

New doping test can reveal more cheating female athletes

June 11 2024



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Roughly three times as many male athletes are banned for doping as female. A [new doctoral thesis](#) from Karolinska Institutet shows that one possible reason for this is that the doping tests in use fail to take account of women's varying hormone profile. Instead, an alternative is proposed that includes a blood test and a limit value that allows doping tests for both elite athletes and casual sportspeople.

Despite the debate of recent years on [testosterone levels](#) in elite female athletes, there are only a handful of scientific studies on the topic. However, Jona Elings Knutsson's doctoral thesis clearly shows that testosterone enhances physical performance in [women](#). One of her studies published in 2019 demonstrated that supplementary testosterone increased stamina in female runners by an average of 8.5%.

"However, what surprised us most of all was how few of our testosterone-supplemented participants were detected when we put them through a [doping](#) control," says Knutsson, a specialist in obstetrics and gynecology and Ph.D. student at the Department of Women's and Children's Health, Karolinska Institutet.

The double-blind testosterone study included 48 healthy, physically active women between the ages of 18 and 35, half of whom were given a testosterone skin cream and half a placebo. After the ten-week study, their pre- and post-treatment aerobic performance was compared.

The women then took a routine test at Karolinska University Hospital's World Anti-Doping Agency (WADA)-accredited doping laboratory. Only two of the 24 women who had enhanced their performance with testosterone received a positive test result.

"The reason is that current doping tests are developed for men, and don't

take account of women's varying hormone profile," explains Knutsson.

The female hormone profile changes during menstruation, and when going on or off the [contraceptive pill](#). To find an alternative to current urine tests, 340 women were randomly assigned to take a contraceptive pill or placebo for three months. When the samples were analyzed, a relationship between the steroid hormones testosterone and androstenedione in the blood was found that remained unchanged irrespective of contraceptive intake or menstrual phase.

Since the finding was published, it has been confirmed by other research groups and in 2023, the WADA introduced the blood test in the doping controls used for elite athletes, whereby each new test is compared with each athlete's normal values.

"It's wonderful to see how your research can have such an impact," says Knutsson. "But so far there's been no limit value that allows the test to be used for non-[elite athletes](#) and sportspeople, who have not taken any previous tests to compare the new ones with. On the back of our first testosterone study, we've now come up with a value that can also be used for routine doping tests."

The principal supervisor was Angelica Lindén Hirschberg at the Department of Women's and Children's Health, Karolinska Institutet. The public defense will take place on 14 June 2024.

More information: Doctoral thesis: "[Testosterone is performance enhancing in women but challenging to detect in doping analyses](#)", Jona Elings Knutsson.

Provided by Karolinska Institutet

Citation: New doping test can reveal more cheating female athletes (2024, June 11) retrieved 21 June 2024 from <https://medicalxpress.com/news/2024-06-doping-reveal-female-athletes.html>

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