

## FERTILITY AND MENOPAUSE IN BLIND WOMEN

STEVEN LEHRER, M.D.

*Radiation Therapy Department, Veterans Administration Hospital,  
Bronx, New York 10468*

Light and light-dark cycles have a significant effect in regulating the reproductive cycles of some mammals.<sup>1</sup> During long nights and short days or after blinding, gonadal atrophy will occur in the Syrian golden hamster, *Mesocricetus auratus*. This phenomenon has been shown to be mediated by stimulation of the pineal gland. Moreover, the light-dark cycle is believed to have a similar endocrine effect in human beings. For example, in northern Finland most conceptions occur during the summer.<sup>2</sup>

A widely cited piece of evidence for the presence of a pineal effect on the fertility of human beings is the study of Elden.<sup>3</sup> In 1969, he reports only one woman blind since birth became pregnant and delivered a normal child in the state of Washington. This woman had no light perception. On the basis of the birth rate and the blind population, there should have been 120 such women. In the United States, only six pregnancies in blind women were reported, when over 1000 should have been expected. From this data and other anecdotal evidence, Elden concluded that blindness caused infertility in human beings.

However, Elden did not take into account the degree of light perception of all the subjects in his study, an important consideration, since the pineal is extremely sensitive to light. As little as 0.5  $\mu$ W/sq cm of full-spectrum white light can inhibit the usual dark-time rise in pineal N-acetyltransferase activity. Consequently, only those women without light perception should show a

pineal effect on fertility. Yet 3% of blind individuals have no light perception.<sup>4</sup> The 97% remaining should be fertile. Thus it is quite surprising that so few blind women in Elden's study were fertile.

The present study was designed to test further the relationship of blindness to human fertility.

### MATERIALS AND METHODS

Data were obtained by a questionnaire sent to the following: (1) alumnae of the Western Pennsylvania School for Blind Children, Pittsburgh; (2) alumnae of the Maryland School for the Blind, Baltimore; (3) alumnae of the Indiana School for the Blind, Indianapolis; and (4) users of the Andrew Woods Sensory Assistance Center, United States Department of Justice, Washington, D.C. All subjects were white and in good health during their reproductive years.

### RESULTS

Results of this study are tabulated in Table 1. Eighty questionnaires were sent out; eighteen were returned completed. Since the subjects were not required to identify themselves, one may safely assume that the data are reasonably representative of the entire population to which questionnaires were sent.

Of the subjects without light perception, seven out of eight reported at least one pregnancy. Only one out of eight said she could not become pregnant. Three others used contraceptives, and so their fertility could not be assessed.

Of the seven subjects with light perception, five became pregnant. Two others said they had never tried to become pregnant. There is no significant

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Reprint requests: Steven Lehrer, M.D., Radiation Therapy Department, Veterans Administration Hospital, Bronx, New York 10468.

difference in the incidence of pregnancy, in those women who tried to become pregnant, between subjects with and without light perception ( $\chi^2 = 0.68; P > 0.5$ ).

One subject with light perception and one subject without light perception said they were diabetic. Both had delivered normal children.

An interesting characteristic of the data is the significant negative linear correlation between age at loss of light perception and age at menopause in the four blind women without light perception who were past menopause (Fig. 1). In other words, the earlier light perception was lost, the later menopause occurred.

#### DISCUSSION

The fertility of the blind women in this study contradicts the report of Elden and suggests that blindness has little or no long-term effect on childbearing. This finding, however, cannot be taken to imply that the pineal has no effect on the fertility of human beings. In hamsters, the gonadal atrophy resulting from short days and long nights lasts only a few weeks, followed by a spon-

TABLE 1. *Fertility and Reproductive Data on Blind Women in This Study*

	Light perception	No light perception
Number of subjects	7	11
Age at blindness (yr)	10.1 ± 12	3.1 ± 5.3
Age at loss of light perception (yr)	—	8.9 ± 10.4
Age at menarche (yr)	13.1 ± 2.8	12.7 ± 1.4
Age today	61.7 ± 15.6	48.9 ± 16.6
Age at menopause <sup>a</sup>	46.8 ± 3.8	50.8 ± 3.5
Menstrual period length (days)	4.7 ± 1.2	4.4 ± 1.6
Menstrual cycle length (days)	27.3 ± 3.2	27.8 ± 2.5
Number of subjects pregnant	5 <sup>b</sup>	7 <sup>c</sup>
Number of subjects infertile	0	1 <sup>d</sup>
Number of pregnancies <sup>e</sup>	1.8 ± 1.1	2.9 ± 1.9
Number of live births <sup>e</sup>	1.4 ± 0.89	1.75 ± 1.28
Number of miscarriages <sup>e</sup>	0.4 ± 0.9	0.93 ± 1.5

<sup>a</sup>Six subjects with light perception and four subjects without light perception were past menopause.

<sup>b</sup>The sixth and seventh subjects in this group never tried to become pregnant.

<sup>c</sup>Three other subjects used contraceptives or never tried to become pregnant.

<sup>d</sup>Two other subjects said they had difficulty becoming pregnant; one became pregnant twice and had one normal child and one miscarriage; the other said she was pregnant four or five times, had one living child, and had had two or three miscarriages.

<sup>e</sup>In subjects not using contraception.

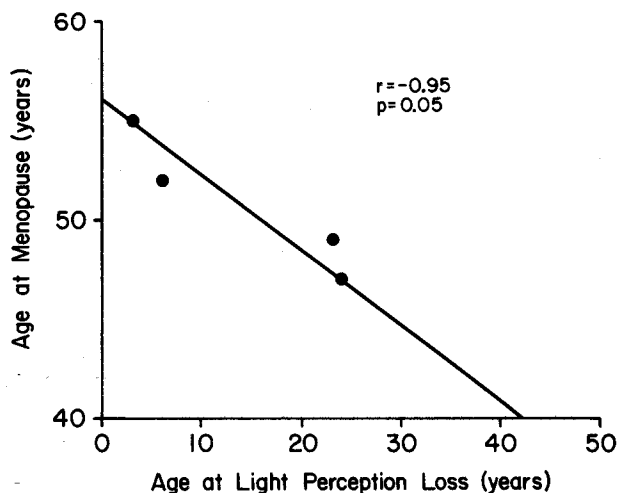


FIG. 1. The significant negative linear correlation between age at loss of light perception and age at menopause suggests that increased pineal activity may delay the onset of menopause.

taneous recrudescence, apparently due to an increasing insensitivity of pineal target tissues.<sup>5</sup> Therefore, a woman blind from early childhood might not be expected to be infertile throughout her entire reproductive life.

The negative linear correlation between age at loss of light perception and age at menopause may imply that pineal stimulation can retard aging in humans. Such a pineal effect on longevity has already been postulated to explain the increased survivorship of persons without light perception when compared with other blind individuals.<sup>6</sup> Further support of this notion is provided by the lengthening of the life spans of rats given daily injections of bovine pineal extracts.<sup>7</sup>

Thus in human beings the pineal may be more important as a regulator of aging than as a regulator of fertility.

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