

Wearing a wetsuit, its effects upon triathlon swim performance and stroke mechanics, taken from:

Tomikawa et al (2008) **Factors related to the advantageous effects of wearing a wetsuit during swimming at different submaximal velocity in triathletes** . Journal of Science and Medicine in Sport. 11, 417-423.

Wearing a wetsuit is known to increase your swim performance due mainly to improved buoyancy and given the option, most triathlon competitors would always choose to 'suit up' rather than braving the bathing costume only! Whilst it may not be common in the uk, several races around the globe take place in water which is warm enough for wetsuit use to be optional, indeed this has been the case at Ironman Germany in recent years. In order for you to make an informed decision regarding wetsuit swimming, this article examines the effects of wetsuits upon open water swim performance and also its effects upon stroke mechanics.

### **How was the test conducted?**

A total of 13 triathletes (9 male / 4 female) took part in the study which used an endless pool to examine the following factors:

1. Swim VO<sub>2</sub> max with and without wetsuit
2. The speed at which VO<sub>2</sub> max was reached with and without wetsuit
3. Economy and lactate at both 60% and 80% VO<sub>2</sub> max with and without a wetsuit
4. Stroke length (distance per stroke) at both 60 & 80% VO<sub>2</sub> max, with and without a wetsuit
5. Stroke rate (strokes per minute) at both 60 & 80% VO<sub>2</sub> max, with and without a wetsuit

The selection of 60 & 80% Vo<sub>2</sub> for the sub-maximal swim speeds is based upon the fact that swim speed in triathlon racing tends to be between 60-80% Vo<sub>2</sub> max (Miura et al 1999).

### **What were the findings?**

1. The actual Vo<sub>2</sub> max did not vary swimming with or without a wetsuit, but the swim speed at which Vo<sub>2</sub> was reached was 5.4% faster when wearing a wetsuit compared to a normal swimsuit!
2. The energy cost when swimming at 60% Vo<sub>2</sub> max and wearing a wetsuit was 14.4% lower that when not wearing a wetsuit.
3. The energy cost when swimming at 80% Vo<sub>2</sub> max and wearing a wetsuit was 7.5% lower that when not wearing a wetsuit.
4. When swimming at both 60% & 80% Vo<sub>2</sub> max the swimmer's stroke length did not change a great deal but there was an increase in stroke rate (the arms were moving faster).
5. Swimming 1500m at 80% Vo<sub>2</sub> max in a wetsuit would decrease swim time by 70 seconds compared to non-wetsuit swimming, based on the data calculated from this study.

### **What were the discussion points?**

The researchers found an interesting difference between swimming with and without a wetsuit at 60% Vo<sub>2</sub> max, energy usage being much higher when swimming without a wetsuit. They concluded that when swimming at very slow speeds a swimmer's body sinks into the water causing more drag, hence the buoyancy of the wetsuit was a big help. When swimming at 80% the faster pace allowed the body to lift in the water which reduced the benefits of the wetsuit.

In addition the researchers noted (using video footage) that at even faster speeds (above 80% Vo2 max) the buoyancy of the wetsuit made even less difference as the high velocities lifted the swimmers even further. We can take from this research that slower swimmers will undoubtedly benefit more from a well fitting wetsuit but it is also fair to say that the benefits of the wetsuit will be greater for any swimmer as the distance of the event increases. The amount of effort (taken as a percentage) is far greater at slower speeds than faster speeds if you choose not to use a wetsuit – a 'swim costume only' sprint triathlon may be considered but Ironman swim should be avoided!!

The researchers found that stroke rate increased when wearing a wetsuit but stroke length stayed the same. In simple terms the swimmers covered the same distance each stroke but their arms were moving faster. Due to the fact that their bodies were more buoyant they were able to pull themselves through the water with greater ease (less drag) and this enabled them to increase stroke rate. Without a wetsuit, the lower body and greater drag slows movement through the water thereby slowing the arms.

### **Conclusion**

Wearing a wetsuit enables you to swim faster and with less effort and has a proportionally greater impact on slower swimmers and those swimming longer distances. The changes in speed are due to increased buoyancy which reduced drag which allows a greater stroke rate. Swimming regularly in a pool can lead to relatively low stroke rates for age group swimmers (40-50 strokes per minute) and this highlights the importance of training in a wetsuit when possible. One of the prime focuses when wetsuit swimming should be increasing stroke rate (target 60 strokes per minute) without loss of form.

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