

Mentored Professional Enrichment Experience Student Application

Applicant:

Phone Number:

Name of Project/Experience: Neuropsychological profiles after brain surgery: A comparison of children with epileptogenic lesions or nonepileptogenic tumors.

Location where Project/Experience will take place: Children's Memorial Hospital, Children's Epilepsy Center, Chicago, IL

Mentor Name: Douglas R. Nordli, Jr., M.D. and Maxine M. Kuroda, Ph.D., M.P.H.

Mentor Phone: 773-880-3749, 773-883-6158 or 6159

RATIONALE

Epilepsy, a condition characterized by recurrent afebrile seizures that are unprovoked by any known proximate insult such as head trauma or infection,¹ is the second most common cause of mental health disability worldwide.² Population-based studies report that the incidence of seizures and epilepsy is high in children, and has been estimated at 100 per 100,000 in infancy and 50 per 100,000 for most of childhood.^{3,4} Epilepsy spontaneously remits in the majority of cases, but is resistant to medication therapy for 20-25%.⁵ For these children with intractable, disabling epilepsy, surgery may be their only chance of substantial progress in development or cure.⁶

The young nervous system presents unique challenges to the epileptologist and neurosurgeon because of its vulnerability and plasticity.⁶ In its crucial role in nervous system development, plasticity allows recovery from major brain injury; but because it is dynamic, plasticity also offers windows of opportunity for abnormal, ultimately deleterious, growth in response to injury.⁷ For instance, the brain has substantial capacity for functional reorganization of language that varies with age,⁷ however, an epileptogenic focal developmental lesion may orchestrate atypical consolidation of the language processing center. Children with epilepsy are at greatly increased risk of not meeting educational, vocational, and social goals,⁸ and congenital epileptogenic lesions may contribute markedly to this risk by interfering with development.

The proposed study will compare adaptive skills, behavior, emotionality, and quality of life between children who have undergone surgical resection of congenital epileptogenic lesions and children who have undergone surgical resection of acquired nonepileptogenic tumors. It is hypothesized that scores in each of these domains will be lower for the children with epilepsy due to interference of the congenital lesions in normal brain development. Subjects will be obtained from the Children's Epilepsy Center and from the Division of Neurosurgery. To date, 20 children seen at the Epilepsy Center have undergone surgery. These children will be matched on age at time of surgery with 20 patients from the Division of Neurosurgery who have undergone surgical resection of low-grade supratentorial tumors (including ependymomas, medulloblastomas, astrocytomas, and glioblastomas). These tumors were selected for study as they primarily involve the gray matter of the brain, as do the lesions that produce the abnormal electrical discharges of epilepsy.¹¹ The low-grade forms were selected as high-grade tumors may have spread and may require the inclusion of chemotherapy or radiation therapy.

GOALS

Goal 1- Explore pediatric neurology and neurosurgery through meetings with Leon G. Epstein, M.D., Douglas R. Nordli, Jr., M.D., Tadanori Tomita, M.D., Maxine M. Kuroda, Ph.D., M.P.H., and two fellows Joshua Goldstein, M.D. and Andy Kim, M.D.

Goal 2- Investigate the benefits of early surgical intervention of childhood epilepsy.

Goal 3- Investigate the presurgical criteria of epileptic pediatric surgical patients and identify any connections between presurgical characteristics and surgical outcome.

Goal 4- Compare surgical outcomes, including development and quality of life, of children with epileptogenic lesions with those with nonepileptogenic tumors.

Goal 5- Gain knowledge of the techniques used to identify epileptogenic lesions, such as EEG, MRI, WADA, and PET.

Goal 6- Gain an understanding of neuropsychological testing and investigate its importance in determining surgical candidates and long-term post-surgical outcome.

METHODS

The investigator will request participation in this study by calling the parents of each subject. If verbal consent is given, the investigator will administer the Woodcock-Johnson Scales of Independent Behavior (Revised short form) by telephone interview.⁹ This is a parent report survey of adaptive skills (activities of daily living) that is easily administered by phone interview in about 10 minutes. A brief 7-item survey that asks the parent to rate the child's quality of life with respect to family life, epilepsy, health aside from epilepsy, behavior, emotions, social interactions, and school performance (appropriate to age) will also be

administered by phone. The Child Behavior Checklist (CBCL) will be mailed to the child's home with two copies of the written consent form. This multidimensional parent report survey asks about child behavior and emotionality. It is well standardized for two age ranges: 1.5-5 years, which includes language development items, and 6-18 years, which includes scales oriented to the DSM-IV.¹⁰ Parents will be asked to return the CBCL and a signed copy of one of the consent forms in a self-addressed, stamped envelope.

ANALYSIS

Descriptive analyses will report n (%) by gender, age group, location and laterality of lesion or tumor. Inferential analyses will compare standard scores on the Woodcock-Johnson Scales of Independent Behavior and T-scores on the CBCL by Student's t test or Mann-Whitney U, as appropriate. Scores will also be regressed on gender, time since diagnosis of epilepsy or tumor, and laterality. As the quality of life items are used in the clinical practice of the Epilepsy Center and are not standardized, results will be reported descriptively and not submitted to formal statistical testing.

SUPPORT

1. Do you request support funds? Yes
2. Would you be able to participate if a scholarship is not available? No

References

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4. Hauser WA. Epidemiology of epilepsy in children. *Neurosurg Clin N Am* 1995;6:419-29.
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8. Sillanpaa M, Jalava M, Kaleva O, Shinnar S. Long-term prognosis of seizures with onset in childhood. *N Engl J Med* 1998;338(24):1715-22.
9. Bruininks RH, Woodcock RW, Weatherman RF, Hill BK. Scales of independent behavior-revised. 1996. Itasca, IL:Riverside Publishing.
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11. Cohen ME, Duffner PK. Tumors of the brain and spinal cord including leukemic involvement. In: *Pediatric neurology: Principles & Practice* (3rd ed.) KF Swaiman and S Ashwal (eds). 1999 Mosby, Inc.: St.Louis, MO, pp.1072-5.