



### **Cleared.**

Sprinter Oscar Pistorius will be allowed to compete in the Olympics if he qualifies.

Credit: Stu Forster/Getty Images

## **"Blade Runner" Back on Track**

By Elsa Youngsteadt  
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In a decision based on scientific uncertainty, the Court of Arbitration for Sport (CAS) has put double-amputee sprinter Oscar Pistorius back on track for the Olympics. After hearing testimony from two teams of researchers, the court concluded that existing data don't prove that the 21-year-old South African's

carbon-fiber racing prostheses give him an unfair advantage over other athletes.

Pistorius has been closing in on Olympic qualifying times for the 400-meter race since he began running competitively in 2004. But in January, the International Association of Athletics Federations (IAAF) ruled that Pistorius's curved Cheetah Flex-Foot racing prostheses give him an unfair advantage. IAAF cited studies by kinesiologist Gert-Peter Brüggemann of the German Sport University in Cologne, whom they hired to test Pistorius for advantages over other runners. A widely publicized result was that Pistorius could run at the same speed as intact athletes using 25% less energy, thanks to a mechanical advantage conferred by the springy blades.

Pistorius appealed the decision, and his lawyers recruited Hugh Herr, a biomechanical scientist at the Massachusetts Institute of Technology in Cambridge, and an international team of researchers to investigate IAAF's claims. Both lawyers and scientists worked pro bono. "We just thought, this is a wonderful scientific opportunity, let's go," says Peter Weyand, a biomechanist at Rice University in Houston, Texas, who was part of the team.

IAAF's claim that Pistorius runs more efficiently than other athletes was based on a 400-meter sprint, during which he used less oxygen than runners with intact legs. But such a short run is mainly powered by anaerobic metabolism, which does not require oxygen but does leave a byproduct, lactate, in the bloodstream. After the run, Pistorius had no more lactate in his blood than did the other runners, suggesting that his aerobic savings were not counterbalanced by greater anaerobic expenditures. But the lactate results are inconclusive, Herr says, because "there just isn't a good methodology" to measure anaerobic energy use. Kinesiologist Daniel Ferris of the University of Michigan, Ann Arbor, who was not involved in the case, agrees. The rate of lactate dissipation varies too much among individuals to get an accurate measure, Ferris says. When Herr's team redid the energy calculations during the aerobic portion of a 6-minute run, when they knew that oxygen consumption should be the whole story, they found that Pistorius is "economical," Weyand says, but not outside the range of intact athletes.

To measure how mechanically efficient, or springy, the Cheetah blades are, both scientific teams used high-speed video to track how the prostheses changed shape as Pistorius ran on them and measured how much force he exerted against the ground. The groups agreed that the prostheses were efficient, storing and releasing more than 90% of the energy they absorbed. Comparable calculations for the human ankle gave a figure of only 41%. But Herr's team says there's no way to know that energy lost from an ankle is actually wasted or whether it's transferred to other parts of the leg through muscles and tendons.

Although existing evidence doesn't prove Pistorius has an advantage, it doesn't prove that he doesn't have one, either. "It's an open question," Weyand says. And it's a question Ferris thinks may not be answerable, at least not yet. "More data has to come out about what's going on inside the human leg during sprinting."

The CAS decision allows for reevaluation of the case with more scientific evidence; in the meantime, Pistorius is working to shave nearly a second off his 400-meter personal best of 46.33 seconds to qualify for either the Beijing Olympics or the 2012 games in London.