LETTER TO THE EDITOR

The evolutionary advantage of migraine

Dear Sir I read the article by Dr Elizabeth Loder entitled 'What is the evolutionary advantage of migraine?' with great interest. In her discussion, she postulates that migraine may represent a compromise between genetic harms and benefits. I believe one of the causative factors to be looked at is the pattern of reproductive behaviour which is peculiar to humans: silent or concealed ovulation. The human female has no period of oestrus, i.e. a time when she is in 'heat'. I propose that the lack of oestrus (which derives from the Italian 'l'estro' or 'the urge') is an evolutionary destabilizing factor which predisposes the central nervous system to headaches, especially at the time of menses.

As humans evolved, concealed ovulation developed; it freed the female from 'reproductive slavery'. In some females, the genes determining concealed ovulation may have produced cells (probably in the hypothalamus) which were inherently unstable and hyperexcitable. Part of this hyperexcitability was the tendency to migraine. This gene (or genes) may have had some expression in the cells of the male hypothalamus as well. Once concealed ovulation evolved, it spread through the gene pool. The tendency to migraine spread with it and now appears in 18% of females and 6% of males. The lack of oestrus confers an evolutionary advantage; the tendency to migraine may be considered evolutionary 'baggage', a compromise between genetic benefits and harms. All other mammals have a period of oestrus; no other mammal is known to have symptoms which resemble migraine.

How might this proposal be investigated? Search for animals in which channelopathies exist in cells of the hypothalamus. Vary hormonal levels of oestrogen or progesterone and see if abnormalities in hypothalamic cell function can be provoked which will then lead to activation of the trigeminovascular system.

Concealed ovulation has been discussed from an anthropological point of view by Helen Fisher in her book, 'the sex contract', 1982. She theorizes that as a consequence of concealed ovulation, human males and females must form long-lasting, usually monogamous bonds. If fertility is unknown, then continuous and non-sporadic relations with multiple opportunities for sex will assure reproduction of the species.

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Author's reply

Any number of evolutionary hypotheses can be constructed to explain the persistent high prevalence of migraine-producing genes in humans, and certainly it is possible that concealed ovulation and migraine, both of which appear to be unique to the human species, are related in some way. That something is possible, though, does not make it plausible. While concealed ovulation may indeed provide an evolutionary advantage, it is more of a stretch to explain how the hyperexcitable hypothalamic cells that may cause it are also linked to migraine. All human females have concealed ovulation, but only a portion of them have migraine, for example. Although I think a link between concealed ovulation and migraine remains highly speculative, I am pleased by Dr Stein's evolutionary perspective on the subject, and thank him for his interest in my article.

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