GNB: CANDIDATE PREREQUISITES

SEPTEMBER 12TH 2023

PREREQUISITE TO FACE THE HANDS-ON SESSION IN RESPIRATION

SKILLS	DESCRIPTION
Programming	• Basic knowledge of data analysis
Web app	Oxynet: https://oxynetresearch.promfacility.eu/#/
Data Management	• Ability to check data
Data Visualization	• Creation of graphs
Communication	Ability to communicate results in a clear and precise manner with the aim of highlighting the results produced.

CHALLENGE PROPOSALS - TASKS

Preamble
The assignment consists of the analysis of a cardiopulmonary exercising test.

In particular the data to be analyzed referred to a test registered with the wearable metabolic system COSMED K5, and exported as an Excel by the software OMNIA, associated to the system. The maximal incremental exercise testing is commonly used to determine peak and submaximal physiological and metabolic variables and parameters. Oxygen consumption is usually reported as milliliters of oxygen and possibly converted in kcal or Joule as follows:
1 L O2 ≃ 5 Kcal
1 L O2 ≃ 21 KJ

The same test will be provided in five different version; only one is the correct one that the web app is capable of adequately process.

The system requires a prior calibration related to flow (to compute ventilation), ambient air (usually close to 20.9%, to set the Fraction of Inspired Oxygen: FiO2), and a reference gas calibration (to set the readings with a gas of a known composition). Data required for the inference include oxygen uptake (VO2), exhaled CO2 (VCO2), minute ventilation (VE), end tidal O2 (PetO2) and CO2(PetCO2), and ventilatory equivalents (VEVO2 and VEVCO2).
Ventilation (VE) is the product of Respiratory frequency (Rf) × Tidal Volume (VT).

The total score is 10.

You can send the results at the following link: GOOGLE FORM

TASKS	DESCRIPTION	TIME	SCORE
Check	Upload and analyze the 5 files on the Oxynet platform	~5'	-
Register	Register the results **expected outcome:** - maximal oxygen consumption (VO2 max: ml/min/kg)	~5'	1

	- Ventilation (VE: l/min) at the first and second ventilatory threshold		
Compute and answer	Look at the excel file for the first and second respiratory threshold as estimated by the online platform (variable: time) expected outcome: - Respiratory frequency (Rf) at the Ist and IInd respiratory threshold - Tidal volume (Vt) at the Ist and IInd respiratory threshold - Percent increase of ventilation (VE), heart rate (HR), Rf and Vt from Ist to IInd ventilatory threshold	~15'	3
Answer	1) Basing on the requirements of the online tool and from the setting of the calibration, what are the problem in the wrong 4 files? 2) What are the absolute and percent increments from the lowest to the highest values of Rf, Vt and HR during exercise? 3) If the participant weighed 90 kg, what would be his maximal energy consumption (in J/min)?	~10'	4
Create a graph	Create a graph from raw data using your preferred software expected outcome: Smoothed curve of VO2 (ml/kg(min) by time, marking Ist and IInd ventilatory threshold	~10'	2
TOTAL		~45'	10