



The Spark of Life: the story of ion channels



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What do a herd of 'fainting' goats, a shivering pig, a child with cystic fibrosis, a person who feels no pain, a migraine sufferer and someone with a rare inherited form of diabetes have in common? The answer is that all of them have genetic errors in a particular kind of protein, known as an ion channel, that regulates the electrical activity of the body.

Humans are electrical machines and your ability to read this page and to understand its message, to laugh and cry, to see and hear, and to move your limbs, is due to the electrical events taking place in the nerve cells in your brain and the muscle cells in your limbs. And that electrical activity is initiated and regulated by your ion channels. These little-known proteins are essential for every aspect of our lives, from consciousness to fighting infection, from sexual attraction to the beating of our hearts. They are also used as weapons of warfare by the immune system and by bacteria. It is therefore not surprising that a multitude of medicinal drugs work by regulating the activity of ion channels, and that impaired ion channel function is responsible for many human and animal diseases.

This lecture charts the development of our understanding of animal electricity, and explains how electrical impulses are generated by ion channels. It discusses the ways that ion channels regulate our lives and the dramatic consequences when things go wrong. It also shows how an understanding of the ion channels involved can lead to a new therapy for patients born with a rare form of diabetes. In brief, its aim is to 'sing the body electric'.