Hormone regulation may protect female elite athletes from risk factors of heart disease

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A review of more than 100 studies suggests that balancing hormone levels may reverse factors that increase heart disease risk in some female athletes. The review is published ahead of print in the *American Journal of Physiology—Heart and Circulatory Physiology*.

The absence of menstruation (amenorrhea) is not uncommon in female elite athletes—particularly in competitors of long-distance running, dance and gymnastics. Not eating enough to support strenuous exercise and a high activity level leads to a negative energy balance, which in turn causes the brain to stop releasing the hormone GnRH. GnRH prompts the body to release follicle-stimulating hormones that make ovulation possible.

According to the international team of researchers who conducted the review, disruption of ovulation may lead to estrogen deficiency, and "the resulting loss of estrogen may affect not only fertility, but also cardiovascular function." Studies have shown that estrogen protects against blood vessel (endothelial) dysfunction and "that low estrogen levels in pre-menopausal amenorrhoeic young athletes are associated with markers of [heart disease] risk," the researchers wrote.

The review describes a critical link between low estrogen and impaired endothelial function. When compared to athletes and a sedentary control group of women who menstruate regularly, athletes with amenorrhea had poorer blood vessel function. However, menstrual status improvement is associated with sustained improvement of blood vessel function.

Athletes who don't menstruate typically have higher levels of LDL—"bad" cholesterol—than those who have a regular cycle. "Estrogen exerts multiple beneficial effects on the cardiovascular system through multiple pathways," including the production of fats in the bloodstream, the research team explained. Research in post-menopausal women has shown that normalizing estrogen levels may lower LDL levels. These results suggest that boosting estrogen may also help regulate cholesterol levels in young female athletes.

"Future research is required to determine the time course and the best interventions" for restoring hormone levels and energy balance to reverse risk factors in amenorrhoeic athletes, the researchers explained.

"Can improvement in hormonal and energy balance reverse cardiovascular risk factors in amenorrhoeic athletes?" is published ahead of print in the *American Journal of Physiology—Heart and Circulatory Physiology*.

More information: Liza Grosman-Rimon et al. Can improvement in hormonal and energy balance reverse cardiovascular risk factors in athletes with amenorrhea?, *American Journal of Physiology-Heart and Circulatory Physiology* (2019). DOI: 10.1152/ajpheart.00242.2019

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