

Olfactory Influences on the Human Menstrual Cycle

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RUSSELL, M. J., G. M. SWITZ AND K. THOMPSON. *Olfactory influences on the human menstrual cycle*. PHARMAC. BIOCHEM. BEHAV. 13(5) 737-738, 1980.—Two groups of women were compared for the timing of the onset of their menstrual cycles. One group was rubbed on the upper lip (directly beneath the nose) with a mixture of alcohol and underarm perspiration collected from a single female donor. The other group was rubbed with plain alcohol. The group which received the perspiration showed a significant shift in the timing of their menstrual cycles which conformed closely with the donor's monthly cycle. This is a preliminary study which supports the hypothesis that the time of menstrual onset may be modified by olfactory cues.

Menstrual cycle Olfactory influences Human female

THAT olfactory cues have a significant influence on the endocrine and reproductive systems of a wide variety of mammals including primates is well established; a number of reviews have been written on the subject [1, 2, 6, 8, 9]. Recently, three laboratories working independently have shown that some rudimentary form of olfactory communication also occurs in humans [3, 4, 7]. These studies demonstrated that odors can be used: by breast feeding infants in identifying their mothers, by adults in recognizing specific individuals and by adults and children in determining the sex of strangers. In our present study we wished to determine if olfactory cues might also influence the hormonal or reproductive status of humans in a manner similar to that found in other mammals. Women who live in close proximity experience synchronization of the onset of their menstruation; McClintock [5] has demonstrated that this menstrual synchrony is not due to changes in food, awareness of menstrual timing or lunar cycles and suggested that the only significant factors seem to be the amount of time the women spend together and the length of their cycles. We wished to determine if olfactory cues of one woman could influence the timing of menstrual onset in other women.

METHOD

For this purpose 16 women were recruited to act as volunteer subjects. None of these women were taking oral contraceptives and none were accepted who were having sexual relations with other women. Their mean age was 28.5 years (range 19-39). The purpose of the experiment was explained to each subject and then we asked them to allow us to place an odor on their upper lip, just below the nose three times a week for a period of four months. The odor for each presen-

tation was collected from the axillary region of a female donor subject. This donor was selected according to a number of criteria: she had a history of a very regular menstrual cycle of 28 days and no significant history of menstrual problems. She had demonstrated a previous experience of "driving" another woman's menstrual cycle on three separate occasions, over three consecutive years, i.e. a friend had become synchronous with her when they roomed together in summer and dissynchronous when they moved apart in the fall. She did not use underarm deodorant nor shave under her arms. During the experiment she was not allowed to use a deodorizing or perfumed soap, and was not allowed to wash under the arms during the odor collection period.

The odorants were collected by having the donor wear square 4×4 in. cotton pads under each arm for a period of twenty-four hours. The pads were then removed and each was cut up into four equal pieces and four drops of 70% alcohol were placed on each piece. The pieces of pad were then put in individual glass vials and frozen in dry ice. When the subject arrived, her sample was taken from the dry ice and allowed to thaw for two minutes and rubbed on her upper lip. The subjects were then allowed to go about their normal business, but asked not to wash their faces for the next six hours.

The subjects in the control group received the same treatment, but did not receive the odor. Because of subject attrition the final number of subjects was eleven, with five in the experimental group and six in the control group. The study ran for a total of five months, with a one-month pretreatment period and a four-month treatment period. The subjects did not know in which group they had been placed. The date of the subject's menstrual onset was determined by questioning her when she came to the laboratory.

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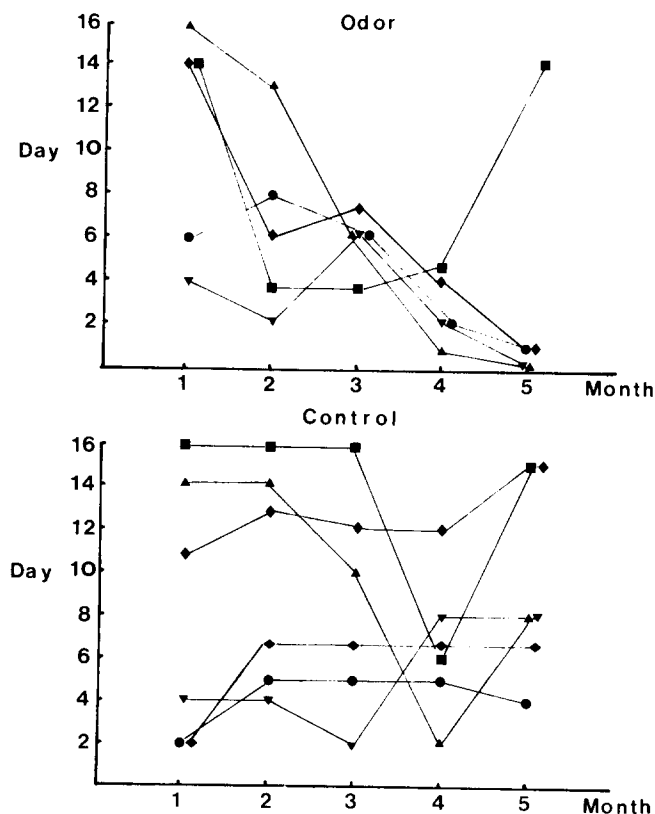


FIG. 1. The difference (in days) between each subject and the donor's onset of menstruation are plotted for the experimental and control groups. Each line represents one individual.

RESULTS AND DISCUSSION

The individual results from this experiment are shown in Fig. 1. The mean difference in days (Fig. 2) from onset of the menstrual cycle of the subjects from the donor was 9.3 days in the pre-treatment month and 3.4 days post treatment for the experimental group and 8.0 days for the pre-treatment month and 9.2 days post treatment in the control group. Analysis of variance for repeated measures showed statistical significance of $p < 0.01$ (F at 3.81). Four subjects synchronized to within one day of the donor's onset.

The data indicate that odors from one woman may influence the menstrual cycle of another and that these odors can be collected from the underarm area, stored as frozen sam-

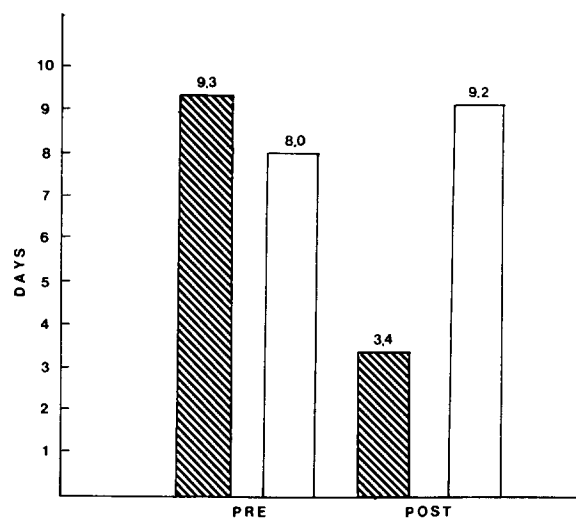


FIG. 2. The mean difference of the onset of the menstrual cycle of the donor and the menstrual cycles of the subjects before and after treatment with the odorant. The hatched bar is the experimental group and the open bar is the control group. The post score is the mean of the individual values in the fifth month.

ples, for at least short periods, and placed on another woman. Further, the experiment supports the theory that odor is a communicative element in human menstrual synchrony, and that at least a rudimentary form of olfactory control of the hormonal system is occurring in humans in a similar fashion to that found in other mammals.

While this study has been conducted in the context of olfaction, it is also possible that volatile substances were being transferred to the nose that the subject had no awareness of and therefore cannot properly be considered odors. It is also possible that the mechanism of transfer did not involve the nose at all, but diffusion of chemical compounds through the skin which may occur when the sample was placed on the subject's upper lip. We hope that these questions and others will be answered with further studies in this area of research.

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