

# BIOELECTRONICS

POST WEBINAR HANDOUT 1 - PROFESSOR ALISTAIR MCEWAN

Thank you for attending our Applied Sciences Webinar! Here's a quick recap of some of the highlights and some further reading you might be interested in.

## HOMEGROWN DEVICES

There are so many ways we incorporate electrical devices into medical practice. Some have been developed in Australia, and have revolutionised medicine:

**1928:** A prototype for today's pacemakers was used to restart a stillborn infant's heart at the former Crown Street Women's Hospital, Sydney

**1961:** The Grey Scale Ultrasound was pioneered in the research labs of Sydney, allowing clear and detailed imaging inside the body

**1979:** The modern multi-channel cochlear implant was independently developed by teams at the University of Melbourne and the University of Vienna, providing those with sensorineural hearing loss a way to perceive sound



## CEREBRAL PALSY

Cerebral palsy is a movement disorder, and is the most common physical disability in childhood. While there are no cures, treatments such as electrically stimulating the spinal cord show potential, as they also do for stroke or spinal cord injuries.



In some cases, people regain their ability to walk even after stimulation has stopped!

## EMERGING BIOTECHNOLOGY

There are also many creative ways that biotechnologies are being used:



- Microwave ablation is a technique used to heat and remove unwanted body tissue. Much like your microwave oven at home, it can heat things without needing to physically be in contact with the tissue!

Using it to remove nerves near the kidney's arteries is an effective way to treat high blood pressure, producing more consistent results than standard radioablation techniques which have a whole host of limitations.



- Sonification, in the context of electroencephalography (EEG), is the process of turning electrical signals into sound waveforms, which allows the quick detection of rhythmic EEG problems in real-time.



*Some Further Reading*

<https://www.braingate.org/>

- Braingate develops and tests new medical devices which restore function to those affected by neurological disease, paralysis, or limb loss.

**Russo, M., Cousins, M., Brooker, C., Taylor, N., Boesel, T., & Sullivan, R. et al. (2017). Effective Relief of Pain and Associated Symptoms With Closed-Loop Spinal Cord Stimulation System: Preliminary Results of the Avalon Study. *Neuromodulation: Technology At The Neural Interface*, 21(1), 38-47. doi: 10.1111/ner.12684**

- Electric devices that are similar to cochlear implants can be used for reducing back pain! This specific one is being developed here in Sydney.