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出國報告（出國類別：國際研討會）

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第一屆腦刺激國際研討會

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壹、 摘要

這次會議是第一次以跨顱磁刺激儀為主題所辦的國際性研討會，來自世界各地從事相關研究的六百多位研究者，該會在新加坡舉行，為期三天(3/2-3/5)。本次赴大會於 3/3 報告與中央大學馬杰仁教授合作的研究，主題為 The parietal cortex, space and brain stimulation。報告內容有關是否手可及距離來探討後頂葉與空間視覺控制之關係，主要操弄伸手可及距離的與否，來探討動作同理心(motor empathy)之議題。報告中說明操弄是否伸手可及距離於地標作業，利用跨顱磁刺激(transcranial magnetic stimulation, TMS) 施打於刺激楔前葉 (Precuneus)(位在右側後頂葉位置)以及中央點，發現右側後頂葉會產生類似忽視現象。最後，討論 TMS 如何提供診斷及治療。此次會議的意外收穫，是認識英國 UCL 的 TMS 實驗室負責人 Prof. Vincent Walsh，一起討論目前感興趣的研究主題「TMS & Sport」，瞭解目前國內外的研究焦點。與 Dr. D. Pitcher 討論有關情緒相關的研究議題，他的研究利用 TMS 探討各種不同刺激，例如，人臉、物品或是身體軀幹在腦中的反應區域是否相同。以及同時遇到成功大學心理所所長蕭富仁老師，瞭解蕭老師目前結合 TMS 與 MRI 之研究，這都是此行相當大的收穫。此次會議行程，亦聆聽多場精彩的演講以及壁報報告，說明如下。

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參、 本文

一、 目的

這是第一次以腦刺激為主的研討會，有別於以往的認知神經科學相關的國際研討會，研究主題橫跨磁振造影(MRI)、腦電波(ERP)、TMS 等，範圍相當廣泛，這一次的研討會聚焦於 TMS 及跨顱直流電刺激 (Transcranial direct current stimulation, tDCS)，除了安排相關的研究演講及壁報發表，更討論 TMS 及 tDCS 的實驗效果的有效性及其可信度。此外，藉由參加該研討會，進一步了解如何結合 ERP、MRI 與 TMS 等研究，了解各國學者的研究外，亦想將 TMS 應用至犯罪防治領域，做為將來防治之用。本人希冀以過去腦波研究結果為基石，結合新起且安全的 TMS 及 tDCS，做為未來研究方向。過去的研究顯示 tDCS 是安全的技術，透過微弱的電流的裝置通過大腦，誘導皮質區域活化的改變，改變受試者大腦表面膜電位神經性改變。tDCS 是良好且合適的技術影響大腦活動，瞭解其行為和認知的連結。希望藉由該研討會更深入瞭解腦刺激的神經生物機制，更希望在累積一定研究數量後，對於偵測及防範性犯罪提供一個最佳的建議，以及相關領域的合作和知識整合，同時對臺灣犯罪防治與矯正提供建議，進而共同形塑一個更好的社會環境。

二、 過程

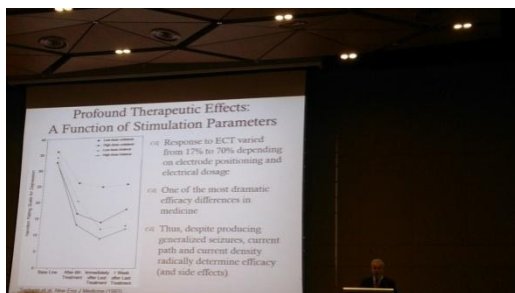
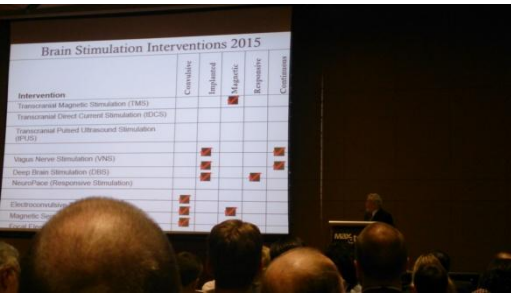
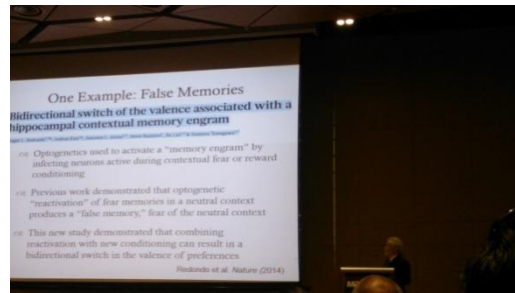
本次研討會的研究報告皆以摘要的形式投稿，經審稿者的詳細審閱後，刊登的研究論文包括口頭發表與海報式發表。透過該學術性研討會進行國際交流，深具學術價值及意涵。該會主題包含：

- (一) 概述腦刺激的基本機制(Overview of the Commonalities of the Methods, Focus on Basic Mechanisms)
- (二) 腦刺激的基本機制(Basic Mechanisms of Brain Stimulation)
- (三) 基礎神經生理學的進展(Advances in Basic Neurophysiology)
- (四) 如何使用計算模型來探討腦刺激的最佳化(How to use Computational Models to Optimize Brain Stimulation)
- (五) 使用腦刺激的方法來瞭解如何大腦工作(Using Brain Stimulation Methods to Unlock How the Brain Works)
- (六) 腦刺激在認知神經科學進展(Brain Stimulation Advances in Cognitive Neuroscience)
- (七) 以腦刺激來了解和測量腦的可塑性(Understanding and Measuring Brain Plasticity with Brain Stimulation Methods)
- (八) 腦刺激的臨床應用(State of the Art Clinical Applications of the Brain Stimulation Methods)

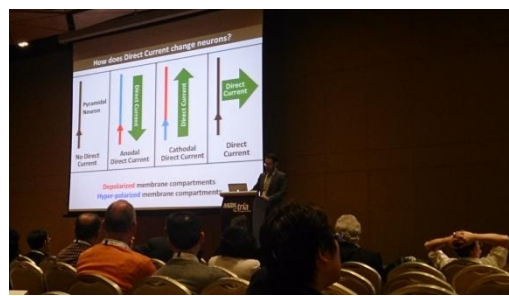
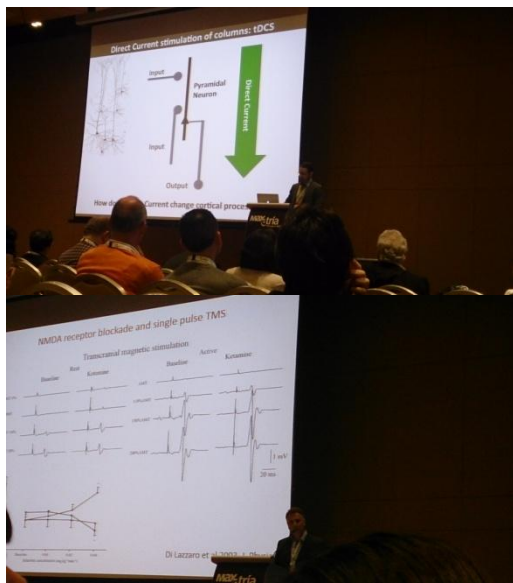
本人與中央大學認知神經科學研究所教授馬杰仁的口頭論文發表題目為「頂葉皮層，空間和腦刺激」 「The parietal cortex, space and brain stimulation」，論文發表時間為 3 月 3 日上午 9:00-9:30 腦刺激的基本機制（Basic Mechanisms of Brain Stimulation），該場次的主席為 Prof. Vincent Walsh，該場次共有四篇論文發表，我們被安排在第二順位報告，報告時間為 30 分鐘，與在場之學者交換研究心得，順利完成論文的發表，分享在研究過程中的心得，達到學術交流的目的，在此次的論文發表中，本人在學術上有著豐富的收穫。報告結束後，主持人 Prof. Vincent

Walsh 建議我們將研究結果投稿至國際期刊 Brain Stimulation，我已經投稿至該期刊且被接受刊登。此次大會提供最重要的資料內容包括會議議程，發表研討會的場次、時間、地點、主講人、講題內容，以及與會發表論文，在發表會場外所展示的壁報發表論文主題及時間。本研討會開會的會場在新加坡的靠近樟宜機場的會議中心內舉行。會場包括二個口頭發表場地及一個海報發表場地，壁報發表在口頭報告中間的休息時間，讓與會者有充足時間參與，口頭及壁報討論相當熱烈，本人從壁報發表中瞭解成功大學心理所所長蕭富仁老師的研究及成功大學所有的實驗設備。

Prof. H. Sackeim 在會議一開始給了一場幽默有趣的演講序曲，探討有關錯誤記憶(False memory)等有關運用磁刺激的研究趨勢。

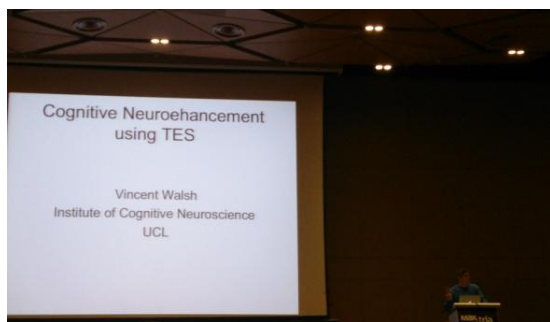


Prof. H. Sackeim 的演講主要說明磁刺激在近年的研究趨勢與數量，逐年增長。這說明該研究的重要性與未來發展。



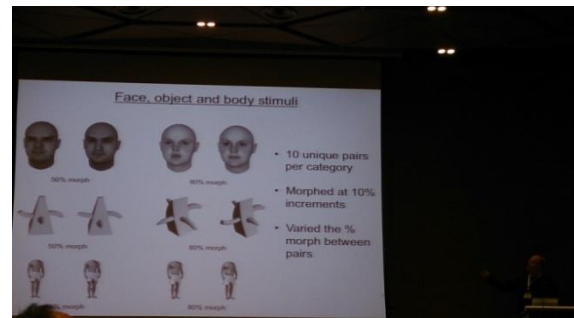
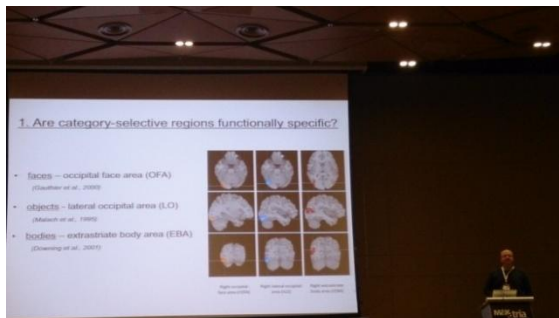
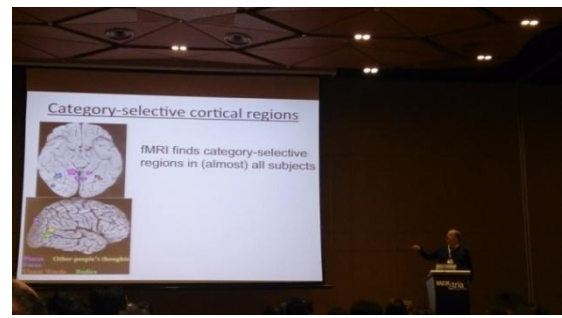
Prof. Randolph Nudo 說明磁刺激背後的神經生理機制，主要影響哪些型態的神經細胞。陽極 tDCS 導致增加皮質的興奮性，而陰極 tDCS 導致降低皮質興奮性。

在腦刺激在認知神經科學進展(Brain stimulation advances in cognitive Neuroscience)方面，Prof. V. Walsh 修改演講主題為 Cognitive Neuroenhancement transcranial electrical stimulation(TES)。主要探討 tDCS& TMS 的研究重要性及重點為何。大概因為時差的關係，Prof. V. Walsh 記錯時間而遲到，造成發表時間稍微的延誤。



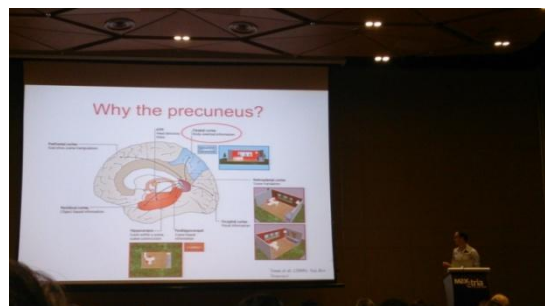
英國 UCL 的 TMS 實驗室 Prof. Vincent Walsh 演講說明磁刺激在各領域的應用性。

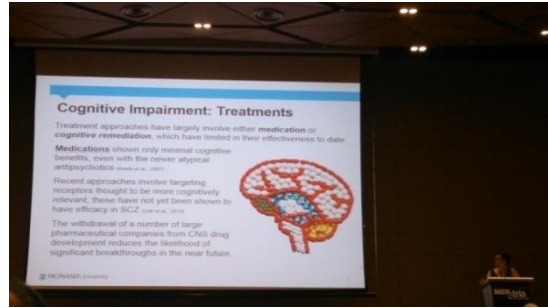
Dr. D. Pitcher 的主題是在短暫中斷認知網路：結合跨顱磁刺激和功能性磁共振造影(Transient disruption in cognitive networks: combining TMS and fMRI), 探討人臉、物品或是身體軀幹是不同類別或是在腦中的反應區域也不相同?



Dr. D. Pitcher 討論有關情緒相關的研究議題，他的研究利用 TMS 探討各種不同刺激，例如，人臉、物品或是身體軀幹在腦中的反應區域是否相同。

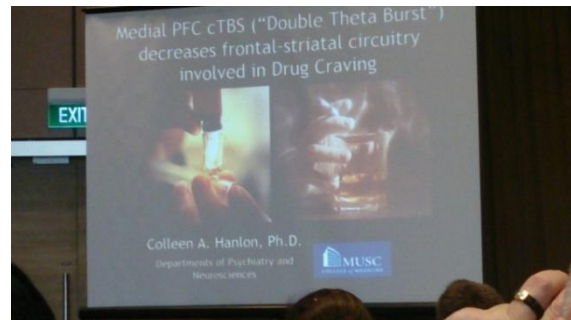
本人與中央大學馬杰仁教授合作的研究，主題為「頂葉皮層，空間和腦刺激」(The parietal cortex, space and brain stimulation)。

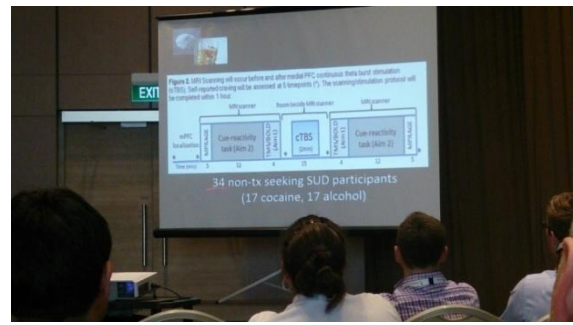
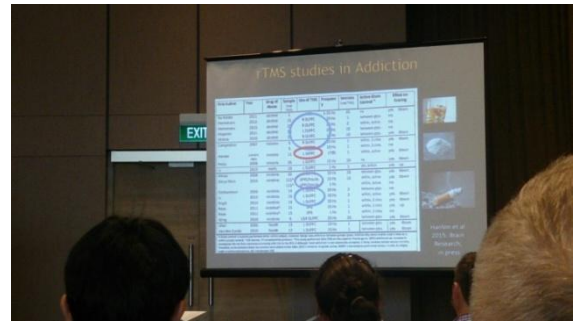




報告內容有關是否手可及距離來探討後頂葉與空間視覺控制之關係，主要操弄伸手可及距離的與否，來探討動作同理心(motor empathy)之議題。報告中說明操弄是否伸手可及距離於地標作業，利用跨顱磁刺激(transcranial magnetic stimulation, TMS) 施打於刺激 Precuneus(位在右側後頂葉位置)以及中央點，發現右側後頂葉會產生類似忽視現象。最後，討論 TMS 如何提供診斷及治療。

本人最感興趣的一場演講是 Dr. Hanlon 的研究，主題為在毒品渴求期間連續 theta 磁刺激於內側前額葉皮質額葉減低額葉-紋狀體迴路(Continuous theta burst stimulation to the medial prefrontal cortex decrease frontal-striatal circuitry involved in drug craving)。





該研究將 TMS 施打於前額葉位置 (FP1)，減低額葉-紋狀體迴路的激發，是相當不容易做的研究，容易引起受試者的疼痛。

本人聆聽部分與本人研究相關的壁報發表，由於大會禁止拍攝，因此盡量在不干擾他人情況下來記錄重要的研究。

有興趣的壁報主題包括:

- (一) 背側前額葉及認知控制的雙系統：tDCS 研究(Dorsolateral prefrontal cortex and dual mechanisms of cognitive control: A tDCS study)。
- (二) 迷走神經刺激對情緒與注意力的影響(Effect of vagus nerve stimulation on emotion-attention interaction)。
- (三) 高頻率的反覆磁刺激和巧克力零食消耗量(High-frequency rTMS and modulation of chocolate snack consumption)。
- (四) 以事件相關電位的 P300 評估電痙攣療法精神疾病患者(ECT and information processing in patients with treatment-resistant psychiatric disorders assessed by event-related potential P300)。

(五) 以 tDCS 區別下額葉和背外側前額葉在反應抑制上的功能(Dissociating the role of inferior frontal gyrus and dorsolateral prefrontal cortex in response inhibitory by TDCS)。

Dorsolateral prefrontal cortex and dual mechanisms of cognitive control: A tDCS study

Maria Cruz Martin and Carlos Gomez-Ariza
University of León (Spain)

Introduction

Executive variability is thought to be a core component of cognitive control. From the dual mechanisms of control (DMC) hypothesis (Braver, 2005), cognitive flexibility may track from the variability and the adaptation used to the relative adjustment between proactive (anticipatory) and reactive (responsive) modes of control (PFC and KC, respectively).

Several studies have shown that individual differences exist regarding which specific control mode is used to inhibit one's behavior (e.g., 2005) and the ability to adapt both control mechanisms (Basson et al., 2015).

Importantly, the DMC account posits that the relative engagement of PFC and KC mechanisms may occur within the same dorsal prefrontal cortex (PFC) regions, via modulation of neural activity in response to variations in task demands or behavioral goals (see Braver et al., 2016).

Key hypothesis

We investigate the role of the dorsolateral PFC in adjusting PFC and KC modes of cognitive control by modulating neural responses to onset of tDCS. If the DLPFC plays a role in the adjustment, differential modulation of core control mechanisms could be observed depending on emotional salience (subjective arousal).

Methods

Participants: 120 right-handed college students from the University of León (Mean age = 22).
Experiment 1: All tDCS sessions were to compare between active and sham tDCS over the dorsolateral prefrontal cortex (DLPFC) and the ventrolateral prefrontal cortex (VLPFC).

Results

Individual tDCS over the DLPFC increased PFC control to show, which suggests higher engagement of proactive control. tDCS over the VLPFC, however, did not give rise to any effects.

Individual tDCS over the VLPFC led to a lower rate of errors for PFC and KC trials, which could be interpreted as more PFC control. However, the group also exhibited more errors on the control condition. tDCS over the DLPFC also led to more errors than control.

Conclusions

Our data support the idea that the DLPFC plays a central role in cognitive control.

They also suggest a role of the DLPFC, using control to maintain engagement and attention (PFC) without attention over the top-down generated "top-down" engagement and attention.

Finally, based on neural modulation used to produce an evidence that PFC and KC may be independent systems in response to cognitive control. However, the group also exhibited more errors on the control condition. tDCS over the DLPFC also led to more errors than control.

References

Braver, T. S. (2005). The variable nature of cognitive control: A dual mechanisms framework. *Psychological Review*, 112, 375-399.

Braver, T. S., Barch, D. M., & Botwinick, M. H. (2007). Executive attention: A central role in the control of goal-directed behavior. *Journal of Experimental Psychology: Applied*, 13, 176-199.

Braver, T. S., Barch, D. M., Botwinick, M. H., & Nave, M. T. (2009). Attentional flexibility and executive control: A dual mechanisms framework. *Journal of Experimental Psychology: Applied*, 15, 311-326.

Effect of vagus nerve stimulation on emotion-attention interaction

Behavioral Research Unit, Department of Psychology, University of York, UK
Department of Psychology, University of York, UK

Introduction

Background (Stimulation (VNS))

VNS is an emerging treatment method for various neurological and psychiatric disorders, e.g., epilepsy, anxiety and treatment-resistant depression.

VNS is electrode is wrapped around vagus nerve and electric pulses are sent to lower nodes of parasympathetic system. The pulses modulate from the vagus nerve.

Research has investigated the role of the vagus nerve in regulating attention and affecting depression in real world situations.

The study

- The impact these vagus nerve and electric (VNS) effects may have on attention and emotion, including the interaction between them, and whether they are unique for negative and attention [1].
- Depression is associated with altered emotion-attention interaction, more specifically with increased attention allocation to emotionally negative information [2].
- An enhanced attention capture by emotional stimuli is observed in clinical populations with MDD and MDD-CAD [3].
- In this study we wanted to investigate the immediate effects of VNS on emotion-attention interaction.
- Since VNS alleviates depression we expected dorsolateral attention allocation to threat related stimuli when VNS is ON versus when it is OFF.

Methods

Behavior was measured using computer based Go/NoGo Reaction Time task which is a flexible task with emotional distractors.

Task measures spontaneous eyeing tendency, task-like shifting, attentional allocation and emotional reactivity.

Participants with VNS were recruited who had been prescribed the treatment.

Behavior was measured over 10 sessions (5 sessions pre-treatment, 5 sessions post-treatment).

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Behavior was measured over 10 sessions (5 sessions pre-treatment, 5 sessions post-treatment).

Results

These results showed that attention allocation to threat related stimuli was reduced during VNS.

When attention was OFF emotional distractors captured more attention and increased number of incorrect responses and slowed response times.

Behavior was measured over 10 sessions (5 sessions pre-treatment, 5 sessions post-treatment).

Behavior was measured over 10 sessions (5 sessions pre-treatment, 5 sessions post-treatment).

Behavior was measured over 10 sessions (5 sessions pre-treatment, 5 sessions post-treatment).

Summary

We found reduced attention allocation to emotional stimuli during VNS.

When attention was OFF emotional distractors captured more attention and increased number of incorrect responses and slowed response times.

Behavior was measured over 10 sessions (5 sessions pre-treatment, 5 sessions post-treatment).

Behavior was measured over 10 sessions (5 sessions pre-treatment, 5 sessions post-treatment).

Behavior was measured over 10 sessions (5 sessions pre-treatment, 5 sessions post-treatment).

Conclusion

Our potential mechanism could be that high frequency VNS modulates effect amplitude via VNS and leads to compensatory modulation of the emotional content of the stimulus [2].

We suggest that diminished attention allocation to negative emotional information might be a potential mechanism for antidepressant effect of VNS.

References

Braver, T. S., Barch, D. M., Botwinick, M. H., & Nave, M. T. (2009). Attentional flexibility and executive control: A dual mechanisms framework. *Journal of Experimental Psychology: Applied*, 15, 311-326.

Braver, T. S., Barch, D. M., Botwinick, M. H., & Nave, M. T. (2009). Attentional flexibility and executive control: A dual mechanisms framework. *Journal of Experimental Psychology: Applied*, 15, 311-326.

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Acknowledgments

This work was supported by the Department of Psychology, University of York, UK.

High-Frequency rTMS and Modulation of Chocolate Snack Consumption

Hyeon Min Ahn, Shan Ah Kim, Eun Jung Lee, Sang Hee Kim
Department of Brain and Cognitive Engineering, Korea University, Seoul, Korea

Introduction

- Previous studies have demonstrated that the application of repetitive transcranial magnetic stimulation (rTMS) to the dorsolateral prefrontal cortex (DLPFC) can reduce craving for appetitive foods among those with report frequent experiences of craving for food (Luhar et al., 2010; Van den Eynde et al., 2015).
- However, whether actual consumption of appetitive foods was reduced by rTMS treatment is less clear.
- In this study, we investigated whether a single session of high-frequency rTMS stimulation to the left DLPFC before training to elicit responses to chocolate stimuli would reduce subjective craving for chocolate food and also decrease the amount of chocolate snack consumption during a binge taste test.

Method

Participants

- 42 healthy women (Mean age = 22.1 ± 1.62)
- Recruited from the University of Seoul
- Excluded if they had any history of psychiatric illness

rTMS Stimulation

- Intensity: 40% of rest power (0.87 ± 0.47%)
- Frequency: 10 Hz
- Total: 1200 pulses

Binge Taste Test

Consist of 10 chocolate (1 block)

Results

Participants Demography

Group	Mean (SD)	Range	Min	Max
Age	22.1 (1.62)	19-28	19	28
Height	163.5 (5.5)	150-175	150	175
Weight	55.5 (10.5)	40-75	40	75
BMI	20.5 (2.5)	16-28	16	28

No mood Change by rTMS

Positive Mood, Negative Mood

Chocolate Snack Consumption

Chocolate Block

Pre-Session, Session 2

Pre-Session, Session 2

Pre-Session, Session 2

Summary & Discussion

- Our results indicate that chocolate snack consumption was reduced in the training group as compared with the sham-control or real-control.
- These results indicate that high-frequency rTMS over the left DLPFC may help attenuating negatively reinforced inhibitory control over tempting chocolate snacks and can be used as an effective tool to modulate food consumption behavior in young women.

Affective Cognitive Brain Lab

ECT and information processing in patients with treatment-resistant psychiatric disorders assessed by event-related potential P300

K. Dapkin, A. Sturkate, J. Lengenauer, V. Malinowski
Department of Psychiatry, University of Vienna, Austria

Introduction

Electroconvulsive therapy (ECT) has been a highly effective treatment for patients with treatment-resistant psychiatric disorders. However, the underlying mechanisms of ECT are still unclear. One hypothesis is that ECT might affect information processing, particularly the P300 component of the event-related potential (ERP).

Methods

Patients with treatment-resistant psychiatric disorders (n = 15) were included in the study. They were divided into two groups: ECT group and control group. The P300 component of the ERP was measured before and after ECT treatment.

Results

The P300 amplitude was significantly reduced in the ECT group compared to the control group. This reduction was observed in both the pre-ECT and post-ECT groups.

Conclusion

The results suggest that ECT treatment leads to a reduction in P300 amplitude, which may be related to the underlying mechanisms of ECT. Further research is needed to clarify the role of P300 in the pathophysiology of psychiatric disorders.

References

Braver, T. S., Barch, D. M., Botwinick, M. H., & Nave, M. T. (2009). Attentional flexibility and executive control: A dual mechanisms framework. *Journal of Experimental Psychology: Applied*, 15, 311-326.

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三、 心得及建議

此次參與在新加坡舉辦的 Brain Stimulation 研討會，最主要的收穫是參加美國南加大 Dr. Hanlon 的演講，這是在國內比較少見的研究，與來自該研究領域的研究者齊聚一堂，不但在發表會場內有交流，還會延續場內的討論到場外，難能可貴的是，除了談相關研究外，亦有交流文化的衝擊，學習不同思維、激盪出更多的研究想法，吸取別人的長處。值得一提的是，這是第一屆腦刺激(Brain Stimulation)研討會，兼備理論與實務，雖然有許多場次是以理論為主，但是部分場次，還是有許多具有應用性的論文發表以及一些與犯罪防治相關的研究。此次國際級會議，讓我了解最熱門的研究議題。聆聽大師級的演講，且有機會面對面互動請益。參與國際研討會，最大的價值之一就在於能夠得到聽者對論文的回饋，從來自現場的各種問題與看法，能夠多思考自己的研究方向與價值。目前臺灣在此領域仍屬少數，未來如何超越其他國家將是重要課題。

主辦單位舉行國際會議之經驗與整體組織能力值得臺灣學習，心中更覺得參加本次研討會的非常有意義。此次大會提供最重要的資料內容包括會議議程摘要，發表研討會的場次、時間、地點、主講人、講題內容，以及與會發表論文摘要等等，十分具有參考價值，其對於從事相關研究上亦有極大的助益。

在個人建議方面，希望多補助國內人士出國經費以鼓勵參與，同時邀請專業人士參與國內舉辦的國際級研討會。