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# Physiology Of Induced Breast Growth

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## ABSTRACT

An investigation was designed to determine if an increase in circulatory levels of estrogen hormones was related to hypnotically induced breast growth. Subjects were eighteen volunteer Black, White, and American Indian females from age nineteen to thirty-five. All subjects were given a placebo task of anagram resolution and experimental subjects were given pre-recorded hypnotic suggestions designed to induce breast growth. Analysis of variance indicated there was a significant increase in breast size following the experimental treatment. There was not a significant increase in urinary estrogens with the experimental treatment. Based upon the preliminary evidence of this study, one may therefore suspect a heightened tissue susceptibility to hormonal action to be the determining factor in induced breast growth.


Because of the ease with which the various emotional states can be produced in hypnotic subjects by appropriate suggestions, the hypnotic procedures provide an excellent means for the investigation of relationships between emotion and bodily changes. It provides the experimenter with the means to control the emotional variable at will. This makes practicable the study of bodily changes produced by induced emotional states under experimental conditions.

The investigation of these changes can be made with relative ease in those instances where the target organs or organ systems are readily accessible to measurement. The female breast appears to be such an organ. Because of its role as a secondary sex organ, it has been found to respond readily to psychic stimulation. In addition, it is one of the body organs which respond to steroid hormones that is accessible for examination.

The initial stimulation of breast growth comes from the estrogen hormones. Estrogen is anabolic. The greatest anabolic action

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of estrogen is manifested in the specific target tissues, the secondary sex organs. The estrogen interacts with the target tissue, and has a systemic effect on both females and males (Lloyd, 1968).

Lloyd (1968) noted that the growth of the breasts and initiation and maintenance of the process of lactation requires "in general, the same hormones, although the quantitative relationship of the hormones are probably different (p. 380)." It has been observed that when lack of breast development is due to a deficiency in estrogen secretion, as in case of amenorrhea, substitution therapy with estrogen will frequently produce the desired results. In women with normal circulatory levels of estrogen, this sometimes produces an initial growth stimulation, but a rapid regression when the estrogen therapy ceases.

Considerable interest in the study of the female breast has been recently reported (Jesser, 1971; Kolin, Baker and Bartlett, 1976; Le Cron, 1964; Williams, 1973, 1974). Williams (1974) reported the production of bilateral breast growth in adult females through suggested emotional states in hypnosis. In an experimental study involving female university students, he used suggested emotional stimuli of regression, time projection, and changes in body image to produce an increase in breast size.

This evidence that measurable changes can be evoked by induced emotional states in external organs whose normal growth and maturation depends on specific steroid hormones provides an opportunity to investigate the relationship between the degree of change in the external organ and the degree of change in the circulatory level of the associated hormones. The study of these organs and hormonal levels should provide indirect evidence for the status of steroidogenic function of the organ both in the basal state and following induced emotional states.

It was the purpose of this study to examine the extent to which induced emotional states can alter neuroendocrine functions normally outside the realm of volitional control to produce measurable changes in a specific organ and the steroid hormones associated with the development and function of that organ. This investigation was designed to determine whether significant differences would exist between treatment conditions in the size of the breast and the level of circulatory estrogens in subjects who received hyp-

notic suggestions to increase breast size and subjects who received no hypnotic suggestions.

## METHOD

### *Subjects*

The subjects consisted of eighteen volunteer adult females from varied ethnic backgrounds. Subjects ranged in age from nineteen years to thirty-five years, with a mean age of twenty-seven years. Forty per cent of the subjects were married, and sixty per cent were single. Eighty per cent of the single subjects had been married previously. Fifty per cent of the married subjects and sixty per cent of the single subjects reported they were taking birth control pills. The age of menarche of the subjects ranged from eleven years to fifteen years, with a mean age of twelve-and-one-half years. All subjects reported their weight had been constant (within five pounds) for a minimum period of six months preceding the experiment.

Subjects were assigned alternately to Group A (control group) or Group B (experimental group) in the order in which they volunteered, with the first subject assigned to Group A.

### *Apparatus*

Instruments utilized in taking the measurements of the breasts consisted of Starrett ten-inch outside calipers, Johnson No. 46 vernier calipers, a Starrett ten-inch scale, and a seventy-two inch flexible measuring tape.

A Realistic Model CTR-21 cassette recorder was used to present the experimental suggestions to each experimental subject via a recording of the author's design.

Urine was collected in specimen containers furnished by the same commercial laboratory that conducted the bioassays.

### *Procedure*

Upon initial interview, each prospective subject was informed that this study was designed to investigate whether any relationship existed between breast size, chemical content of the urine, and the

speed with which anagrams can be solved. If the prospective subject indicated interest in participating in the experiment, she was asked to read and sign a release form and complete a background information questionnaire. The first subject was assigned to Group A (control), the second to Group B (experimental), and the remaining subjects were alternately assigned to Group A or Group B in the order in which they volunteered for participation in the study.

At the initial treatment period of each subject in either group, breast measurements were taken and recorded along the dimensions of: the bust on the horizontal plane of the nipples, sternum to nipple, cup base to nipple, lateral periphery to nipple, the span between the nipples, and the chest measurement at the base of the cups of the breast. In addition, each subject was weighed and her weight recorded.

All measurements were made by a female assistant, who aided the experimenter throughout the study. The same assistant who took and recorded the initial measurements of each subject also took and recorded all subsequent measurements of the same subject.

All initial treatment periods were instituted during the luteal phase of the menstrual cycle of each subject. This was expected to insure that there would be two urinary analyses representative of each of the three eight-week treatment periods.

Following the recording of the measurements at the initial treatment of each subject, the placebo task of anagram resolution was presented. Each subject was given a series of five five-letter anagrams, one at a time, with the instruction that each trial would be timed, and a maximum time limit of one hundred twenty seconds would be allowed for each trial. The anagrams were presented on three inch by five inch plain white index cards with one-half inch high letters in black ink. After each trial, the time taken to resolve the anagram was recorded. No further use was made of this placebo task data.

The same measures taken and recorded at the initial treatment period and the same number of anagram presentations were made to each subject at each subsequent treatment period. This procedure was followed once weekly for a period of twenty-four weeks with each subject in both groups.

Throughout the three eight-week treatment periods, a twenty-four-hour urine specimen was collected by each subject on the fourteenth day following onset of menstruation each month. Each specimen was assayed for circulatory level of estrogen hormones, and each assay was recorded in the subject's record. A commercial laboratory was utilized to conduct the assays.

Urinary estrogen levels were chosen as the method of measurement of the circulatory levels of the estrogen hormones, because the normal concentration in blood is too small to be accurately evaluated (Levinson and MacFate, 1961; Lloyd, 1968). The total excretion of the metabolites in the urine should be a reflection of the integrated secretion of the hormone during the preceding twenty-four hours.

Because of the variation in estrogen levels during the normal menstrual cycle, the fourteenth day following the onset of genital bleeding was selected as the twenty-four-hour period during which all urine voided would be collected. This day was anticipated to be near the estimated date of ovulation, when estrogen level is reaching its peak (Grossman, 1967; Heller, 1957).

During the three eight-week treatment periods, the subjects in Group A (control) received only the treatment procedure outlined, i.e., breast measurements were taken and recorded, the placebo task of each anagram resolution was presented, and urine samples were taken for analysis. No hypnosis was induced in this group of subjects and no suggestions were given.

During the three eight-week treatment periods, the subjects in Group B (experimental) received the same treatment procedures outlined for the control group. In addition, during the second eight-week treatment period, the experimental treatment procedure was initiated.

At the eighth week treatment session of each of the subjects in Group B, following recording of the measurements and solution of the anagrams, hypnosis was induced. Initial hypnosis with each subject was conducted by the experimenter without benefit of tape recording. The method used was the "modern" or "standard" method of fixation, some variations of which are described by Weitzenhoffer (1957) and by Gindes (1951). Following the induction proper,

deepening techniques of visualization (Monaghan, 1972) and fractionation as described by Weitzenhoffer (1957) were utilized to achieve the greatest hypnotic depth in a short time period, and to condition the subject to the ability to experience visual and tactile sensory hallucinations.

Following this induction, the experimental treatment suggestions were played to the subject by the recorder used for this purpose. These suggestions employed three specific hypnotic phenomena expected to induce emotional stimulation of an intensity sufficient to produce the physiological changes necessary to reactivate the process of growth of the breasts: (1) age regression, during which experiences and behaviors which existed at the earlier age are reactivated, and the organic conditions of that period may be then re-established (Weitzenhoffer, 1957), (2) time projection, during which the subject achieves a view of what he believes at that moment he has already accomplished (Erickson, 1954), and (3) changes in the body image, in which seen and felt changes in tissue, organs, and body systems occur, accompanied by perceptions and emotions (Klemperer, 1954).

In measuring the degree of change elicited by induced emotions, it is necessary to consider the emotional stimuli presented to the subject. The stimuli required to bring about a maximal emotional response in a given subject are highly individual, and vary widely from those which might be effective in a different subject. In order to assess the varying individual responsiveness to the stimuli being presented, all experimental suggestions were pre-recorded. It was anticipated that this would minimize the possibility of presenting unequal emotional stimuli to different subjects, with the expectation that the subjects evidencing maximal emotional response would exhibit the greatest degree of change.

During the remainder of the experimental treatment period—weeks nine to sixteen—both the induction procedure and the experimental treatment suggestions were delivered by recording. The recorded induction technique was a progressive relaxation method.

All sessions were conducted in the treatment room of an outpatient clinic, with the subject, female assistant, and experimenter present. None of the sessions involved more than one subject at a time.

## RESULTS

The first question examined whether hypnotically induced emotional states with suggestions for increased breast growth would be effective in inducing breast growth. The criterion measure for the effectiveness of the experimental treatment procedure was a significant increase in the breast size. Expired bust measurement on the horizontal plane of the nipples was selected as the primary index of breast size.

Each subject's breast measurements were taken and recorded weekly for a period of twenty-four weeks. Each subject's breast measurements for the last three weeks of each eight-week treatment period was averaged, and this figure was used as the treatment period for statistical analysis. All breast measurements were recorded in fractions of an inch. In order to facilitate machine computation, all fractions were converted to decimal equivalents.

In treatment period one (no treatment), the experimental group breast measures varied from 31.50 inches to 35.50 inches, with a mean measure of 33.74 inches. In the control group, the measures ranged from 31.25 to 42.00 inches, with a mean measure of 35.40 inches.

Treatment period two (experimental treatment) measures for the experimental group ranged from 32.25 inches to 37.75 inches, with a mean measure of 35.56 inches. In the control group (no treatment), the measures varied from 31.25 inches to 42.00 inches, with a mean measure of 35.42 inches.

In treatment period three (no treatment), experimental group measures varied from 33.25 inches to 37.75 inches, with a mean measure of 35.73 inches. The control group measures ranged from 31.25 inches to 42.00 inches, with a mean measure of 35.47 inches.

The data reveal that all subjects in the experimental group exhibited an increase in breast size during the experimental treatment condition. Increases ranged from .75 inch to 2.75 inches, with a mean increase of 1.82 inch. At the end of the post-treatment period, the increases varied from .92 inch to 3.50 inches, with a mean increase of 2.00 inches.

Data on the control group indicate one subject exhibited an increase of .17 inch in breast size during the experimental treatment

period. Group mean increase was .02 inch. At the end of the post-treatment period this subject exhibited an increase of .67 inch, with a group mean increase of .07 inch.

Results from an analysis of variance of breast measurement data reveal significant differences in breast measurements between treatment conditions in the experimental group ($F = 51.70$, $p. < .001$). There was no significant difference in the control group ($F = 1.0$, $p. > .05$). This evidence indicates breast growth was elicited by induced emotional states in a diverse sample of adult female subjects.

The second question examined whether a concommitant increase in circulatory levels of estrogen hormones would be associated with increased breast growth. The criterion measure for the effectiveness of the experimental treatment procedure was a significant increase in the urinary estrogen levels.

Each subject's urine specimen was collected during the six successive menstrual cycles occurring within the twenty-four-week treatment period. Initiation of treatment was gauged so that two urine specimens would reflect each of the three eight-week treatment periods. The circulatory estrogen levels were recorded in micrograms per milliliter per twenty-four hours (ug/24 hr.). The two samples in each of the treatment periods were averaged, and this mean figure was used as the treatment period measure for statistical analysis.

In treatment period one (pre-treatment), the experimental group measures varied from 16.65 ug/24 hr. to 51.75 ug/24 hr., with a mean measure of 27.74 ug/24 hr. In the control group the measures ranged from 22.75 ug/24 hr. to 113.45 ug/24 hr., with a mean measure of 52.33 ug/24 hr.

Treatment period two (experimental treatment) measures for the experimental group ranged from 19.15 ug/24 hr. to 127.55 ug/24 hr., with a mean measure of 51.47 ug/24 hr. The control group (no treatment) measures varied from 12.60 ug/24 hr. to 55.15 ug/24 hr., with a mean measure of 29.54 ug/24 hr.

In treatment condition three (post-treatment) the measures of the experimental group varied from 7.00 ug/24 hr. to 86.05 ug/24 hr., with a mean measure of 36.41 ug/24 hr. The control

group measures ranged from 10.00 ug/24 hr. to 40.65 ug/24 hr., with a mean measure of 24.88 ug/24 hr.

Data on the individual estrogen level measures for each of the treatment conditions indicate all subjects in both groups exhibited changes in estrogen levels during the three treatment periods. During the experimental treatment period changes in the experimental group ranged from −2.60 ug/24 hr. to +83.50 ug/24 hr., with a mean increase of 20.39 ug/24 hr. Changes in the control group varied from +.20 ug/24 hr. to −58.30 ug/24 hr., with a mean decrease of 22.79 ug/24 hr. Overall average secretion was 38.54 ug/24 hr. for the experimental group and 35.58 ug/24 hr. for the control group.

Results from an analysis of variance of urinary estrogen levels reveal there was not a significant increase in estrogen levels between treatment conditions of the experimental group ($F = 2.89$, $p.>.05$). There was a significant decrease in estrogen levels between treatment conditions of the control group ($F = 8.76$, $p.< .005$). This evidence indicates there was not a concomitant increase in circulatory levels of estrogen hormones associated with the increased breast growth.

## DISCUSSION

Data from this study failed to support all the findings of an earlier study (Williams, 1974). Subjects in this group with an earlier age of menarche showed average gains equal to those with a later age of menarche. Neither was the average decrease in chest measurments associated with breast growth as great as the earlier study. Other data did appear consistent with the earlier findings.

There was no difference in the amount of increase in breast size between those subjects who had borne children and those who had not. There was, however, a difference between the subjects taking birth control pills and those who were not. Subjects taking birth control pills averaged an increase one-fourth inch greater than those not taking oral contraceptives.

Frequency of sexual intercourse was examined as a possible factor in the degree of growth attained. There was a slight difference in the frequency of intercourse between the marital clas-

sifications. Those who were divorced indicated an average frequency of more than two times weekly. Single subjects reported a frequency averaging twice weekly, and married subjects reported an average frequency of less than two times weekly. Those subjects who reported frequency of intercourse of more than twice weekly showed an average increase one-fourth inch greater than those who reported less frequent intercourse.

The experimental subjects included Black, White, and American Indian females. There was not a significant difference in the amount of increase in breast size between the ethnic origins, but the average increase was slightly higher among Blacks. This data suggests this procedure may be a viable alternative to surgical breast augmentation, particularly among non-white populations, where the incidence of keloids is higher (Thomas, 1973).

Examination of the supplemental breast measurements at the beginning of the study disclosed all but one of the experimental subjects recorded measurements of the right breast the same or larger than those of the left breast. At the close of the study all but two experimental subjects recorded measurements of the left breast the same or larger than those of the right breast.

Increase in the measurement from the cup base to the nipple averaged .19 inch for the left breast and .08 inch for the right. The measurements from the sternum to nipple increased an average of .29 inch for the left breast and .18 inch for the right. The increase in measurements from the lateral periphery to the nipple averaged .43 inch for the left breast and .31 inch for the right.

This suggests that the individual subject may be able to selectively choose the specific site at which the greatest alteration of function occurs. Support for this comes also from the reports of anomalous changes occurring with treatment in women in which one breast had been retarded in development (Deutsch, 1926; Groddeck, 1921).

Lending additional support to this proposition is the theory of Baudouin (1922). He suggested that there is no radical difference between the action of induced suggestions which lead to purely functional results and those which result in organic modification. He proposed that the suggestions act on the circulation and on the secretions in a localized fashion through the intermediation of the

vasomotor nerves. The vasomotor mechanism stimulates the circulation through the capillaries supplying a particular group of cells, and this action is persistent. This particular group of cells enjoys an excess of nourishment and grows more rapidly (Baudouin, 1922).

This concept is very much in line with the "general adaptation syndrome" of stress outlined by Selye (1956). Stress was defined as a state which manifests its action by measurable changes in the organs of the body. The stress reaction pattern is very specific, and affects certain organs in a highly selective manner.

Selye (1956) proposed that during local stress certain cells develop an affinity or attraction for growth-regulating adaptive hormones. This could endow certain tissue-regions with a selective sensitivity for one or the other type adaptive hormone and permit stress to mold the structure of the body. This adaptive reaction would be accomplished by enlargement and multiplication of preexisting cell-elements, without a qualitative change. This local effect of stress and hormones is manifested only under certain conditions. For instance, local nutritional excess due to dilation of blood vessels sensitized the growth-producing effect of hormones, thereby permitting selective reactions to the hormones which are equally distributed through the blood to all parts of the body. The theories of both Baudouin and Selye suggest hormonal activators.

Normal values of total estrogens for premenopausal adult females are 5-25 ug/24 hr. in the preovulatory phase, 25-100 ug/24 hr. in the ovulatory phase, and 10-80 ug/24 hr. in the luteal phase (Smith-Kline, 1976).

There are two peaks in estrogen secretion, with the first involving the three important urinary estrogens. This occurs at the time of ovulation. Estriol excretion reaches its highest level about one day after the peak of estrone and estradiol. A transitory fall in estrogen excretion follows immediately after this high level. The second rise in the estrogen excretion is present during the luteal phase, when the corpus luteum forms both estrogen and progesterone (Lloyd, 1968).

Because of the rapidly fluctuating estrogen values of the normal menstrual cycle, random samples do not give a consistent indication of the peak levels of estrogens. The time interval between ovulation and menstruation remains relatively constant at fourteen

to sixteen days. The difference in menstrual cycle lengths is due to shorter or longer preovulatory phases.

Although every subject in the study indicated in the background questionnaire that her cycles were regular, review of the data reveals little consistency within or between the subjects throughout the study. Cycles among the subjects ranged from eighteen to forty-two days in length. The experimental hypothesis was predicated on the consistency of length of menstrual cycle within subjects. However, none of the subjects maintain consistency of cycle length sufficient to insure the validity of cycle samples. The wide range of estrogen levels recorded suggests that the sampling procedure used may not be the most accurate estimate of peak estrogen secretion. Because of this, it appears that further investigation is warranted.

The measurement of urinary estrogen appears to be a valuable research technique, but the inconvenience to the subject and the extensive laboratory utilization renders it impractical as a routine daily procedure. Future investigation might employ a sampling time using the rise in body temperature associated with ovulation to determine the peak period of estrogen excretion. This peak level could be utilized as the datum for statistical evaluation for significance of change.

The significance of such a finding would justify additional research in this area. Should the findings indicate specific hormones can be selectively manipulated by induced emotional states, the potential for corrective measures against endocrinopathy will be opened to further investigation.

The evidence indicates that the individual is able to influence specific functions of his own body through induced emotional states. However, unless further investigation can validate an increase in the circulatory levels of the estrogen hormones associated with induced breast growth, one must suspect a heightened tissue susceptibility to hormonal action to be the determining factor in induced breast growth.

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