

Research Tidbit

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Commonly asked question...

“How does walking one mile in the water equate to walking one mile on land?”

There are several research studies that compared walking and running on the treadmill to walking and running in deep water with a buoyant vest. Results were measured in energy expenditure, heart rate and the number of calories burned/ minute.

Coad et al. (1987)

Treadmill walking	.850 (VO2 L/min)	101 HR	4.0 Kcal/min
Treadmill running	2.35	163	11.8
Deep water walking	1.8	130	8.78
Deep water running	2.30	162	11.5

Deep water running and treadmill running were very similar in energy expenditure. Deep water walking elicited 2 times the energy expenditure of treadmill walking.

DeMaere et al. (1997)

Water 60% VO2 peak	39.6 (ml/kg/min)	143 HR	13.5 Kcal/min
Treadmill 60% VO2 peak	40.7	143	13.8
Water 80% VO2 peak	54.9	172	18.9
Treadmill 80% VO2 peak	55.4	173	19.2

Deep water running and treadmill walking at similar intensities resulted in similar energy expenditure values.

In “energy expenditure” terms, with all other factors being equal, it could be estimated that walking one mile in the water may be similar to walking two miles on land.

Byrne et al. (1996)

Ten female and ten male subjects performed similar exercise bouts on an underwater treadmill (UT) and a land treadmill (LT). The subjects walked at 2 and 3 miles per hour at 0% grade.

- UT walking elicited greater cardiac output and stroke volume than LT walking at both speeds.
- UT oxygen consumption was greater at both speeds with greater variance at 3 miles per hour.
- Analysis of data at matched oxygen consumption values demonstrated heart rates to be significantly lower and stroke volume higher during water exercise.

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1. Coad, d. et al. The energy cost of treadmill versus hydor-exercise. *Medicine and Science in Exercise and Sport*, 1987 19(2), S63.
2. Demaere J. et al, Effects of a deep water and treadmill running on oxygen uptake and energy expenditure in seasonally trained cross country runners. *Medicine and Science in Exercise and Sport*. 1997, 29, S221
3. Byrne H, et al. A comparison of the effects of underwater treadmill walking on oxygen consumption, heart rate, and cardiac output. 1996, *Journal of Aquatic Physical Therapy*, November, 4-11.