



## SMBE, EA CBME & IEEE EMBS Evening Lecture with Professor Hugh McDermott, Bionics Institute

### Current Technological Innovations in Neuroengineering and Medical Bionics

#### ABSTRACT

Since the first person received an implantable cardiac pacemaker in the 1950s, there has been a rapid development and application of medical bionics devices. Such devices employ miniature electronic circuits that interface directly with nerves and other excitable tissues. Examples of successful bionic devices include cochlear implants and deep brain stimulators as well as cardiac pacemakers. Cochlear implant (CI) systems have been provided to over 300,000 children and adults worldwide, enabling useful hearing when acoustic aids are insufficient. Like CIs, deep brain stimulation (DBS) devices deliver controlled electric current pulses to neural tissue via an array of implanted electrodes. DBS has been approved for over 10 years to treat symptoms of Parkinson's disease and essential tremor, and more than 100,000 patients have been implanted. Benefits have been demonstrated not only for movement disorders but also for other medically challenging conditions such as epilepsy and certain neuropsychiatric conditions. Furthermore, several types of visual prosthesis are being evaluated presently, and a range of novel devices known as 'electroceuticals' are under development to treat conditions as diverse as obesity and diabetes. Today's rapid advances in the fields of neuroengineering and medical bionics are bringing effective new therapies to people living with numerous conditions that are not adequately alleviated by conventional treatments.

#### SPEAKER

Hugh McDermott is the Deputy Director of the Bionics Institute of Australia, a Fellow of the IEEE (Institute of Electrical and Electronics Engineers), and a Fellow of the Acoustical Society of America. For over 30 years he has contributed directly to the design, development, and evaluation of neurostimulation devices, particularly cochlear implants, and signal processing systems. The outcomes of this research have had direct application to practical improvement of products manufactured by the world's foremost companies in this field (including Cochlear Ltd, Australia and Sonova AG, Switzerland). Over the past 5 years Hugh's activities have extended into the fields of prosthetic vision and brain stimulation. The latter research aims to treat conditions such as movement disorders and certain neuropsychiatric conditions by means of electric stimulation of the brain. Hugh is an honorary Professorial Fellow at the University of Melbourne. He is named as an inventor on over 20 patent families and is a prolific author. In 2009 he was awarded the inaugural Callier Prize by the University of Texas for leadership "that has fostered scientific advances and significant developments in the diagnosis and treatment of communication disorders".



#### EVENING LECTURE

**Venue:** Engineering House,  
21 Bedford Street, North  
Melbourne

**Time:** 5:30pm refreshments  
for 6:00pm start

**Date:** Tuesday, 17<sup>th</sup> March  
2015

Register at  
[www.engineersaustralia.org.au/  
events-all](http://www.engineersaustralia.org.au/events-all)  
There is no admission fee for EA, IEEE or  
SMBE members.

Note: Engineers Australia members are eligible to claim CPD for attending this event.

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