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Reproductive suppression

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Reproductive suppression can be defined as any change in reproduction function of female mammals which lowers the probability of successful pregnancy. A range of environmental, behavioral, and social factors can disrupt or downregulate ovarian function or the ability to sustain fetal development. The most common cause of reproductive suppression in humans and other mammals is poor nutrition and inadequate calorific intake. Ovarian function and menstrual cycles are suppressed in women with negative energy balance due to insufficient food intake, hard physical labor, or intense sport (Ellison 2008). Psychosocial stress is also known to inhibit menstrual cycling and fertility in humans and nonhuman mammals. Although women do manage to conceive and successfully produce offspring in conditions of famine, war, and psychological stress, these pregnancies on average have less successful outcomes and can inflict lasting damage on mothers, compromising the success of future pregnancies (the “maternal depletion syndrome”).

The “reproductive suppression hypothesis” (Wasser and Barash 1983) suggests that downregulating fertility or terminating pregnancy in times of resource scarcity or stress is an adaptive response which permits females to shift

reproductive investment to future breeding attempts in more benign conditions. This hypothesis predicts that (1) most cases of pregnancy failure should occur early in fetal development, when mothers have invested the least in current offspring; and (2) within populations, younger females should be more likely to suppress reproduction in response to stress than older females, since older females have more to lose from postponing what little reproductive potential they have left. Data from humans and other mammals lend general support to both these predictions.

Social suppression

A special form of reproductive suppression occurs in response to socially imposed costs of reproduction. In many mammals that live in close-knit family groups, such as callitrichid primates (marmosets and tamarins), meerkats, African wild dogs, Ethiopian wolves, and naked mole rats, reproduction within groups is monopolized by older, socially dominant females while subordinate adult females are reproductive suppressed. Dominant females maintain their reproductive monopoly by acts of aggression and threats of infanticide. In common marmosets

and African wild dogs, for example, dominant females kill the offspring of subordinate females that produce young, and this threat of infanticide is sufficient to induce subordinate females to downregulate reproductive function in the presence of the dominant.

In humans, there is little evidence that older women suppress reproduction in younger women. However, recently it has been suggested that social suppression may have contributed to the evolution of menopause. Menopause, the cessation of reproduction midway through life is absent from other long-lived terrestrial mammals but universal in human populations, including hunter-gatherers. This “reproductive conflict hypothesis” (Cant and Johnstone 2008) predicts that (1) older females should terminate breeding when the next generation starts to breed, and (2) intergenerational conflict over reproduction should involve substantial costs to offspring fitness. Data from hunter-gatherers and preindustrial populations support both predictions, suggesting that menopause may reflect, at least in part, a form of social suppression of older females by younger females.

SEE ALSO: Fertility and Fecundity; Infanticide; Life History Theory; Menopause (Evolution); Ovulation; Reproductive Technologies

Abstract

Reproductive suppression is a change in female reproductive function that reduces the probability of successful pregnancy. In humans and other mammals, poor nutrition and negative energy balance can inhibit ovarian function and reduce the probability of fertilization. Delaying or inhibiting reproductive function when conditions are poor appears to be an adaptive response to maximize reproductive success across the lifespan. In many social mammals, socially dominant females suppress reproduction in subordinate females via acts of aggression and infanticide. In humans, recent studies suggest menopause may represent a form of adaptive reproductive suppression.

Keywords: fertility; ovarian function; reproductive competition; reproductive skew

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