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*Time Intervals during the Menstrual Cycle with
Special Reference to the Long Follicular Phase*

James B. Brown

TO UNDERSTAND the timing of events during the menstrual cycle, it is necessary to understand the underlying mechanism. During the latter part of the preceding cycle, the high output of estradiol and progesterone by the corpus luteum suppresses the production of follicle stimulating hormone (FSH) by the pituitary gland. The waning production of hormones by the corpus luteum at the end of that cycle causes shedding of the endometrium (menstruation) and removes the suppression of FSH production.

The FSH levels rise slowly with a delay mechanism. This delay is necessary because it takes five days from the initiation of a follicular response to the production of enough follicular estrogen to inform the pituitary that the required production of FSH has been reached. Initially, FSH production is below that necessary for the growth of follicles, although some conditioning occurs at these levels. The output of FSH "hunts" upwards seeking the "threshold" level at which a group of follicles is stimulated into active growth. Within five days these follicles are secreting estradiol.

There is an intermediate level of FSH production which must be exceeded before a follicle is stimulated sufficiently from its initial growth phase to progress to ovulation. There is also an upper level of FSH production which must not be exceeded lest excess stimulation and multiple pregnancies result. This upper level is only 20 to 30 percent above the threshold value, so that precise feedback control of FSH production by ovarian estradiol is essential.

As the dominant follicle is being boosted to ovulation it is producing increasing amounts of estradiol, which feed back to the pituitary and suppress FSH production to below the threshold value; this suppression is important, as it prevents the FSH production from exceeding the desired limit, removes stimulation from lesser follicles which are competing the race to ovulation, and turns on a maturing mechanism within the dominant follicle which renders it receptive to the second pituitary gonadotrophin, luteinizing hormone

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imum symptoms of fertile mucus are observed on the day of peak estradiol intermediate state depend on the levels of estradiol being produced. The maximum ranges. Again, the characteristics of mucus patches experienced in the intermediate phase of pituitary activity at which the delay occurs. The chart is in effect a record of when the FSH levels are in the "sub-threshold" or "intermediate" extremely variable number of "dry" days and "mucus" days, depending on In terms of the mucus symptoms, prolonged cycles are characterized by an interval denotes an infertile cycle and a lengthening denotes pregnancy. next menstrual period is ten to fourteen days. Usually, a shortening of the last production to ovulation is two days, and the interval from ovulation to the three days to the maximum mucus symptoms, the interval from peak estradiol within very narrowly defined time sequences. The boosting phase occupies Once an ovulatory course is embarked upon, the resulting events occur production so that a follicle is boosted to ovulation.

time, or the feedback mechanisms may eventually operate to increase FSH true anovulatory bleed. This intermediate phase can persist for a considerable through bleeding (in the form of inter-menstrual bleeding or spotting) or a produced has caused sufficient growth of the endometrium to cause break-variable time sequence of the cycle. It may continue until the estradiol pro-and the FSH levels remain within the intermediate phase. This is the other boosted to ovulation. However, in prolonged cycles the rise may be arrested that the intermediate level is exceeded within a few days and the follicle is During the normal cycle, the rise in FSH production continues smoothly so days, estradiol is being secreted and mucus production commences.

exceed the "threshold" and follicular development commences. Within five settled into a long phase of amenorrhea, the FSH values eventually rise to "dry" days during this time. Unless she has reached the menopause or has secreted and no mucus is produced. The woman experiences a succession of lar development occurs until the threshold is reached; thus, no estradiol is normal length or several months in women with infrequent cycles. No follicu-two variable time sequences of the cycle and may take a week in cycles of pituitary is searching for the "threshold" level of FSH production, is one of the All of the above processes require time. The "hunting" phase, in which the even in the presence of estradiol, inhibits production of this mucus.

Estradiol produced during the follicular phase of the cycle causes pro-duction of cervical mucus; the progesterone produced by the corpus luteum, hormone, progesterone.

then starts secreting increasing amounts of estradiol and the second ovarian ovulation, and the corpus luteum which emerges from the ruptured follicle lar rupture (ovulation). Production of estradiol falls immediately before pituitary to cause the preovulatory surge of LH release, which initiates follicu-

production before ovulation, the rapid change in symptoms which occurs at ovulation is due to the increasing production of progesterone at this time, and the onset of the next menstrual period is highly predictable from these events.

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References

Professor James B. Brown, D. Sc., *Bulletin of the Natural Family Planning Council of Victoria*, III (June), 1976, 5-6. Printed here with permission.