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Research article

Comparison of Rowing on a Concept 2 Stationary and Dynamic Ergometer

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ABSTRACT

Biomechanical and physiological responses to rowing 1000 m at a power output equivalent to a 2000 m race were compared in 34 collegiate rowers (17 women, 17 men) rowing on a stationary and dynamic Concept 2 ergometer. Stroke ratio, peak handle force, rate of force development, impulse, and respiratory exchange ratio decreased by 15.7, 14.8, 10.9, 10.2 and 1.9%, respectively, on the dynamic ergometer. In contrast, percent time to peak force and stroke rate increased by 10.5 and 12.6%, respectively, during dynamic ergometry; the changes in stroke rate and impulse were greater for men than women. Last, VO_2 was 5.1% higher and efficiency 5.3% lower on the dynamic ergometer for men. Collegiate rowers used higher stroke rates and lower peak stroke forces to achieve a similar power output while rowing at race pace on the dynamic ergometer, which may have increased the cardiopulmonary demand and possibly reduced force production in the primary movers. Differences were more pronounced in males than females; this dichotomy may be more due to dynamic ergometer familiarity than sex.

Key words: Biomechanics, physiological response, stroke rate, efficiency, cadence

Key Points

- When rowing at a constant power output, all rowers used higher stroke rates and lower stroke forces on the Concept 2 Dynamic ergometer as compared to the Concept 2 Stationary ergometer.
- When rowing at a constant power output, cardiopulmonary demand was higher for all rowers, as measured by heart rate, on the Concept 2 Dynamic ergometer as compared to the Concept 2 Stationary ergometer.

- When rowing at a constant power output, efficiency was lower for male rowers on the Concept 2 Dynamic ergometer as compared to the Concept 2 Stationary ergometer.

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