



How Periods Happen

By the end of this you should:

Understand what a period is and understand why and how women have periods

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Introduction

If women didn't have periods, the human race would soon die out. They are the very raison d'être and the core of a woman's physiology. Periods (like many other gynaecological conditions) weren't really a problem 'in the old days' as women were usually either pregnant or breastfeeding - both of which stop periods - and the average age at which women died at the turn of the 19th century was around 50 (it was lower in the middle ages, but that was because so many people died as children - if you survived to be a teenager you had a chance to live much longer). On the other hand, periods are a bit of a bummer if you never want children, ever. But, without periods, I would be out of a job. If men had periods, I am sure that sanitary wear would be either free or at least tax-deductible as a business expense.



The menstrual cycle

Once you understand what a period is and how it happens, many of the treatments used when things are not going to plan make sense, arming you to be pro-active and helping you to make positive decisions about what is right for you in any particular circumstance.

Like so many things, control of the menstrual cycle starts in the brain and not the other way around like the Greeks believed (hysteria was thought to be from the womb, which is where one gets 'hysterectomy' from). There are two everyday examples women are quite familiar with that demonstrate this. If a group of women are in close proximity for any length of time (dormitory, close working environment or - and this is tough for a gynaecologist with 3 daughters, a wife and a sister-in-law sometimes under the same roof - living together) they will start to cycle synchronously and to have their periods at more or less the same time. Also, if a group of girls are put under stress - exams, for example - a fair few will stop their periods for the duration of the stress. It's the phenomenon we also know when couples with 'unexplained' infertility are trying to conceive, have spent their life savings and everything they own on (failed) IVF and then they fall pregnant when they give up all hope (we speak from personal experience).

The first part of the cycle:

The front (anterior) bit of the pituitary gland in the brain produces a hormone called follicle stimulating hormone (FSH). It's called this because it makes the little fluid filled sacs in the ovaries containing an egg begin to develop. Up until they are stimulated they are inactive and actually, you



have millions of these 'primordial' follicles when you are still in your mother's womb, but the number drops rapidly after birth. Several of these tiny follicles start out developing further, but one of them becomes dominant (becomes recruited) and the others regress, never to be heard of again. From 1mm or less, this follicle grows under the effect of FSH. The cells around this follicle, in the ovary, produce the hormone oestrogen. This (amongst many other effects) causes the lining of the womb (the endometrium) to develop - it proliferates. It is quite logical that this first part is therefore called the follicular or proliferative phase of the menstrual cycle by those talking about it scientifically.

As the follicle gets bigger - 10mm, 12mm, 16mm in diameter etc - the level of oestrogen increases as does the thickness of the endometrium. A second hormone from the pituitary, luteinising hormone (LH) has been increasing very slowly in response to stimulation from higher up in the brain (the hypothalamus) but when the follicle reaches a certain size, the oestrogen has a sudden positive feedback on the pituitary and there is a rapid rise in luteinising hormone - the so-called 'LH surge'. This induces the follicle - now perhaps 20mm in diameter (so the volume of the ovary has increased) - to rupture. This 'bursting' into the abdomen, releases the teeny tiny egg. And that's ovulation for you. Actually, in an amazing bit of cleverness because the fimbrial end of the uterine tube is attracted to the vicinity (if it is mobile enough and not stuck) so that the tube captures the egg and the process of travel down the tube to the uterus begins. We know that this happens because there are some women in whom we have removed one Fallopian (uterine) tube from one side - say because of infection or an ectopic pregnancy - and they might have had the ovary removed from the other side (there are several causes for why this might be so, but this is not important right now). Clear? Tube one side and no ovary, ovary the other side and no tube. And some women still conceive - how impressive is that.

Ovulation

So, you've ruptured a follicle (ovulation). If this occurs in a bit of the ovary that has a blood vessel in it, you bleed - either into the pelvis or into the hole that is trying to seal over that was the follicle. Most of the time this is a small amount and entirely self limiting, but it is not surprising that many women experience pain mid-cycle and know EXACTLY when they ovulate, given the above. In fact, this pain has a name - Mittelschmerz (for once, not named after a doctor but from the German for 'middle' and 'pain').

The second part of the cycle

Having been a 'follicle' to this point - a fluid filled sac with the egg in it - and under the influence of luteinising hormone - the nature of this area changes and it grows a lining itself that starts to produce the hormone progesterone. This lining, and the cyst contents, contain fat - which is yellow - and the cyst of the second part of the cycle is called a corpus luteum (yellow body). This is the 'luteal' phase of the cycle, and the progesterone acts on the lining of the womb (the endometrium) by maturing it, making it spongy and receptive to any newly fertilized egg coming its way. The effect is to greatly increase the blood supply to the endometrium ready for this and the lining can become quite thick (when we talk about endometrial thickness in an ultrasound scan, we measure from one edge to the other, including the thin cavity of the uterus. You will see that the thickness varies with the timing of the scan in the menstrual cycle and thicknesses of 10mm are therefore normal in most women in the second part of their cycle. This is different in post-menopausal women not on



hormones, in whom an endometrial thickness of around 5mm usually leads to further investigation).

If pregnancy takes place (in general, 'sex = pregnancy' is a good starting point to get across) the corpus luteum continues to produce progesterone that maintains the early pregnancy (embryo) until the afterbirth (placenta) takes over about 10 weeks later (we'll deal with early pregnancy another time).

Periods themselves

When pregnancy doesn't take place - and the egg only survives for 24 hours after ovulation (sperm fare a bit better at 72 hours, but then they take about 74 days to make) - the corpus luteum starts to fail. The progesterone level falls, which makes the blood vessels retract back into the muscle of the uterus, leaving the lining starved of oxygen. The 'supply train' has withdrawn and the endometrium dies. It is similar to the gangrenous foot in a heavy smoker - and the medical term is ischaemia (myocardial ischaemia is a heart attack). It is grossly inflammatory and it is not at all surprising that some women get pain with this process - which responds to anti-inflammatory drugs like Ibuprofen.

The first day of a period is usually taken to be Day 1 of the cycle, although it is really the end result of the previous cycle. The follicles are starting to develop and oestrogen is being produced. Bleeding for between 2 and 7 days is considered normal - combined oral pill withdrawal bleeds tend to be lighter and shorter than normal periods. The cycle length is taken to be from the first day of one period to the first day of the next, so it includes



the time bleeding as well. Although the average is 28 days, normal people (and by that I mean women who don't seem to have any problems getting pregnant) can have cycles between 21 and 42 days. Since many women bleed for a range of days and with slight variations in cycle length, gynaecologists sometimes write this as K=5-7 / 28-30 for someone who bleeds 5 to 7 days every 28 to 30 days (the 'K' is the Greek for 'kalends' = month).

It is the luteal phase - the second part of the cycle - that is relatively constant in the human, at about 14 days. Thus, if you have a regular cycle - whatever length - you will probably ovulate (on average) 14 days before the next period. Thus, if your cycle is 28 days, you will ovulate around day 14. If you have a cycle that is usually 35 days, you will ovulate around day 21.

Periods and dating pregnancy

You do not (usually) have a period if you get pregnant so timing of pregnancy from a practical point of view starts from the period from the previous cycle. This, of course, means that when we say that someone is 10 weeks pregnant, they actually conceived (in a 28 day cycle, on Day 14) 8 weeks previously. The time that ovulation took place is taken to be predictable only by a regular cycle (or an ovulation kit that detects the LH surge). If the cycle is irregular or occurs immediately after stopping the combined oral contraceptive pill (because the return of ovulation is often delayed), this assumption cannot be made and an ultrasound scan in sometime between 8 and 12 weeks of pregnancy is a better predictor on average of the time someone might be expected to go into labour.

Summary

The brain 'drives' the ovaries by releasing Follicle Stimulating Hormone into the blood stream from the pituitary gland. Several follicles in the ovary start to develop in each cycle, but (usually) one becomes dominant and the others stop.

The cells around the follicle produce the hormone oestrogen that stimulates the lining of the uterus (the endometrium) to start to develop (proliferate).

Around mid-cycle, when the follicle is about 20mm diameter, the pituitary releases a burst of Luteinising Hormone (LH) that causes the follicle to burst - this is ovulation - and the egg is picked up by the finger-like fimbrial end of the uterine (Fallopian) tube.

After ovulation, the ruptured follicle forms a cyst - the corpus luteum - that produces the hormone progesterone (so every woman in a cycle will have a 2-3cm cyst as part of normal physiology). Progesterone matures the endometrium, supporting the extra blood supply it needs and making it thick and ready to receive a pregnancy. When fertilisation does NOT take place, the corpus luteum shrinks down and the progesterone level plummets. The blood supply retracts and the lining dies, so it sloughs off - as a period - and the whole cycle starts again.

If fertilisation occurs, the corpus luteum and its progesterone maintain the early pregnancy until the placenta takes over this role at about 12 weeks and therefore a period does not happen.