

Should Caster Semenya Be Allowed to Compete Against Women?

Sex-verification policies in sports have more to do with politics than science. If researchers start studying the right things, that could change.

By Daniel Engber



South African track star Caster Semenya is at the center of the controversy over sex-verification policies in sports. Above, Semenya competes at the Olympic Stadium in Rome on June 2.

Tiziana Fabi/Getty Images

There's a "ticking time bomb" in Olympic sports: a new rule in place for the Rio de Janeiro Games—or rather, the recent suspension of an old rule—has opened up the field to female-identified athletes with **intersex conditions**. It now seems possible that **multiple medals will be won**, and maybe even world records set, by a group of women who until recently would have been excluded from competition or forced into treatment to suppress their levels of testosterone. If these women win gold, a set of issues that have clouded the Olympic Games for more than 50 years will gather into a storm.



DANIEL ENGBER

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At the center of this potential mess is South African track star Caster Semenya, a woman whom the *New Yorker's* Ariel Levy described in a **2009 profile** as "breathtakingly butch" with a torso "like the chest plate on a suit of armor." Among athletes with intersex conditions, none is as prominent nor as magnificently gifted as Semenya. Seven years ago, while still a teenager, she destroyed her rivals in the 800 meters at the track and field world championships. Shortly thereafter, a clumsy, ad hoc, and **supposedly secret assessment** of Semenya's true biological sex made its way into the press: She'd been found to have internal testes in place of a uterus and ovaries, as well as high levels of testosterone. Semenya addressed the controversy in early 2010: "I have been subjected to unwarranted and invasive scrutiny of the most intimate and private details of my being," **she said**.

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In the aftermath of this disaster, international sporting officials got together to figure out a better, more humane way to handle cases like Semenya's. In April 2011, the International Association for Athletics Federations put out **new, clearer guidelines** on what would now be called *hyperandrogenism* in women's sports. If a female athlete tested high for functional testosterone, the guidelines said, then she'd be given a choice: Give up competition, or undergo treatment to push her levels back below the "male range."

The women who agreed to undergo this treatment saw a quick decline in their performance. According to testimony from Stephane Bermon, a medical consultant to the IAAF, about half decided to retire, and the other half resumed competition with somewhat less success. (The number of women in these groups was not publicly reported.) Semenya appears to be a member of the latter class. Her performance tailed off in the years that followed—she finished in silver-medal position in the 800 meters at the 2012 Olympics, with a time nearly 2 seconds slower than she'd run in 2009.

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When another runner with an intersex condition, Indian sprinter Dutee Chand, ran afoul of the regulations in 2014, she decided to **push back**. "Experts tell me that the basis for this policy is unscientific," Chand wrote in a letter to the head of the Athletics Federation of India, "and that these interventions are invasive, often irreversible and will harm my health now and into my future."



Indian sprinter Dutee Chand, who has qualified for the women's 100-meter event at the Rio Olympic Games, in Bangalore on July 9.

Manjunath Kiran/Getty Images

Last year, the **Court of Arbitration for Sport** ruled in Chand's favor. The testosterone standard has been shelved through 2017, pending more and better evidence that it does what it's supposed to do. Intersex athletes who were using drugs to keep their hormones down have now reverted to their natural levels. Ross Tucker, an exercise physiologist and supporter of the invalidated testing protocol, told me he's observed that several women with intersex conditions have been running 5 to 6 percent faster in the past year. (For context, the very best male runners in the world tend to run about 11 percent faster than the very best women.) Semenya's full ability has now been unleashed. Last month, she ran a **personal best in the 800 meters**. At the South African championships in April, she **won races at three different distances on the same day**. Tucker, who watched the events, says **she wasn't even going all out**.

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That brings us to Rio, where Semenya is very likely to win gold in the 800 meters and might win the 400 as well. Seen one way, this represents a move toward greater inclusivity and away from telling women how they should act or look; it's a victory for human rights. (In 2009, Levy wrote that if Semenya returned to being the world champion, she'd be "a poster child for triumphant transgression.") But from another point of view, the abandonment of testosterone testing undermines the point of gender-based divisions in sports. If men

We noticed you're using an ad blocker. Support Slate's journalism and help us reduce our dependence on advertising — join Slate Plus, and women raced against each other, the men would always win—largely due to their testosterone. Would full “inclusivity” really serve the great majority of women athletes, who now find themselves matched up against a handful of competitors whose bodies produce natural steroids?

No amount of science can provide a final answer to that question, which has **more to do with ethics than endocrinology**. Still, a better understanding of the testosterone test—what it shows and what it doesn't and how it came to be—provides a useful framework for what is otherwise a conflict between competing values. How did we end up testing female athletes for testosterone?

Efforts to divide male and female athletes have always faced a daunting problem of biology: Intersex conditions are so subtle and diverse as to defy any rational policy of exclusion. The earliest attempts at gender testing were less concerned with revealing unusual conditions of sexual development than uncovering true imposters—men pretending to be women for the sake of winning medals. The method was as imprecise as it was intrusive: Doctors looked at athletes' genitals. It was up to the medical professionals to draw a bright line somewhere within the fine gradations of biological sex, marking off the boundary between, say, an enlarged clitoris and a micropenis. Needless to say, this was neither all that scientific nor all that reliable for measuring a person's athletic advantage.

A less invasive, more objective test arrived in the 1960s. Starting then, all women athletes had their cheeks swabbed and their cells checked for certain genes. Anyone found to have markers of a Y chromosome would be barred from competition. There were refinements to this test as time went on, but certain problems never went away: A woman with an XX pair of chromosomes might pass and be granted her “**certificate of femininity**,” even if she had a masculine physique, ambiguous genitalia, and high levels of testosterone—all perhaps resulting from a **sex-hormone-producing adrenal tumor** or a genetic condition such as **congenital adrenal hyperplasia**.

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In certain cases, then, athletes with seemingly unfair advantages could make it through the cheek-swab screen. More distressingly, other athletes were excluded with no evidence of their having bigger muscles, heavier bones, or more oxygen-carrying red blood cells. In 1985, a Spanish hurdler named Maria José Martínez-Patino failed a genetic test and was **barred from competition**; she lost her sports scholarship, her boyfriend, and her career. It could be that Patino has what's called **complete androgen insensitivity syndrome**. Women with this condition have a Y chromosome and produce lots of testosterone, but their bodies are unable to make use of it. As a result, they develop as typical women but with internal testes instead of a uterus or cervix.

Genetic tests did screen out a group of women who held an edge in competition. Data drawn from 20 years of mandatory testing between 1976 and 1996 found that women with Y chromosomes were hugely overrepresented at the Olympics. According to Eric Vilain, a medical geneticist who consults for the International Olympic Committee and **supports testosterone testing**, these women turn up at a rate of 1 in 400 competitors, as compared with 1 in 20,000 in the general population. Still, the Patino case showed the risk of false positives. In 1988, the sports authorities reinstated her, and within the next few years they did away with mandatory testing for every female athlete. Eventually, they put in place a more flexible standard for women who had been flagged for testing, relying on a host of factors, including each athlete's internal and external anatomy, psychology, hormone levels, and genetics.

When doctors did this testing on Semenya in 2009, everything blew up. It wasn't that she'd been flagged unfairly, as Patino may have been a quarter-century before. Semenya does not appear to be insensitive to testosterone; indeed, her muscular build, deep voice, and slender hips suggest a high degree of what doctors call *virilization*. As such her levels of testosterone are likely to confer a real advantage in her sport. But the sloppy way in which the tests were carried out—and the manner in which the results were leaked, hours before she was scheduled to race at the world championships—pulled back the curtain on what had been a makeshift system of exclusion.

So the sporting groups tried again and added one more level of refinement. The system put in place in 2011 had a lot in common with the previous testing regime. First, athletes would be targeted on the basis of “reasonable grounds for belief” derived from “any reliable source.” (What, exactly, qualifies as “reasonable” and “reliable”? The rules never said.) Second, any tested athlete who had a very high level of testosterone would be subject to a holistic follow-up exam (involving her genetics, hormones, anatomy, etc.) not unlike the one that had been in place before. From a scientific point of view, the biggest change was that an objective screen for testosterone had been interposed between two subjective steps, of targeting suspicious athletes and doing a full evaluation.

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The testosterone standard was indeed more sensitive than earlier screenings for Y chromosomes. Under the new rules, women with ultra-rare testosterone-producing tumors would be flagged, and so would athletes with untreated congenital adrenal hyperplasia. Meanwhile, the new system would be no more prone to false positives than the earlier tests, since any woman like Patino, who had a Y

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These were just the ancillary benefits, though. The most important innovation of the 2011 rules had to do with politics rather than science. By switching to a testosterone standard, the sports authorities could claim to have sidestepped the gender question altogether. When the IAAF abolished the protocol formerly known as *gender verification* and rebranded it as *hyperandrogenism testing*, its leaders signaled they weren't interested in gender. No longer would they be screening anyone for Y chromosomes, a test that carries a whiff of essentializing man-or-woman judgment. Instead they'd be looking for a chemical that happens to be very strongly correlated with gender and which seems to boost performance. In other words, they tried to make the testing of an athlete's femininity something more akin to testing her for doping. The message that came with a negative result shifted from, *Sorry, we don't think that you're really a woman* to more like, *Sorry, you have too much of this performance-enhancing substance circulating in your veins*.

Not everyone saw this as a meaningful shift. Bioethicist Alice Dreger responded in the *New York Times*, calling the new policy regressive from the point of view of women's rights. By shifting its focus from Y chromosomes to androgens, she said, the IAAF was turning testosterone into "a manly thing" and insisting "that a woman never be manly."

Dreger had a point: For all the hoopla around the threshold for testosterone, the new rules still boiled down to measured manliness, at least in the second stage of the assessment. If an athlete like Semenya failed the initial hormone screen, she'd be examined in more detail to see if her testosterone was "functional" enough to give her an advantage. How would the doctors figure out if her testosterone was functional? They'd check how much of it was bound to her receptors, screen her for known mutations in those same receptors, weigh the hoarseness of her voice, rate the development of her **pubic hair and breasts**, evaluate her muscles, size her labia, palpate her vagina, and measure her anogenital distance. In other words, they'd try to calculate the degree to which she'd been virilized—or one might say, made "manly"—by her intersex condition.

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The 2011 policy did change things in a few important ways. For one thing, women who failed the test now had a way of getting back into their sport. Under the old system, losing your certificate of femininity meant you were not a woman in the eyes of the sports authorities; you were barred from competition forevermore (pending appeal). With the testosterone standard, a woman's ineligibility was refigured as a temporary state, one that could be overcome through surgery or medication. Gender didn't matter anymore, only chemicals. The same logic applied—and still applies—to transgender Olympic athletes: As long as a trans woman can keep her hormones within the normal female range, she's **free to compete** as the gender of her choice, regardless of her chromosomes or external anatomy.

The political rebranding also mattered as rhetoric. The move from gender verification to hyperandrogenism testing may not have made excluded athletes feel much better, but it sent a useful and progressive message. "You can word it this way, that it's 'politically advantageous,' which it is," Vilain told me. "But it's also a reality. There is no more certificate of femininity." Vilain also sees a benefit in assessing intersex athletes for virilization traits, with the goal of making allowances for as many intersex athletes as possible. "The only reason to do the physical assessment," he says, "is to try to be more inclusive—to see if there's any evidence of [androgen] resistance."



Caster Semenya and team South Africa hold a national flag as they win the 4-by-400-meter finals for women at the Confederation of African Athletics Championships in Durban on June 26.

When the Court of Arbitration for Sport overturned the 2011 testosterone rules last year, it raised another issue: Are we really sure testosterone plays such a major role in athletic performance? That question seems absurd on its face. We know lots of athletes have been caught cheating with artificially enhanced levels of testosterone. We know men have a **clear biological advantage** over women in sports performance, and that this gap widens during puberty, when boys are bursting with testosterone. We know testosterone improves exercise performance in animal models. We know trans women runners who suppress their testosterone lose athletic ability. And recent observations suggest elite intersex runners who stop suppressing their testosterone get significantly faster.

There are lots of reasons to believe testosterone matters for performance. What's less clear is exactly how much of an advantage it provides, and the extent to which other factors also play a role in building up the gap between male and female sports achievement. Under the 2011 rules, for example, women with Y chromosomes and complete androgen insensitivity syndrome were free to compete, since they can't make use of their high levels of testosterone. (In theory, they might even be at a disadvantage, since most women carry small amounts of functional testosterone.) But genetic-testing data from the 1996 Olympics suggest such androgen-insensitive women might, in fact, be overrepresented among elite athletes. That implies there's something else about having a Y chromosome that helps in sports, irrespective of testosterone. According to David Epstein, author of *The Sports Gene*, women with androgen insensitivity tend toward being tall, with limb proportions more like men's. Are these putative advantages for sports at all comparable to those derived from having functional testosterone? Scientists don't think so, but the facts remain unclear.

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Here's another complication. Among women with high levels of testosterone, androgen insensitivity runs along a spectrum. Most are totally insensitive, says Vilain, the IOC consultant—they have a mutation that makes it impossible for them to utilize testosterone in any way. But the rest fall in a murky middle ground of “partial insensitivity.” How might these intermediate conditions relate to athletic performance—and how should they be regulated? That's another open question. (Vilain argues that any woman with even partial testosterone insensitivity should be allowed to compete. His view is not official IOC policy, though.)

The uncertainty extends to trans athletes who suppress their testosterone. Does this treatment erase the male-female performance gap? “There's only two papers on the topic,” says Joanna Harper, a **medical physicist, IOC consultant, trans woman, and athlete**. The first, from 2004, measured physiological changes among 19 subjects over several years of testosterone suppression. After a year of treatment, the trans women had the same hemoglobin levels as cis women, suggesting the elimination of an important male advantage in endurance sports. Their advantage in terms of muscle mass was also cut in half, though it never shrank beyond that point.

The second paper on the subject is Harper's own. It describes her **clever study** of race results from transgender women runners like herself, collected over seven years. Harper compared each athlete's times with those of other women of the same age. Then she did the same calculation, this time using the athletes' race results from before they transitioned into being women. She found amazing overlap: Controlling for age, the post-transition athletes ran about as well, relative to other women, as they had before transitioning, relative to other men.

These results can be taken to suggest that suppression of testosterone levels the playing field for transgender women, such that they can compete without advantage in women's sports. It's easy to extend the same reasoning to athletes with intersex conditions. But while Harper's study is a good one, it's also very tiny, with only eight participants and a high risk of selection bias. “I fully admit that I made some decisions on whether or not to include subjects,” she told me. (She tried to include only those women who trained as hard after their transition as they had before.) As Harper acknowledges in the introduction to her paper, “the science supporting transgender inclusion is very thin indeed.”

In light of these gaps in the knowledge, it's tempting to view the present interruption in the gender-testing rules as an opportunity to advance our knowledge—a sort of research Rumspringa. Perhaps the IOC and IAAF should use this time to gather the best data they can on the prevalence and significance of intersex conditions in women's sports. For example, they might let the eligibility rules remain on ice for a dozen or so years, while at the same time doing blanket tests for genetics and testosterone. After the 2028 Olympics, they could analyze this massive data set and figure out just how many athletes with each intersex condition are actively competing and the extent to which they're overrepresented among medalists.

In any case, even perfect data would not prevent administrative bungling and insensitivity in the application of the rules, nor could it resolve the underlying ethical debate. One can only hope that if the testosterone-testing rules do get reinstated in 2017, they'll be handled more astutely than they were before. Here's one necessary fix: The screening for testosterone should be universal, the way it used to be for cheek-swab tests. While it may once have seemed like progress to abolish mandatory screens, the alternative—suspicion-based testing, where women can be singled out by secret allegations—harms more than it protects.

More importantly, sports doctors and officials should be wary of encouraging women to undergo irreversible treatments for their intersex conditions, since the rules on those conditions can change from one year to the next. A recent paper described the diagnosis and treatment of four “tall, slim, muscular women” who were elite athletes from remote areas in developing countries and had been barred from competition. They each had masculine-type bones, a lack of breast development, and internal testes caused by mutations in a common gene. According to the paper, all four agreed to have their testes surgically removed, followed by “feminizing vaginoplasty” and estrogen replacement. “Sports authorities then allowed them to continue competing in the female category,” the doctors wrote at the bottom of their results.

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It's a tricky problem because Olympic athletes are, almost as a rule, exceptional examples of human biology. [More...](#)

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Banned from women's sports for having too much testosterone, the four intersex athletes from the paper chose to have their gonads taken out. They feminized themselves for the sake of staying in the game and playing fair. Only now the rules are different: Caster Semenya can be herself in Rio, and smash the competition, while these women won't ever get that chance. Whatever one might think of gender testing, that's not playing fair at all.

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POLITICS WHO'S WINNING, WHO'S LOSING, AND WHY.

NOV. 10 2016 4:09 PM

The Five Baskets of Trump Voters

The deplorables make up only one basket. If Democrats dismiss the other four, they'll keep losing elections.

By William Saletan



President-elect Donald Trump shakes hands with Vice President-elect Mike Pence during election night in New York on Wednesday.

Jim Watson/Getty Images

You're sick to your stomach at the results of this election. Maybe, like me, you've had trouble sleeping and eating. You can't believe your country elected a transparent bigot, misogynist, and conman as president of the United States. You can't believe voters rejected a supremely qualified woman. The people who did this, the people who voted for Donald Trump, are bad people. They've declared war on you. They've declared war on all of us.



WILLIAM SALETAN

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This country is full of hate, you tell yourself. Racism, sexism, homophobia, Islamophobia. Did white women vote for Trump? Yes, because they fell for his racism. Did Latino men vote for him? Yes, because they fell for his sexism. We need more education about ethnicity, gender, and diversity. We need to talk more about the racism of white America and the misogyny of our culture.

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NOV. 4 2016 11:34 AM

The Real Problem With Power Posing Isn't the Data

It's the idea that increasing testosterone is the way to power.

By Carole Hooven



Yes, she's power posing. No, she doesn't need to.

GeorgeRudy/Thinkstock

For eight months in 1998 and 1999, I woke every morning in search of chimpanzee pee. That pee held the key to the chimps' testosterone levels, and I helped to catch it. To do this, I would hike through the rainforest to the trees in which the chimpanzees had built their sleeping nests the previous evening. The field assistants and I would wait under them, as bird and monkey calls gradually filled the air. Then came the rustling sounds from the nest above us—our cue to get ready. Chimps are not so different from humans in many respects, including this one—first thing they do when they wake up in the morning is urinate (they just had to stick their butts over the side of the nest). When they did, we would try to catch some of their pee, using a special tool crafted on our hike—a long stick with a plastic bag tied around the forked end. I would pipette some of that pee into a test tube and bring the samples back to the research site for storage. Later, they would be brought back to the lab at Harvard, so others could measure the chimpanzees' testosterone levels.

Each chimpanzee knows his or her place in the status hierarchy. They signal that status to one another in various ways (vocalizations, body postures and movements, aggression, etc). **Long-term data**—some that we collected as part of the **Kibale Chimpanzee Project** in Uganda and some from other sites—clearly demonstrate that dominance rank among chimpanzees is related to testosterone levels. The dominant males tend to have the highest testosterone. They also let their presence be known by, among other tactics, making themselves look and sound as large as possible and taking up more physical space.

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