Anaerobic respiration is the process of creating energy without the presence of **oxygen.** Sometimes the body can't supply the muscles with the oxygen it needs to create energy – such as in a sprinting situation. Without the process of anaerobic respiration there may be no energy supplied to muscles in times of high demand.

Process of Anaerobic Respiration

Without the presence of oxygen, the electron transport chain **(ETC)** cannot continue as there is no terminal electron acceptor. Therefore the usual number of ATP molecules cannot be created. Cessation of the ETC leads to reduced activity of the reactions before this step, such as the Krebs cycle and glycolysis. The anaerobic pathway utilises pyruvate, the final product of glycolysis.

Without the functioning ETC there are an excess of **NADH** and pyruvate. Pyruvate is subsequently reduced to lactate (lactic acid) by NADH, leaving NAD+ after the reduction. This reaction is catalyzed by the enzyme lactate dehydr**ogenase.** This essentially leads to the recycling of NAD+.

By recycling NAD+ the process of **glycolysis** is able to continue as the NAD+ 'stock' has been replenished. The glycolysis pathway produces 2 net ATP molecules which can be used for energy to drive muscular contraction etc. The 2 ATP molecules is much less than would be produced by aerobic respiration, it is necessary as

without anaerobic respiration there would be no other method of ATP production.

This may happen in conditions of **ischaemia.** Glycolysis will happen faster and will produce lactic acid. This is necessary in situations such as exercise where the oxygen demand of muscles increases above the supply, in ischaemic heart disease or when a malignant tumour outgrows its blood supply.

Anaerobic glycolysis happens faster than aerobic because less energy is produced for every glucose broken down (2ATP cf. 32ATP), so more must be broken down at a faster rate to meet demands. This may lead to lactic **acidosis.**

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