

think but neither know (explicitly or implicitly) nor care how others feel. The role of the amygdala in the development of ToM in autism and psychopathy is discussed.

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06-05

## Theory of mind in Williams syndrome assessed using a nonverbal task

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**Background:** Williams syndrome (WS) is a rare genetic disorder associated with intellectual impairment, good verbal skills and an unusual social personality. Despite extensive interest in the area, it remains unclear whether theory of mind (ToM) abilities are impaired or intact in WS. This uncertainty most likely relates to the wide range of measures used to assess ToM abilities and the unique profile of strengths and weaknesses associated with the syndrome. The aim of this study was to examine ToM in WS using a non-verbal picture sequencing task. The picture sequencing task was selected so that the WS individuals could not rely on their good verbal skills when performing the task. The paper also aimed to further explore heterogeneity within WS and the possibility of WS subtypes.

**Methods:** Langdon et al.'s (1997) picture sequencing task was administered to 30 individuals with WS and to normal chronological-age-matched and mental-age-matched controls. The picture sequencing task assesses understanding of pretence, intention and false belief, while controlling for social script knowledge and physical cause-and-effect reasoning.

**Results:** Results indicated a specific deficit in understanding of false belief within the WS group. There was also evidence of heterogeneity in the WS group, with the false belief impairment restricted to only a particular subgroup of WS individuals identified originally by Porter and Coltheart (2005).

**Conclusions:** Our research, using a nonverbal task to assess ToM, indicates impaired false belief understanding in a select group of WS individuals. There are some indications that the deficits in social understanding in this group go beyond an impaired ToM.

## Brain Stimulation Approaches in the Treatment of Depression

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### Overview

This symposium will discuss current clinical and potential future brain stimulation techniques for the treatment of depression: electroconvulsive therapy (A/Professor Loo), transcranial magnetic stimulation (Professor Mitchell), vagus nerve stimulation (Doctor Trollor), transcranial direct current stimulation, deep brain stimulation and parallels with psychosurgery (Doctor Malhi). Each talk will present an overview of the current state of the field, recent original research and possible mechanisms of action. The session will conclude with a panel discussion on similarities and differences in the neurobiological effects of these different brain stimulation approaches.

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07-01

## ECT – future directions: a trial of the effectiveness and safety of four forms of ECT, bitemporal, bifrontal, right unilateral and right unilateral (ultrabrief pulsewidth)

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**Background:** Electroconvulsive therapy (ECT) is a highly effective treatment for depression, but its use is limited by the risk of associated cognitive side-effects. This study aimed to investigate the relative effectiveness and cognitive side-effects of ECT given in four different forms, varying in electrode placement and pulsewidth, to determine the optimal form of ECT.

**Methods:** Depressed in-patients referred for ECT in a private clinic in Sydney were recruited after giving informed consent. Subjects received the form of ECT prescribed by their treating psychiatrist [bitemporal at 1.5 times seizure threshold (1.5 ST), bifrontal at 1.5 ST, right unilateral at 5 ST or right unilateral with ultrabrief pulsewidth at 6 ST]. Mood (MADRS) and neuropsychological functioning (digit span, Rey Auditory Verbal Learning Test, Rey figure, word

generation, STROOP, Autobiographical Memory Interview) were assessed at baseline, after six ECT and at the end of the ECT course.

**Results:** The study is in progress and preliminary results (mood, neuropsychological function, seizure indexes) will be presented.

**Conclusions:** All four forms of ECT appear effective, but preliminary results suggest some forms may be advantageous in terms of a lower rate of cognitive side-effects. There is evidence for the clinical use of bifrontal ECT. Ultrabrief unilateral ECT may hold great promise for the future.

07-02

### TMS treatment for depression: overview of efficacy and report on a sham-controlled trial of twice daily left prefrontal rTMS

**P Mitchell<sup>1,2</sup>, C Loo<sup>1,2</sup>, G Malhi<sup>2,4</sup>, T McFarquhar<sup>1,2</sup>, P Sachdev<sup>1,3</sup>**

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**Background:** The majority of clinical trials have reported positive statistical results for repetitive transcranial magnetic stimulation (rTMS) (compared with a sham control) in treating depression, but the results of many studies were not clinically impressive. Recent studies have explored strategies to optimize the efficacy of rTMS. One such strategy is to increase the frequency of treatment sessions. The efficacy of twice-daily sessions of rTMS has not been previously examined in sham-controlled trials.

**Methods:** Thirty-eight subjects with DSM-IV major depressive episode were randomly assigned to receive active or sham rTMS for 2 weeks, with two treatment sessions per weekday. Treatment was given to the left prefrontal cortex at 10 Hz, 30 trains of 5 s, 110% motor threshold. Subjects were allowed to receive up to 6 weeks of active daily rTMS in an open extension. Mood and cognitive functioning were assessed weekly during the study.

**Results:** The active treatment group improved more than the sham treatment group over the 2-week sham-controlled period on Montgomery-Asberg Depression Rating Scale (MADRS) ( $P < 0.05$ ) but not Hamilton Depression Rating scales. After 6 weeks of active treatment, 53% and 47% of subjects achieved response ( $\geq 50\%$  improvement) and remission (MADRS  $\leq 10$ ), respectively. rTMS was well tolerated.

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**Conclusion:** High-frequency left prefrontal rTMS given twice a day was safe and more effective than sham in treating depression.

07-03

### Vagus nerve stimulation for treatment-resistant depression: utility and possible mechanisms of action

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Early clinical observations and subsequent prospective studies indicated that vagus nerve stimulation (VNS) had the potential to improve mood in patients with epilepsy. Subsequent studies have evaluated the effect of VNS in treatment-resistant major depression. These initial studies indicate a significant short- and long-term benefit of VNS on mood. Although the precise mechanisms underlying the antidepressant effect of VNS remain obscure, there is emerging evidence that VNS is associated with alteration of cerebrospinal fluid concentrations of various neurotransmitters. Furthermore, VNS impacts on functional activity of brain areas within the limbic system. This presentation will review the evidence for VNS as an antidepressant treatment and will review the potential neurobiological correlates of this effect. This will be compared with data from other brain stimulation approaches to treatment of depression. The implications of VNS for our understanding of functional models of depression will be discussed.

07-04

### Direct current and deep brain stimulation with lessons from neurosurgery

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Neurosurgery for mental disorders (NMS) antedates pharmacotherapy and brain stimulation and arguably