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Aerobic and Anaerobic Respiration

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Aerobic and Anaerobic Respiration

The advantages and disadvantages of aerobic and anaerobic respiration can best be articulated by comparing cellular respiration in organisms in oxygenated and low oxygenated environments. At the outset, the efficiency of either of the two depends on oxygen. Cells need oxygen because in aerobic respiration, after the electron transport chain is complete, oxygen acts as the electron's final acceptor (Koutsokali, 2020). Moreover, the absence of oxygen leads to glucose to produce few ATP. Conversely, many ATP is produced in an oxygenated environment.

General energy production tends to be the dominant argument when appraising aerobic and anaerobic respiration's advantages and disadvantages. Organisms in low oxygenated environments break glucose-containing six-carbon into three-carbon pyruvate molecules (Koutsokali, 2020). Moreover, enough energy capable of producing two net ATPs per glucose molecule is released through glycolysis. As a result, ATP production ceases at this stage in anaerobic respiration with a final total of just 2 ATPs produced per glucose molecule. Nonetheless, since this anaerobic process occurs very rapidly, anaerobic respiration lets the muscles of organisms in low-oxygenated environments acquire the needed energy within short bursts of an activity deemed as intense.

Correspondingly, ATP production in aerobic respiration is slower. Nevertheless, aerobic respiration breaks glucose down to carbon dioxide, thus ending up with thirty-eight ATPs. Although active transport costs can slightly reduce this theoretic yield, the fact remains that aerobic respiration frequently yields at least fifteen times much ATP than the anaerobic process (Fujita et al., 2015). One benefit of aerobic respiration is that the massive increase in energy production helps organisms in oxygenated environments dominate life in a given environment.

Additionally, it allows them to increase their body size, counting multicellularity as well as profound diversity.

Similarly, organisms found in anoxic niches (few places remaining on our planet without oxygen); have an additional advantage from aerobic respiration. From what scientists considered oxygen catastrophe after oxygen became highly reactive and toxic, aerobes have evolved different protection mechanisms (Zakem et al., 2019). These restorative materials are antioxidants and enzymes. Hence, organisms occupying the above niches without oxygen are not exposed to the jeopardy of exposure to oxygen. Therefore, they spend zero energy to build the aforementioned intricate compounds.

One drawback of anaerobic respiration is that if a distinct cell is exposed to low or lacking oxygen conditions, it would be at a greater risk of facing more significant problems. Drawing from the demonstration by fermentation of lactic acid, biologists found out that muscle cells perpetually recall anaerobic respiration; thus, they utilize the above fermentation to produce ATP in low oxygenated environments (Zakem et al., 2019). Yet, alternate cells counting brain cells fail to remember anaerobic respiration, and consequently, they cannot produce ATP when lacking oxygen. The latter explanation sheds more light on why these organisms, such as humans, automatically end up dead within four minutes of no oxygen exposure.

Subsequently, another advantage of anaerobic respiration rests on muscle cell variation. For instance, within short bursts of energetic expenditures, vertebrate muscles through lactic acid fermentation are permitted to yield ATP quickly (Fujita et al., 2015). As a result, different chemical and structural adaptation prevails for muscles dedicated to such an activity. For example, fibers for red muscles assume a dark appearance since they experience-rich supply of blood to guarantee steady oxygen supply, as well as "organelle where the Krebs cycle together

with electron transport chain accomplishes aerobic respiration" (Fujita et al., 2015). Therefore, they are considered to be the endurance muscle.

On the other hand, cells for white muscle tend to be light since they are void of rich blood supply. Besides, the number of mitochondria found in them is few, and instead of storing oxygen, they typically store the carbohydrate known as glycogen. Therefore, these white muscles are meant for sprinting.

The above explanation ultimately leads to a joint evaluation of aerobic and anaerobic respiration's pros and cons in the lens of different biochemical paths of muscle fiber. That is, a great deal of ATP is produced from very little glucose when aerobic respiration takes place in a red muscle jam-packed with mitochondria (Zakem et al., 2019). However, the downside is that this production tends to slow down over a lengthy period. Subsequently, anaerobic respiration occurring in cells within white muscle filled with glycogen yields ATP quickly to ensure swift gusts of speed; however, a hunter organism that may persist in chase might ultimately catch a white-muscle organism.

In conclusion, certain conditions unveil the advantages and disadvantages of aerobic and anaerobic respiration. A profound amount of ATP is produced in aerobic respiration, but the risk of an organism's exposure to oxygen toxicity is high. On the other hand, although anaerobic respiration tends to be less efficient on energy, it permits organisms in low-oxygenated environments to survive in environments with no oxygen. Conversely, both aerobic and anaerobic respiration is of great significance for muscle operation of the human body. Endurance is provided by muscle cells dedicated to aerobic respiration, while anaerobic respiration facilitates short but intense energy expenditures.

References

- Fujita, Y., Tsujimoto, R., & Aoki, R. (2015). Evolutionary aspects and regulation of tetrapyrrole biosynthesis in cyanobacteria under aerobic and anaerobic environments. *Life*, 5(2), 1172-1203.
- Koutsokali, M., & Valahas, M. (2020). Anaerobic and Aerobic Respiration in Yeast: Small-Scale Variations on a Classic Laboratory Activity. *Journal of Chemical Education*, 97(4), 1041-1047.
- Zakem, E. J., Mahadevan, A., Lauderdale, J. M., & Follows, M. J. (2019). Stable aerobic and anaerobic coexistence in anoxic marine zones. *The ISME journal*, 1-14.

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