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Menstrual Cycle

The onset of menstrual cycles (**menarche**) is generally at about 12.7 years of age, with the development of breasts and pubic hair (secondary sex characteristics) usually occurring one or two years earlier. Normal menstrual cycles take place at intervals between 21 and 35 days, with the average being about 28 days.

Menstrual flow generally lasts about three to five days. The first day of menstrual bleeding marks the onset of the **follicular** phase. During the early part of this phase, blood levels of the female hormones estrogen and progesterone are both low. Toward the latter part of the follicular phase, estrogen secretion rises to a peak, just prior to **ovulation**. Ovulation usually occurs around midcycle (between days 13 and 15), although stress and a variety of other factors could cause ovulation to be delayed or missed. The **luteal** phase lasts from ovulation until the onset of the next menses, normally about 14 days. This phase can also be affected by external factors. Estrogen levels remain high-although not as high as immediately before ovulation-and progesterone also increases. These reproductive hormones can cause some physiological and psychological symptoms, described later. If implantation of a fertilized ovum does not occur, falling hormone levels will lead to shedding of the uterine lining (the endometrium) as menstrual flow, and the cycle begins again.



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Current Comments

Report on Menstrual Cycle Dysfunction

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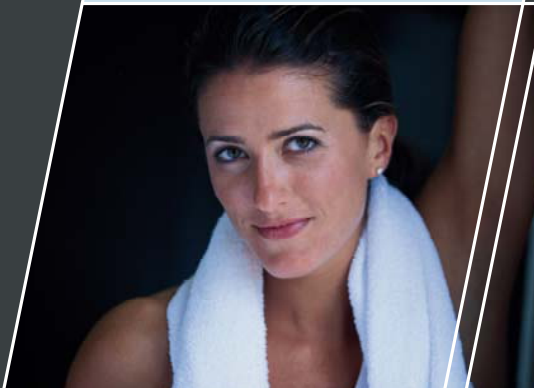
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Amenorrhea disorder

Amenorrhea occurs in two to five percent of the general population, as compared with between one and 44 percent of exercising women. The other menstrual cycle disorders are also more common in athletes.

Athletic amenorrhea, or exercise-associated amenorrhea, is a diagnosis of exclusion, which means that other medical causes—pregnancy, thyroid or other endocrine disorders, excess of male hormones (androgens), pituitary tumor (prolactinoma), polycystic ovarian syndrome, genetic abnormalities—must be ruled out. Based on the history and physical examination, a physician can order appropriate blood tests and other investigations.



Potential Factors

There is no single cause for the onset of athletic amenorrhea. Potential factors include low body weight and low percent body fat, rapid weight loss, sudden onset of vigorous exercise, nutritional deprivation, disordered eating and energy imbalance, as well as psychological and physical stress. Suppression of the reproductive cycle is different in each individual.

Sports that emphasize leanness (such as strenuous endurance sports or aesthetic sports) are more likely to have a high percentage of athletes with menstrual disorders. For example, the prevalence of amenorrhea in runners (24 to 26 percent) has been shown to be higher than in swimmers (12 percent).

Written for ACSM by Constance M. Lebrun, M.D., FACSM

ACSM Current Comment

During the past few decades, increasing numbers of women of all ages have been participating in sports, at both recreational and competitive levels. Most girls and women derive significant health benefits from regular physical activity. They can achieve the same training effects as do men, such as decreased blood pressure, lowered heart rate, and improved aerobic capacity, as well as decreased percent body fat. These changes help protect against atherosclerosis and heart disease. In addition, weight-bearing exercise promotes strong and healthy bones. Earlier myths regarding detrimental effects of excessive exercise on the female reproductive system have been largely dispelled. However, athletes, parents, coaches and physicians should be aware that exercising women could potentially be subject to menstrual cycle dysfunction.



Menstrual Cycle Dysfunction

An ACSM Report

“Regular” ovulatory menstrual cycles can result only if the regulated feedback systems involving the hypothalamus, the anterior pituitary gland and the ovaries are functioning as they should. In addition, the uterus and the reproductive organs must be intact.

In general, the numerous health benefits associated with regular physical exercise far outweigh any potential risks. Early recognition of problems and appropriate management are essential.

A woman is considered to have **primary amenorrhea** if she has not started menstruating by age 16, or has not yet begun to develop breasts of pubic hair by the age of 14. In some women, there may be a constitutional delay in menarche, especially if the mother was late in developing.

Secondary amenorrhea is the absence of three or more consecutive menstrual cycles after menarche.

Oligomenorrhea is defined as three to six menstrual cycles per year, or cycles with intervals greater than 35 days.

Athletic women can also have a **shortened luteal phase** (less than ten days' duration), or **anovulatory cycles**. These variations can be difficult to detect, as there may still be what appears to be regular menstrual bleeding. The only external warning sign may be a difficulty getting pregnant.

Certain symptoms suggest ovulation. They include breast tenderness, fluid retention, appetite changes and mood changes during the second half of the cycle. In moderation, they signal that the neuroendocrine axis is working as it should. In excess, they can become troublesome as **premenstrual syndrome (PMS)**. Painful menstrual cramps and heavy flow are termed **dysmenorrhea**. Scientists believe that regular physical exercise may be beneficial in reducing the severity of these latter two conditions.



High Intensity Exercise

Higher intensity exercise and increased frequency of training are associated with a greater incidence of menstrual disorders, but there is no scientific evidence for a direct cause and effect. Metabolic alterations and change in the body composition such as weight loss and decreased percent body fat are coincidental rather than causative. A positive energy balance (consuming enough calories for the amount of exercise performed) seems to be critical for maintaining ovulatory cycles. Nutritional deprivation may also result in deficits of calcium, iron and other important nutrients. Women with amenorrhea should consume the equivalent of 1500 mg of elemental calcium daily to protect their bone density.

Estrogen & Bones

The lack of the protective effect of estrogen on bone causes demineralization or premature osteoporosis, leading to an increased risk of scoliosis, stress fractures, and other more serious fractures. Even with resumption of normal menses, some of these changes can be irreversible. Adolescence in particular is when 60-80 percent of skeletal bone is laid down and consolidated. Hypoestrogenism and poor nutrition during these years may lead to a low peak bone mass.

Once a physician makes the diagnosis of athletic amenorrhea, he or she may administer a five-day course of synthetic progesterone called Provera (ten mg/day). Any withdrawal bleeding can be taken as evidence that the pituitary axis is intact. Treatment solutions can then include a modest reduction in exercise (five to ten percent), a slight increase in weight (five percent or as indicated), and proper attention to nutrition, stress, sleep, and training practices. Amenorrheic athletes who must stop training because of an injury will often begin regular cycles again within two months. Ovulation and reversal of amenorrhea are unpredictable and may occur before the menses resume, so adequate methods of birth control are necessary.

If the cycles do not resume spontaneously in women over 16 years of age, it may be necessary to give replacement hormones such as estrogen and progesterone. In a young woman who is sexually active, oral contraceptives provide a safe, convenient alternative. With the newer low-dose preparations, there is no significant impact on athletic performance. Women with secondary amenorrhea who desire pregnancy and do not respond to dietary intervention, reduction of training or stress reduction, may require certain medications to stimulate ovulation.

Why should you worry about missing a few menstrual cycles?

Amenorrhea, once considered by some athletes to be a "normal" and "desirable" end effect of training, has been linked since 1984 to premature loss of bone density. It is a symptom of an underlying problem that requires medical evaluation within the first three months of occurrence. In some women, the biggest problem is infertility, but the greatest unseen risk from prolonged amenorrhea is a loss of bone density, or premature osteoporosis. Why does this happen? Amenorrhea, and the other forms of menstrual dysfunction, are associated with an estrogen deficiency state similar to menopause. Estrogen, and possibly progesterone as well, increase the absorption of calcium and its uptake and deposition into bone. The loss of estrogen may also theoretically increase blood lipid levels and lead to premature atherosclerosis and cardiovascular disease. There may also be a higher incidence of cancer of the reproductive organs.

Psychological and emotional factors, as well as stress, play a role as well in the development of menstrual cycle disorders. In some sports, the tendency of coaches, parents, and judges to focus on body composition and percent body fat create an unhealthy preoccupation with body image.

