

**The 9<sup>th</sup> Annual Scientific Meeting of the Hong Kong Neurological Society was held on 21-22<sup>nd</sup> November, 1997 with epilepsy as the main theme. Abstracts of the symposia and free papers on the Hong Kong Epilepsy Registry were as follows:**

**1. Hong Kong Children's Seizure & Epilepsy Registry (HKCSER)**

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Seizure and epilepsy disorder constitute the commonest neurological referral to our Paediatric Neurology Centre. We have set up a computerized database collection for children with various seizure patterns to prognosticate the outcome of different seizure types and epileptic syndromes, study the clinical outcomes with trials of various new anti-epileptic medications and to recruit those with intractable epilepsy into our Epilepsy Surgery Programme including Neuro Cybernetic Prosthesis System (NCPS) for Vagus Nerve Stimulation Therapy study.

The database collection was started in March 1, 1997. All children presented with seizure disorders were retrospectively and prospectively collected. During the period from 1987-1997, there had been around 5,000 children with various seizure disorders registered in our Centre. Of these, about 3,000 had febrile seizures. Around 2,000 children had active epilepsy. More than 99% of the children are Chinese in origin. This preliminary analysis over an 8 month period (March - October 1997) includes 1000 cases (723 cases from Queen Mary Hospital; 377 cases from Duchess of Kent Children's Hospital). The male to female ratio is 1.23 to 1. In the febrile seizure group, 10% had recurrent febrile seizures. In the epilepsy group, 29% had refractory epilepsy. The current 1997 Registry analyzes those with epilepsy only.

The classification consisted of idiopathic (36.3%), cryptogenic (0.8%) and symptomatic (62.9%). The associated diseases consisted of learning disabilities (4.4%), mental retardation (38.6%), cerebral palsy (14.6%), psychiatric problems especially autistic features (2.9%), and behavioural problems (5.6%).

The etiology consisted of pre- and perinatal insults (14.4%), such as prematurity (2%), and hypoxic-ischemic encephalopathy (7%); congenital infection (1%); intracranial haemorrhage (2.6%); hypoxic brain damage (2.2%); metabolic events (2.6%); acute meningitis (3.5%); acute encephalitis (10.8%); chronic encephalitis (0.9%); congenital cerebral malformation (6%); head trauma (0.7%); cerebral neoplasm (2.2%); inborn errors of metabolism (0.2%); degenerative brain disease (2.7%); genetic disorder (8.9%); neurocutaneous syndrome (15.5%); stroke (0.2%); and hippocampal sclerosis (1.8%).

A history of status epilepticus occurred in 9% of our children. A positive family history of epilepsy and febrile seizure occurred in 19% and 4% of families respectively. Other neurological diseases present in families are psychiatric disorders (1.2%) and migraine (2.2%).

CT scan and MRI scan facilities are available in Government hospitals only in the years 1985 and 1993 respectively. Investigations performed in our group consisted of CAT scan (67%), MRI scan (54%), SPECT scan (5.5%), EEG (100%), Video Telemetry (1.4%), ambulatory EEG (0.8%) and WADA Test (0.5%). Of those with neuroimaging performed, 86% and 90% had abnormal CAT scan and MRI scan respectively.

40% of our children need special schooling for associated physical or mental handicap. The clinical outcome consisted of: 54% with remission; 13% with suboptimal outcome (i.e. less than 2 seizures in the past 6 months); 6% partial remission (i.e. significant >50% reduction or 3 - 10 seizures over the past 6 months) and 24% having poor outcome (i.e. no reduction in seizure frequency or more than 10 seizures over the past 6 months). Epilepsy surgery is indicated for 3.3% of children. One child with hypothalamic hamartoma and intractable epilepsy had NCPS implant performed in December 1995. More than 60% of children had been given a trial of more than one anticonvulsants. The anticonvulsants used in order of frequency are: Sodium Valporate (27%), Carbamazepine (21%), Phenobarbitone (12%), Vigabatrin (6.2%), Clonazepam (5.3%), Clobazam (5.2%), Phenytoin (5.1%), Nitrazepam (3.9%), ACTH (2.2%), Lamotrigine (2.1%), Ethosuximide (1.6%), Gabapentin

(0.8%), Prednisone (1.4%), Primidone (1.3%), Pyridoxine (1.3%), Topiramate (0.7%), Ketogenic Diet (0.6%), and Oxcarbamazepine (0.4%).

This is a very preliminary analysis of the children with active epilepsy seen over an 8-month period (March 1st to October 30th, 1997). The registry is on-going, and, hopefully, the clinical spectrum and genetic implications of our Chinese children with seizure and epilepsy disorders can be studied in depth in the future.

## 2. The Hong Kong Epilepsy Registry 1997

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*Introduction:* The Hong Kong Epilepsy Registry is a cross-sectional study of adult patients with epilepsy attending outpatient clinics of 8 major hospitals in Hong Kong. Queen Elizabeth Hospital (QEH), United Christian Hospital (UCH), Queen Mary Hospital (QMH), Prince of Wales Hospital (PWH), Kwong Wah Hospital (KWH), Pamela Youde Nethersole Eastern Hospital (PYNEH), Ruttonjee Hospital (RH) and Princess Margaret Hospital (PMH) from March through August, 1997. It included all patients with active epilepsy and patients with no seizure but under medical treatment. Exclusion criteria included: 1. patients who were not on medical treatment and had no seizure within the past 5 years; 2. patients with non-epileptic events or uncertain diagnosis for epilepsy; 3. patients who had not attended out-patient clinic.

*Results:* 2,952 patients were included: QEH 774, UCH 666, QMH 548, PWH 492, KWH 182, PYNEH 177, RH 58, PMH 55. 54.3% were males and median age was 35.8 years old (Range: 10-94.8). 55.2% of patients had a more-than-10 -year-history of epilepsy and 27.6% had been followed up in the present hospital for more than 10 years. Seizures types included generalised tonic-clonic 80.7%, complex partial 28.3%, simple partial 14.4%, absence 2% and myoclonic 1.1 %, and 28.6% of patients had more than one seizure type. Investigations performed included EEG 81.2%, CT 62.1%, MRI 16.9% and neuropsychological assessment 2.2%. 60.6% of patients were classified to have cryptogenic epilepsy, 35.5% symptomatic epilepsy and 3.9% idiopathic epilepsy. The most common cause of epilepsy were CNS infections, cerebral vascular accidents, trauma and perinatal insults. 25.9% of patients were taking more than 2 drugs currently with phenytoin, carbamazepine and sodium valproate being the commonest used drugs. Drug compliance was considered to be satisfactory in 90.8% of patients. 43% of patients had seizures in the past 6 months and 26.7% were considered to have unsatisfactory control of their medical treatment. Medical refractoriness was associated with perinatal insults, CNS infections, congenital malformation of CNS, neoplasm, cerebral vascular accidents, hippocampal sclerosis, mental retardation and history of status epilepticus. 55.5% of patients were able to take open employment.

*Conclusions:* Although being a retrospective study limited to patients with epilepsy attending tertiary out-patient clinics of 8 major hospital, the Hong Kong Epilepsy Registry is the first of its kind conducted in Hong Kong and gives some information on the local population of patients with epilepsy. This concert consisted of a high percentage of patients with cryptogenic epilepsy indicating the inadequacy of present investigations to delineate the underlying cause for most epilepsies. A significant proportion of patients were suffering from medically refractory epilepsy suggesting the insufficiency of present treatment and newer modalities should be implemented so as to improve the seizure control and quality of life in this subgroup of patients.

### **3. The Hong Kong Epilepsy Registry – Queen Elizabeth Hospital**

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*Introduction:* Queen Elizabeth Hospital (QEH), opened in 1963, is a regional hospital in Kowloon and has 186 beds at present. Most of the adult patients with epilepsy of a non-surgical cause are under the care of Division of Neurology, Department of Medicine while their surgical counterparts are under the care of Department of Neurosurgery. Out-patient clinic records of all patients with epilepsy attending Department of Medicine from March through August, 1997 were examined retrospectively for the present study.

*Results:* 776 patients with active seizures or under medical treatment were included. 45.6% were males with median age = 34 years old (range 15-94). 65.3% of patients had a more-than-10-year-history of epilepsy and 37.5% had been followed up in QEH for more than 10 years. Seizure types included generalised tonic-clonic 88.6%, complex partial 39.2%, simple partial 20.9%, and 46.6% of patients had more than one seizure type. Investigations performed included EEG 91%, CT brain 61%, MRI brain 23.7% and neuropsychological assessment 2.5%. 27.4% of patients were classified to have symptomatic epilepsy, 69.2% cryptogenic epilepsy and 3.4% idiopathic epilepsy. The most common causes of epilepsy were CNS infections, congenital malformation of CNS and hippocampal sclerosis. 34.1% of patients were taking more than 2 antiepileptic drugs currently but satisfactory drug compliance were observed in 94% of patients. 54% of patients had seizures in the past 6 months, 40.5% were considered to have unsatisfactory control of their seizures and 27.2% were refractory to medical treatment. Medical refractoriness was associated with simple partial or complex partial seizure types, perinatal insults, congenital CNS malformation, meningitis, cerebral vascular accidents, hippocampal sclerosis and mental retardation. 62.5% of patients were able to take open employment.

*Conclusions:* A significant proportion of epilepsy patients suffer from chronic refractory epilepsy. Many of them have long duration of epilepsy, received multiple antiepileptic drugs, but still have poor control of their seizures, mostly with a cryptogenic cause. Further assessment with newer modalities of investigations and newer treatment modalities should be explored in order to improve seizure control for this subgroup of patients.

### **4. The Hong Kong Epilepsy Registry – United Christian Hospital**

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United Christian Hospital (UCH) is the only acute general hospital serving the Kowloon East region. Among the 959 beds in the hospital, 327 beds belong to the medical and geriatrics department. Most of the epilepsy patients were being looked after in the out-patients clinic. During the period from March to August 1997, a total of 666 patients received anticonvulsants from the pharmacy department for their epilepsy treatment, and they formed the cohort for this analysis. Their case notes were traced and reviewed.

The sex ratios (male: female) are 1.08:1 and the mean age was 47.9 years (SE 0.79). 44.9% of the patients have been suffering from epilepsy for more than 10 years. Phenytoin, Valproate and Carbamazepine were the commonest used drugs for medical therapy of epilepsy; and 25.7% of patients received more than 1 drug for their epilepsy. Most of the epileptic patients had satisfactory control over the seizures and more than 44% had a fully active life. Only 15.9% were refractory.

The proportion of idiopathic, cryptogenic and symptomatic epilepsy were 2.5%, 50.9% and 46.6% respectively. While 71.3% of patients had generalized tonic-clonic seizure, 22.1% had more than 1 type of seizure. The Kwun Tong district has a high ratio of elderly population, 10.6% of the people were aged 65 years or more. Undoubtedly, stroke would be the commonest cause of symptomatic epilepsy and was responsible for half of the cases. Other common causes of secondary epilepsy

included CNS infection (14.9%) and trauma (8.1%). The number of idiopathic epilepsy is very small in this series because our cohort did not include any pediatric patients and we had strict selection criteria including positive EEG findings of generalized spikes and waves pattern.

## 5. The Hong Kong Epilepsy Registry – Queen Mary Hospital

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Between March to August, 1997, 548 patients attending our epilepsy clinic were recruited in the registry. This was estimated to represent 60% of the epilepsy clinic population. The majority of patients (57%) belonged to the age group of 21-40 with a male to female ratio of 1.75 to 1. The mean duration of epilepsy was 15.2 years and the average length of follow-up at our clinic was 8.2 years. Generalized tonic clonic seizure was the predominant seizure type (45.3%) and complex partial seizure ranked second (40.3%). Seizures were classified into cryptogenic (64.2%), symptomatic (33.8%) and idiopathic (2%). Identifiable causes in the symptomatic group included trauma (n=34), stroke (n=29), meningitis (n=29), encephalitis (n=19), hippocampal sclerosis (n=18), congenital CNS malformation (n=17) and neoplasm (n=15). Mental retardation was the commonest associated feature (12.6%). Of 256 patients who had CT brain done, 27.5% showed abnormal findings. MRI was performed less frequently (22.9%) but with a higher diagnostic yield (62% showed abnormal findings). EEG was performed in most patients (86.5%) but 49% of them were normal. Abnormal EEG findings included frontal (7%), parietal (1.5%), temporal (11.3%), occipital (0.7%) focal spikes, generalized spike waves (6.5%), unilateral slow waves (6.3%), bilateral slow waves (5.7%) and photosensitivity (0.4%). Of those 449 patients on antiepileptic drugs, 53.6% were maintained on monotherapy and 28.2% on combination drug therapy. The most commonly used drugs were phenytoin, (31%) carbamazepine (21.9%) and sodium valproate (19.8%). This is in contrast to the time of commencement of treatment when phenytoin and phenobarbitone were most frequently prescribed (38.7% and 19.2% respectively). In terms of seizure control, 56.9% were satisfactory and 20.3% were suboptimal. The remaining 13.9% of the patients were classified having refractory epilepsy. Poor prognostic factors included hippocampal sclerosis, neoplasms, complex partial seizures and congenital CNS malformation (Fisher's exact test,  $p < 0.05$ ).

Our data showed that more than 90% of patients have chronic epilepsy. There was a high percentage of cryptogenic epilepsy but a very low incidence of idiopathic epilepsy. This could represent referral bias to a tertiary epilepsy clinic for adult patients. Underdiagnosis is also likely since 79 patients attended our clinic before 1985 when CT brain was not available and EEG was not a routine investigation. In addition, full investigations were seldom performed in those with satisfactory seizure control (57%) due to limitation of resources. Among those with symptomatic epilepsy, a full spectrum of aetiology was identified, reflecting common CNS disorders in our community e.g. head injury, stroke and CNS infections. Seizure control and drug prescription practice were otherwise comparable to other epilepsy centers.

## 6. The Hong Kong Epilepsy Registry – Prince of Wales Hospital

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This hospital-based registry collected information from 492 adults over the age of fifteen who had been followed up for a mean of 6.4 years. Morbidity was substantial: 30.3% of patients were considered to be refractory to appropriate anticonvulsants given at adequate dosages, with 9.96% of the whole sample population heavily dependent on care at home or at an institution. 7.9% complained of reduced activity and 29.5% were unemployed. 31 patients (6.5%) were classified as being idiopathic under the ILAE classification of epileptic syndromes with 199 (40.4%) symptomatic and 261 (53.0%) cryptogenic. This reflected diagnostic imprecision and the difficulties in classifying every patient under the present scheme. Clinical and neuroimaging evidence of causation included

cerebrovascular disease, CNS infection and tumours. The commonest neurocutaneous syndrome was tuberous sclerosis. MRIs were performed in 62 patients with EEG or clinical evidence of partial onset. Only three showed hippocampal sclerosis with a fourth showing a neuronal migration disorder. Other foreign tissue pathology included low grade glioma, meningiomas and angioma. Epilepsy is a symptom of underlying brain disease; epileptic syndrome is the determining factor in prognosis and the best treatment option. Given this point, univariate analysis identified clinical predictors of poor seizure control. The presence of atonic attacks were more common in the refractory than the non-refractory group (80% vs 29%,  $P < 0.01$ ); similarly those with complex partial seizures (52.2% vs 25.3%,  $P < 0.01$ ), mental retardation (57.3% vs 24.4%,  $P < 0.01$ ) and a history of status epilepticus (61.5% vs 29.4%,  $P < 0.02$ ) were more common in the refractory group.

## **7. The Hong Kong Epilepsy Registry – Kwong Wah Hospital**

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Kwong Wah Hospital (KWH) was set up in 1911. It was one of the major general district hospital in Kowloon with 1173 beds. The main purpose of the study was to evaluate the characteristic features, types, seizures control and social backgrounds of our epilepsy patient group.

*Results:* the total number of our epilepsy patient group was 184. The mean age was 41. Male to female ratio was 1.24: 1. 65.1% of the patients had generalized tonic clonic convulsion. 26.2% had complex partial seizure. 69.8% were cryptogenic. 30.2% were symptomatic. Mean year of epilepsy were 17 and mean year of follow up was 10. For the causes of epilepsy: infection was 40% (meningitis and encephalitis), trauma was 23%, stroke was 9.3% and neoplasm was 4.7%. For investigations: 71.8% of our patients had CT brain scan, 14.8% had MRI and 85.8% had EEG. Results of these investigations: 33% of CT brain scan were abnormal, 51.9% of MRI were abnormal and 62.3% of EEG were abnormal. For medications of our patients: 55.4% were taking only 1 drug and 23.4% were taking 2 drugs. Drugs most commonly prescribed were in the order of phenytoin (29.2%), carbamazepine (24%), phenobarbitone (19.9%) and sodium valproate (13.3%). Epilepsy patients with satisfactory seizure control were about 2/3 (53.6%). Suboptimal, partial or poor control were about 1/3 (35.9%). The majority of our patients (90.7%) was not refractory to treatment. Besides, 89.1% had good drug compliance, 91.2% were fully active in life and 60.2% were still working.

## **8. The Hong Kong Epilepsy Registry – Pamela Youde Nethersole Eastern Hospital**

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Pamela Youde Nethersole Eastern Hospital (PYNEH) commenced services in October 1993. Being the only hospital in Eastern Hong Kong Island, PYNEH provides comprehensive hospital services to a population of about 550,000. The number of epileptic patients follow up in our department risen rapidly in the past 2 years and the number is expected to grow steadily in the next few years at a rate of about 20 patients per year. There are several hostels providing institutional care for severely mentally retarded near our hospital. A substantial portion of our epileptic patients comes from these hostels with severe disabilities and refractory epilepsy.

During the study period, there were 179 active epileptic patients followed up in our department. Most of the patients were not de novo to us with mean year of follow up 1.58 and mean duration of epilepsy 11.67 years. The mean age of patient was 38; female to male ratio was 1.06: 1. 70% of patients had generalised tonic-clonic seizure and 30% had two or more seizure types. On aetiological classifications, the majority of patients were cryptogenic (103 patients; 57.5%); 63 patients (35.2%) had secondary causes identified; only 13 patients (7.3%) were idiopathic with specific epileptic syndromes. The common secondary causes are: stroke, CNS infection, perinatal insults and trauma. The mean number of anti-epileptic drugs currently taken was 1.38 per patient. 19 patients (10.61%)

were refractory to medical treatment and factors associated with refractoriness were: perinatal insults, mental retardation and early onset (< 10 years old). A high proportion of our patients had poor functional status and unemployment (23%) which is likely due to over representation of mentally and physically handicapped in our patients (19%). This is a biased group of epileptic patients due to the above mentioned factors.

### **9. The Hong Kong Epilepsy Registry – Ruttonjee Hospital**

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Ruttonjee Hospital (RH) is a relatively new and small regional hospital. As we do not have an epilepsy clinic, patients are seen in many different clinics including General Medical, Geriatric or General Neurology Clinic. The total number of epileptic patients seen in these clinics is unknown. However, there were 11,781 hospital admissions during the same study period of which 141 admissions (1.2%) involving 125 patients were related to seizure. Because of logistic reasons, only 58 patients (31 male & 27 female) who attended follow up in our General Neurology Clinic and satisfied the inclusion criteria were recruited into the study. Their mean age was 39, ranging from 14 to 87 years old. The commonest seizure types were generalized tonic clonic seizure (59%) and complex partial seizure (26%). Brain CT or MRI were performed in 90% of them. Cryptogenic epilepsy was diagnosed in 69%, and symptomatic epilepsy in 29%. Only one patient was diagnosed idiopathic epilepsy. Over 90% of patients were on monotherapy and 60% were seizure free while on antiepileptic drugs. None had refractory epilepsy. Although our patients belong to a highly selective group, they are probably representative of those seen in a secondary adult referral centre in Hong Kong.

### **10. The Hong Kong Epilepsy Registry – Princess Margaret Hospital**

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Princess Margaret Hospital (PMH) is in the area of Tsuen Wan, Kwai Chung and Tsing Yi which has a population of 800,000. There are three government hospitals: Caritas Medical Centre (1300 beds), PMH (1200 beds), Yan Chai Hospital (700 beds). All three hospitals have Accident and Emergency Department and Intensive Care Unit. In PMH, patients at the age of >18 to 65 will be admitted to the Department of Medicine. There are 55 epileptic patients who attend the Neurology Clinic regularly for follow up. 30 (54%) are male, mean age is 35. 39 (68%) belong to the generalised tonic-clonic seizure type. Their mean duration of epilepsy is 19.7 years. 28 (51%) have active epileptic attacks and 54 (98%) of these patients have been followed up for more than one year.

13 (24%) were symptomatic and their causes include perinatal insult (3), meningitis (3), encephalitis (1), congenital CNS malformation (4), trauma (1), and neurocutaneous syndrome (1). 11 (20%) have mental retardation. For the investigations, 49 (90%) have CT brain, 20(41%) have CT abnormalities. 9 (16%) have MRI brain, 5 (50%) have MRI abnormalities. 48 (87%) have EEG done, 37(77%) have EEG abnormalities. Most of our patients were managed with phenobarbitone (23%), phenytoin (26%), sodium valproate (21%), and clonazepam (4%). Only 4 patients had been put on gabapentin, lamotrigine or vigabatrin.