Reliable studies have shown that regular participation in an aquatic exercise program improves muscular and cardiovascular endurance. For land athletes, water provides a friendly, cross-training environment. Moreover, the properties of water buoyancy, hydrostatic pressure, density, viscosity and inertia enable the body to work out at even higher energy values than land.

Compared to land cycling, aqua cycling engages different muscle groups against hydrostatic pressure. Also, water’s density (800 times greater than air) provides extra resistance to movement. This extra resistance (in every direction) and the decreased stress on weight bearing structures enable training all muscles required for cycling movements: agonists, antagonists, and stabilizers.

**Initial Research into Aqua Cycling:**

#1. “Design And Evaluation Of A Modified Underwater Cycle Ergometer”


Chen AA, Kenny GP, Johnston CE, Giesbrecht GG, Laboratory for Exercise and Environmental Medicine, Faculty of Physical Education and Recreation Studies, University of Manitoba, Winnipeg

An underwater cycle ergometer was designed consisting of an aluminum cycle frame in water connected with a 1:1 gear ratio to a mechanically braked standard cycle ergometer supported above the water. Three progressive maximal exercise tests were performed (n = 10):

(a) Underwater ergometer in water (UEW)

(b) Underwater ergometer in air (UEA)

(c) Standard cycle ergometer in air (SEA)

At sub maximal power outputs, oxygen consumption (VO2) and heart rate (HR) were generally lower in the SEA condition (p < .05), indicating that exercise in the upright position was more efficient.

Exercise in water (UEW) resulted in lower total exercise duration, maximal HR than in air conditions.

The upright position (SEA) resulted in greater total exercise duration and maximal power output than the semi recumbent positions.
Cyclists Find Their Fit In The World Of Vertical Aqua Training

Because of positional differences between the standard and underwater ergometers, air-water comparisons should be made by using the underwater ergometer in water and on land.

#2. “Modification Of A Conventional Bicycle Ergometer For Underwater Use”
Sogabe Y., Monji K., Nakashima K., Tajima F., Iwamoto J., Department of Physiology, School of Medicine, University of Occupational and Environmental Health, Kitakyushu, Japan.

With a few simple modifications, a conventional row-bicycle ergometer could be made suitable for underwater use. By attaching three sizes of fins to the pedal cranks of the ergometer, workload in water could be achieved to an oxygen consumption (VO2) level range of 400 to 2000 ml/min.

The preferable range of pedaling speeds was 30-40 rpm to maintain a constant speed for a prolonged time.

When using three different fins VO2, when n is the number of pedaling rate, was found to be:
- VO2 = 254.3 + 4.50n - 0.12n² + 0.0030n³ for no fins
- VO2 = 250.1 + 8.30n - 0.32n² + 0.0062n³ for small fins
- VO2 = 254.0 + 6.10n - 0.24n² + 0.0068n³ for medium fins
- VO2 = 256.4 + 13.77n - 0.72n² + 0.0131n³ for large fins

Major advantages of this modified ergometer for underwater exercise are:
1) The modification is simple and the size of the device is small enough to place in a tank of a climatic chamber
2) The ergometer can be biologically calibrated and used for a wide range of exercise oxygen uptakes
3) A subject can exercise in a comfortable upright position

Other similar studies of the cycle ergometer include:
- “Aerobic power and body size affects the exercise and induced stress hormone responses to varying water temperatures” (1994)

There are various possible uses of the cycle ergometer in exercise studies. For fitness enthusiasts, these initial studies have paved the way for designing safe, effective underwater-cycle exercise classes.

Specificity of training benefits the tri-athlete or cyclist. By aqua cycling as a means of cross training, these athletes can finally find their fit in the world of vertical aqua training. This article has touched on a few initial studies in the promising area of aqua cycling.