

# Oogenesis

## I.

### Definition

Oogenesis is the process of formation of the female gamete, ovum in humans, which is haploid and contains 23 chromosomes.

The formation of **oogonia** starts before birth and ends at the age of 45-50 called **menopause**.

#### Oocytes

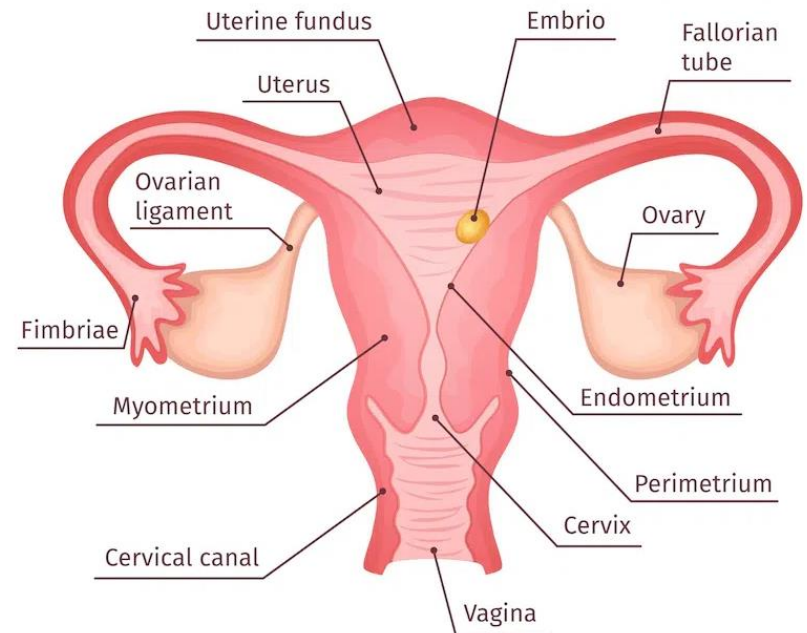
~2 million at birth

~40,000 at puberty

~400 ovulated over lifetime

It occurs in the **ovaries**.

It is a **discontinuous** process (cyclical), beginning during **foetal** life and ending at the **menopause**.

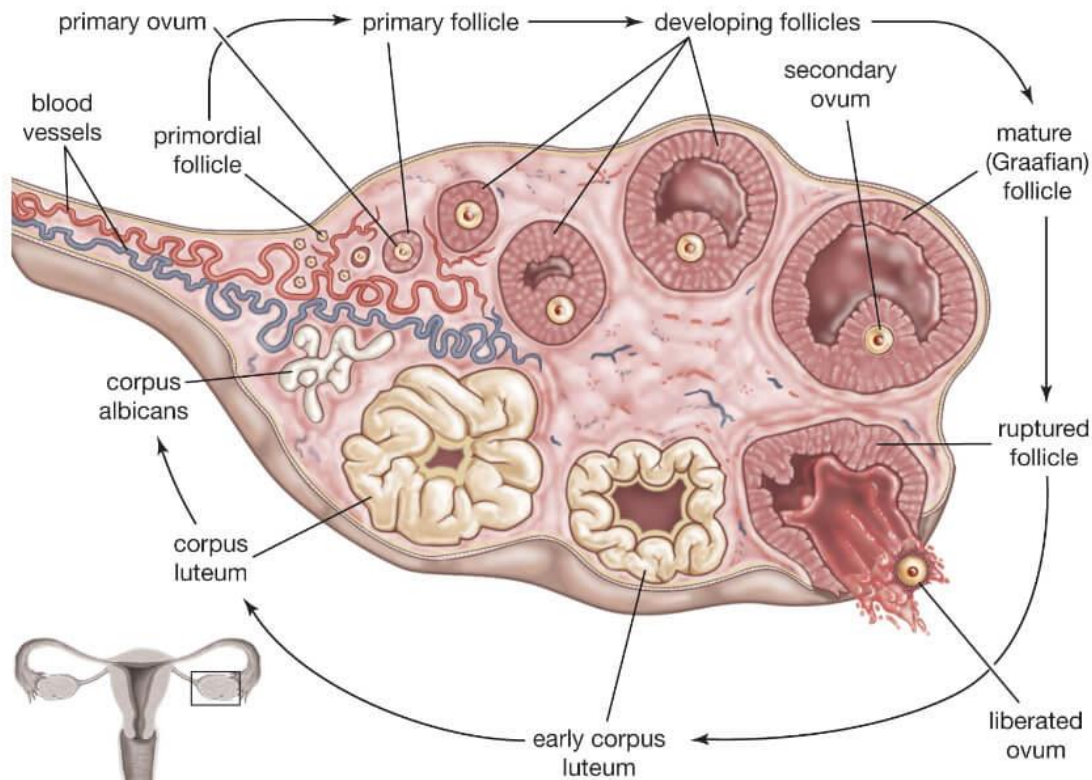
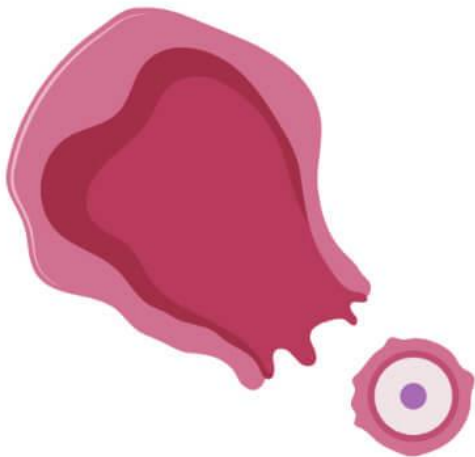


# Oogenesis / Ovulation / Ovarian cycle

Follicular phase

Ovulation phase

Luteal Phase



## II. Phases of ovogenesis

### A) Multiplication phase:

The **ovogonia** ( $2n$ ) divide by mitosis and give a **non-renewable stock**.

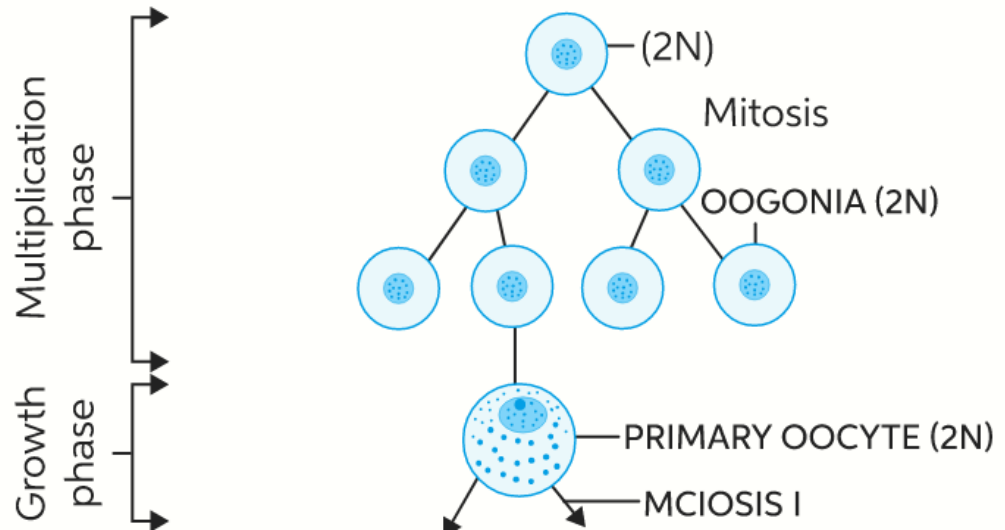
In women this phase takes place during embryonic and foetal life.

### B) Growth phase :

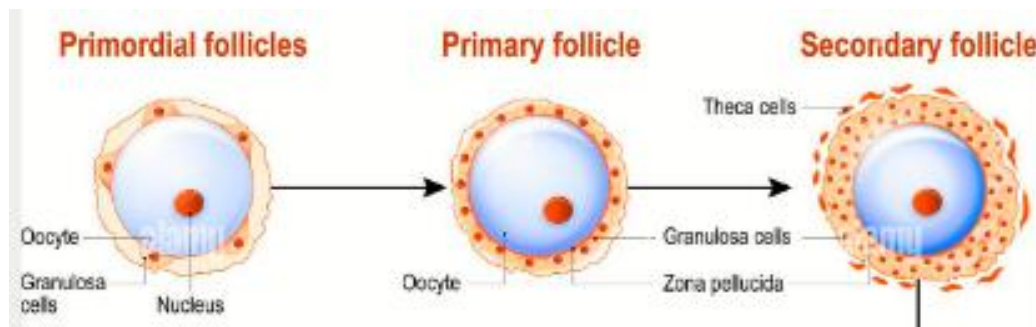
*Before birth*, the ovogonia stop multiplying and enter **prophase I** (meiosis I), where they become blocked.

The cells **grow** in volume and develop into **ovocytes I** ( $2n$ ).

Each of these cells is surrounded by a layer of follicle cells to form a "**primordial follicle**".



- *From birth*, a series of waves of oocytes I grow and develop a remarkable volume increase without cell division (they remain blocked in prophase I).
- The primordial follicle is transformed into a **primary follicle** and then into a **secondary follicle** by multiplication of the *follicular cells*.
- It should be noted that the primordial follicles and the oocytes I they contain regress in large numbers between birth and puberty; only 400,000 will remain at puberty.
- Fewer than 500 will develop to ovulation during the woman's genital life.



## C) Maturation phase :

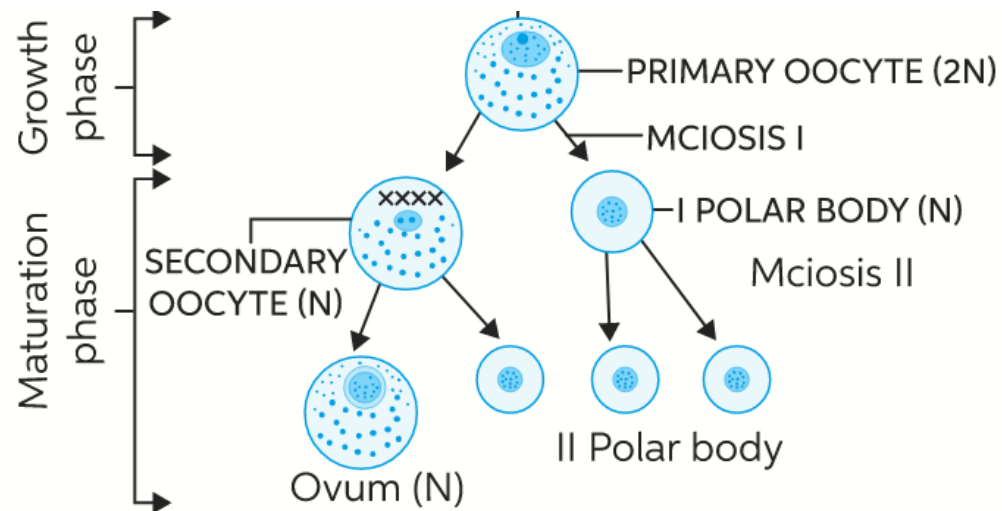
Between puberty and menopause and cyclically, **ovocytes I** complete [meiosis I](#) and give **ovocytes II** (n chromosomes, 2q DNA) with emission of the **1st polar globule** (n chromosomes, 2q DNA).

This division is very unequal, with ovocyte II guarding the totality of the cytoplasm.

Immediately afterwards, [meiosis II](#) begins. But the process is blocked once again (in metaphase 2).

***If there is no fertilisation***, the oocyte II remains at this stage of meiosis and then rapidly degenerates.

***If fertilisation*** occurs, the **oocyte II** will complete its maturation and become a **mature ovum** with the emission of the **2nd polar globule**



### III. Folliculogenesis :

- This is the ***process*** by which a primordial follicle develops to ovulation or regresses by apoptosis.

**The follicle** : is a structure in the ovarian cortex, consisting of an oocyte surrounded by follicular cells.

There are different types of follicles corresponding to stages of progressive development of the same morphological structure; these are chronologically

- 1) **the primordial follicle**
- 2) **the primary follicle**
- 3) **the secondary follicle**
- 4) **the tertiary follicle**
- 5) **the mature follicle or De Graaf follicle**