



Pediatric epilepsy

Smyth reports on the cost of open versus LITT callosotomy – higher costs for LITT \$44480 vs Open \$35747, not accounting for readmission or complication costs, both safe and effective for refractory epilepsy in children

Salehi details outcome of hemispherotomy and posterior quadrant disconnection in infants <12 months. Comparable to results in older children, 74% seizure free and 66% favorable GMFCS rating at average follow up of 4.8 years

From the functional session

Dell describes modeling the structure of cerebral microneuronal circuitry with artificial neural networks. Deterministic equations do not govern network behavior yet they remain robust and reliable. Weakly predictive, nondeterministic mathematics is useful

McGovern describes low gamma power band (30-45Hz) suppressible with anterior nucleus of the thalamus stimulation may be a biomarker of DBS responders and could be an optimization target in DBS for refractory epilepsy

Miller reports on connectivity patterns in high frequency ultrasound lesioned tissue. A series of patients mapped to Montreal Neurological Institute tractography templates shows tremor relief associated with endpoints in ipsilateral precentral gyrus. Gait alteration is associated with superior parietal lobule endpoints. Speech and paresthesia side effects did not map consistently

Youngerman describes feasibility of a modular, wireless, high channel BCI array and depth electrodes in a porcine model. Recording, microstimulation, power and telemetry are all integrated

Das reports on a curriculum for general surgeons in military environments to do emergent neurosurgical intervention

Lee recounts his experience self-installing rooftop solar panels and connecting to the electrical grid, parallels and differences between learning neurosurgery and learning electricity

Morone adapts computer vision for surgical instrument detection in SPD. A trained computer vision system was able to track surgical instruments through SPD with 96.9% accuracy. The method has potential for improving SPD efficiency and accuracy

Mukherjee reviewed the impact of a virtual neurosurgery curriculum on preparedness for medical student clerks and subinterns, demonstrating improvements in readiness and select skills

Virtanen reported on a literature review of advanced technologies application to neurosurgery including virtual, augmented, mixed reality, 3-D printing and AI. The augmenting technologies provide a rich tapestry for education and simulative training

Raksin discusses inherent restrictions in guidelines-based practice and calls for informative, rather than prescriptive, use of them in clinical care



Fedor Panov presented a review of medical ethics to offer possible guidelines for our society regarding appropriate treatment/security/ownership of data streaming from the neural circuits of our patients.

John Adler in his excellent talk “Disruptive Innovation” shared his experiences in the field over many decades, focusing on ways to streamline progress in the age of significant hurdles.

The talk was followed by a **Panel discussion with Regis Haid, Richard Fessler, Fedor Panov, Constantinos Hadjipanayis, and Ian Kalfas** highlighting decades of innovation by the panel members and what they see as the critical area for focus in the near future. Balance in collaboration with industry while working at large academic centers was stressed by the participants.

Matthew Smyth showed an excellent review of cost and benefit analysis of Laser Interstitial thermal therapy Corpus Callosotomy approaches to Drug Resistant Epilepsy versus Open Corpus Callosotomy.

Ben Kennedy showed how minimally invasive eyelid and eyebrow transorbital craniotomies can be well tolerated by children with Drug Resistant Epilepsy. Well selected patients can benefit greatly from such an approach with accessibility to a wide variety of pediatric epilepsy pathologies.

Afshin Salehi in their excellent presentation on hemispherotomy and posterior quadrant disconnection in infants showed favorable seizure freedom and motor function scores for those under a year of age.

Stephen Dell presented an overview of computational modelling of mammalian cortical network micro-structure. Our progress in computer cognition allows future study of cortical brain networks using similar approaches, merging the two fields to understand each one better.

Robert McGovern presented data supported development of a new biomarker for responders to ANT-DBS for epilepsy. The group discovered that DBS responders show low gamma oscillatory (30-45 Hz) peak that can be suppressed with acute stimulation after measuring LFP recordings over 1-2 years using the Medtronic PC percept system. Non Responders had peaks that were not suppressible with chronic stimulation in this gamma band, or peaks in other frequency ranges..

Christopher Miller demonstrated that in patients undergoing High Frequency Ultrasound (HiFU) targeting the Thalamus (Vim) for essential tremor, lesions made in white matter tracts connected to the ipsilateral precentral gyrus showed best response to treatment. Tractography of pts with complications showed lesional connectivity to the parietal lobule (likely via the medial lemniscus) or encroached on the internal capsule.

Brett Youngerman presented initial safety and feasibility data in a porcine model for Bioelectronic Interface System to the Cortex (BISC), a new ultrathin high density electrode with wireless power and high-throughput telemetry through a wearable relay station. Such approach may allow for increase in patient specific neuromodulation in many functional disorders.