BE COMPLEAT

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100% science
100% data
Zero guessing

Test, don’t assume

Compleat BODY

Objective **monitoring of body composition and weight changes** is a key part of the process when working with dietitian.

What did we assess?

- skinfold thickness (sum of 6 and 8 sites, in mm)
- body circumferences
- height and weight
- arm span
- bone widths
- body fat % and muscle mass
- BIA analysis

ISAK protocol

	Value		Phantom Z-value
Mass	**67.1**	kg	-0.64
Stature	**177.6**	cm	
Sitting height	**92.0**	cm	-0.39
Arm span	**178.5**	cm	-0.18
Triceps sf	**4.6**	mm	-2.46
Subscapular sf	**7.2**	mm	-2.04
Biceps sf	**2.1**	mm	-2.99
Iliac crest sf	**7.1**	mm	-2.30
Supraspinale sf	**5.1**	mm	-2.35
Abdominal sf	**9.2**	mm	-2.13
Thigh sf	**6.4**	mm	-2.51
Calf sf	**5.7**	mm	-2.26
Arm girth relaxed	**30.1**	cm	0.84
Corrected arm girth	**28.7**	cm	2.83
Arm girth flexed and tensed	**33.2**	cm	1.01
Waist girth	**75.8**	cm	0.16
Hips girth	**89.8**	cm	-1.55
Thigh middle girth	**50.9**	cm	-0.97
Corrected thigh girth	**48.9**	cm	-0.14
Calf girth	**35.1**	cm	-0.70
Corrected calf girth	**33.3**	cm	0.86
Humerus breadth	**6.8**	cm	0.10
Bi-styloid breadth	**5.1**	cm	-1.15
Femur breadth	**8.9**	cm	-2.07

Somatotype (Heath-Carter)	Endomorphy	**1.5**	
	Mesomorphy	**4.1**	
	Ectomorphy	**3.4**	
Body Mass Index (BMI)		**21.3**	kg/m2
Waist/Hip ratio		**0.84**	
Sum of 6 skinfolds		**38.2**	mm
Sum of 8 skinfolds		**47.3**	mm
Fat percentage		**8.6**	(Slaughter)
		9.8	(Faulkner, from Yuhasz)
		6.6	(Carter, from Yuhasz)
Muscle percentage		**48.3**	(Lee)
		46.8	(Poortmans)
Bone percentage		**15.6**	(Rocha)

Body weight according to BMI - within the normal range.
WHR (waist-to-hip ratio) - within the normal range.
Muscle mass ~48%.
Body fat ~8%.
Higher fat distribution observed in the lower torso area (abdominal), with lower fat levels in the proximal upper limbs (biceps).
Sum of 8 skinfolds = 47.3 mm
Skeletal structure - large-framed (broad-boned).

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Compleat REST

This test is considered the “gold standard” for assessing human **metabolic rate**.
It is performed using **indirect calorimetry** method.
Basis of this method lies in the assumption that energy used by the body is obtained through oxidation of nutrients.
During these reactions, oxygen is consumed and carbon dioxide is produced in amounts proportional to the energy expended.
It is precisely the **analysis of gas exchange** that allows us to determine **number of calories your body burns at rest.**

Substrates use

Through resting metabolic rate test using **indirect calorimetry**, you will learn:

- What your **actual resting metabolic rate** is - not just an estimate based on formulas.
- Current state of your **metabolic health**.
- How your body utilizes **main energy substrates** (carbohydrates and fats).

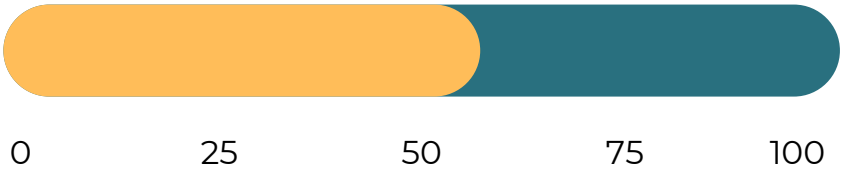
Energy sources

To produce energy required to maintain basic life functions and carry out daily activities, your body relies on mix of **fats and carbohydrates**.
High degree of **fat utilization** as an energy source is one of the most reliable indicators of cellular-level health and strong predictor of maintaining **stable body weight**.

Fat

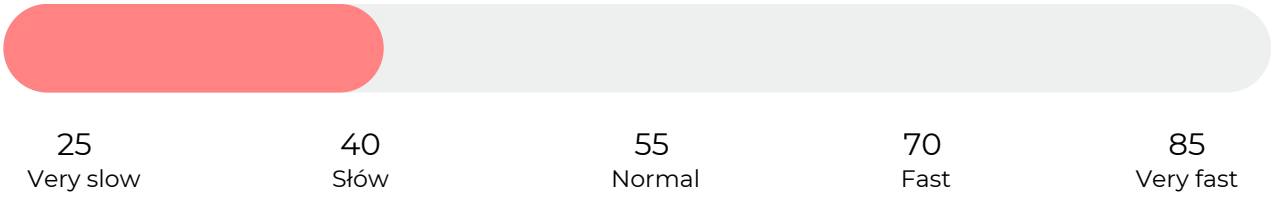
Carbohydrates

Your body is currently using mix of **57% fats** and **43% carbohydrates**.



Slow or fast metabolism?

Rate of your metabolism indicates whether your body burns fewer or more calories compared to standard accepted norms.
Chronic, low-energy diets can **slow down your metabolic rate**.
Strength training (increasing lean body mass) and/or increased calorie intake can **stimulate your metabolism**.
Slow metabolism leads to fewer calories burned daily and, consequently, potential difficulties with weight loss or maintaining **steady rate of weight loss**.



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Resting Metabolic Rate

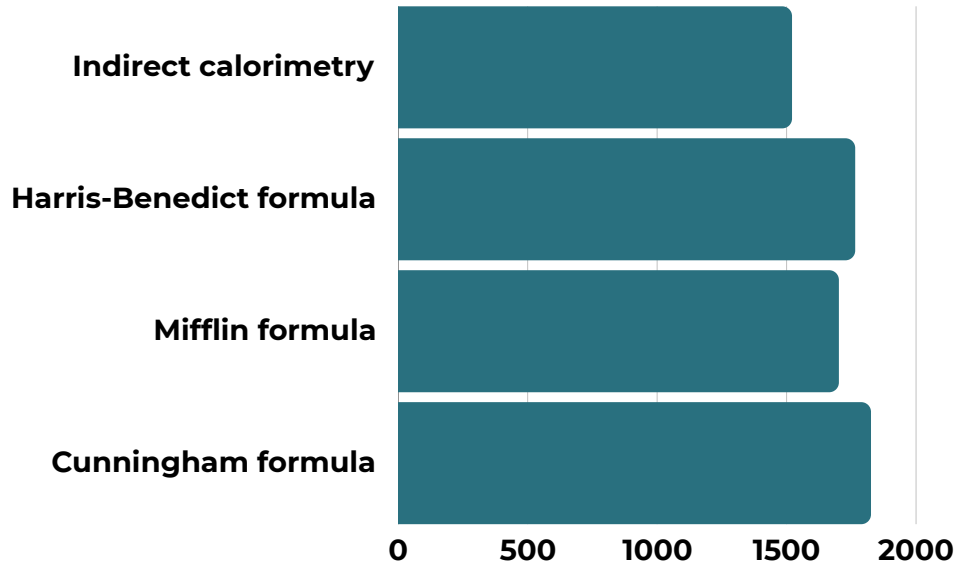
Your Resting Metabolic Rate:

1521 kcal

RMR according to **Harris-Benedict** formula — 1765 kcal

RMR according to **Mifflin** formula — 1702 kcal

RMR according to **Cunningham** formula — 1826 kcal



Your **resting metabolic rate** serves as the starting point for analyzing your **total daily energy expenditure**. To accurately determine **energy expenditure during exercise**, we analyze results of the **ACTIVE test**.

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Compleat ACTIVE

Combination of **spirometry** and cardiopulmonary exercise testing (**ergospirometry**) provides us with data on functioning of three key health systems: **cardiovascular, respiratory and metabolic**.

Analysis of results and progress monitoring allow for identification and addressing of factors limiting each of these systems.

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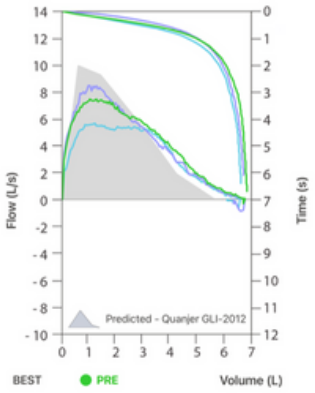
Spirometry test

Test allows the determination of **volumetric and flow parameters** that characterize your respiratory system. It is performed to assess your **respiratory efficiency** and is used in metabolic analysis to evaluate **respiratory performance during exercise**.

Best values from all loops

Parameter	Predicted	PRE	%Pred.	POST	%CHG
FVC (L)	5.64	6.89	122	-	-
FEV1 (L)	4.65	5.06	109	-	-
FEV1% (%)	82.94	73.44	89	-	-
PEF (L/s)	9.92	11.83	119	-	-



Parameter	LLN	Predicted	PRE #1	%Pred.	PRE #2	PRE #3	POST	%Pred.	%CHG	Z-Score
FVC (L)	4.55	5.64	6.89	122	6.75	6.65	-	-	-	1.87
FEV1 (L)	3.72	4.65	5.06	109	4.91	4.64	-	-	-	0.75
FEV1% (%)	71.88	82.94	73.40	89	72.70	69.80	-	-	-	-1.43
PEF (L/s)	6.50	9.92	7.54	76	8.56	5.67	-	-	-	0.92
FEF25-75 (L/s)	2.96	4.73	4.15	88	3.81	3.73	-	-	-	-0.50
FET (s)	-	6.00	6.86	114	6.27	6.53	-	-	-	-
ELA (years)	-	28	28	100	28	29	-	-	-	-

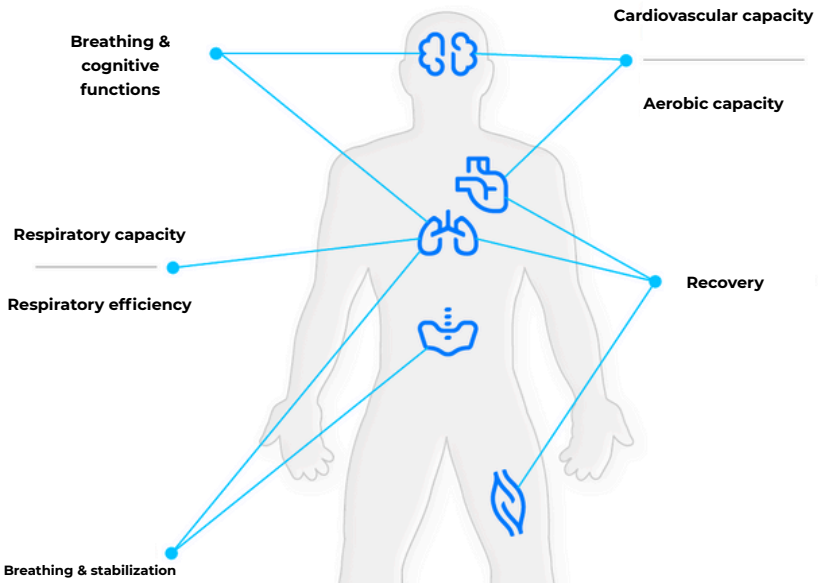
FVC - 6.89 liters or 122% of the norm for age, gender and race

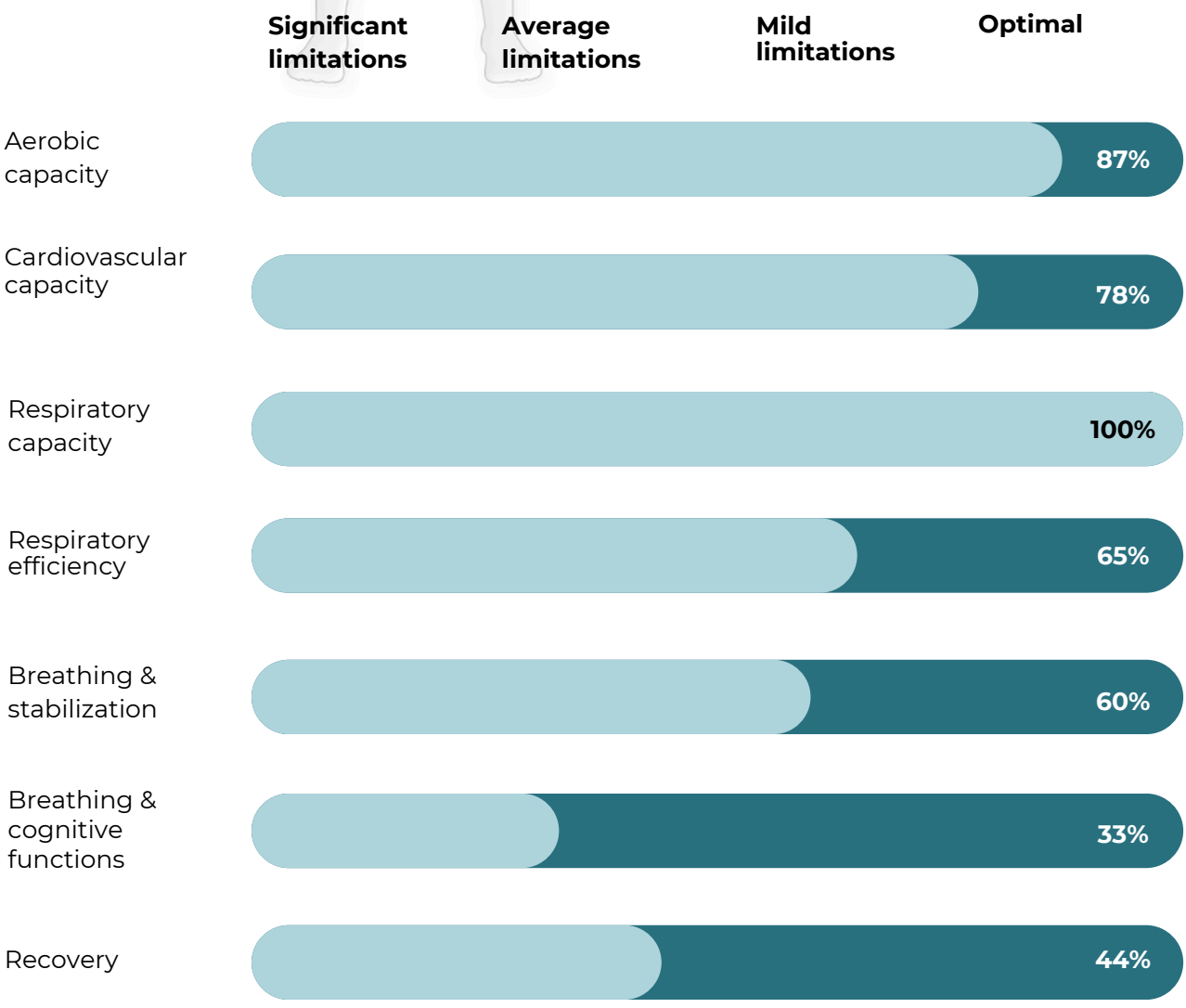
FEV1 - 5.06 liters or 109% of the norm for age, gender and race

FVC (forced vital capacity) – maximum volume of air exhaled with maximal effort after taking the deepest possible inhalation.

FEV1 (forced expiratory volume in one second) – volume of air exhaled during the first second of forced exhalation.

Overview


Breathing & cognitive functions
Cardiovascular capacity
Aerobic capacity
Respiratory capacity
Respiratory efficiency
Recovery
Breathing & stabilization


Significant limitations
Average limitations
Mild limitations
Optimal
Aerobic capacity
87%
Cardiovascular capacity
78%
Respiratory capacity
100%
Respiratory efficiency
65%
Breathing & stabilization
60%
Breathing & cognitive functions
33%
Recovery
44%

Indicators

Aerobic capacity

This indicator reflects body's ability to tolerate physical effort. **Aerobic capacity** is one of the best markers of **overall health** and strong predictor of potential **cardiovascular disease development**. Value of the indicator is based on **VO_2Peak** – peak oxygen uptake, or the maximum amount of oxygen consumed per kilogram of body weight per minute during the test.

Sedentary lifestyle, lack of cardiovascular-supporting activity and excessive focus solely on strength training can **impair aerobic fitness**.
Cardio training and interval training can effectively **improve aerobic capacity**.

VO2 max norms ml/kg/min

age	very poor	poor	sufficient	good	very good	great
13-19	<35.0	35-38.3	38.4-45.1	45.2-50.9	51.0-55.9	>55.9
20-29	<33.0	33-36.4	36.5-42.4	42.5-46.4	46.5-52.4	>52.4
30-39	<31.5	31.5-35.4	35.5-40.9	41.0-44.9	45.0-49.4	>49.4
40-49	<30.2	30.2-33.5	33.6-38.9	39.0-43.7	43.8-48.0	>48.0
50-59	<26.1	26.1-30.9	31.0-35.7	35.8-40.9	41.0-45.3	>45.3
60+	<20.5	20.5-26.0	26.1-32.2	32.3-36.4	36.5-44.2	>44.2

Źródło: American College of Sports Medicine

Cardiovascular capacity

This indicator represents the ability of **cardiovascular system** (heart, blood vessels and blood) to **efficiently deliver oxygen**. It shows whether cardiovascular system may be a potential limiting factor for optimal body function and training quality.
Value is based on **VO_2Peak** (compared to reference values for individuals of the same sex and age) and trend of the oxygen pulse (**VO_2/HR**) – amount of oxygen used per heartbeat during progressively increasing exercise intensity.

Low VO_2Peak combined with declining oxygen pulse during the test results in poorer cardiovascular fitness score.

Sedentary lifestyle, lack of cardiovascular-supporting activity and excessive focus solely on strength training **negatively affect** cardiovascular performance.
Cardio training and interval training can help **improve it**.

Indicators

Respiratory capacity and efficiency

This indicator reflects the efficiency of **respiratory system** (lungs, respiratory muscles, mobility of the rib cage and chest) in **effectively delivering oxygen**. It shows whether respiratory system may be a potential limiting factor for optimal body function and training quality.
Value is determined based on the analysis of:

1.**Respiratory capacity**, assessed during spirometry:
a. Maximum amount of air exhaled after the deepest possible inhalation (FVC – Forced Vital Capacity)
b. Maximum amount of air exhaled in the first second of a forced breath (FEV1 – Forced Expiratory Volume in 1 Second)
2.**Respiratory efficiency**, meaning the ability to utilize lung capacity effectively during exercise. This is evaluated using two indicators during the test:
a. **Tidal Volume** – amount of air inhaled and exhaled during normal, relaxed breathing
b. **Breathing Frequency** – number of breaths taken per minute

Low values of FVC and FEV1 (compared to normative standards) will result in **lower respiratory capacity** score.

Low level of lung volume utilization during the ACTIVE test =, along with tendency toward fast, shallow breathing, will **negatively affect the respiratory efficiency** rating.

Targeted breathing exercises, combined with aerobic and interval training, are the most effective methods for **improving this indicator**.

Breathing & cognitive functions

Excessively high breathing frequency (**hyperventilation**) leads to a state of reduced partial pressure of carbon dioxide in the blood (**hypocapnia**). As a result, blood vessels in the brain constrict, limiting the amount of oxygen delivered to the brain and negatively affecting cognitive functions (e.g., the ability to think and react quickly). This indicator reflects the impact of breathing frequency on the carbon dioxide levels in the blood.

The assessment is based on the analysis of two parameters:

- **Breathing frequency** (BF) across different intensity zones during exercise
- Amount of **carbon dioxide** exhaled during the test

Excessive breathing frequency (**hyperventilation**), occurring in one or more intensity zones, combined with low levels of exhaled carbon dioxide, results in a **lower score**.
More than 10% of the population suffers from **chronic hyperventilation** without being aware of it. Performing appropriate breathing exercises, focused on frequency and depth of breath, combined with aerobic and interval training, is the most effective way to **improve this indicator**.

Indicators

Breathing and stabilization

This indicator reflects how breathing patterns influence **spinal stability, limb strength and posture**. It is based on the value of **tidal volume** (VT) - amount of air inhaled and exhaled with each breath during the test.

Low tidal volume breathing **can reduce** spinal stability, impairing the ability to generate power and maintain proper posture.

Low **tidal volume** (VT) relative to **FEV1** results in a lower score. Low VT combined with hyperventilation can also be a predictor of musculoskeletal dysfunction, such as lower back pain.

Performing targeted breathing exercises focused on breath depth is an effective way to **improve this indicator**.

Recovery

This indicator reflects your ability to recover after intense physical exertion. The assessment is based on two variables.

1. Cardiovascular recovery - percentage by which **heart rate decreases during the first minute of recovery phase** of the test, relative to the baseline heart rate (average heart rate during warm-up phase) and the maximum heart rate (highest heart rate during the test).

2. Total recovery - percentage by which **VCO_2** (amount of exhaled carbon dioxide) **decreases during the first two minutes of recovery phase** of the test, relative to the baseline VCO_2 level (average VCO_2 during the warm-up phase) and the maximum VCO_2 level (highest VCO_2 during the test).

Recovery ability is directly related to **cardiorespiratory fitness** and **metabolic flexibility**. Small decrease in heart rate during the first minute of recovery phase and a low reduction in VCO_2 during the first two minutes of recovery phase of the test will result in **lower recovery score**.

Aerobic and interval training, along with breathing exercises (if indicated after prior analysis), will positively affect the **improvement of this indicator**.

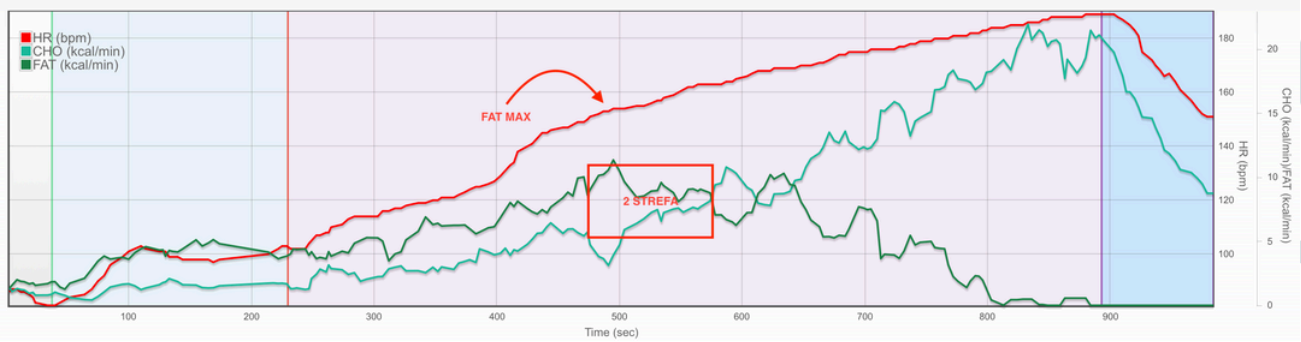
Energy substrates used

Heart Rate	VOL L/min	Kc/L O2	Kc/min	Calories / hour	% Fat	% Carbs
190	4060.16	0.0051	20.62	1237.37	1.62	98.38
185	3998.08	0.005	19.9	1194.04	10.4	89.6
180	4039.31	0.0049	19.85	1190.94	27	73
175	3749.49	0.0049	18.35	1101.26	32.11	67.89
170	3645.57	0.0048	17.63	1057.59	49.77	50.23
165	3445.19	0.0048	16.7	1001.84	46.42	53.58
160	3256.58	0.0048	15.67	940.26	57.41	42.59
155	3093.88	0.0048	14.78	887.02	66.45	33.55
150	2926.87	0.0048	14.06	843.89	59.43	40.57
145	2775.63	0.0048	13.4	803.98	52.01	47.99
140	2711.97	0.0048	13.01	780.35	61.53	38.47
135	2417.98	0.0048	11.54	692.62	68.11	31.89
130	2104.64	0.0048	10.1	606	62.32	37.68
125	1980.7	0.0048	9.47	567.93	67.34	32.66
120	1639.4	0.0048	7.83	469.98	62.28	37.72
115	1461.6	0.0048	6.99	419.32	64.9	35.1
110	1375.2	0.0048	6.61	396.39	61.4	38.6
105	1211.28	0.0048	5.77	346.3	71.29	28.71
100	1310.68	0.0048	6.24	374.33	71.8	28.2
95	1282.48	0.0047	6.06	363.42	83.92	16.08
90	551.82	0.0047	2.59	155.69	81	19
85	500.68	0.0048	2.42	145.12	51.37	48.63

Low level(~57%) of fat utilization as an energy substrate in Zone 2.
Higher level of fatty acid utilization at the beginning of Zone 2 (~59%, HR 150), **lower** at the end of Zone 2 (~46%, HR 165).

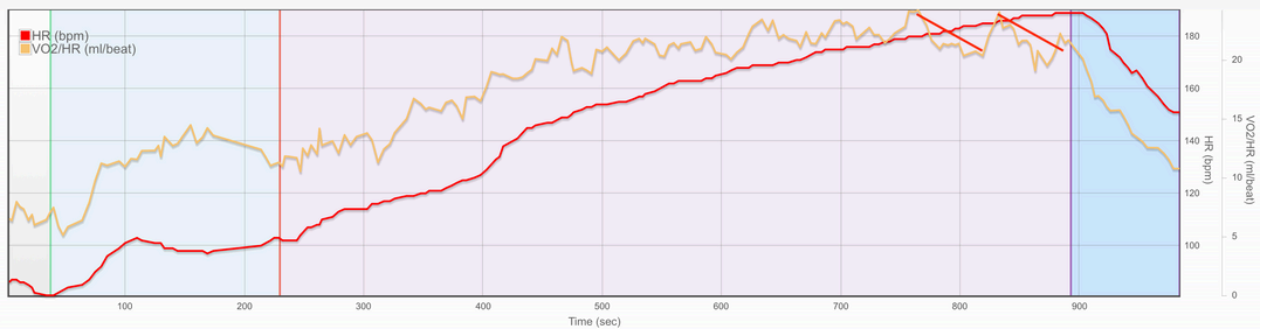
Summary

Metabolic system



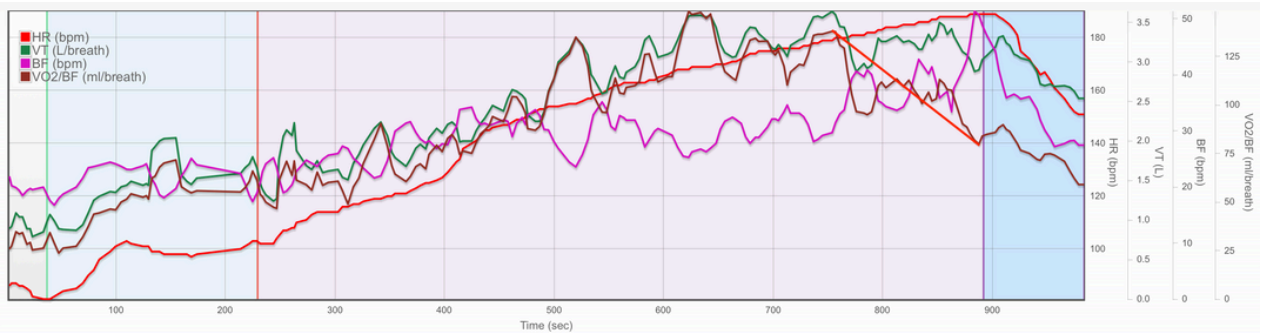
FAT-MAX at heart rate of 154 bpm.
Underdeveloped Zone 2 in terms of energy substrate utilization (high level of carbohydrate utilization).

Cardiovascular system



Normal, linear increase in heart rate, adjusted to the increasing exercise intensity. Proper increase in the **VO_2/HR** index (oxygen consumption and utilization per heart beat) up to Zone 3. Observed drops and increases after transitioning to Zone 4 (HR 180 and HR 186).

Respiratory system



Increased breathing frequency (**hyperventilation**) during work in Zones 1 and 2, optimal during work in Zones 3 and 4 and decreased (**hypoventilation**) during work in Zone 5.
Gradual decrease in trend of oxygen uptake with increasing breathing frequency (**VO_2/BF**) from Zone 4 (HR 179), continuing through Zone 5 until the end of the test.

Indicators and trends

	UNIT	01.01.25
VO_2PEAK	ml / min / kg	**51**
VENTILATORY COMPENSATION POINT (RCP)	bpm	**184**
ANAEROBIC TRESHOLD (VENTILATORY)	bpm	**163**
FAT-MAX	bpm	**154**
VT (MAX)	l	**3.64**
BF (MAX)	breaths / min	**51**
VE (MAX)	l / min	**134**
RER (MAX)	VCO_2 / VO_2	**1.1**

VO_2Peak
Peak oxygen uptake value, expressed in ml / kg / min, that was achieved during the test.

Ventilatory compensation point (RCP)
Point during physical exertion at which body is no longer able to buffer accumulating metabolites with acidic pH.

Fat-max
Intensity level of exercise at which the highest degree of fat utilization as an energy substrate occurs.

Tidal volume(VT)
Volume of air exchanged with the environment during each breathing cycle (l/breath).

Breathing frequency (BF)
Number of breaths taken per minute.

Ventilatory efficiency (VE)
Volume of air that flows through the lungs in one minute.

Respiratory exchange ratio (RER)
Ratio of the CO_2 exhaled to the amount of VO_2 consumed. It reflects changes in energy systems.

Ventilatory treshold (VTI)
Level of exercise intensity, beyond which anaerobic energy production begins to progressively contribute to energy production.

Training zones

	TYPE OF TRAINING	HR RANGE	VELOCITY (KM/H)	DESCRIPTION
ZONE 5	Interval, repetitive training (15-90 seconds)	**>184 BPM**	**>15**	Lactate zone. Submaximal and maximal intensity. Developing strength and speed endurance.
ZONE 4	Moderate-high intensity interval / repetitive training	**178 - 184 BPM**	**14 - 15**	Developing strength endurance, medium- and short-term. Improving body's buffering capacity.
ZONE 3	Moderate intensity interval / tempo training	**163 - 178 BPM**	**11 - 14**	Developing medium- and long-term endurance. Increasing maximum oxygen uptake, strengthening cardiovascular system and improving lactate transfer.
ZONE 2	Low intensity aerobic training	**151 - 163 BPM**	**10 - 11**	Improving or maintaining aerobic fitness. It promotes fat burning, increases mitochondrial density and enhances capillarization.
ZONE 1	Active recovery	**141 - 151 BPM**	**8 - 10**	Improvement of body's ability to use free fatty acids as an energy source, with increased oxygen delivery to the muscles supporting active recovery.

Summary

Compleat REST

- Predominance of fat utilization over carbohydrates (57% fats, 43% carbohydrates) as an energy substrate at rest. Optimal percentage ratio of fat to carbohydrate utilization is approximately 70/30.
- Optimal resting heart rate – 67 beats per minute.
- Variable resting respiratory rate averaging 7–16 breaths per minute (6–12 breaths per minute is within the normal range).
- Variable tidal volume ranging from 0.49 to 1.48 L per breath (~0.54 L is considered optimal).
- Resting Metabolic Rate is lower than estimated by formulas (1521 kcal).

Compleat ACTIVE

- In spirometry test, lung vital capacity (FVC – 6.89 L, i.e., 122% of the norm) and FEV1 (5.06 L, i.e., 109% of the norm) were achieved at above-average levels.
- During the ACTIVE test, maximum tidal volume reached 3.64 L, which is 72% of FEV1 (optimal peak volume is considered to be 75–85% of FEV1).
- Zone 2 is poorly developed in terms of energy substrate utilization – high reliance on carbohydrates.
- Fat Max occurred at 154 bpm – point of highest fat utilization efficiency.
- Increased respiratory rate (hyperventilation) was observed during exercise in zones 1 and 2, optimal in zones 3 and 4 and decreased (hypoventilation) in zone 5.
- Noticeable drop in oxygen uptake relative to respiratory rate was observed from zone 4 (HR 179), continuing through zone 5 until the end of the test.

Recommendations

- Body composition – maintain current body weight and composition, with the option of a slight muscle gain (target +1-2kg of muscle mass).
- Breathing – practice diaphragmatic breathing at rest. The goal is to use this technique both at rest and during low-intensity training (zones 1 and 2).
- Use of the Pro Metronome app to develop an optimal resting respiratory rate.
- Pay attention to proper respiratory function during physical activity – breathing rate and depth should match the intensity of the effort, with special focus on frequency.
- Update training zone data and regularly monitor training sessions using measurement devices (heart rate monitor on chest or smartwatch).

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Breathing

Breathing training (rest, zone I & II)

At rest:

- focus on breath depth, approx. 6–12 breaths/min

During training:

- Zone I / active recovery – focus on breath depth, approx. 18–22 breaths/min
- Zone II – focus on breath depth, approx. 22–26 breaths/min

Use the PRO Metronome app to monitor breathing frequency:

Download the app:

- **Apple:**
- https://apps.apple.com/us/app/pro-metronome-tempo-beat-subdivision-polyrhythm/id477960671

- **Google:**
- https://play.google.com/store/apps/details?id=com.eumlab.android.prometronome&hl=pl&gl=US