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Experimental Stimulation of Breast Development in the Teen-Age Female

The breast of a teen-age girl seems more responsive to hormone stimulation than that of the adult; and less likely to revert to its previous size after cessation of therapy.

IT is a rare physician who has not been consulted by women desirous of increasing the size of their breasts. In the last decade of Hollywoodism, emphasis has been placed on mammary development as the symbol of femininity. Many women, not generously endowed by nature, have become self-conscious about this. They feel inadequate in their feminine role. These feelings have been passed on to our enlightened teen-agers who, like their mothers, share this feeling of inadequacy and seek solace in the padded bra. However, there is no objective criterion of "underdevelopment" here. There is no standard as to the amount of bust line any figure should have.

Consultation with over a dozen bra manufacturers has cast little light upon the subject. Statistics are neither informative or conclusive. As one company¹ points out: "Statistics will give a completely distorted picture since many women will buy separate pads to wear in regular bras; and there are those who alter their bras."

PHYSIOLOGY

THE breast normally retains its infantile contour² until between the ages of ten and

fourteen. By sixteen, the average teen-ager has a good picture of her own breast development. She is either resigned to the use of "falsies" or is happily filling out her bra in adequate proportions.

The accepted theory³ of mammary development has been that once gonadotrophins are produced in significant amounts, the gonadal hormones are responsible for subsequent breast changes by direct end target action.

Turner^{4,5} and his associates have suggested that the gonadal hormones act only as stimulants to the pituitary with the production of mammogen I and mammogen II. The former is produced in response to the stimulation by estrogen and results in ductal development. The mammogen II develops in response to both estrogen and progesterone and results in lobulo-alveolar growth.

Nelson⁶ cites experimental evidence which

1. Personal communication from Helen M. Gray, the Formfit Company, New York Office, N. Y.

2. Pryor, H. B.: *Journal of Pediatrics*, 8:52 (1936).

3. Zimmerman, A. and Levine, M.: *Physiologic Principles of Surgery*. Saunders, 1957, Philadelphia, page, 876.

4. Gomez, E. T. and Turner, C. W.: *Proc. Soc. Exper. Biol. and Med.*, 37:607 (1938).

5. Mixner, J. P., Lewis, A. A. and Turner, C. W.: *Endocrinology*, 27:888 (1940).

6. Nelson, W. O.: *Physiol. Rev.*, 16:488 (1936).

suggests that the pituitary hormone, prolactin, plus the ovarian hormones estrogen and progesterone are necessary for mammary growth. In animals the relative roles of progesterone and estrogen in breast development differ so much among experimental laboratory animals that it is difficult to compare them with the human breast. However, it appears that even though the breast will enlarge under estrogen the glands will be more normal histologically if a suitable amount of progesterone is added.

Ingelby⁷ found in a small series of adolescent girls alveoli were absent prior to the beginning of menstruation. When progesterone first appears at puberty the alveoli and lobules begin to form and the breast develops into its adult structure.

One remarkable feature of mammary epithelium is its ability to respond to hormonal stimulation. In an adult it would appear that the changes are reversible when estrogens are given.

Since the introduction of the hormonal control of ovulation by the use of norethynodrel with ethynylestradiol 3-Methylether,⁸ I have been impressed by the amount of breast engorgement and increase in size in some women. For the most part this is completely reversible.

Based on the premise that estrogen and progesterone would produce a nearly normal histologic growth in the breast and that the mammary epithelium is sensitive to hormonal stimulation the following experiment was carried out.

PROCEDURE

AN estrogen-progesterone combination was administered to "flat chested" teen-age girls. Their ages varied from fourteen to nineteen. These girls were measured monthly for

7. Ingelby, H.: Archives of Pathology, 33:573 (1942).

8. Enovid supplied for experimental use for this project by G. D. Searle & Co., Chicago 80, Illinois.

9. Cook, C. D., McArthur, J. W. and Berenberg, W.: New England J. Med., 248:671 (1953).

10. Davis, M. E., Boynton, M. W., Ferguson, J. H. and Rothman, S. J.: Clin. Endocrinol., 5:138 (1945).

three months prior to administration of the hormones. Those showing no change in breast size were selected. Thirteen acceptable teenagers were placed on the dosage of hormone needed to suppress ovulation: 10 milligrams daily beginning on the fifth day for three months. Breasts, hips, waist, thighs and weight were measured after each menstrual period for this three-month period. At the conclusion of medication an additional three months were allowed to elapse before final measurements were recorded. Five (under-developed) adults were measured for comparison. In one instance, the mother of two of the teen-agers was so used.

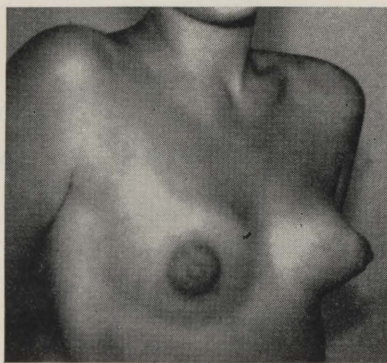
Of the thirteen youthful subjects four discontinued the hormone because of nausea and vomiting. This side-effect incidence was much higher than in a similar adult group. Two of these discontinued the medication immediately after the first dose. The other two persisted for one and two months. Their measurements are included in this study.

RESULTS

EACH teen-ager noticed an increase in the size of her breast. This was accompanied by a marked tenderness and some broadening of the hips by the end of the first month. By the third month, maximum growth appeared to have taken place. This was unaccompanied by any noticeable pigmentation of the nipples. This feature of this type of combined therapy is in marked contrast⁹ to that which occurs with ingestion of stilbesterol.¹⁰ Prominent stretch marks *did* appear attesting to the rapidity and extent of the mammary development.

Three months after the hormones had been discontinued there had been a reduction in the size of the breasts in all but four. But unlike the adult control group their breasts did not return to their original size. In the four subjects whose breasts did not diminish in size there was still no change six months to one year later.

Maximum growth was found to have oc-



Left figure shows breasts before therapy. The figure on the right shows breast size six months later, which was 3 months after cessation of therapy.

occurred in one 16-year old. Her bust measurements increased from $31\frac{1}{2}$ to $35\frac{1}{2}$ inches in three months time. Three months later the bust line had decreased by one inch. See the figures.

The minimum response was in a 19-year old, whose measurements went from 33 inches to $34\frac{1}{2}$ inches in three months, with a decrease of 1 inch three months after the cessation of therapy.

Of the eleven volunteers, average growth was 2 inches in three months. Minimum growth was 1 inch and the maximum was 4 inches. Three months after cessation of therapy, minimum overall increase was $\frac{1}{2}$ inch; maximum was $3\frac{1}{2}$ inches; an average was $1\frac{1}{2}$ inch.

In the four adult subjects, after three months, maximum growth was $2\frac{1}{4}$ inches with a minimum growth of no inches. Three months after the experiment had been concluded,

breasts had returned to previous size, with the exception of one 20-year old, whose breasts remained 1 inch larger than her original measurements.

CONCLUSIONS

IT IS possible that the combination of estrogen and progestin in the ratio found in Norethynodrel® with ethynylestradiol 3-Methylether⁸ can favorably influence the development of the underdeveloped breast in the teen-age female. This study was carried out in a small number of girls and for a period of only six months. It does offer evidence that the teen-age breast is more susceptible to hormone stimulation than the adult breast and the effects are not completely reversible.

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