
2.Nephron, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons



<https://medicine.nus.edu.sg/pathweb/wp-content/uploads/2020/11/2156-2.png>

## DUCT ECTASIA:

- **Aetiology:**
  - Nipple Outflow Duct Obstruction
- **Pathogenesis:**
  - (\*Remember – Kind of like ‘Cystic Acne’ of the Nipple.)
  - Nipple Outflow Duct Obstruction → Stagnation of Breast Secretions → Inflammation
  - Note: Healing phase may → Fibrosis → may cause nipple inversion (a DDx of malignancy)
- **Morphology:**
  - Dilation (Ectasia) of Lactiferous Ducts
  - Duct filled with Concentrated Secretions & Debris
- **Clinical Features:**
  - Typically Multiparous Women 40-60yo.
  - **Symptoms/Signs:**
    - **\*Poorly-Defined Periareolar Mass + Nipple Discharge.**
      - Nipple Discharge – (Serous/White/Frank Pus/or Frank Blood).
      - May → Fibrosis → Nipple Retraction/Inversion
    - Note: Pain is Uncommon
  - **Clinical Significance:**
    - *Fibrotic Response can → Firm, Irregular Periareolar Mass which may Mimic Invasive Carcinoma on Palpation & Mammogram!!*
- **Management:**
  - **Diagnosis:**
    - FNA-Biopsy/Imaging to Investigate for DDx (Eg: Intraductal Papilloma)
  - **Treatment:**
    - Often Self-Limiting
    - +/- Antibiotics
    - (+/- Mammary Duct Excision)



<http://www.meddean.luc.edu/lumen/meded/medicine/pulmonar/pd/step30b.htm>

## GALACTOCOELE: (Obstruction of one of the ducts → accumulation of milk → Cyst)

- **Aetiology:**
  - Protein-Plug Obstruction to Duct Outlet
- **Pathogenesis:**
  - Protein-Plug Obstruction to Duct Outlet → Obstruction → Accumulation of Milk → Cyst
- **Morphology:**
  - **Macro:**
    - Smooth, Malleable breast lump filled with fluid
  - **Micro:**
    - Large Cystic space lined by normal duct epithelium
- **Clinical Features:**
  - Centrally Located, NON-Tender Mass
  - No risk of infection since milk is sterile
  - Drainage is pointless as the Protein Plug remains and Milk Production Continues
- **Treatment:** Self-Limiting Once Lactation Stops. (Drainage NOT Necessary, & recurs)

### **ACUTE MASTITIS:**

- **Aetiology:**
  - Acute Breast Infection (Typically Bacterial Skin Flora – **Staph aureus**/Strep pyogenes)
- **Pathogenesis:**
  - **99.9% - Lactational (First few weeks post-partum)** → Crack in Nipple = Entry Point → Bacterial Infection (*Staph. aureus*, Strep. Pyogenes) → Inflammation + Pain.
- **Morphology:**
  - Acute Inflammation, Swelling, Erythema & Pus.
  - May → Single/Multiple Abscesses.
- **Clinical Features:**
  - Initial Weeks Post-Partum.
  - Unilateral, Painful, Erythematous, & Swollen Breast
  - + Fever, Inflammation, Flu-Like Symptoms
  - (+/- Pus Discharge)
  - (+/- Nipple Cracks/Fissures)
- **Diagnosis:**
  - **Clinical Diagnosis** (Hard, Tender, Red, Swollen Area of one breast + Fever in a Nursing Mother)
    - (Note: Distinguishable from Engorgement which is Bilateral)
    - (Note: Breast USS can distinguish between Mastitis & Abscess)
  - (+/- Breastmilk Culture if Infection is Severe/Hospital-Acquired.)
- **Management:**
  - **Analgesia** (*Ibuprofen*)
  - **Cold Compresses**
  - **Improve Breast-Feeding Techniques** (Eg: Nipple Shields to stop Chapping)
    - (Note: Breastfeeding can continue during treatment)
  - **Antibiotics** (Anti-Staphylococcal; *Cephalexin*/*Dicloxacillin*/*Clindamycin*)

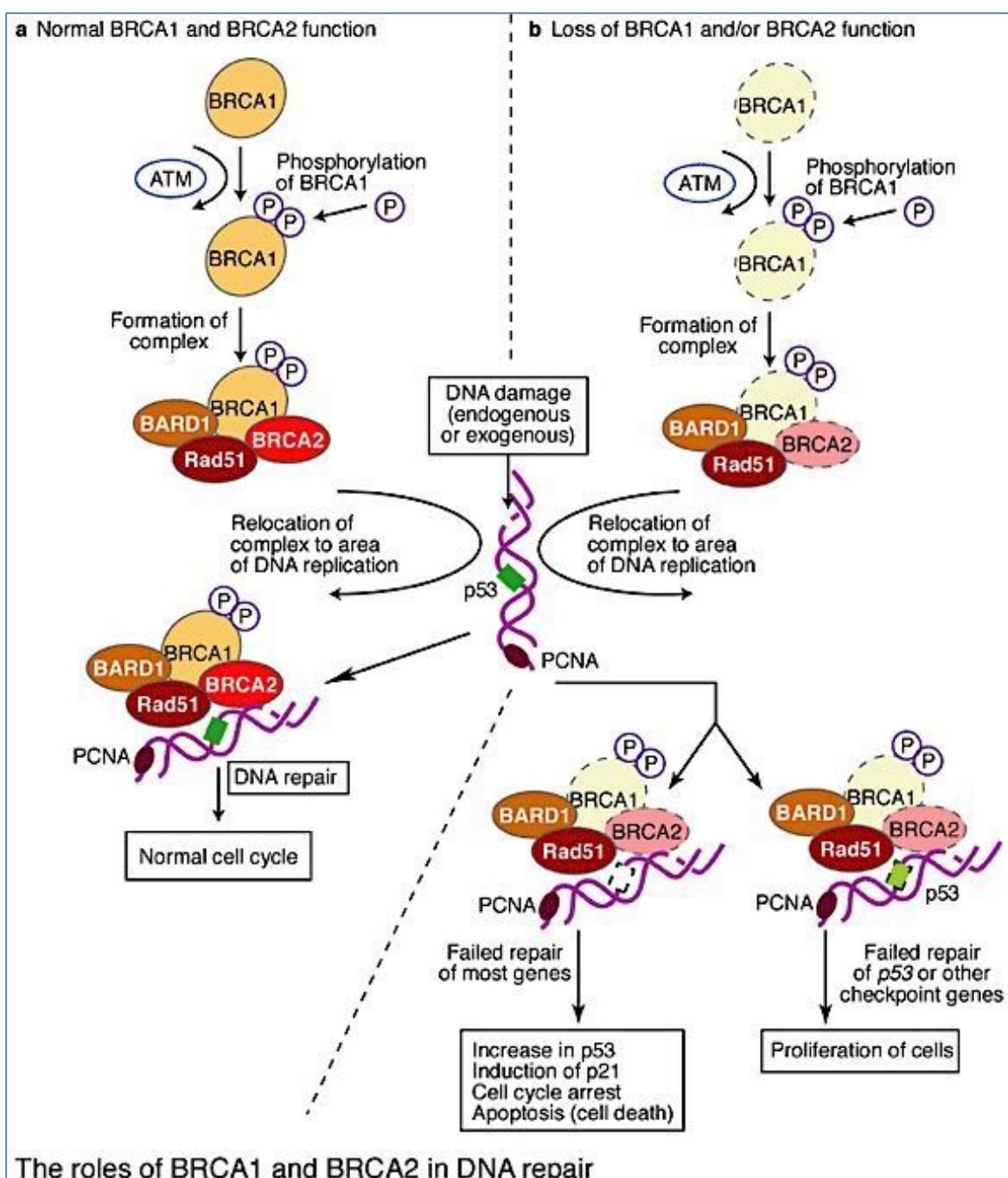
### **CHRONIC MASTITIS:**

- **Aetiology – (NON-Lactational):**
  - Granulomatous (TB, Fungal, Silicone etc.)
  - Diabetic Mastopathy
- **Pathogenesis:**
  - Chronic Breast Infection (TB, Fungal, Immunocompromise) → Inflammation
- **Morphology:**
  - Localised Inflammation, Swelling & Erythema.
- **Clinical Features:**
  - Chronic
  - Localised Inflammation, Swelling & Erythema.
- **Management:**
  - Swab MCS & Appropriate Antibiotics



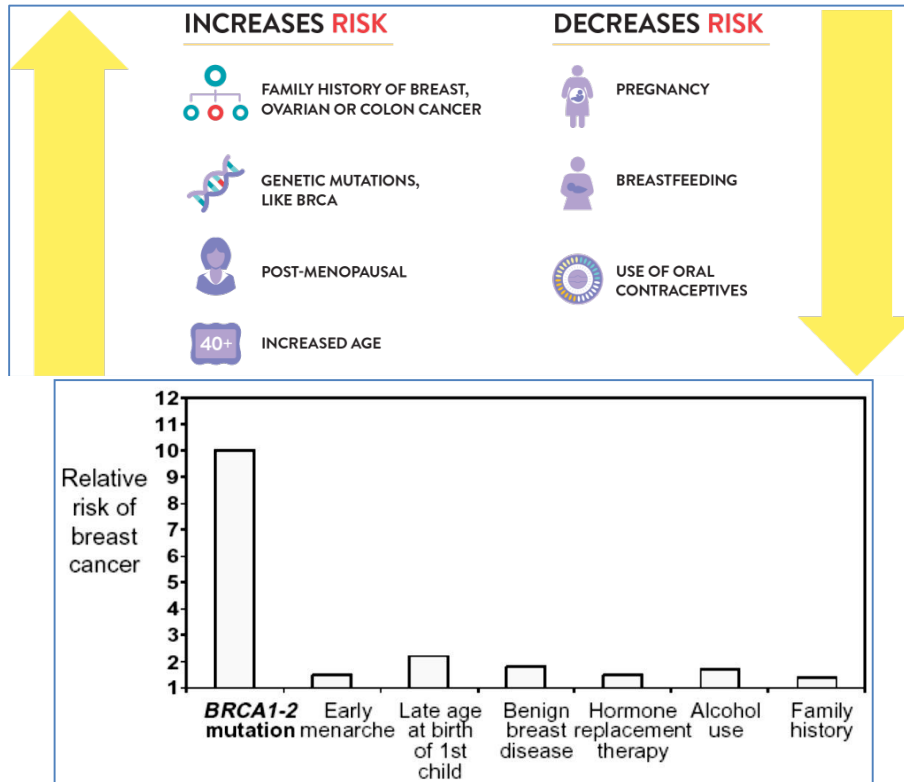
## BREAST CANCERS:

- **Aetiology/Risk Factors:** (Note: know these for the exam – Eg: “List the risk factors.”)
  - **Hormonal (Sporadic):**
    - **Gender** (99%F:1%M)
      - Affects ≈ 9% of Women
    - **Age** – Highest in 50-69yrs
    - **Parity** – Late Parity/Nulliparous Women have ↑ Risk of Breast Ca.
      - (Early Parity & Breastfeeding → ↓ Risk of Breast Ca)
    - **Prolonged Oestrogen Exposure** – (Early Menarche, Late Menopause, HRT)
      - (Note: OCP Marginally ↑ Breast Ca. Risk; BUT also ↓ Endometrial Ca. Risk)
    - **Pre-Existing Fibrocystic Disease** – (Esp. *Proliferative* Subtype)
  - **Genetic (Familial):**
    - **ER-Negativity &/Or HER2-Positivity** → Cancer in Young Women
    - **Hereditary (Only 30% of Breast Cancers):**
      - ↑ Risk with ↑ # of 1<sup>st</sup>-Degree Relatives with Breast Ca.
      - ↑ Risk with Presence of **BRCA1 or BRCA2 Gene Mutations** (Predisposed)



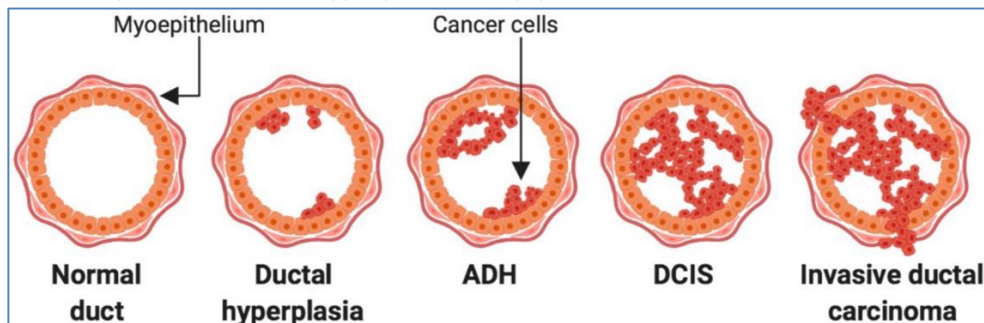
- **Environmental:**

- Radiation Exposure
- Pesticide Exposure



- **Pathogenesis:**

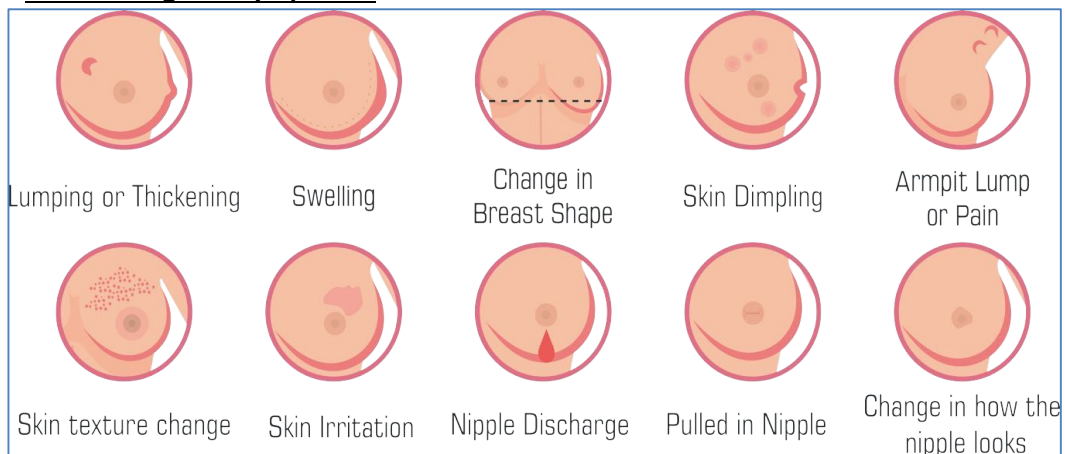
- **Carcinogenesis of Duct Epithelial Cells → ∴ "Ductal Carcinoma"**
- As with any other cancer: **(Hyperplasia → Dysplasia → Cancer → Invasion)**



Tower H, Ruppert M, Britt K. The Immune Microenvironment of Breast Cancer Progression. *Cancers*. 2019; 11(9):1375. <https://doi.org/10.3390/cancers11091375>

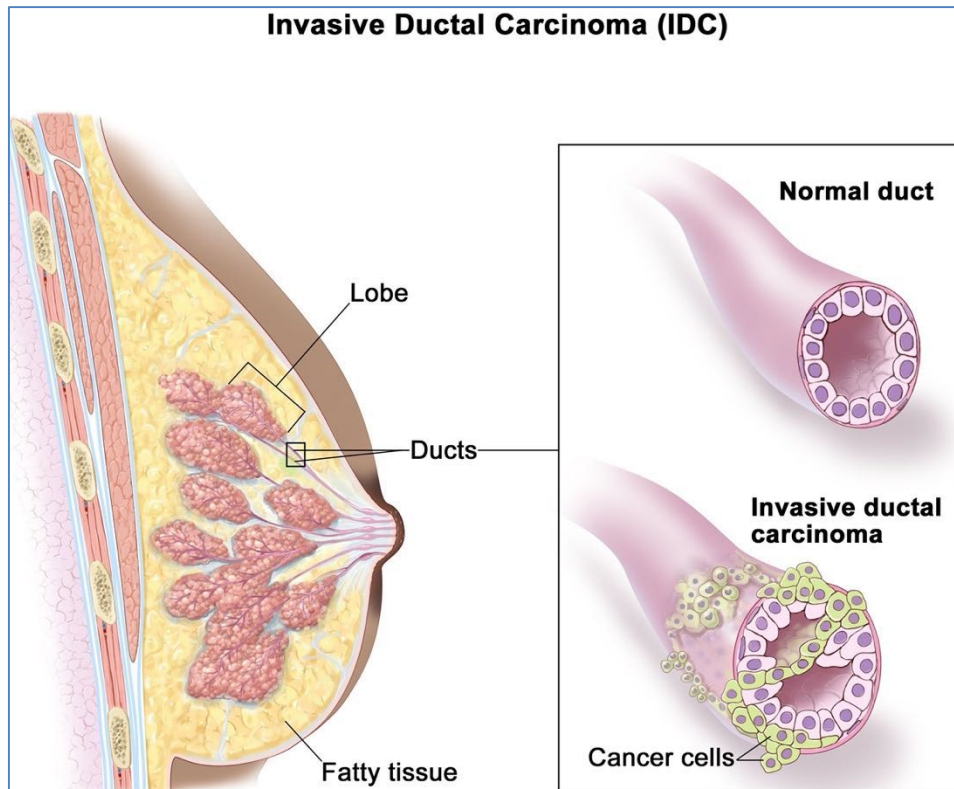
- **Clinical Features:**

- **Common Signs & Symptoms:**



Source: <https://www.pinkribbon.org.pk/>

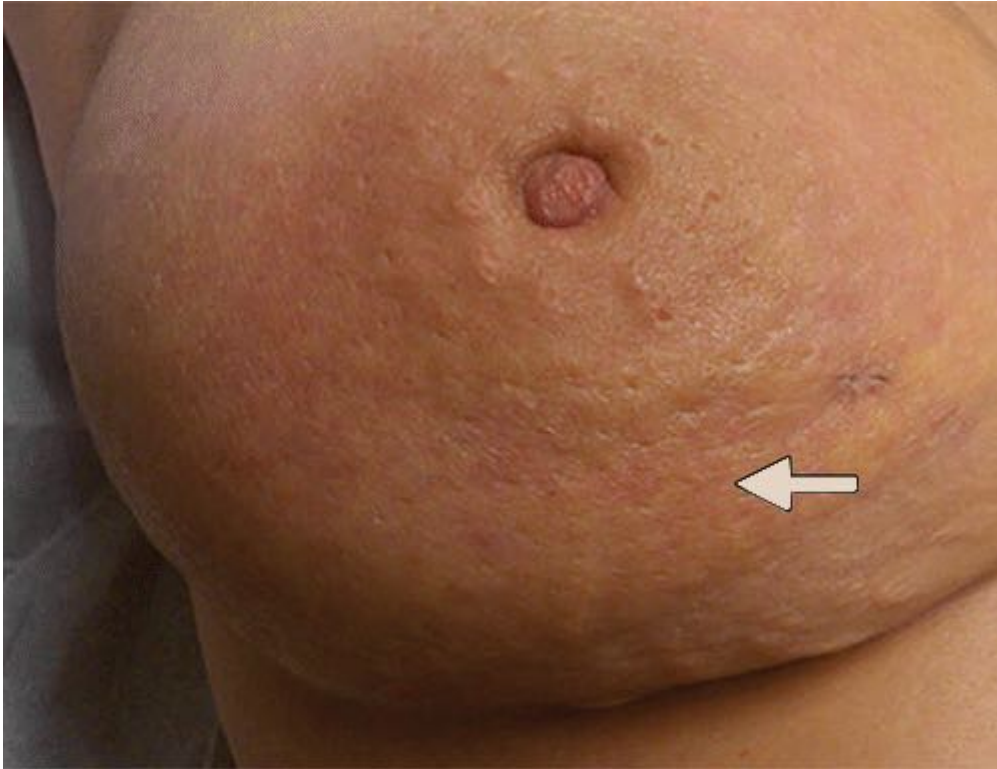
- **Specific Features of DCIS (Ductal Carcinoma In Situ):**
  - **Presentation:**
    - **Bloody Nipple Discharge** (Intraductal papilloma still most common)
  - **Diagnosis:**
    - **\*\*Almost Exclusively detected by Mammography**
  - **Complications:**
    - Localized; No distant metastasis ☺
    - Spreads through Ducts → Eventually becomes an **Invasive Duct Carcinoma**.



Public domain: <https://nci-media.cancer.gov/pdq/media/images/806270.jpg>

- **Specific Features Of Ductal Carcinoma (Typical “Schirrhous” Type):**
  - **Presentation:**
    - **Nipple Retraction!!!**
    - **Skin puckering**
    - **Axillary Lymphadenopathy**
    - **Peu’dé’Orange** – (Lymphedema due to Lymphatic Infiltration by Ca. Cells)
  - **Quadrant Distribution:**
    - 50% occur in Upper-Outer Quadrant
    - 10% occur in each remaining Quadrants
    - 20% Sub-Areolar.
  - **Diagnosis – Triple Assessment:**
    - **1: Clinical History/Examination** (Firm, irregular, fixed lump)
    - **2: Imaging** (Mammography → Radial Fibrosis)
    - **3: Biopsy** (Malignant Adenocarcinoma)
  - **Complications:**
    - → Metastasis
    - → Death

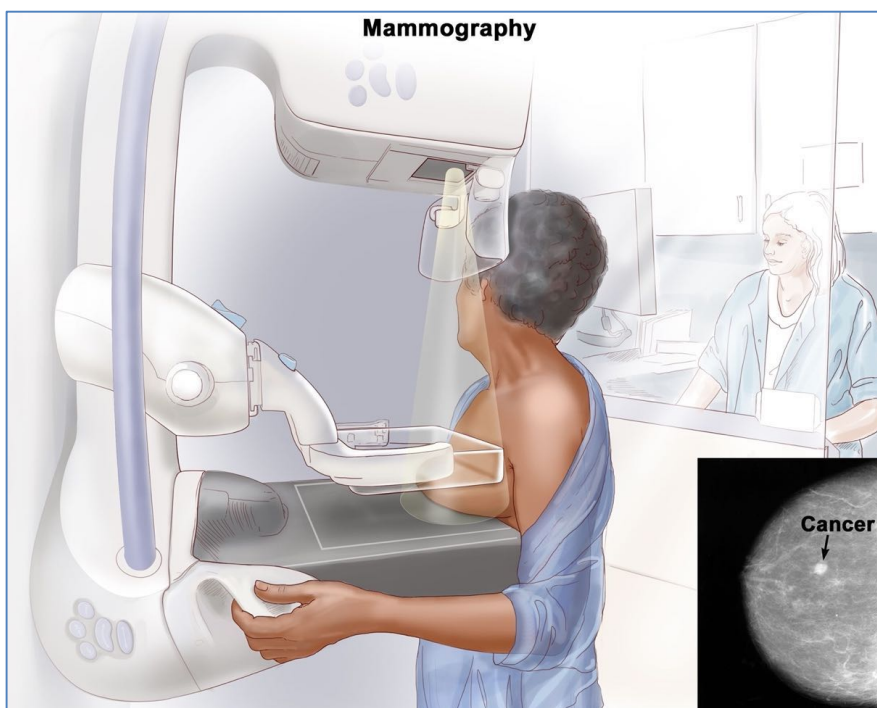
### Peu'de'Orange & Nipple Retraction



Eren D. Yeh, Heather A. Jacene, Jennifer R. Bellon; <https://doi.org/10.1148/rg.337135503>

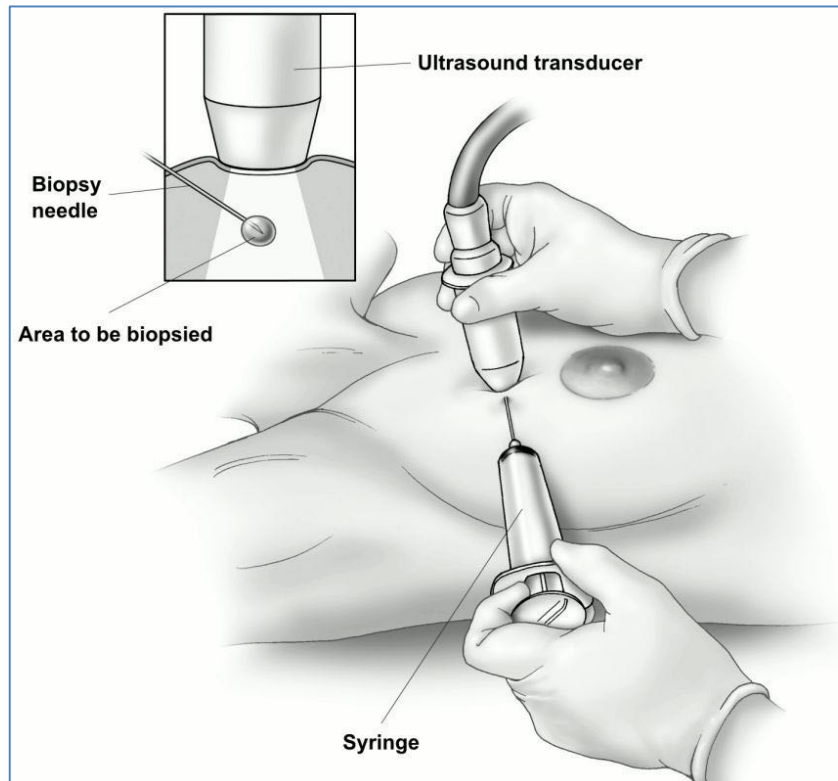
#### - Diagnosis – “Triple Testing” (Clinical, Imaging & Biopsy):

- **1: Clinical** History & Examination First (Firm, irregular, fixed lump + Lymphadenopathy, etc)
- **2: Imaging** – (Mammogram):
  - **Mechanism:**
    - Low radiation dose (0.1rad)
    - Light compression by plates to stabilize and spread its interior structures.
  - **Very Sensitive; Low Specificity** – (Detects Lumps 1-2y before Physical Breast Exam)
    - (Note: This increases with age as breast density decreases)
  - **Recommended every 2yrs for Women 50-69yo. – (Yearly for high risk Pts).**
  - Signs of Breast Ca = **Densities & Calcifications.**



Public Domain: <https://nci-media.cancer.gov/pdq/media/images/711008.jpg>

- **3: Fine Needle Biopsy/Sectional Biopsy (Cytology):**
  - **Microscopy:** Dysplasia/Pleomorphism
  - **Staining** – for *HER2 & ER Status* (Dictates Management & Prognosis)
  - **Gene Detection:** Familial BRCA1 & BRCA2 Gene Mutations



<https://www.cancer.org/cancer/breast-cancer/screening-tests-and-early-detection/breast-biopsy/fine-needle-aspiration-biopsy-of-the-breast.html>

- **Calculating Prognosis:**

- **Grading - Based on Tumour Markers (Low Grade → High Grade):**
  - **1: 'Luminal A' – (98% 5yr Survival):**
    - ER-Positive (Good Sign)
    - HER2-Negative (Good Sign)
    - **Responsive to Anti-Oestrogen (Tamoxifen) Therapy**
  - **2: 'Luminal B':**
    - ER-Positive (Good Sign)
    - **HER2-Positive (Bad Sign)**
    - **Responsive to Chemotherapy**
  - **3: 'Basal-Like'/'Triple Negative':**
    - **ER-Negative (Bad Sign)**
    - HER2-Negative (Good Sign)
    - **But BRCA1 Positive (Bad Sign)**
    - **Poor Prognosis + Young**
  - **4: 'HER2 Positive' – (16% 5yr Survival):**
    - **ER-Negative (Bad Sign)**
    - **PR-Negative (Progesterone) (Bad Sign)**
    - **HER2-Positive (Bad Sign)**
    - **Poor Prognosis + Early Brain Mets**
    - **Note: BUT has a Targeted Treatment ("Trastuzumab"/"Herceptin")**
  - (Note: ER = Oestrogen Receptor. Loss is Abnormal)
  - (Note: HER = Human Epidermal Growth-factor Receptor. Presence is Abnormal)
  - (Note: E-Cadherin = Cell Adhesion protein)
  - (Note: BRCA = Breast Ca. Antigen)

○ **Staging:**

▪ **Investigations for Staging:**

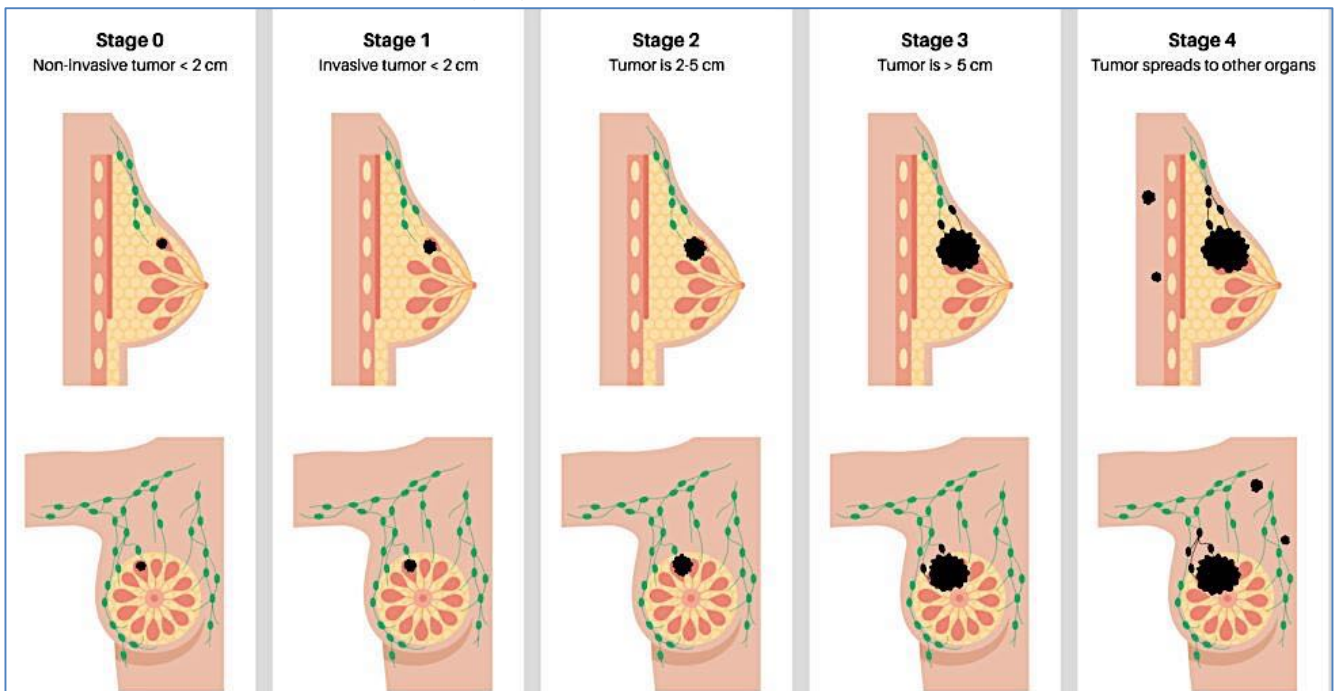
- Mammogram/USS if not already done
- CXR
- CT/MRI/PET Scans
- Bone scan

▪ **Based on TNM System:**

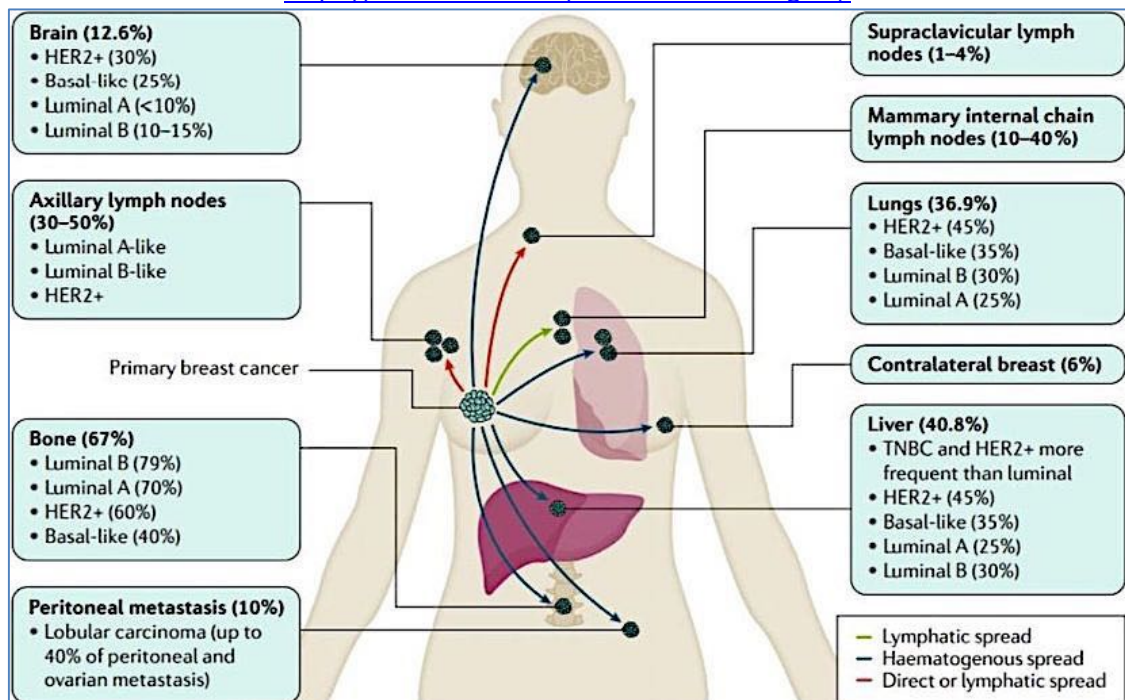
- **T** – (Size of Primary Tumour)
- **N** – (# of Regional Lymph Nodes Involved)
- **M** – (Metastases?)

▪ **Stages:**

- **0** – DCIS
- **1** – T<2cm, N0, M0      98% 5YS
- **2** – T<5cm, N0, M0      85% 5YS
- **3** – T>5cm, N1, M0      50% 5YS
- **4** – T>5cm, N+, M+      16% 5YS



<https://massivebio.com/breast-cancer-stage-4/>



Unattributable

### Breast Cancer Staging & Prognosis in Detail:

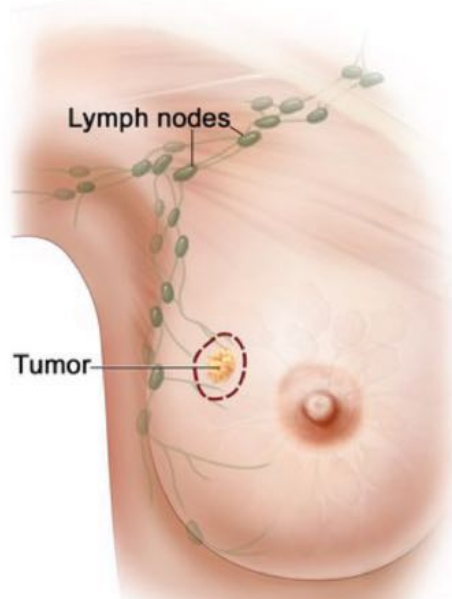
Stage	TNM	Description	5-year Survival
0	Tis N0 M0	Carcinoma in situ. No tumor in regional lymph nodes, No distant metastases	99%
I	T1 N0 M0	Tumor is less than or equal to 2 centimetres, No tumor in regional lymph nodes, No distant metastases	92%
IIA	T0 N1 M0 T1 N1 M0 T2 N0 M0	No evidence of primary tumor, metastases to movable ipsilateral nodes, No distant metastases. Tumor is less than or equal to 2 centimetres, metastases to movable ipsilateral nodes, No distant metastases. Tumor is between 2 and 5 centimetres, No tumor in regional lymph nodes, No distant metastases	82%
IIB	T2 N1 M0 T3 N0 M0	Tumor is between 2 and 5 centimetres, metastases to movable ipsilateral nodes, No distant metastases. Tumor is over 5 centimetres, No tumor in regional lymph nodes, No distant metastases.	65%
IIIA	T0 N2 M0 T1 N2 M0 T2 N2 M0 T3 N1, N2 M0	No evidence of primary tumor, metastases to fixed ipsilateral nodes, no distant metastases. Tumor is less than or equal to 2 centimetres, metastases to fixed ipsilateral nodes, No distant metastases. Tumor is between 2 and 5 centimetres, metastases to fixed ipsilateral nodes, no distant metastases. Tumor is over 5 centimetres, metastases to movable or fixed ipsilateral nodes, no distant metastases.	47%
IIIB	T4 Any N M0 Any T N3 M0	Tumor extends to chest wall, any nodal involvement, no distant metastases. Any primary tumor involvement, metastases to ipsilateral internal mammary nodes, no distant metastases.	44%
IV	Any T Any N M1	Any primary tumor involvement, any nodal involvement, distant metastases.	14%

Reference: Cancer Monthly Article with reference to Marc E. Lippman, *Breast Cancer*, in HARRISON'S PRINCIPLES OF INTERNAL MEDICINE, pt. 5 § 76, at 516-523 (Dennis L. Kasper, M.D. et al., eds, 16th ed 2005).

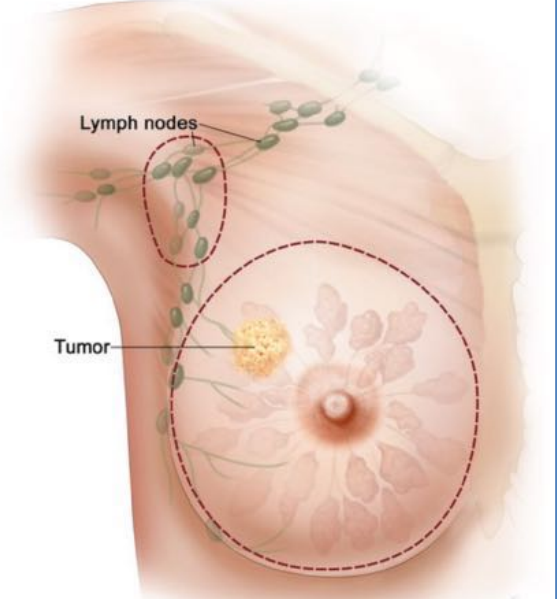
#### - Treatment – Surgical or Pharmacotherapy:

- **Surgery** - May be Radical (Mastectomy) or Conservative (Local Excision + Chemo/Radio)
- **Pharmacotherapy** - Depends on Hormonal Status:
  - Positive ER/PgR Status (Typically BRCA1) → Anti-Hormone Therapy (Tamoxifen)
  - Negative ER/PgR Status (Typically BRCA2) → Chemotherapy
  - **Eg: Tamoxifen** – An ER Antagonist → 45% Risk Reduction in **ER-Positive** Tumours.
  - **Eg: Herceptin** – A HER2 Antagonist → Used in **HER2-Positive** Tumours
- **If DCIS (Stage 0):**
  - Conservative Surgery + Radiotherapy
- **If Breast Cancer (Stage 1-4):**
  - Surgery – (Optional Conservative [Stage 1-2], OR Mastectomy [Stage 1-3] +/- L-Nodes)
    - (Note: If [Stage 4], surgery is only Palliative)
  - + Radiotherapy & Chemotherapy - (↓Risk of Reoccurrence & Metastases)
  - (+/- Hormonal therapy (**Tamoxifen**) if ER-Positive)
  - (+/- Targeted therapy (**Herceptin**) if HER2-Positive)

## Breast-Conserving Surgery



## Total (Simple) Mastectomy



<https://www.cancer.gov/news-events/cancer-currents-blog/2021/breast-cancer-mastectomy-quality-of-life>

### - Screening & Prevention:

- Population Screening Recommendations (UpToDate):
  - **BSE (Breast Self-Examination)** advised Monthly from 18yo
  - **CBE (Clinical Breast Examination)** advised Annually from 25yo
  - **\*Mammogram 1-2yrly from 40yo until old age (Recommended by UpToDate)**
  - **\*+/- BRCA-Gene Testing for Pts with a FamHx of Breast/Ovarian Ca. (90% Sensitive)**
- Prevention of BRCA-Associated Cancers:
  - Breast:
    - **Prophylactic Double Mastectomy:**
      - (≈ 90% Reduced Risk of Breast Ca.)
    - **+/- Prophylactic Oophorectomy (↓ Oestrogen Stimulation):**
      - (≈95% Reduced Risk of Ovarian Ca.)
      - (≈50% Reduced Risk of Breast Ca.)
  - Ovarian:
    - **Prophylactic Oophorectomy (↓ Oestrogen Stimulation)**
    - **Surveillance**

### **Treatment (In More Detail):**

- **DCIS**
  - Breast conserving surgery
  - Radiotherapy post-surgery
  - Possible node resection (rarely)
  - Hormonal therapy may be useful, side effects often outweigh benefit
- **Early breast cancer**
  - Breast sparing surgery or mastectomy +/- breast reconstruction
  - Chemotherapy lowers risk of recurrence – given after surgery
  - Radiotherapy almost always given – sole agent or after chemo
  - Hormonal therapy of benefit solely or in combination with other agents
  - Targeted therapy (Herceptin) only suitable in some women
- **Inflammatory breast cancer**
  - If no lump in breast, begin with Chemotherapy
  - Mastectomy +/- nodal resection if responding well to chemotherapy +/- breast reconstruction
  - Radiotherapy is almost always used before or after surgery or as a replacement to surgery if response to chemotherapy is good.
  - Targeted therapy only suitable for some women
  - Hormonal therapy suitable for some women and can be used alone or with other agents
- **Locally advanced breast cancer**
  - Chemotherapy
  - Mastectomy for some, not all women.
  - Radiotherapy may be used before or after – local, axillary, neck and surrounding areas
  - Targeted therapies only suitable for some women
  - Hormonal therapies used if hormone sensitive and can be used alone or with other treatments
- **Metastatic breast cancer**
  - Hormonal are used as first treatment if hormone sensitive alone or with other agents
  - Chemotherapy for non-hormone sensitive cancers or in combination with hormone therapies for rapid-growing cancers particularly in liver or lung
  - Targeted therapies are only suitable for some women and are used with other treatments
  - Radiotherapy can be used to reduce size of tumours and secondaries in an effort to reduce pain, especially in bones
  - Surgery is not routinely used, but may be used to reduce symptoms at the sites of secondaries, such as bones, lung or brain and rarely liver.

Reference: Australian Government Cancer Australia online at: <http://canceraustralia.nbooc.org.au/breast-cancer/treatment/treatment-options-by-breast-cancer-type>

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