Tanner Stage 4 Breast Development in Adults: Forensic Implications

WHAT’S KNOWN ON THIS SUBJECT: There are no studies to support the clinical awareness of persistent Tanner stage (TS) 4 breast development in adulthood, and forensic experts continue to use TS 4 as evidence of age < 18 years in cases of alleged child pornography.

WHAT THIS STUDY ADDS: One-fourth of nonclinical images of women over 18 years of age could be considered by a single forensic expert to represent TS 4. This observation, and substantial discordance in interpretation by pediatric endocrinologists, renders testimony based on this distinction invalid.

abstract

BACKGROUND AND OBJECTIVE: Forensic testimony in alleged child pornography cases commonly asserts that Tanner stage (TS) 4 breast development, characterized by secondary mounding of the areola that is obliterated in TS 5, is evidence of age < 18 years. Clinical experience does not support this notion, but there are no relevant studies. We sought to estimate how frequently TS 4 might be interpreted from nonclinical images by individual forensic experts.

METHOD: Published images of 547 adult women were independently examined by the authors and classified as having TS 4 or TS 5 breast development.

RESULTS: There was concordance among all 4 of the examiners for 17 of the images, agreement of 3 of the examiners on another 36 images, of 2 examiners on 39 images, and 53 images were designated TS 4 by only 1 examiner, for a total of 153 (26.5%) images that could have been considered by a single forensic expert to represent TS 4.

CONCLUSIONS: A substantial number of adults have persistent TS 4 breast development. This observation, and the frequent difficulty distinguishing TS 4 from TS 5, even by adolescent development specialists, especially in nonclinical images, renders testimony based on this distinction invalid. Without clinical relevance for distinguishing these advanced stages of breast development, they should both be considered indicative of full maturation. Testimony based on this inappropriate test of maturity should no longer be allowed. Pediatrics 2012;130:1–4
Marshall and Tanner\(^1\) defined the stages of breast development as:

- **Stage 1**: Preadolescent; elevation of papilla only.
- **Stage 2**: Breast bud stage; elevation of breast and papilla as a small mound, enlargement of areola diameter.
- **Stage 3**: Further enlargement of breast and areola, with no separation of their contours.
- **Stage 4**: Projection of areola and papilla to form a secondary mound above the level of the breast.
- **Stage 5**: Mature stage; projection of papilla only, due to recession of the areola to the general contour of the breast.

In some girls, the secondary mound characteristic of Tanner stage (TS) 4 persists until the first pregnancy or even later. Thus, the progression to TS 5 is not an essential component of the maturation of the breast. The same may be said of TS 4 because some girls pass directly from stage 3 to 5 without developing a secondary mound.\(^2\)

The stages of sexual maturation were designed for estimating development or physiologic age in individuals of known age undergoing physical examination.\(^3,4\) In recent years, however, Tanner staging has been used as a forensic tool to estimate the ages of adolescents from images in alleged child pornography cases, a use for which there is no scientific basis.\(^3,4\)

Because Tanner staging of females involves only breast and pubic hair development and most subjects in artistic, erotic, or pornographic images have partially or completely shaved pubic hair, breast development is pre-eminent in these evaluations. Expert testimony frequently asserts that the impression of TS 4 breast development is an indication that the image is of a girl under the age of 18. The current study was designed to determine the ability of board-certified pediatric endocrinologists to concur on distinguishing TS 4 from TS 5 by using nonclinical images of adult women and to estimate the frequency of persistence of TS 4 breast development into adulthood based on such data.

**METHODS**

Inspired by the report of Italian and German investigators who used images from legitimate pornographic Web sites (to be sure that the subjects were women over 18 years of age),\(^4\) we examined 547 images with breast exposure from an anthology of the monthly centerfold illustrations in *Playboy* magazine from December 1953 to December 2007 that did not include >1 picture of any single model.\(^5\) Women were classified as having breast TS 4 or TS 5 by each of us independently. Although developmental staging is based on physical examination, this design, using reasonably good quality but not standardized clinical grade images, more closely approximated the conditions of forensic application. Recruitment of investigators blinded to the purpose of the study was not considered feasible because no pediatric endocrinologist would deem such a study (using non-clinical, nonuniform images) to be a scientifically valid means of determining frequency of TS 4 breast development in adults. No attempt was made to resolve differences of interpretation among examiners because, in forensic application, a single expert’s interpretation is presented as evidence.

**RESULTS**

There was concordance among all 4 examiners that 17 of the images (3.1%) represented TS 4 breast development, concordance among 3 examiners for another 36 images (6.6%), classification as TS 4 by 2 of the examiners for 39 images (7.1%), and interpretation of TS 4 by 1 examiner for 53 images (9.7%). Thus, a total of 145 of the images (26.5%) could have been considered by a single forensic expert to represent TS 4.

**DISCUSSION**

Tanner staging of breast development is subject to misuse in the forensic setting because of the subjectivity of assessment in still or video images and failure to recognize or acknowledge that TS 4 development can persist well into adulthood. Defendants have been brought to trial and even convicted on the basis of expert testimony that images interpreted as TS 4 breast development were absolutely indicative of individuals <18 years of age. Examples of such testimony from cases in which 1 of us (Dr Rosenbloom) has provided expert testimony include the following:

- **“All girls reach the level of Tanner 5 before they reach the age of 18.”** (Testimony of gynecologic cancer specialist)\(^6\)
- **“Ninety-eight point five percent (98.5%) of girls will manifest TS 5 by 16 years, 6 months.”** (Testimony of family practice physician)\(^7\)
- **“They’re Tanner 4 breasts, and those are not fully matured…. And 18-year-olds will have fully formed breast tissue.”** (Testimony of pediatrician)\(^8\)
- **“… her sexual maturational rating was a TS 4 based upon her breasts. I gave her an age estimate of 12.9 years.”** (Testimony of pediatrician)\(^9\)
- **“Within reasonable medical probability, both of these females were at TS 4 and were between the ages of 13 and 15 years.”** (Testimony of pediatric emergency department physician)\(^10\)
- **“… showed breast development TS 4, which would be 10 to 16 1/2 years development.”** (Testimony of family practice physician)\(^11\)
The persistence of secondary mounding of the areola into adulthood is rarely noted in the pediatric endocrinology literature, and the frequency of TS 4 breast development in adulthood has not been reported. Marshall and Tanner noted that 7% of females progress to TS 5 without passing through TS 4 and that a few return to TS 4 from TS 5 but that there were no data to provide an estimate of the number who do not progress beyond TS 4. This paucity of information likely reflects the lack of clinical importance of the distinction between TS 4 and TS 5. A large element of subjectivity is also part of the problem in using this measure for generating opinions in a forensic setting. Over 30 years ago, it was observed that even with clinical examination, “stage 4 and 5 are not distinct in some girls.” Figure 1 is taken from the original illustration of breast staging by Marshall and Tanner. Despite these images being exemplary, the difference between stages 4 and 5 is sufficiently subtle to invite ambiguity, and the distinction is going to be even less apparent in nonclinical images. Individuals ≥18 years with small breasts might even be considered to be at TS 3 from nonclinical images and therefore <18 years of age. Because of the aesthetic bias of the material reviewed, no such images were noted. The substantial discordance among the examiners on classification of the images in the current study reflects the problem of interpreting images and the frequent subtlety of the distinction between TS 4 and TS 5. Indeed, classification preceding that of Marshall and Tanner avoided this problem by ignoring the distinction, describing only 4 stages of breast development.

We do not pretend to have supplied an estimate of the frequency of adult TS 4 breast development, which would require, at the very least, analysis of standardized high resolution images if not actual physical examination. Nonetheless, our results suggest that a given expert might consider one-fourth of adult women in nonclinical images to have TS 4 breast development and, therefore, testify that the subject is under the age of 18 years. Our findings are consistent with the report of Cattaneo et al, who found that the 11 adult images from legitimate pornographic sites using women of known age >18 years were erroneously considered to represent females <18 years of age in 73% and 95% of cases by Italian and German pediatricians and in 69% and 91% of cases by their respective obstetrical colleagues by using a variety of developmental features, including breast development.

CONCLUSIONS

Failure to appreciate the frequent persistence of TS 4 breast development into adulthood and difficulty distinguishing TS 4 from TS 5 breast development, especially in nonclinical still or video images, has resulted in testimony that

FIGURE 1
has no scientific basis. In view of the absence of developmental or clinical significance between TS 4 and TS 5 breast development, and frequent difficulty distinguishing them, they should both be considered indicative of full maturation. Testimony based on this inappropriate test of maturity should not be allowed.

REFERENCES

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