

How does OVAL translate to VO₂?

The logo for OVAL, featuring a green circular icon with a white arrow forming a clockwise loop, followed by the word "OVAL" in a bold, green, sans-serif font.

How does OVAL translate to VO2?

- An OVAL SMART Test collects heart rate, lactate, and watts during a cycle-based, submaximal and graded exercise test with three-minute stage durations.
- Three primary data points of relative power are collected: Watts at Lactate Threshold 1, Watts at Lactate Threshold 2, and Final/Peak Watts Performed during last stage of the test.
- These Thresholds are physiologically congruent to Ventilatory Threshold 1, Ventilatory Threshold 2, and Peak Watts Completed in a VO2-based model.
- To translate our lactate-based model to a VO2-based model, OVAL uses a generalized cycle ergometry equation for predicting maximal oxygen uptake from the FRIEND registry (Kokkinos et al. 2018):
 - VO_{2max} in $ml\ O_2 \cdot kg^{-1} \cdot min^{-1} = 1.74 * (Watts * 6.12 / kg\ of\ body\ weight) + 3.5$
- OVAL identifies the Watts at each point of interest during a SMART Test and translates to VO2/METs at those points.
- For example, a male weighing 60 kg performs a SMART Test with the relative Watts at each point of interest: LT1 (100 Watts), LT2 (150 Watts), Final/Peak Watts (175 Watts)
 - After these data are entered into the FRIEND VO2 equation above:
 - LT1 yields $21.2\ ml\ O_2 \cdot kg^{-1} \cdot min^{-1}$
 - Translates to VT1 for comparison
 - METs = $21.2 / 3.5 = 6.1$
 - LT2 yields $30.1\ ml\ O_2 \cdot kg^{-1} \cdot min^{-1}$
 - Translates to VT2 for comparison
 - METs = $30.1 / 3.5 = 8.6$
 - Final Watts/Peak yields $34.6\ ml\ O_2 \cdot kg^{-1} \cdot min^{-1}$
 - Translates to VO2peak for comparison
 - METs = $34.6 / 3.5 = 9.9$
- Final Watts here should be interpreted as a VO2peak (submaximal) rather than VO2max as a VO2max, by definition, requires full effort (maximal) testing that fulfills pre-established criteria for attaining a true VO2max.

Peter Kokkinos, Leonard A Kaminsky, Ross Arena, Jiajia Zhang, Jonathan Myers, A new generalized cycle ergometry equation for predicting maximal oxygen uptake: The Fitness Registry and the Importance of Exercise National Database (FRIEND), *European Journal of Preventive Cardiology*, Volume 25, Issue 10, 1 July 2018, Pages 1077–1082, <https://doi.org/10.1177/2047487318772667>