



Electroceuticals and Electrodiagnostics

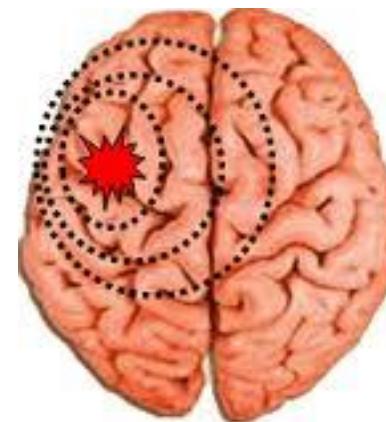
Roger Whittaker (IoN)

Patrick Degenaar (EEE)



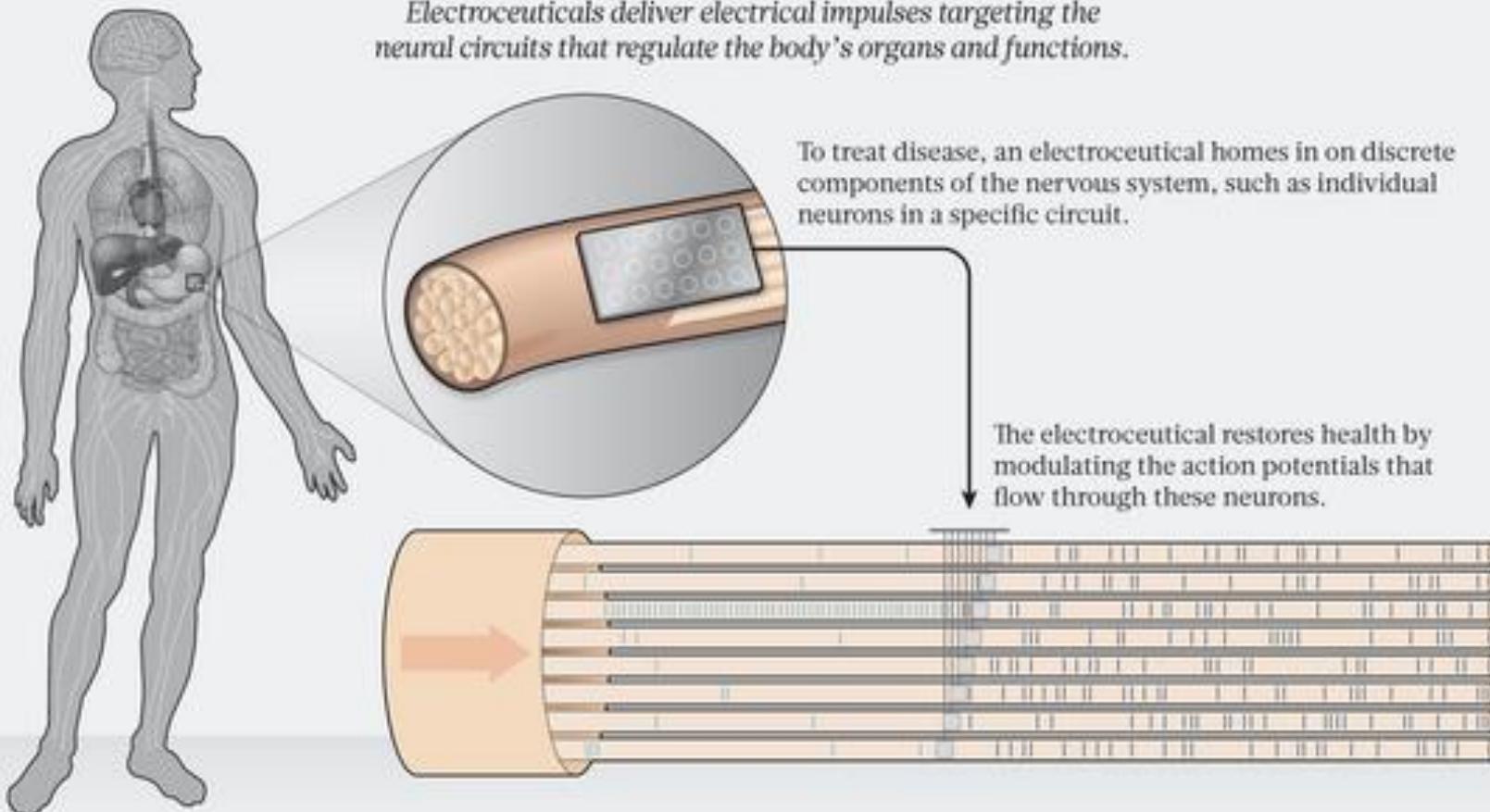
The healthcare need

- Increasing prevalence of chronic diseases
- Poor compliance with oral medications
- Side effects with polypharmacy
- Lack of efficacy of current drugs
- Correct treatment is predicated on correct diagnosis



Electroceuticals (bioelectronic medicine)

Electroceuticals deliver electrical impulses targeting the neural circuits that regulate the body's organs and functions.



Advantages and challenges

- Relatively cheap to develop
- Controllability
- Fewer side effects
- Guaranteed compliance
- Tuneable to an individual patient
- Animal models
- Surgical implantation
- Neural interface
- Decoding neural signals
- Power and data transfer
- Longevity of devices
- Safety aspects

Neuroprosthetics @ Newcastle

Epilepsy brain prosthesis

Visual prosthesis

Spinal cord injury

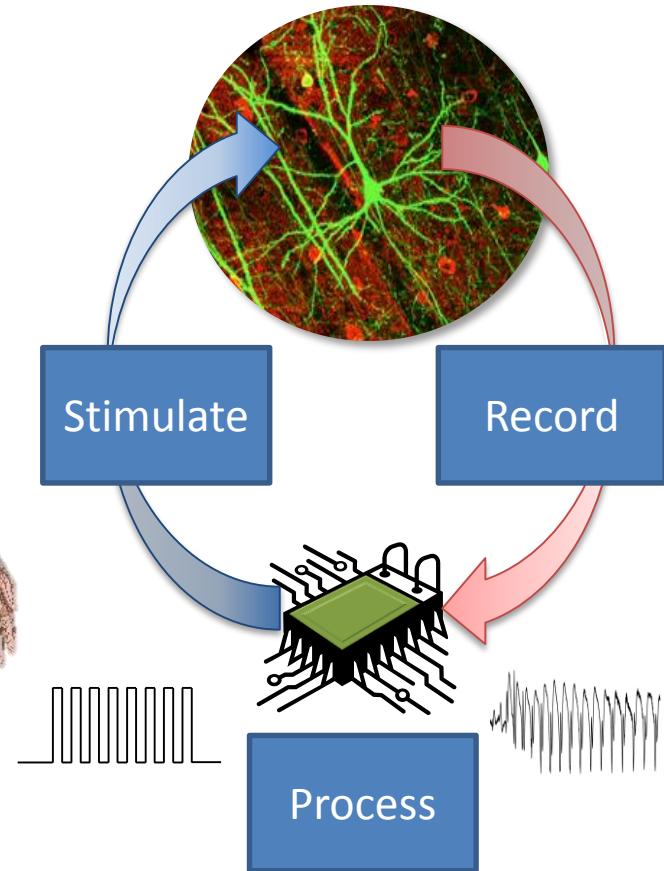
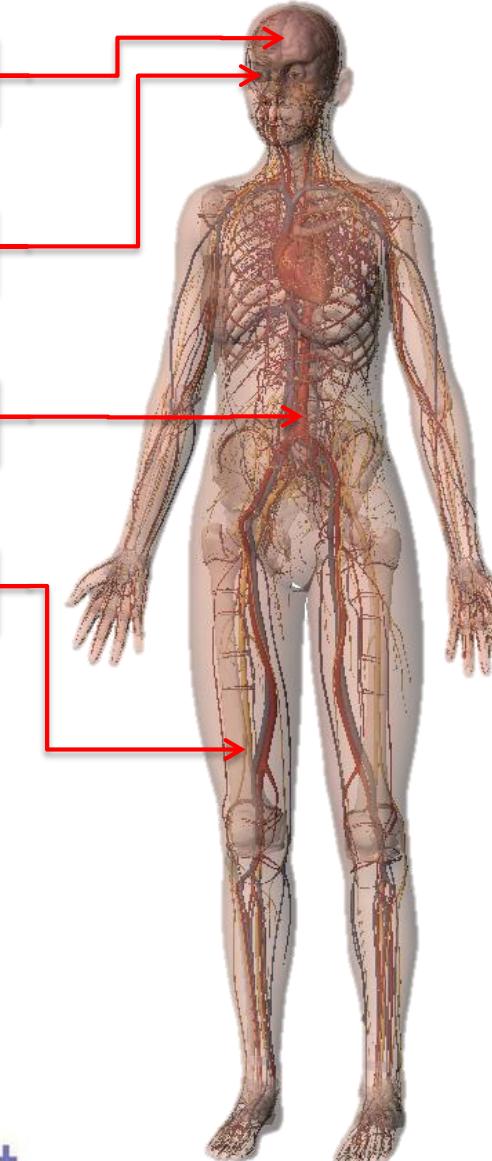
Hand/Leg bionics

Electrodiagnostics

Multi-EMG recording

<http://www.cando.ac.uk>

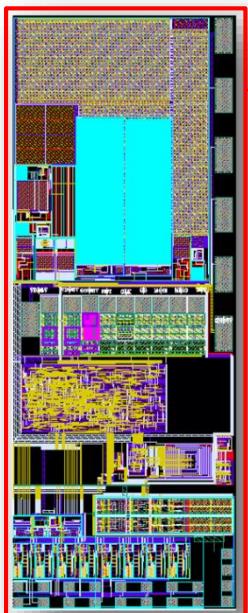
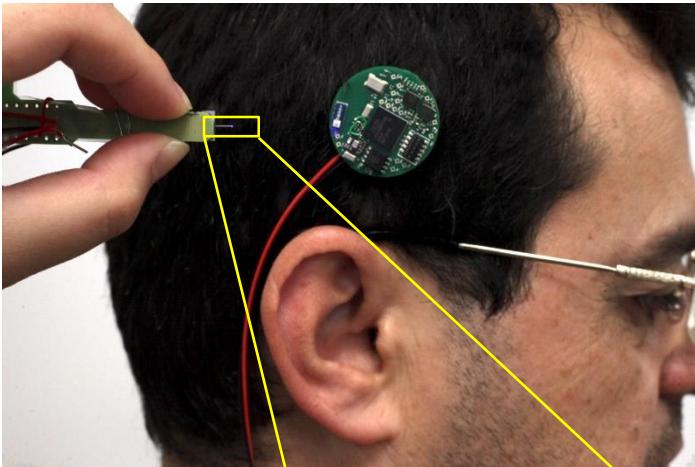
<http://www.optoneuro.eu>



Closed loop neural
interfaces!!

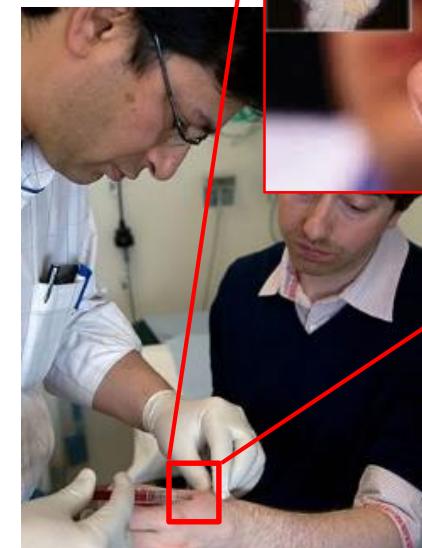
Injectable electronic systems

Surgical neuroprosthetics

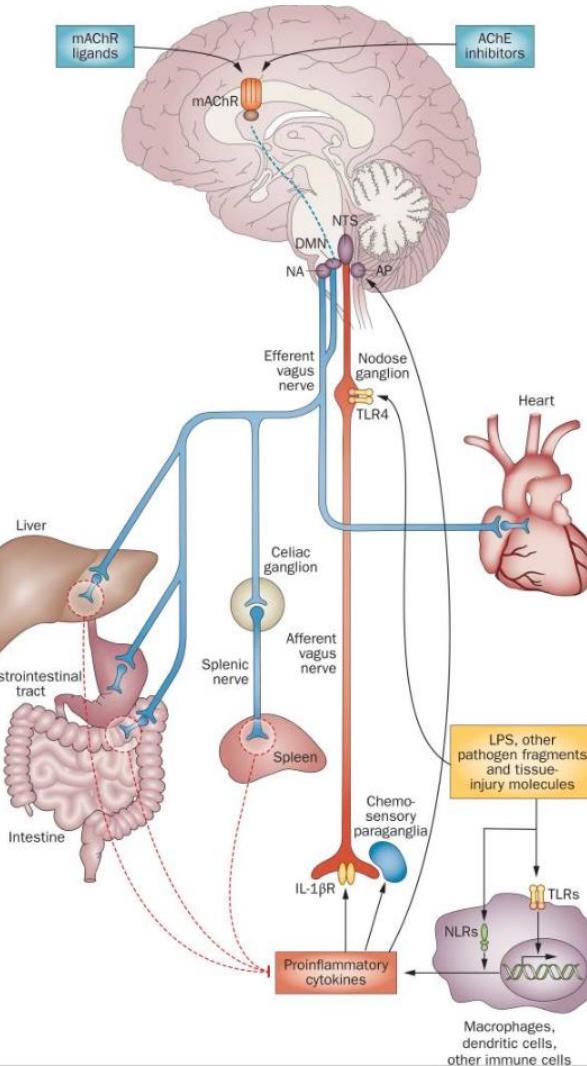
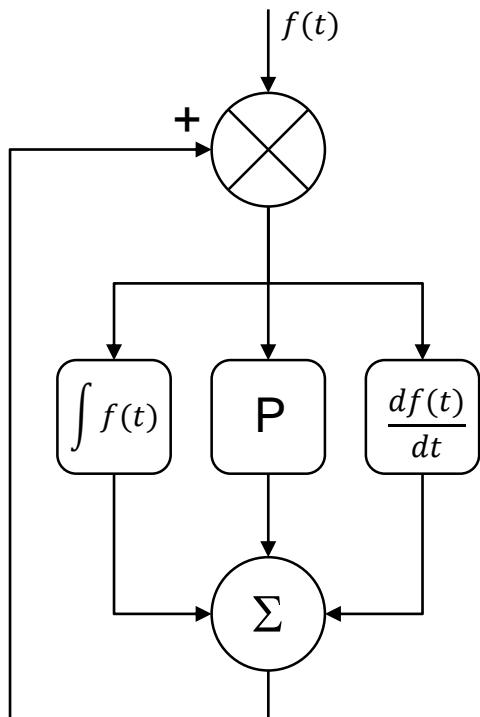


CANDO & Visual prosthesis

Injectable bioelectronics



Bioelectronic control



Can we start thinking applying classical methods of control to the human body?

1. [Nat Rev Endocrinol. 2012 Dec; 8\(12\): 743–754.](#)
2. [J Intern Med. 2011 Jan; 269\(1\): 45–53.](#)
3. [Immunol Rev. 2012 Jul; 248\(1\): 188–204.](#)