

## **12.1.4.1 OVARIES AND STIMULATION OF OVULATION**

### **1. NORMAL FUNCTION**

Ovulation is the release of a mature egg (oocyte) from the ovary. Usually only one egg is released per month. Eggs are stored in the ovaries in a very immature form. In this state they are not capable of being fertilised by a sperm until they undergo a maturing process which culminates in their release from the ovary at the time of ovulation. The maturing of eggs and ovulation is stimulated by two hormones secreted by the pituitary, a gland at the base of the brain, follicle stimulating hormone (F.S.H.) and luteinizing hormone (L.H.). It is important these two hormones are produced in appropriate amounts throughout the monthly cycle for normal ovulation to occur.

### **2. DETECTING OVULATION**

Ovulation is usually only confirmed absolutely by a subsequent pregnancy. However a number of changes in blood hormone concentrations and the appearance of the ovaries in an ultrasound picture can provide strong evidence that ovulation will or has occurred.

The female sex hormone oestrogen is produced by the cells which surround a maturing egg within the ovary. As the egg matures more oestrogen is produced reaching a peak level about two days before ovulation. If more than one egg matures simultaneously, the oestrogen produced by the ovary is greatly increased. Oestrogen can be measured in the blood and urine and its effects on the body are usually obvious, particularly on the amount and consistency of mucus discharged from the vagina. As the oestrogen level increases, the amount of mucus increases. This mucus usually has the appearance and consistency of raw egg white.

As the egg matures a cyst called a follicle develops on the ovary. This follicle may grow to about 2 cm in diameter just before ovulation. It can be seen and measured on an ultrasound picture of the ovaries, and serial ultrasound pictures are another way of detecting ovulation.

Ovulation is triggered by a surge of Luteinizing Hormone (LH) from the pituitary gland. LH also stimulates the ovary to begin producing the second female hormone progesterone. Progesterone is only produced in significant amounts after ovulation has occurred and can be measured in the blood. Progesterone changes the consistency of the vaginal mucus so that it becomes tacky or sticky. This hormone also causes a slight increase in body temperature.

Therefore ovulation may be detected by changes in the vaginal mucus, a small increase in body temperature or by changes in the amounts of oestrogen, LH and progesterone in the blood. The value of body temperature charts is limited because ovulation has already occurred by the time a temperature rise is recognized.

## **12.1.4.2 OVARIES AND STIMULATION OF OVULATION**

### **3. LACK OF OVULATION.**

Ovulation usually occurs regularly once a month from puberty until the menopause apart from times of pregnancy and breast-feeding. In some women ovulation does not occur regularly or may not occur spontaneously at all. This may be due to an abnormality with the ovaries, the pituitary gland or some other unrelated illness. A number of tests are usually necessary to determine the cause of this situation before appropriate treatment can be given.

### **4. STIMULATING OVULATION**

If Ovulation is not occurring regularly it may be necessary to give drugs or hormone injections to stimulate the ovaries. Before these treatments are used however it is important to find out why regular ovulation is not occurring as more specialized treatment may be necessary for some women. In ART (Assisted Reproductive Technology) programmes these drugs and hormones are given to women who may already be ovulating regularly, to hyperstimulate the ovaries so that more than one mature egg develops. This improves the chance of success in an ART programme (and also increases the chance of a multiple pregnancy).

The most common treatments used include clomiphene citrate (trade name is Clomid) gonadotrophins and HCG (human chorionic gonadotrophin). Clomiphene acts by interrupting the chain reaction of stimuli to the pituitary gland and allows more FSH and LH to be released. These hormones in turn stimulate the ovaries. Clomiphene tablets are usually given for five days commencing in the first few days of a monthly cycle and ovulation is expected to occur between five and ten days later. Some women notice they have less vaginal mucus while taking Clomiphene and may not be able to use this method to detect ovulation. The chance of multiple pregnancy after using clomiphene by itself is only marginally greater than normally would occur.

Gonadotrophins and HCG are hormones which need to be given by injection. Gonadotrophins contain FSH, while HCG is equivalent to LH. HCG is used to trigger ovulation when a mature egg has developed. Gonadotrophins are usually given for several days in the early part of the monthly cycle either alone or combined with clomiphene. This hormone treatment stimulates the egg-maturing process and the development of the follicles on the ovaries. When using gonadotrophins it is very important to monitor its effect by regular tests as this treatment is more likely to cause a multiple pregnancy.

### 12.1.4.3 OVARIES AND STIMULATION OF OVULATION

Hormone levels for a normal ovulatory menstrual cycle.

DAY OF CYCLE	ESTROGEN E2	LUTENIZING HORMONE LH	PROGESTERONE P4
<b>1 of bleeding</b>	150	8	2.5
<b>2</b>	150	7	1.8
<b>3</b>	160	8	1.5
<b>4</b>	170	8	1.5
<b>5</b>	180	8	1.5
<b>6</b>	195	8	1.5
<b>7</b>	205	9	1.5
<b>8</b>	250	10	1.5
<b>9</b>	300	9	1.5
<b>10</b>	350	8	1.5
<b>11</b>	420	9	1.5
<b>12</b>	510	10	1.5
<b>13</b>	650	13	1.5
<b>14</b>	1000	35	1.9
<b>Ovulation day</b>	750	100	2.8
<b>+1</b>	550	25	6.5
<b>+2</b>	350	13	15.0
<b>+3</b>	350	10	30.0
<b>+4</b>	400	8	45.0
<b>+5</b>	470	5	60.0
<b>+6</b>	510	3	50.0
<b>+7</b>	650	3	60.0
<b>+8</b>	570	3	65.0
<b>+9</b>	490	3	50.0
<b>+10</b>	410	3	40.0
<b>+11</b>	330	4	35.0
<b>+12</b>	250	6	17.0
<b>+13</b>	200	7	10.5
<b>+14</b>	180	8	1.5

**NOTE: These hormones levels can fluctuate widely from patient to patient and are only a rough guideline.**