

Science Ceilidh Resource Pack

A Running Guide What's behind our body?



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AVAILABLE AT:

WWW.SCIENCECEILIDH.COM/PLACEMENTRESOURCES#RUNNING-GUIDE

What's behind our body?

Introduction

Do you have the habit of regular jogging?
Have you ever experienced feeling tired and exhausted after a long running race?
Running sounds simple, in fact your body works so hard to optimize your performance during exercise!

You need three things when running:

Glucose, Oxygen and Energy

Interested about what is going on inside your body? Check them out in this resource!

Key Points

1. Recognize aerobic and anerobic respiration as the means to generate energy during running
2. Recognize how our heart and lungs function and coordinate in order to optimize your performance
3. Understand the benefits (both physically and mentally) of running and jogging
4. Appreciate the benefits of regular exercise to promote well-being



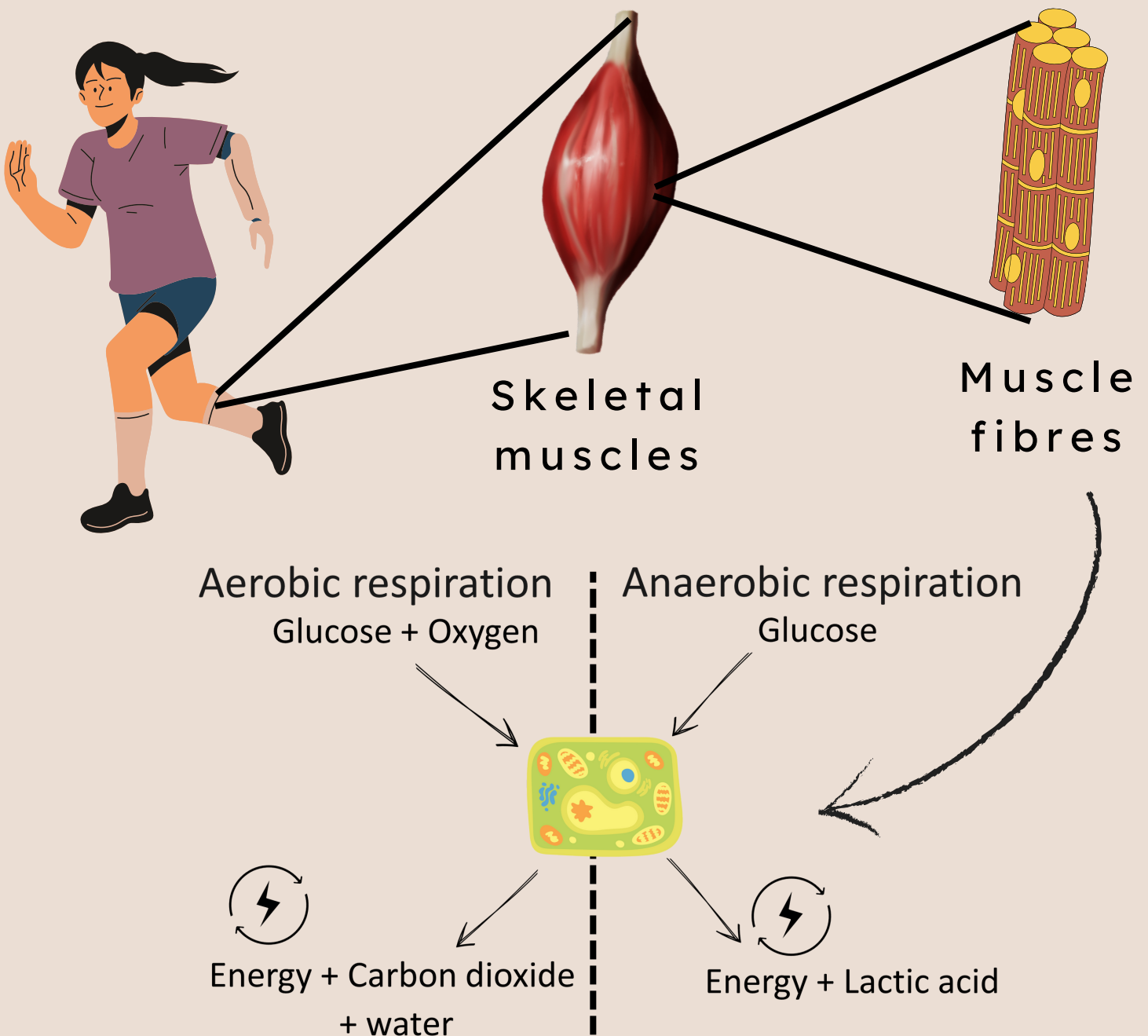
Energy Production

When you run, your skeletal muscles actively produce energy by **cellular respiration**.

There are two types of respiration:

Aerobic respiration: the generation of energy in the presence of oxygen

Anaerobic respiration: the generation of energy in the absence of oxygen



Aerobic vs Anaerobic Respiration

	Aerobic respiration	Anaerobic respiration
Oxygen requirement	Needs oxygen	Without oxygen
Oxidation of glucose	Complete	Incomplete
By-products of respiration	Carbon dioxide, water	Lactic acid in skeletal muscles
Amount of energy produced	Relatively large amount	Small amount

Aerobic respiration is useful particularly for:



Marathon



Cycling

Anaerobic respiration is useful especially for:

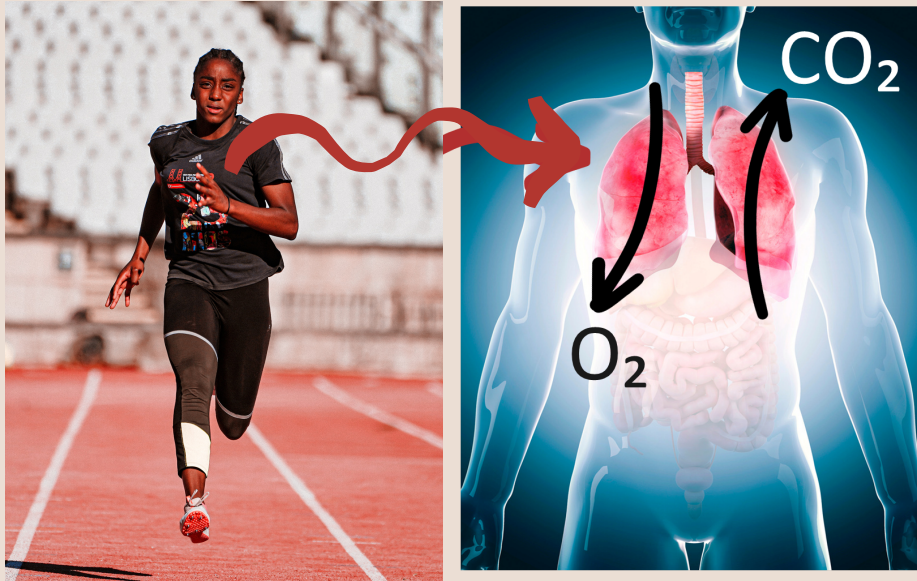


Weightlifting



Sprinting

Lungs: breathing more



During exercise, your lungs bring oxygen into the body and remove carbon dioxide, the waste product produced from respiration. To cope with the extra demand, your breathing has to increase from about 15 times a minute (12 litres of air) when you are resting, up to about **40-60 times a minute (100 litres of air)** during exercise.

Heart: A powerful pump

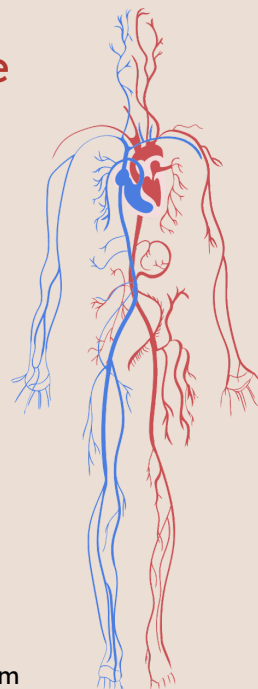
Well-trained marathon runners' hearts can pump up to 40L of blood per minute against the usual 5L so as to supply oxygen-rich blood to body cells, in particular skeletal muscles.

American Heart Association Recommendation:

Target Heart Rate = **50%-85% of Maximum Heart Rate**

Maximum Heart Rate = **220 beats per minute (bpm) - your age**

Age	Target HR Zone 50-85%	Average Maximum Heart Rate, 100%
20 years	100-170 beats per minute (bpm)	200 bpm
30 years	95-162 bpm	190 bpm
35 years	93-157 bpm	185 bpm
40 years	90-153 bpm	180 bpm
45 years	88-149 bpm	175 bpm
50 years	85-145 bpm	170 bpm
55 years	83-140 bpm	165 bpm
60 years	80-136 bpm	160 bpm
65 years	78-132 bpm	155 bpm
70 years	75-128 bpm	150 bpm



Benefits of Running



Stay in Shape

Running involves your major muscles in your body, and help you burn lots of calories



Relieves Stress

Aerobic exercise e.g. running reprogrammes your brain to increase serotonin and norepinephrine, to generate new neurons and create resilience to stress



Improves Physical Health

Running helps improve your cardiovascular fitness and build up your muscles, which brings lifelong benefits

Improves Mental Health

Running helps your sleep and psychological functioning, increases your confidence and better focus



Take home messages

- You need oxygen, energy and water during running
- Energy is produced by aerobic respiration (especially for marathon) and anaerobic respiration (for short-distance sprinting)
- During running your lungs breathe more air to bring oxygen and remove carbon dioxide faster
- Your heart also pumps faster and increases the heart rate
- Running can benefit your physical as well as mental wellbeing



Useful Resources

Marathon Handbook

<https://marathonhandbook.com/>

Runner's World

<https://www.runnersworld.com/uk/>

Run Oxford

<https://runoxford.com/index.html>

Park Run

<https://www.parkrun.org.uk/>



Why not start going out and exercise?

Notes (Or Running journals!)

