



The Breast Cancer and the Environment Research Center
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Bay Area Breast Cancer and the Environment Research Center
2nd Annual Town Hall Meeting
Environmental Influences on Girls' Development During Puberty
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What is the Tanner Staging System?

One of the primary tools that epidemiologists and other clinicians use to follow a girl's progress through puberty is the Tanner staging system, also known as the sexual maturity rating, that breaks down puberty into discrete steps.

Developed in 1969, the system grew out of a two-decade-long study of girls as they transitioned through puberty. The Tanner staging system is named after a British pediatrician, Dr. James Tanner. He performed a longitudinal study in which the subjects were observed repeatedly over a period of time in the same context. The study included 192 girls, all of them white, British, and living in a children's home. Some children were orphans and some came from broken homes. Over the study's 20-year period, the girls underwent examinations and photographs every three months. Dr. Tanner and others in his research group reviewed the collected data and compartmentalized what is a continuous process of development into five stages.

The Tanner staging system evaluates both breast development and pubic hair. Below is a description of the five tanner stages.

Stage One

This stage is the period before pubertal development begins.

Breast Development

The breast shows no outwardly noticeable changes. There is no development. Only the papilla is elevated.

Pubic Hair

No pubic hair.

Stage Two

Breast Development

Also known as thelarche, a breast at Tanner stage two, the areola widens, darkens slightly, and elevates from the rest of the breast as a small mound. The mound (nipple) may be visible, and lying under the areola is a bud of breast tissue (breast bud) is palpable (noticeable to the touch).

In the Tanner study, the average age of thelarche was 11.15 years, with a range of 8.5 to 13 years. Other contemporary studies done in the United Kingdom, United States and Hong Kong at or around the time of the Tanner study showed a range of 9.9 - 10.8 years. A 1992-93 study, the Pediatric Research in Office Settings (PROS) study, of 17,000 U.S. girls had results a bit younger than the Tanner study. The Caucasian girls averaged 9.96 with a range of about 7-12; and the African American girls were even younger.

Pubic Hair

First appearance of pubic hair, which is sparse, straight, or only slightly curled, longer but still downy hair, slightly pigmented, and appearing chiefly along the labia.

Stage Three

Breast Development

In Tanner stage 3 breast development, the bud enlarges beyond the areola, the areola experienced early changes including pigmentation, and small glands, called Montgomery glands, form on the areola. There is further breast enlargement, but there is no separation of the contours of the areola from the breast. This is all one mound.

The age attainment of stage three in Tanner's study was 12.15 years. The contemporary U.K. and U.S. studies reported 11.2-11.4 years, which is consistent with the PROS study, but is significantly later than the African-American girls, who attained breast stage 3 at a mean of 10.19 years.

Pubic Hair

The hair is considerably darker, coarser, and more curled. The hair spreads sparsely over the middle of the pubic bone.

Stage Four

Breast Development

The areola and nipple project above the contour of the breast to form a secondary mound in stage four. The areola becomes more pigmented and enlarged, and nipple also becomes pigmented. This is the most variable of all the stages.

In the Tanner study, some girls skipped stage 4, and went directly from Tanner Stage 3 to Tanner stage 5. In the Tanner study, the mean age of Tanner Stage 4 was 13.1 years.

Pubic Hair

The hair is adult-like in appearance. The area covered is still smaller than that in the adult. There is no hair spread to the medial thighs.

Stage Five

Breast Development

Tanner Stage 5 breast development is the mature, adult breast. There is projection of only the papilla with recession of the secondary mound back to the contour of the breast, and there is a further increase in breast size.

Of the 57 girls who reached stage 5 in the Tanner study, four of them regressed to stage 4. Breast development is not a linear process. Longitudinal studies have shown that there is some hormonal fluctuation and girls can go back to previous stages. In the Tanner study, the mean attainment of stage 5 was 15.3 years with a range of 11.8-18.9 years. In other contemporary studies, the average age was about 13.8.

Pubic Hair

The hair is adult-like in appearance and distributed in the classic female triangle. Some individuals may have hair spread to the medial thighs.

Menarche

Menarche, or the first menstrual period, is not part of the Tanner staging system. You need a certain amount of estrogen to menstruate, but it can happen at Tanner stage 2, 3, 4 or even 5. The response of the vaginal mucosa and the vaginal lining to estrogen and progesterone is different from what's happening in the breast.