

B B C BITESIZE

Hello, I'm Dr Alex Lathbridge and this is Bitesize Biology.

This is the fifth episode in our eight-part series on homeostasis. Today, we're going to learn about hormones during puberty and the menstrual cycle.

In Episode 3, we went through hormones and the fact that they're chemical messengers produced in glands, carried by the bloodstream, to target specific organs. You need to know the names of some hormones like insulin and adrenaline, plus where they're released. So go back and listen to episode 3 if you need to.

Puberty is the stage in life when a child's body develops into an adult body.

Puberty takes place gradually, usually occurring between the ages of 10 and 16. But, everyone is different and there are no rules as to when puberty starts.

During puberty, reproductive hormones are released in the body, that cause changes known as secondary sex characteristics. Some of these changes happen across both biological sexes, whereas some only happen in either females or males.

In females, oestrogen is the main reproductive hormone. It is produced by the ovaries, where its function is to release eggs and begin the menstrual cycle.

In males, testosterone is the main reproductive hormone, and it is produced by the testes. Its function is to stimulate sperm production.

Both females and males undergo changes such as developing pubic hair, underarm hair, and the development and growth of sexual organs.

The menstrual cycle is a recurring, monthly process in females. On average, it takes around 28 days.

But it's completely normal to have a cycle that's longer or shorter, but it's really simple to understand, let me explain.

Imagine you're preparing a bed for a guest that you might be expecting to come over.

You're going to throw down a new bedsheet on the bed. You wait a couple of days to see if they're turning up.

And if they don't show up, you're going to rip off those sheets and get rid of them.

And that happens again and again every 28 days or so, on the off chance that that guest does turn

up. It's basically that, but with more bodily fluids.

The important thing is that it's a cycle, and it's a really interesting one.

It involves the female releasing an egg, the lining of the uterus (the womb) being prepared and thickening, in case it receives a fertilised egg (that's the guest).

If the released egg is fertilised by sperm, then the female becomes pregnant.

If the egg is unfertilised, it doesn't implant into the prepared uterus lining, so this lining is no longer needed and so it gets shed, like layers of wallpaper coming off a wall.

This is known as menstruation, or a period, containing all of that shed lining and blood.

You're going to need to know the four stages of a menstrual cycle. We'll say it's over 28 days:

Stage 1. The first day of your period. The lining of the uterus breaks down and menstruation starts, and that bleeding and shedding goes on for about four days.

Stage 2. The lining of the uterus builds back up again, over about ten days, and becomes a thick, spongy, lining of blood vessels ready to support a fertilised egg.

Stage 3. In the middle of the cycle, on day 14, an egg is released from the ovary in a process called ovulation.

Stage 4. The lining of the uterus is then maintained up until day 28. If no fertilised egg arrives by day 28, the lining begins to break down again, and the whole cycle starts again with the first day of menstruation, or the first day of the period.

Those are the stages. Now we need to know the names of hormones involved, and where they are made in the body, plus what they do.

Because this cycle is driven by a constant change of hormones being released into the blood and sensed by various different organs, it can get a little bit tricky.

It might help you right now if you pause it here and pull up the Bitesize website. You can find a diagram illustrating what I'm about to explain to you.

There are four hormones that you need to know about:

1. Follicle Stimulating Hormone (we call that FSH)
2. Oestrogen
3. Luteinising Hormone (we call that LH)
4. Progesterone

First, Follicle Stimulating Hormone (or FSH) is produced in the pituitary gland (in the brain).

Easy one to remember, it stimulates the ovaries to mature an egg.

The egg matures inside a fluid filled sac on the ovaries known as a follicle.

Oestrogen is released by the ovaries, and it does a couple of things.

It stops, or inhibits, the Pituitary Gland from producing more FSH (we don't need more than one mature egg per cycle).

Oestrogen also repairs and thickens the uterus lining (basically telling the uterus "Hey, we might get a fertile egg soon, so be ready").

Finally, it stimulates the release of Luteinising Hormone (also known as LH).

The Luteinising Hormone (LH) is produced by the pituitary gland in the brain, same as FSH.

It stimulates the release of a mature egg on day 14, that's around the middle of the cycle, this is ovulation.

So once that egg is released, the follicle is now empty, and it gets broken down by the ovaries to produce progesterone alongside oestrogen.

Progesterone is the last hormone involved. I call it the menstrual maintenance hormone.

It maintains the lining of the uterus in the second half of the cycle, so days 14 to 28.

And inhibits the release of LH and FSH.

Both of those things basically tell the pituitary gland and womb "okay chill – there might be a fertilized egg, just wait to see."

If a woman becomes pregnant, the fertilized egg sticks to the uterus and the placenta produces more progesterone. This maintains the lining of the uterus during pregnancy and means that menstruation does not happen.

If pregnancy doesn't occur, progesterone levels decrease, and the lining of the uterus breaks away again starting the period, or menstruation, so the cycle continues.

But here's the absolute beauty of biology. By understanding the role of hormones in preparing for pregnancy, we can manipulate that to prevent pregnancy.

Yes, let's talk about contraceptives, preventing pregnancy with science.

All contraception does is prevent sperm and egg from meeting to fertilise, either biologically (hormonal methods) or physically (barrier methods).

These are things like male and female condoms, diaphragms and caps. It's exactly what it says on the tin, they create a physical barrier to stop the sperm from reaching the egg.

Now onto hormonal methods of contraception.

We have the oral combined contraceptive, also known as "the pill".

It contains a combination of artificial forms of the hormones oestrogen and progesterone and is taken daily.

How does this work? It basically tricks the body.

Oestrogen taken every day inhibits FSH production. No FSH means that no eggs are stimulated to mature.

Progesterone stimulates cervical mucus to become super thick, so it's like the sperm are swimming through dense porridge instead of water.

The pill makes the uterus lining thin, so even if there is fertilisation, there's less chance of the egg being able to grow, because it won't be able to stick to the lining of the uterus.

The pill can also inhibit egg maturation.

Besides pills, there are injections, implants and skin patches that contain slow release of artificial progesterone to prevent the maturation and release of eggs.

I'm Dr Alex Lathbridge and this is Bitesize Biology. Listen now on BBC Sounds.