This edition brings together an array of interesting topics for the neuroscience nurse and related allied health personnel. It begins with a review of the literature regarding the sampling of cerebrospinal fluid from an external ventricular drain.

Then follows an article from Thailand that describes the on-going disability & consequences following TBI within the Thai context. This is useful information for the world neuroscience community as well.

There is a scarcity in the literature for management strategies relating to terminal ICH in the palliative care setting — what to expect and how best to deal with the imminent finality. Discussion in this manuscript centres around these catastrophic events and how best to deal with them from a staff, patient and family perspective.

A Western Australia study looking at a Neurological Integrated Care Pathway (NICP) showed that once introduced, it improved service efficiency for both the hospital system and the community neurological support service. A useful introduction to patient care.

A literature review was conducted highlighting that the neurotrauma population was at greatest risk for development of venous thromboembolism. The neurosurgical nurse remains at the forefront of monitoring patients and implementing strategies for treatment of VTE, DVT and PE. Thromboprophylaxis is discussed.

The journal begins with an interesting editorial on the topic of surgical epilepsy from Dr Mark Dexter relating to the use of SEEG evaluations in drug resistant epilepsy patients. I thank Dr Dexter for his contribution and support of the Australasian Journal of Neuroscience.

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Stereoelectroencephalography (SEEG)  
Something Old Becomes Something New – Invasive Electrode Recordings in the Evaluation of Drug Resistant Epilepsy

Epilepsy is a common medical problem in the Australian community with a prevalence of 7.5 per 1000 Australian citizens. There are approximately 52,000 people in New South Wales who suffer from epilepsy. Approximately 30% will never achieve lasting seizure control from medical therapy alone. Patients with drug resistant epilepsy require evaluation at a comprehensive epilepsy surgery program similar to the one at the Westmead Adult and Children’s Hospitals. Drug resistant epilepsy is typically defined as a failure of two anticonvulsant medications trialled at an adequate dosage. Patients would typically have at least a two year period of uncontrolled seizures with an average of one seizure per month for more than 18 months and no seizure free period lasting more than three months. The presurgical evaluation involves referral to a neurologist/epileptologist who would typically perform a detailed clinical evaluation, EEG, video EEG telemetry, MR imaging, PET imaging, SPECT studies and a neuropsychological evaluation.

This evaluation would define a group of patients who will benefit from epilepsy surgery. The most common form of epilepsy referred to surgical epilepsy programs involves temporal lobe epilepsy. This is a well defined electrical and clinical syndrome that has been better defined in the PET and MR era. The majority of these patients can proceed to surgery without the need for an invasive electrode evaluation. Seizure freedom rates in the order of 70% would be standard in high volume surgical epilepsy centres. There has been a randomised clinical trial of surgery for temporal lobe epilepsy published by Wiebe et al (2001) in the New England Journal of Medicine. This demonstrated a significant benefit of surgery over medical therapy for temporal lobe epilepsy. Excellent out-
comes for surgery have been demonstrated in a variety of other conditions, particularly those where a lesion can be defined on anatomical imaging.

There are however a group of patients with drug resistant epilepsy where no lesion is visible on MR imaging and the pre-surgical evaluation suggests that the seizures begin outside of the temporal lobe. These patients are often referred for an invasive epilepsy evaluation at the Westmead Hospitals. For more than 20 years we have been implanting subdural grid electrodes to evaluate patients with non-lesional drug resistant epilepsy. There remained a group of patients where despite implanting multiple subdural grid electrodes, we were unable to delineate the site of seizure onset. In 2011 we began to study the technique of stereoelectroencephalography. The SEEG technique had been common in France and Italy for more than 40 years, having originally been published by Talairach and Bancaud in 1965 at the Sainte-Anne Hospital in France. Initially this technique was performed with formal cerebral angiography as the only imaging modality. Over subsequent decades, complex three dimensional MR, CT angiography as well as formal digital subtraction angiography, has been incorporated into the technique.

Over the last few years the technique has become more common in Europe and also in the United States. We performed our first SEEG case at Westmead Hospital only three years ago and have gone on to perform a further 30 cases. Increasingly, it is replacing the implantation of subdural grid electrodes as our preferred technique for investigating non lesional drug resistant epilepsy.

The SEEG technique involves implanting multiple depth electrodes through twist drill holes thereby avoiding the need for a craniotomy. We have found that the SEEG technique allows three dimensional definition of the epileptogenic zone. The procedure is well tolerated by patients and it is significantly less invasive than the craniotomy required to implant subdural grid electrodes. If an epileptogenic zone can be defined through the SEEG technique, then patients would typically return for craniotomy and resection of the epileptogenic tissue six weeks following the SEEG procedure.

We use invasive monitoring in epilepsy surgery to clarify discrepancies identified in the pre-surgical epilepsy evaluation. It is very important in patients with drug resistant epilepsy who have a normal MRI scan. It allows us to precisely localise multi-lobar discharges, evaluate early involvement of functional cortical areas and helps us define seizure onset zones in patients with non lesional epilepsy who have a normal MRI scan. We also occasionally use invasive electrode monitoring in patients with lesions that involve or are adjacent to functional areas of brain cortex or where the lesion is likely to be surrounded by a structurally normal epileptogenic region.

We have found that subdural grid electrodes allow precise superficial two dimensional definition of the epileptogenic zone. The subdural grid technique allows highly precise mapping in eloquent cortex but provides very poor mapping of deep foci of epilepsy, particularly those involving the insular cortex. Similarly it has a high potential for morbidity. The SEEG technique which is a relatively new technique on our campus allows more precise three dimensional definition of the epileptogenic zone. Although we have only performed a little over 30 cases at Westmead, the technique has been widely utilised in Europe for 50 years. It has some minor drawbacks in that it allows less precise mapping of the eloquent cortex. However it does allow us to perform detailed electrical evaluations of deeply located lesions, the insular cortex and the mesial surface of the hemisphere. We have found that it is certainly less invasive and patients tolerate the procedure very well. Complication rates are significantly lower than subdural grid electrodes. This (old) technique has significantly enhanced our ability to evaluate the many patients in our community with drug resistant non-lesional epilepsy.