Fellowship Program in Stereotactic and Functional Neurosurgery

**Program Director:**
*Robert E. Gross, MD, PhD*
Director of Functional and Stereotactic Neurosurgery

**Program Faculty:**
- *Robert E. Gross, MD, PhD*  Associate Professor, Departments of Neurosurgery, Neurology and Biomedical Engineering
- *Nicholas M. Boulis, MD*  Associate Professor, Departments of Neurosurgery and Biomedical Engineering
- *Jon T. Willie, MD, PhD*  Assistant Professor, Department of Neurosurgery

**Associated Faculty:**
- Mahlon R. DeLong, MD, Professor of Neurology
- Thomas Wichmann, MD, Professor of Neurology
- Catherin Beutifisch, MD, PhD, Associate Professor of Neurology
- Helen Mayberg, MD, Professor of Neurology
- Kimford Meador, MD, Professor of Neurology
- Charles Epstein, MD, Professor of Neurology
- Suzette LaRoche, MD, Associate Professor of Neurology
- Klaus Mewes, PhD, Assistant Professor of Neurology
GOALS AND OBJECTIVES:

- To train neurosurgeons to a high degree of competency in the subspecialty practice of functional and stereotactic neurosurgery, including:
  - Movement disorders surgery: DBS, thermal ablation, gene/cell therapy
  - Epilepsy surgery: Resective surgery, intracranial monitoring, disconnection surgery, neuromodulation
  - Pain surgery: Neuromodulation, decompressive surgery, thermal ablation, peripheral nerve surgery
  - Psychiatric surgery: DBS, thermal ablation
  - Radiosurgery

- To develop necessary skills required to work effectively within interdisciplinary clinical and research teams involved in the practice of functional neurosurgery

- To provide exposure to successful models of translational research in functional neurosurgery; and to provide mentorship in the skills and knowledge necessary to develop into a productive, funded neurosurgeon-scientist developing and translating novel neuromodulatory surgical therapies.

TRAINING CURRICULUM:

- The Emory Functional Neurosurgery program provides an intensive surgical experience in all areas of functional neurosurgery, together with training in associated areas of neurology, psychology, radiology, physiology and anesthesia. In addition, opportunities are available for further training in clinical and translational research tools.

- The Training Curriculum follows the recently developed ‘Matrix Curriculum’ being developed by the Society for Neurological Surgeons for resident education. This curriculum (attached), the development of which I led, details all skills necessary for a neurosurgeon to become competent in the area of stereotactic and functional neurosurgery. By the completion of their resident training, residents are not necessarily at the level of proficiency, but are expected to be competent in nearly all areas, except highly subspecialized procedures. ‘Expert’ ratings are reserved for practicing neurosurgeons. Since fellows are 1) post-residency, and 2) by and large going into academic practice where they will
be expected to teach residents, they will be expected to become ‘expert’ in most (non-experimental) areas by the completion of the fellowship. The curriculum is tailored to individual programs (work-in-progress): since Emory offers each and every area, we expect our fellows to be experts in MD surgery, epilepsy surgery and pain surgery (and proficient in investigational psychiatric surgery).

- The Training Curriculum is achieved by the following educational techniques:
  - **Neurology**
    - Neurology DBS and movement disorders clinic (DeLong, Aia, Buettifisch) [Tuesdays]
    - DBS program case conference (DeLong, Aia, Buettifisch, Gross, Boulis, Willie) [Thursday mornings]
    - DBS surgery planning conference (Neurology, Neurosurgery) [Biweekly, Wednesday afternoon]
    - Comprehensive Epilepsy Surgery Conference (Neurology, Neurosurgery), [Tuesday morning]
    - Ad hoc epilepsy intracranial EEG rounds
    - Clinical neurophysiology fellow teaching rounds [Tuesday]: program developed for EEG and Epilepsy neurology fellows
    - Emory Epilepsy Symposium (annually)
  - **Neurosurgery**
    - Didactic
      - Functional neurosurgery case conference (monthly)
      - Functional neurosurgery journal club (monthly)
      - Gross/Boulis lab meetings (Tuesdays)
      - Neurosurgery Clinical Research Meeting (Gross, Director: Tuesday afternoon)
    - Patient evaluation
      - Functional neurosurgery clinic (Gross, Boulis, Willie) [every Thursday, all day]
    - Procedural
      - DBS
        - MER-guided lead implantation: two leads (1 bilateral or 2 unilateral procedures) [Mondays]
        - MRI-guided (Clearpoint) implantation: 2 – 4 cases/month [Friday]
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- DBS IPG implantations and replacements
  - Staged 2 procedure and IPG replacements performed in separate room [every Monday]
- DBS for depression: ~1 case/month [Wed or Fri]

- Epilepsy
  - Intracranial monitoring case [every other Wednesday]
  - Resection (neocortical; amygdalohippocampectomy) or disconnection (callosotomy; hemispherotomy) [alternating Wednesdays]
  - Visualase laser ablations: ~1/month in MRI scanner [Friday]
  - Vagus nerve stimulation (~1-2/month) [Monday]

- Pain and Spasticity
  - Microvascular decompression (1-2/month) [Wednesday]
  - Stereotactic glycerol or RF rhizotomy (1/month) [Monday, Wed]
  - Percutaneous cordotomy, DREZ rhizotomy, myelotomy (~6/yr) [Wed, Friday]
  - Intrathecal drug pump (baclofen, narcotic, Prealt) (2 – 4/month) [Mondays, Fridays]
  - Peripheral nerve stimulators; decompression; repair (2-4/month) [M, W, F]
  - Spinal cord stimulator implantation/revision (1-2/month) [M, W, F]

- Translational Research
  - Fellow will participate in laboratory meetings (Gross, Boulis, Willie) Tuesday afternoons
  - Personal instruction by mentors on grant applications, managing and integrating clinical practice/lab/grant writing
  - Manuscript writing, providing clinical input to translational manuscripts with postdoctoral fellows and graduate students
METHOD OF EVALUATION OF FELLOW:

- Milestones during operative procedures, progression towards independence
- The fellow will be called upon to develop surgical plan, incorporating neurological factors, during movement disorders and epilepsy case conferences.
- Fellow will present patient evaluation and independently develop plan of care during functional neurosurgery clinic
- Fellow will prepare and deliver didactic sessions
  - Neurosurgery resident conference (Thursday)
  - Functional neurosurgery case conference and journal club (Wednesday)
  - Emory Epilepsy Symposium
- Academic productivity
  - It is expected that fellow will publish as first authors at least 2 manuscripts
  - Submission of at least 1 abstract to national meeting
- Faculty evaluations

IMPACT OF TRAINING/OUTCOMES

- Impact of training curriculum will be determined by progression to independent academic or private practice in functional neurosurgery