

Mildred Clulow Award Final Report

Principal Applicant: Professor Maria Fitzgerald,

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Amount Awarded: £25,000

Title: 'Cortical pain processing in preterm infants'

Date of Award: October 2005

Use of Resource: Purchase of a multichannel amplifier for recording infant somatosensory evoked potentials (SEP)s.

Summary of achievements: (300 words)

This award had a major impact on the success of our laboratory in developing a new 'brain' led approach to the measure of pain in infants. While a substantial body of research showed that even the youngest newborn infants are capable of displaying robust behavioural, physiological and metabolic signs of pain and distress, the measures were all necessarily indirect and importantly failed to take into account the underlying developmental changes in sensory and motor physiology. Clinical analgesic trials, however sophisticated their design, that rely upon a pain assessment 'tool' without an adequate understanding of the neural pathways underlying pain behaviour and physiology are bound to fail in their objective. By investigating the cortical activity produced by noxious stimulation in infants, we aimed to more directly measure infant pain.

The Mildred Clulow Award allowed us to successfully develop methods for recording the first somatosensory evoked potentials from the preterm and term infant brain. Direct measures of the neuronal activity in response to clinically required lances were recorded from electrodes placed in defined positions on the skull. We have since used these noxious evoked somatosensory potentials (SEPs) to study successfully study the development of cortical pain processing, their sensitivity to age, the effects of repeated intensive care procedures and the effects of analgesics in hospitalised infants.

Key Publications Arising Directly from the Award (maximum 5)

Slater R, Worley A, Fabrizi L, Roberts S, Meek J, Boyd S, Fitzgerald M (2010). Evoked potentials generated by noxious stimulation in the human infant brain. *Eur J Pain*, 14(3), 321 - 326.

Slater R, Fabrizi L, Worley A, Meek J, Boyd S, Fitzgerald M (2010). Premature infants display increased noxious-evoked neuronal activity in the brain compared to healthy age-matched term-born infants. *Neuroimage*, 52(2), 583 - 589.

Slater R, Cornelissen L, Fabrizi L, Patten D, Yoxen J, Worley A, Boyd S, Meek J, Fitzgerald M (2010). Oral sucrose as an analgesic drug for procedural pain in newborn infants: a randomised controlled trial. *Lancet*, 376(9748), 1225 – 1232.

Further Research Funding following the Award

The Mildred Clulow award provided seed funding for future grants that have supported this work ever since

- 2006 MRC (with Boyd, Meek & Worley) 3 years: Cortical responses to pain in human infants-towards a rational analgesic strategy 3 years, **£973,367**
- 2010 Wellcome Trust (with Boyd, Meek, Slater & Worley): Cortical pain responses in human infants 3 years **£556,885**
- 2014 MRC (with Fabrizi & Meek): The development of human cortical networks: effects of early life stress and injury 2014-2018 (with Meek & Fabrizi), 4 years **£ 1,412,255.60**

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