analysis of the RNAseq data revealed 56 significantly regulated genes in MTLE patients and showed that many of these belong to a cohesive network of physically interacting proteins linked to several cellular functions. This study identified various genes like FN1 which is central in our analysis, NEUROD6, RELN, TGFβR2, NLRP1, SCRT1, CSNK2B, SCN1B, CABP1, KIF5A and antisense RNAs like AQP4-AS1 and KIRREL3-AS2 that needs further evaluation for their potential as diagnostic/prognostic biomarkers in intractable MTLE.

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Differential modulation of various inflammatory mediators in mesial temporal lobe epilepsy and focal cortical dysplasia patients

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Introduction: Neuroinflammation and innate immunity play important role in the pathogenesis of epilepsy. Cytokines and chemokines induced inflammation may lead to a disturbance of the glutamatergic system, and subsequently to the persistence of seizures by chronic neuronal over excitation. Numerous candidate gene specific studies have postulated the role of inflammatory and immune modulators in neuronal death and/or development of pharmacoresistance in MTLE-HS however there are not many reports in FCD. Therefore, in this study we have used a multiplex immunoassay approach to measure multiple inflammatory mediators (cytokines, chemokines and growth factors) which includes IL1β, IL1Ra, IL6, IL10, MIP1A (CCL3), MIP1B (CCL4) and TNFα in brain tissues resected from MTLE and FCD patients.

Methods: Tissue samples collected from MTLE, FCD and tumor periphery of glioma patients (non-epileptic controls) were assessed by quantitative cytokine assays using a customized Bioplex™ Pro-human cytokine 8-plex panel kit. Scattered plots were generated using SigmaPlot version 13.

Results and conclusion: Analysis of FCD tissue highlighted differences with MTLE. Upregulation of IL-1β, IL-1Ra, IL-6, MIP-1α and MIP-1β were observed in both MTLE and FCD patients as compared to controls. Except IL-1β, upregulation was relatively higher in FCD. IL-10 showed down regulation in both, MTLE and FCD as compared to controls. TNF-α did not show any significant change between groups. Our results are in line with data from mRNA profiling studies on human epileptic tissues. The mechanism and clinical implications of these epilepsy-related immune alterations need to be clarified in a larger cohort of patients with a goal of developing potential anti-epileptic treatment strategies.

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Gamma knife versus open surgery for epilepsy: A longitudinal neuropsychological profiling study

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Introduction: Neuropsychological evaluations of preoperative epilepsy surgical candidates have been a routine portion of the multidisciplinary evaluation at most epilepsy centres for decades, hence, it is a laid fact that neuropsychology has played a prominent role throughout the modern era of epilepsy surgery. It has been explored as a means to predict and identify postoperative cognitive deficits after resections (chiefly temporal lobe), and in numerically quantifying those changes that do occur. In addition, neuropsychological results have some predicative power regarding seizure outcome following anterior temporal lobotomy.

Aim: To compare the neuropsychological outcomes in patients with pharmaco-resistant mesial temporal lobe epilepsy undergoing radio surgery and temporal lobe surgery, in particular with respect to verbal memory, visuo-constructive ability, attention and new learning ability function for language-dominant hemisphere treated patients along with psychosocial intervention.

Methods: A sample of 6 randomized consenting subjects were assessed longitudinally on standardized neuropsychological tests namely, verbal memory and learning (AVLT), visuo-constructive memory (CFT), new learning ability (PGI-MS, subtest-8), attention (colour trail 1 and 2), depression (BDI) and anxiety (BAI) from baseline to the 36 month assessment (4 follow-ups annually during the 3 year period).

Result: Descriptive statistical analysis shows that there was no statistical significant difference between the groups; i.e the type of epilepsy surgery (radio surgery or temporal lobe surgery) does not affect neuropsychological profile. While there was improved neuropsychological profile more in temporal lobe surgery group than in radio-surgery group over 3 year assessment. Temporal lobe surgery group has improved visuo-constructive ability (8.3 ± 3.8; 15.6 ± 7.4; 28.3 ± 20.8; 30.0 ± 31.2), learning ability (25.8 ± 29.8; 34.1 ± 39.8; 35.8 ± 31.6; 57.5 ± 44.2), delayed memory (15 ± 13.2; 23.3 ± 23.6; 25.0 ± 22.9; 21.6 ± 24.6), attention(43.3 ± 29.1; 77.0 ± 28.2; 58.2 ± 71.0; 84.3 ± 81.0) along with reduced depression and anxiety respectively over 3 year period of time, as compared to radio surgery group where only visuo constructive ability(10.0 ± 4.3; 14.2 ± 7.6; 30.0 ± 2.5; 43.3 ± 10.4) and new learning ability (70 ± 20; 83 ± 11; 90 ± 0; 90 ± 0) was found be improved.

Conclusion: Neuropsychological testing is useful as a means of prediction and risk stratification for postoperative

cognitive changes after epilepsy surgery, irrespective of type of surgery. Among the assessments, there are no statistically significant changes in the neuropsychological outcomes, though, there is an evidence of clinically significant results, however, due to small sample size, no conclusive claim can be made.

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Oxidative stress in human epilepsy

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Introduction: A series of oxidative stress studies in Kanic Acid induced epileptic brain, found that malondialdehyde (MDA) was about 51% higher (Gupta, 2002), mitochondrial superoxide(O_2^-) and DNA氧丸損傷指標 (8-Hydroxy-2-deoxyguanosine) were increased (Liang, 2000), and extracellular fluid hydrogen peroxide was increased (Layton, 1999). Clinically higher Hcy tended to developed seizures. In epileptic patients, plasma Vit. 6, folic acid and Vit. 12 all decreased. Thus a oxidative stress may play and important role in epilepsy.

Material and methods: We recruit 15 cases of epilepsy surgery. The epileptic focus was localized according to preoperative and intra-operative ECoG spikes. The resected epileptic brain and non-epileptic brain was used for oxidative stress and antioxidant study including: 1. 氧丸壓力指標: ROS, Hcy及 MDA, 2. 抗氧丸物含量: Vit. C, B_6, 3. 抗氧丸能力指標: SOD, catalase, GPx, GR及GSH/GSSG.

Results: Among these 15 patients, their age ranged from 8 to 63 year-old with a mean of 32 ± 16, and gender of 5 males and 10 females. The ROS (RLU/mg tissue/s) were 10,890 ± 9541 in epileptic hippocampus, 10,887 ± 8704 in epileptic cortex and 5112 ± 2077 in non-epileptic cortex respectively. The MDA (μM/g tissue) were 8570 ± 4181 in epileptic hippocampus, 8821 ± 5953 in epileptic cortex and 8300 ± 4757 in non-epileptic cortex respectively. The SOD (unit/mg protein) was 42,798 ± 34,372 in epileptic hippocampus, 42,082 ± 20,599 in epileptic cortex and 36,947 ± 17,035 in non-epileptic cortex respectively. There were no prominent differences of GPx, GR, GSH, GSSG, GSH/GSSG and ATP. It seemed that ROS MDA and SOD all increased in epileptic brain. ROS and MDA were also higher in post-operative non-seizure freedom patients. ROS was also higher in seizure history longer than 1 year.

Conclusion: Higher oxidative stress and lower anti-oxidant patient tended to have seizure recurrence after epilepsy surgery. Longer seizure history may have higher free radicals.

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2015 AESC Lecture

Epilepsy surgery care in Taiwan

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Taiwan is an island with a population of 24 million. Over 95% have been covered by National Health Insurance. The age-adjusted prevalence was 5.85 per 1000, and incidence was 97 per 100,000 person-years. Taiwan may be divided in 4 regions geographically, namely north, central, south and east. There were excessive epilepsy patients in east Taiwan, predominantly in the young and middle aged group.

The total expense for epilepsy treatment was NT 1.6 billion ($ 52 millions). OPD visit was 8.4/year per patient with expense of NT 2159 ($ 72) per OPD. The anti-epileptic drug (AED) expense was NT 900 millions in year 2007, and increased up to 2 billion in year 2009. AED expensed was NT 1145 ($35) per OPD, about 53% of OPD expense.

Epilepsy surgery program was started by Professor His YS in 1987, followed by Professor Chang CN in 1988. Until now, there are only 5 epilepsy surgery programs among 19 medical centers in Taiwan, Taipei Veteran General Hospital (both adult and pediatric), Chang Gung Memorial Hospital, Tzu-Chi General Hospital and Taichung Veterans General Hospital (mainly VNS).

The epilepsy surgery includes awake craniotomy, intraoperative cortical functional mapping, epilepsy with lesion, Temporal lobe epilepsy, Frontal lobe epilepsy, implantation of subdural grid and strip, depth electrodes, foramen ovale electrodes, Callosotomy, Multiple sub-pial trans-section, vagus nerve stimulation, deep brain stimulation and cortical stimulation.

In the past ten years, about 50–60 cases of epilepsy surgery were done annually in Taiwan. As compared to the other developing or developed countries, it is slightly under performed after such a long history of over 20 year's development. There is still a tremendous space for us to continue more hardly.

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