

FREEDIVING AND HIIT

EFFECTS OF HIGH INTENSITY INTERVAL TRAINING ON FREEDIVING

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WHAT IS HIIT?

HIIT stands for **H**igh **I**ntensity **I**nterval **T**raining

- Bursts of intense exercise followed by an interval of low level activity (4-8 intervals)
- Exercises are varied: combining cardio and strength, simply running on the spot or cycling
- Anaerobic workout
- *High-intensity interval:*
 - Close to (80-95%) or even over (170%) our VO₂ max
 - It should be hard & sweaty
- *Low-intensity interval:*
 - Passive or active; if active: 50-70% of VO₂ max
 - Ratio to high-intensity interval varies from 1:1, 1:2 or in the more extreme workouts 1:0.5

HIIT BENEFITS

GENERAL

- Cardiovascular health is essential in maintaining fitness
- Diffusion of oxygen to muscle, muscle endurance due to high density of mitochondria and higher fatigue resistance

HOW DO I GET FIT?

- Combine aerobic, anaerobic and strength training
- Train all three muscle fibres

BENEFITS

- Anaerobic HIIT has a big impact on *both* aerobic and anaerobic capacity, and also trains strength.
 - Raises VO₂max
 - Prolonged fat burning after exercise = builds lean muscle
 - Tolerance to lactic acid
 - Muscle endurance and recovery
 - Good cardiovascular health

HIIT & FREEDIVING

GENERAL

- Aerobic and anaerobic capacity is important: in freediving we use both systems
- We start the dive aerobically; when the ratio between aerobic:anaerobic changes, the muscles stop relying on O₂ → lactic acid
- This can happen as part of the Dive Reflex (Vasoconstriction), with extended breathhold and kicking

AEROBIC CAPACITY

- High red blood cell count, high levels of haemoglobin, lower resting heart rate, high mitochondria count

→ efficient O₂ distribution to tissues, less O₂ consumption due to lower heart rate at start, healthy ventilation system means good gas exchange and longer endurance

Discussion point: mitochondria uses O₂ to create fuel for the muscles; a higher density means that we can work *longer* aerobically, better endurance and later onset of lactic acid

HIIT & FREEDIVING

ANAEROBIC CAPACITY

- A good anaerobic capacity means we can raise our lactic threshold (LT)
- Untrained individuals have a low threshold (55% of $VO_2\text{max}$) and top endurance athletes a high threshold (80-90% of $VO_2\text{max}$)
- In freediving we work our muscles anaerobically, so raising the threshold is beneficial
- HIIT raises the $VO_2\text{max}$ conditioning the body to remove lactate better, increasing the mitochondria count and tolerating high levels of lactic acid —> raises the LT
- We can freedive more efficiently and longer before lactic acid becomes unbearable

Discussion point: Excess Post Exercise Oxygen Consumption (E.P.O.C)

INTEGRATING HIIT INTO FREEDIVING TRAINING

ADVANTAGES

- Short time investment
- Varied exercise = doesn't get boring
- Accessible

DISADVANTAGES

- Intense workout
- Longer recovery times - don't perform more than 1-3 times a week
- High Post-Exercise Oxygen Consumption (E.P.O.C) up to 2hrs after exercising

KEEP IN MIND

- Warm up, Main, Cool down (no stretching)
- It should feel hard, you will be sweaty, you will be out of breath
- Raise your heart rate over your max calculated one (220-age) and give it you all
- After the third interval it should feel hard - ventilatory thresholds V1 & V2 —> V02 Max

CONCLUSIONS & QUESTIONS

- HIIT has a big impact on aerobic and anaerobic capacity with minimal time investment
- Varied exercise, that can be done anywhere at any level
- Increases lactic threshold, improves gas exchange, efficient distribution of O₂, lower resting heart rate (conserving O₂) and improves muscle endurance
- Can be a hard workout- difficult to keep up motivation
- Long recovery times

Debatable:

- High VO₂ max in itself- is it beneficial? Mitochondria density?
- Consider E.P.O.C for up to two hours after exercising