

Setting fair regulations for top female athletes that have naturally higher testosterone levels

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Top performing female athletes are more likely to have naturally occurring higher testosterone levels, which sporting regulations should take into account, according to findings to be presented in Lyon, at the European Society of Endocrinology annual meeting, ECE 2019. The researchers show that top female athletes are more likely to have higher testosterone levels and mild disorders, as well as more severe and rarer conditions that increase testosterone levels. These findings suggest that higher testosterone levels can enhance physical performance in women, to levels more comparable to male physiology, and raises questions on how to ensure fairness of competition in women's sport.

Elite athletic competitions have separate male and female events to maintain fairness, as men naturally have physical advantages in strength, speed, and endurance. These characteristics are widely accepted to be due to men having 15- to 20-fold greater levels of [testosterone](#) than children or [women](#) at any age. Recent regulations introduced by the International Association of Athletics Federation (IAAF) and the International Olympic Committee (IOC) on the management of naturally high [testosterone levels](#) in women have been controversial. The new regulations require women with high levels to medically reduce them to be allowed to compete, however the fairness and morality of these rules have been challenged by human rights and academic experts. The reasons for high testosterone levels in women are complex, and may be caused by common disorders like polycystic ovary syndrome (PCOS) or

rarer conditions such as having the male Y chromosome. Studies in men show a clear relationship between testosterone levels and enhanced [physical performance](#) but fewer studies have examined this relationship in women. It is therefore vital to establish what extent higher levels of testosterone may be enhancing performance in [female athletes](#), towards a more male-like physiology, and to set an acceptable and fair testosterone level range for female athletes to be allowed to compete.

Prof Angelica Lindén Hirschberg and colleagues from the Karolinska Institutet and Karolinska University hospital in Sweden, have investigated the levels of testosterone in female athletes and how these impact on their physical performance. Their studies have shown that women with very high testosterone levels develop muscle mass and physical endurance more similar to that of men. They also found that top female athletes were more likely to have higher naturally occurring levels of testosterone and to have PCOS. They used their data to establish recommendations on an acceptable testosterone level range for elite female athletes, that takes into account whether the levels are high enough to push women's physiology to be more similar to men's. Levels in healthy men are in the range 7.7 to 29.4 nmol/L and 0 to 1.7 nmol/L in healthy women, so for fairness and considering the over-representation of women with naturally higher levels in sport, the team recommended a maximum testosterone level for female athletic events of 5.0 nmol/L to be used in the IAAF and IOC regulations.

Prof Hirschberg says, "Sporting success should come from a combination of talent and dedication. In circumstances where women have high testosterone levels they may have a powerful advantage. Elite female athletes want to compete fairly against other women, not those who have a more male physiology. However, we must also appreciate that drawing a line on an acceptable level is difficult, our recommended limit makes allowances for women with naturally higher levels and mild PCOS, whilst ruling out those with more severe conditions that hugely

increase testosterone levels and promote a more male-like physiology."

Prof Hirschberg comments, "In the interests of fairness in sport for all, a policy that responds with sensitivity to those who may have a condition causing high testosterone is needed. We have focused specifically on defining the levels that really confer additional advantages on strength and speed in women, and setting an appropriate limit for competitive fairness."

Provided by European Society of Endocrinology

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