

A New Spin

Why exertion on the erg and the bike feel so different.

Whether it's for cross-training or rehabilitation purposes, most rowers will train on the bike at some point in their careers. And virtually all of them will notice just how different exertion on the bike feels in comparison to exertion on the erg. Those who base their training off of heart rate often notice that effort and heart rate don't correlate the same way on the bike, and those who train with wattage meters on the bike occasionally wonder how the wattage they produce on the bike compares to their power output on the erg. As it turns out, a few researchers have noticed the difference too.

Cycling Versus Rowing

A group of researchers that included noted rowing physiologist Fritz Hagerman conducted a study at Ohio University in Athens that compared energy expenditure during both rowing and cycling. Although the testing occurred several years ago, the data collected during the experiment sheds light on a fact that endures for anyone hopping between the bike and the erg. Hagerman and his colleagues compared the metabolic and cardio-respiratory responses of 60 healthy men and 47 healthy women aged 20 to 74 years old to variable-resistance rowing exercise and fixed-resistance cycling ergometer work. They measured power (in watts), heart rate, and a number of other physiological indicators over the course of the test.

The researchers found that maximal power output produced during the test was significantly higher in cycling than rowing for both the men and the women. They also found that heart rate was significantly higher at all power increments during the rowing test when compared with

the same output level in cycling. Rowing coaches have speculated about the reasons for this and considered the possibility that the more continuous power output in cycling may provide some advantage in generating power over the pulse/rest/pulse power application inherent in the rowing stroke cycle. It's also worth noting that when cyclists stand over the pedals on their bike, they have gravity working in their favor. In any case, the results indicated that the energy cost of producing power on the ergometer was significantly higher than the cost to produce the same power on the bike.

"Every rower knows that there's no discomfort quite like the discomfort of going anaerobic on the erg." //

Cycling Versus Rowing

Every rower knows that there's no discomfort quite like the discomfort of going anaerobic on the erg, but few venture very far beyond that recognition. Most of us would prefer recognizing that it's hard and moving on with our lives than pondering what exactly makes anaerobic erg work so unpleasant, even when compared to other forms of anaerobic exercise like running or cycling. A group of researchers at the University of Washington's Center for Bioengineering decided to take the extra step and ran a project that studied the ventilatory response to rowing and cycling in elite female rowers.

Whether for cross-training or rehabilitation, most rowers will spend time on the bike at some point in their careers. And chances are, they will notice how different it feels.



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The researchers were interested in finding out how much of an impact the imposed biomechanical motion of rowing may have on both respiratory mechanics and timing, so they studied the breathing patterns of eight women's rowers from the University of Washington and one former member of the 1984 Olympic women's rowing team. They put the rowers on an erg and on an exercise bike and asked them to exercise to exhaustion as the researchers measured the frequency and depth of their breathing. They found that rowing elicited a higher ventilatory response than cycling

at both maximal and sub-maximal levels—no surprise there. What was interesting, however, was the nature of the rowers' breathing patterns on the erg: rowers breathed more frequently but less deeply on the machine than they did on the bike, often to the point of hyperventilation. The researchers concluded that much of the reason for this was a result of the seating position; the body's position when seated and reaching forward on the erg made deep breathing harder than the relatively open position the bike affords. □

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