A Zone 2 heart rate training is a low-intensity endurance workout (60-70% of max Heart Rate) that relies on the oxidative energy system to produce aerobic energy. Some examples include walking, jogging, cycling, swimming and hiking at a moderate pace. Zone 2 HR training improves aerobic efficiency (as it activates and mainly relies on the aerobic system) and increases mitochondrial density. It enhances the body's ability to sustain prolonged efforts while preserving glycogen and reducing fatigue. To better understand the nature of Zone 2, we could compare it to Zone 1 trainings and see the differences.

Zone 2 HR trainings differs from Zone 1 HR trainings mainly in its intensity. While Zone 1 is hold at a pace allowing the subject to mantain a conversation in a comfortable manner by requiring them to hold their maximum heart rate in a range between 50% and 60% of the full capacity, Zone 2 makes holding a conversation more challengig by demanding a range between the 60% and the 70%. Because of this, the energy fuel used during both exercises is slightly different: both trainings rely mainly on the aerobic system to produce energy, but in Zone 2 there is a small amount of anaerobic metabolism that pushes lactate levels and clearance up to the lactate threshold. This leads us to speak of one of the main benefits of Zone 2: improvement on mitochondria flexibility and respiration capacity.

Mitochodrial flexibility is the capacity of the mitochondria to change between fat and carbohydrate oxidation in order to generate ATP. As the body gets used to the push on lactate levels, it starts transforming lactate into useful enzymes that can be used during aerobic metabolism in the mitochondria to produce a more efficent energy fuel. At the same time, mitochondria adapts by increasing density and efficiency, improving it's ability to generate ATP using fat, wwhich allows preserving glycogen for higher intensity exercise.

"Exercise can improve mitochondrial health by increasing mitochondrial content, increasing the transcriptional activity of mitochondrial proteins such as PGC−1α, and decreasing ROS production. A 16−week aerobic exercise program as an intervention in both men and women showed an increase in CS and cytochrome c oxidase of 45 and 76%, respectively, as well as an increase in the expression of genes involved in mitochondrial biogenesis, such as PGC1a (55%), NRF−1 (15%), and TFAM (85%)."

Smith, R. L., Soeters, M. R., Wüst, R. C. I., & Houtkooper, R. H. (2018). Metabolic Flexibility as an Adaptation to Energy Resources and Requirements in Health and Disease. Endocrine Reviews, 39(4), 489–517. https://doi.org/10.1210/er.2017-00211