Electrogenic bacteria — How much have we really known?

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Madam, as new studies emerge surrounding the bacterial genome, their mechanisms of survival, utility and influence on human health becomes evident and one wonders if our understanding is just the tip of the iceberg. The recent discovery of conversion of blood groups through bacteria, and faecal microbiota transplant to cure some refractory diseases shows how as our knowledge deepens, the utility of bacteria increases.

A study by Potter nearly a century ago[1] astounded not only the conventional doctor but also the biologist, environmentalist and engineer. This was the discovery of the electrogenic bacteria which, as their name suggests, can generate electricity. They remove excess electrons, produced during metabolism in an oxygen-deficient environment, by transferring them to extracellular acceptors, and in doing so produce current.[2] This has provided an insight as to working on ways to develop a sustainable means of power generation. Microbial fuel cells (MFC) work on the same principal. Another well-known application is waste treatment to reduce water pollution.[1]

An extensive research by Light et al has discovered these bacteria in our gut.[3] Pathogens such as Listeria, Clostridium, Enterococcus, Streptococci and probiotics like Lactobacilli taking advantage of the flavin found in the gut, have found an easier way to survive. These bacteria use an entirely different means of transferring electrons to the exterior via the flavin mononucleotide (FMN) system. Another study by Tse C found the protein EspP secreted by enterohaemorrhagic Escherichiacoli may act as an enterotoxin and drive electrogenic ion transport that could be a principle factor causing watery diarrhoea.[4]

These studies may prove to be cornerstone in helping us understand the pathogenicity of these bacteria and management of diseases effectively. These bacteria can also be used in waste treatment to reduce water pollution. Last but not the least, tapping onto these electrogenic bacteria can lead to development of sustainable means of power generation. We need strategies to create renewable energy and minimise our waste. More researches need to be conducted to make this process economical.

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References

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