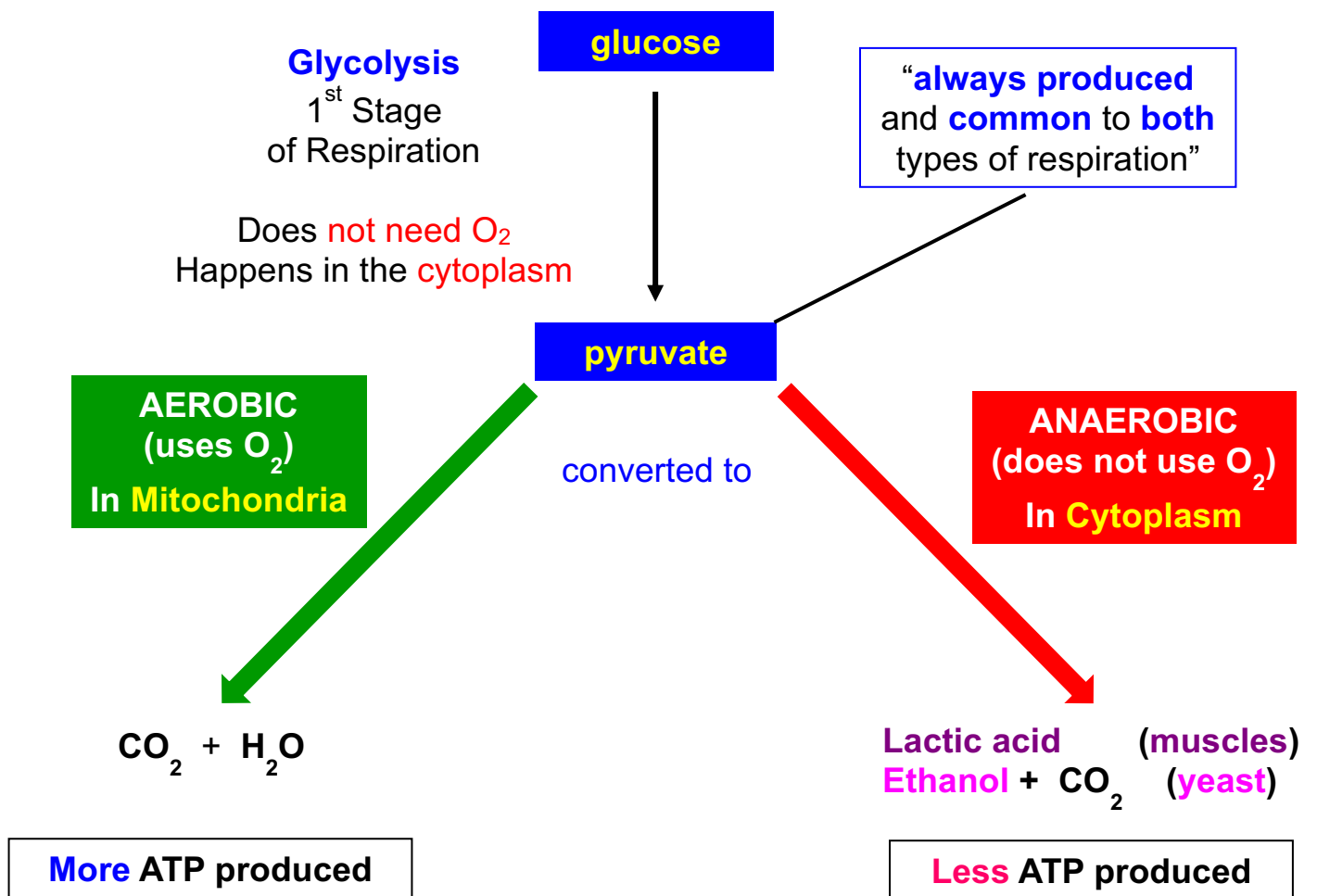


A. DEFINITION

Respiration is:

The **controlled** release of **energy** from **organic** compounds to produce **ATP**

B. TYPES OF RESPIRATION

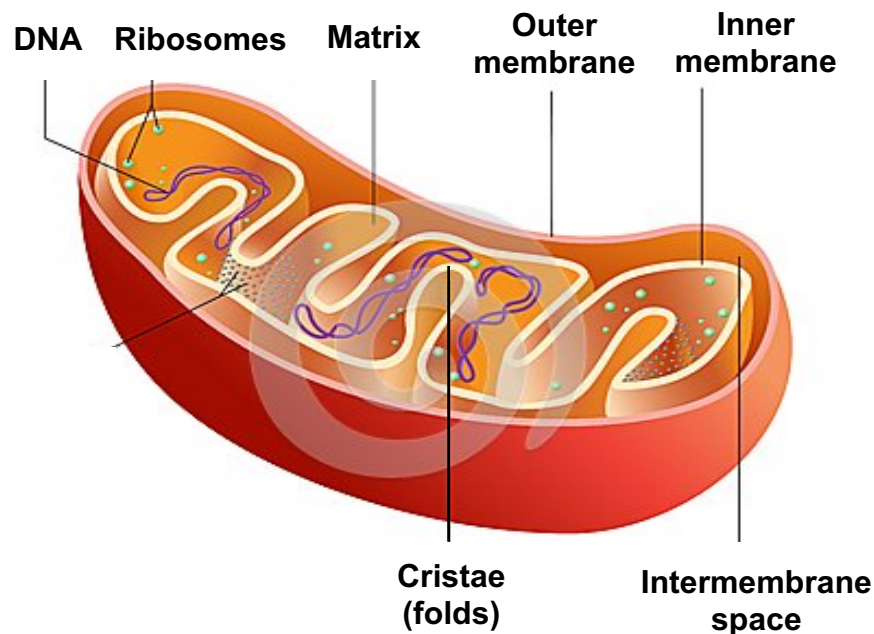


'Compare & Contrast' Table

Aerobic Respiration	Anaerobic Respiration
Similarities	
use glucose	
use glycolysis	
produce ATP	
produce pyruvate	
Differences	
requires oxygen	does not require oxygen
produces CO ₂ and water	produces ethanol and CO ₂ in yeast / lactic acid in animals
(can) use lipids	does not use lipids
produces more <u>ATP</u> (per glucose)	produces less <u>ATP</u> (per glucose)
(some stages) occur in mitochondria	does not occur in mitochondria / only occurs in the cytoplasm

C. MITOCHONDRION

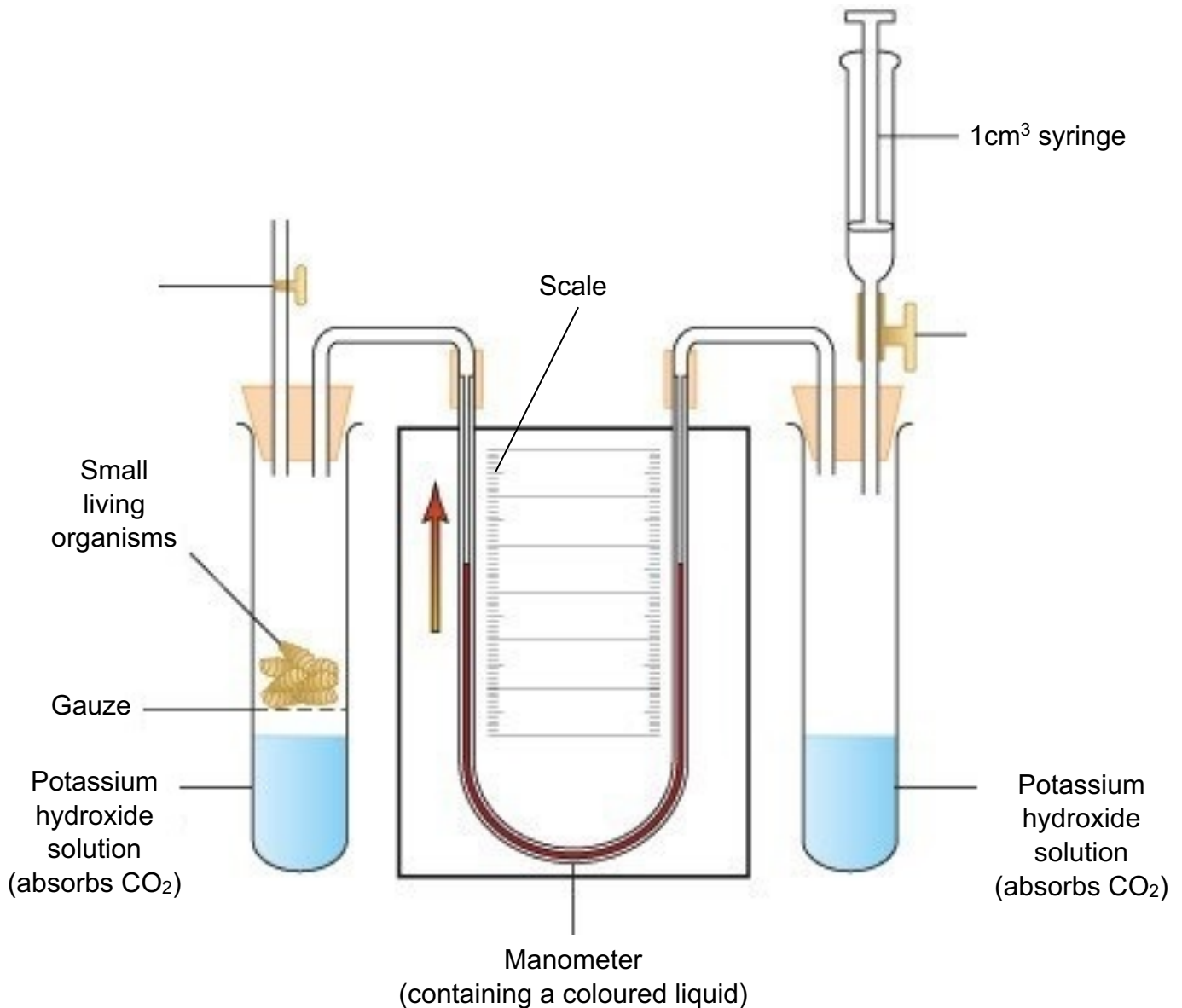
- Aerobic respiration mainly occurs in **mitochondria**.



- Most** of the **ATP** is produced at the **cristae**, which contain **respiratory enzymes**.

D. RESPIROMETERS AND RESPIRATION RATES

- Used to measure the **rate of respiration** of living organisms.



- Living organisms are placed in a **sealed glass container**.
- As the animals respire they would **use O₂**, **decreasing** its **volume** and **pressure** in the tube.
- The **suction** created will draw the liquid **towards** them (**upwards**).
- However, they would also **produce CO₂**, which would move this liquid **away from them (down)**.
- Potassium hydroxide** (alkali) is added to the tube, which **absorbs CO₂**.
- This ensures that any **change in volume** is **only due** to the **volume of O₂ consumed**, so the liquid will **only move towards them (up)**.
- The **greater the distance** the liquid moves towards them, the **greater the rate of respiration**.

- The **temperature must be kept the same** throughout as it **affects the rate of respiration** due to **decreased or increased enzyme activity**.
- Rate of respiration = **mm of liquid** moved per **unit time** per **g** of organism.

Ethics of doing this

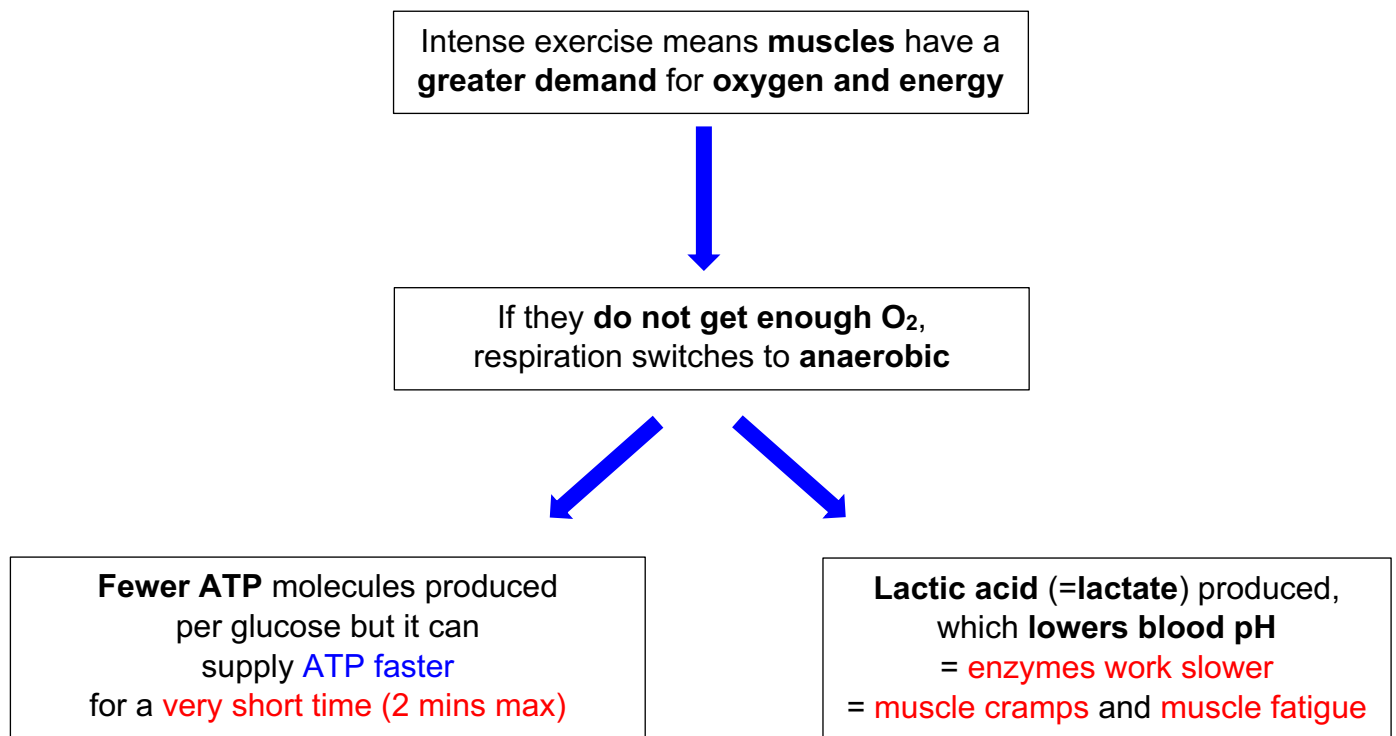
- Will animals suffer **stress** or **pain**?
- Are there **unacceptable risks** to the animals e.g. touching the potassium hydroxide?



- Are animals **taken out of their natural habitat**? If so, **will they be put back**?
- Is it necessary to use animals **rather than plants**, such as germinating seeds?

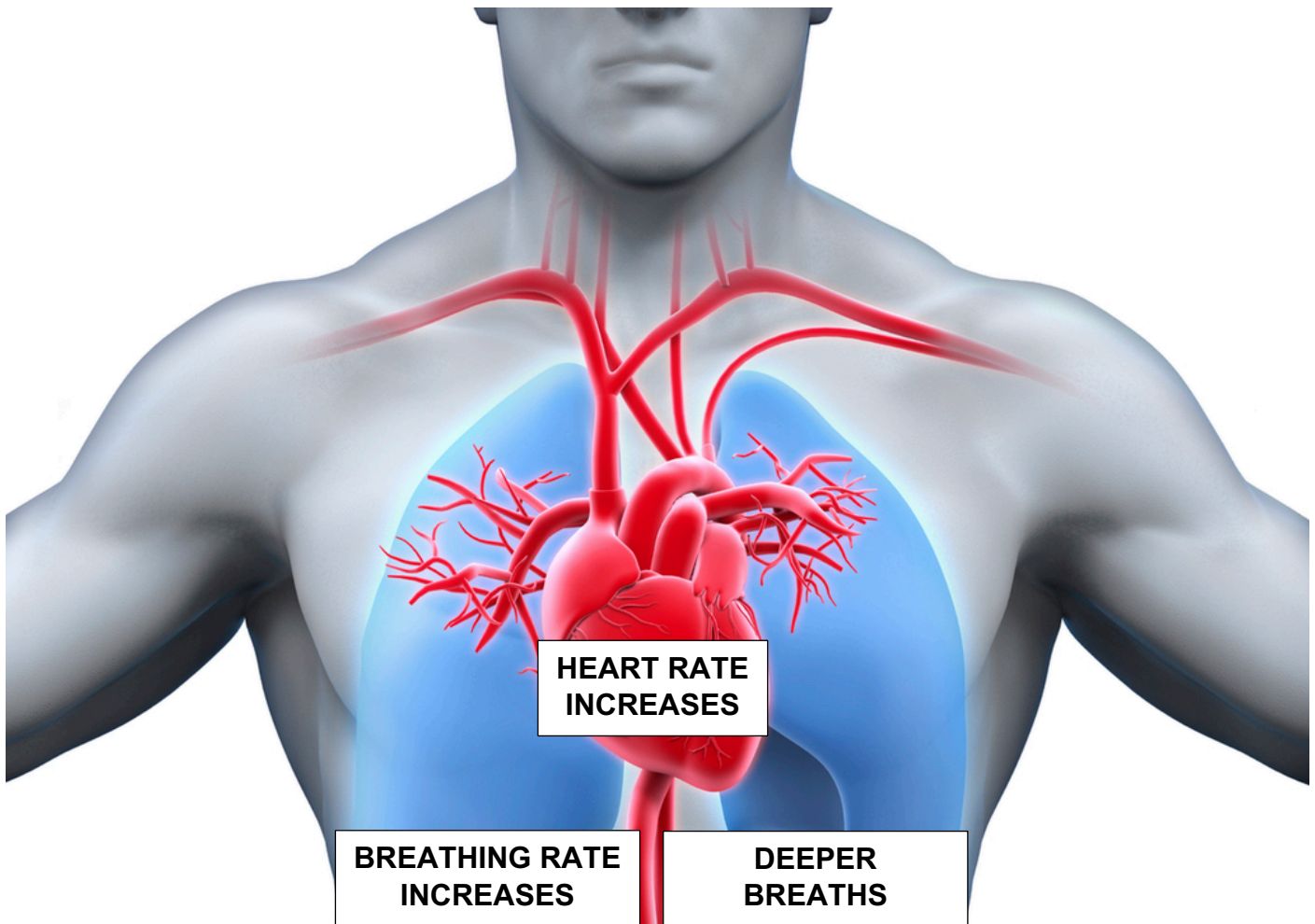
E. ANAEROBIC RESPIRATION IN MUSCLES

Intense exercise



- When a person slows down, **oxygen** is **first used** to **breakdown the lactic acid** by **aerobic respiration**, which has **built up** in **muscles**.
- The **amount** of **oxygen** needed to **breakdown the lactic acid** is called the **oxygen debt**.
- If a **large amount** of **lactic acid** is present in muscles, it can be taken to the **liver** via the **blood** and **broken down** by **aerobic respiration**.

F. ADAPTATIONS DURING INTENSE EXERCISE



- **More oxygen** enters the **blood**;
- **More oxygen** to **cells/tissues/organs**;
- (For) **aerobic** respiration;
- (As) **muscles** have a **greater demand** for **energy**;
- **More lactic acid** taken to **liver**;
- **More oxygen** taken to **muscles/liver**;
- (So) **lactic acid** broken down faster / **faster aerobic respiration** of **lactic acid**;
- (Also) **more** (toxic) **carbon dioxide** removed (from body);

G. USING ANAEROBIC RESPIRATION IN BAKING AND BREWING

- The fungus **yeast** is used.

Baking bread



CO₂ bubbles make the dough **rise**.

This makes the dough **less dense**.

The dough then **increases in volume**.

The **ethanol evaporates**.

Brewing alcohol



Yeast is given a source of **sugar**,
such as **grape juice**.

Yeast is grown in a container in the
absence of oxygen so that it **respires**
anaerobically.

The container **allows CO₂ to escape** so
that it does **not build up** and **kill** the yeast.

If the **alcohol** content rises to over **15%**, it
will **kill** the yeast and stop this process.