I. PURPOSE:

The purpose of this document is to broadly define the content of core knowledge and principles to be mastered by fellowship trainees in the subspecialty of Neuro-Oncology.

II. CORE CURRICULA

A. DEFINITION OF SUBSPECIALTY

1. Definition

Neuro-oncology is a specialty which involves the management of primary and metastatic central and peripheral nervous system neoplasms; neurologic complications of cancer and related disorders; and neurologic complications of therapy utilized in such patients.

2. Scope of practice

a. Background of practitioners

The subspecialty evolved in the latter third of the 20\textsuperscript{th} century out of a demonstrated need for physicians trained and experienced in the management of such patients. This specialty fell outside the scope of established practice requirements for the specialties of neurology, medical oncology, and neurosurgery, justifying its development. Of late most physicians practicing neuro-oncology have background in Neurology. Currently there is a UCNS certification for Neuro-Oncology.

b. Distinction from established specialties

It is the position of the Section on Neuro-Oncology that the proper management of neuro-oncology patients requires training and experience in Neurology or Medical Oncology or Neurosurgery. This allows familiarity with CNS disease and chemotherapeutic practices.

1) Approved residency training (U.S. or equivalent) in Neurology, Neurosurgery, or Internal Medicine (oncology fellowship) with experience in and/or rotations involving neurology

2) Training in clinical oncology as related to primary and secondary nervous system neoplasms, and direct and indirect complications of these neoplasms and their management (Approved completion of Medical Oncology fellowship by CGME approved program which includes emphasis in neuro-oncology or Neuro-Oncology Fellowship recognized by AAN/Section of Neuro-Oncology).

Board certification or a board eligible status, in accord with requirements of the American Board of Medical Specialties, in one of the following specialties (neurology, internal medicine
or neurosurgery) is strongly recommended.

B. CORE CONTENT AND KNOWLEDGE BASE
Fellowship training programs in neuro-oncology will have the following purposes and goals (See attached UCNS guidelines for complete content):

1. To provide supervised training in the practice of neuro-oncology. Core training will include but not necessarily be limited to the following areas:

   a. Advanced principles in the diagnosis of primary and secondary (metastatic) nervous system malignancies
   b. Advanced principles of management of primary and secondary nervous system malignancies, to include:
      1. Expertise in the treatment of these neoplasms, including:
         a. Primary central nervous system adult and pediatric tumors
         b. Metastatic cancer to the nervous system, including:
            - Brain and spinal cord
            - Metastases neoplastic
            - Meningitis
              - epidural cord compression
            - Nerve and plexus
            - Metastases base of skull
            - Metastases
         c. Treatment of cancer related complications, including:
            - Encephalopathy
            - CNS infections
            - Cerebrovascular
            - Disease Seizures
            - Increased intracranial pressure
            - Thromboembolism
            - Neutropenia, thrombocytopenia, anemia
            - Sepsis and other infections
            - Metabolic disorders Pain management Palliative / end of life care
   2. Expertise in the use of related chemotherapeutic agents, supportive medication related to neuro-oncology, and blood products
   3. Expertise in the recognition and management of complications of related chemotherapy and other therapeutic agents (including radiotherapy, surgery, steroids etc.)
   4. Experience in the coordination of multidisciplinary management of patients with neuro-oncologic disorders with other subspecialties, including medical oncology, neurosurgery, radiation oncology, neuroradiology, neuropathology, pain management, rehabilitative and cognitive services, palliative care and hospice transitions.
2. To provide supervised training in clinical research. This experience will include but is not necessarily restricted to:

   a. Experience in: clinical scientific research methodology and protocol design; data management and interpretation; regulatory mechanisms applicable to clinical oncology research; toxicity, safety and biostatistical methodology; independent design of original clinical or laboratory research; presentation of accomplished activities; and writing and submission of manuscripts and research grant applications.

3. To provide guidelines and counsel with regards to the transition to an independent career as a competent neuro-oncologist.
**Appendix A**

**List of AAN/Section of Neuro-Oncology Recognized Fellowship Programs**
(September 2013)
*are UCNS certified*

<table>
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<tr>
<th>Institution</th>
<th>Program Director</th>
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Division of Neurology  
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Harvard Medical School  
330 Brookline Ave.  
Boston, MA 02215          | Eric Wong  
Phone: 617-667-1665  
Email: dcooper@bimc.harvard.edu |
| Cleveland Clinic Foundation*  
9500 Euclid Avenue  
Cleveland, OH 44195       | Glen Stevens, DO, PhD, FAAN  
Phone 216-444-1787  
Fax: 216-444-0924  
Email: steveng@ccf.org |
| Duke University Medical Center*  
PO Box 3951, DUMC  
Durham, NC 27710         | Katherine Peters, MD, PhD  
Phone: 919-684-5301  
Email: Katherine.peters@duke.edu |
| Hermelin Brain Tumor Center  
Henry Ford Hospital  
2799 W. Grand Blvd  
Detroit, MI 48202        | Tom Mikkelsen, M.D.  
Phone: 313-916-1094  
Fax: 313-916-7139  
Email: nstom@neuro.hfh.edu |
| John Hopkins University Medical School*  
Brain Cancer Program  
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Baltimore, MD 21287      | John Laterra, MD  
Phone: 410-614-3853  
Fax: 410-502-2797  
Email: jlaterr1@jhmi.edu |
| Massachusetts General Hospital*  
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Boston, MA 02114        | Scott Plotkin, MD, PhD  
Telephone: 617-726-3650  
Fax: 617-643-2591  
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| Mayo Clinic Rochester  
Department of Neurology  
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Fax: 507- 284-4074  
Email: boneill@mayo.edu |
| Memorial Sloan-Kettering Cancer Center*  
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New York, NY 10021      | Thomas Kaley, MD  
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Neuro-Oncology Secton
Core Curriculum Page 5
Appendix B  
UCNS Neuro-Oncology Core Curriculum

Neuro-oncology is a subspecialty that involves the neurological, medical, surgical, and oncologic management of patients with primary or metastatic central and peripheral nervous system neoplasms, and any other disorders or complications affecting the nervous system, that result directly or indirectly from nervous system or systemic neoplasms or from related treatment.

I. CORE CONTENT

A. Management of Adult Primary Nervous System Tumors
   Knowledge of advanced principles of management of primary nervous system tumors in adult neuro-oncology patients. This training must include the following:
   1. Proper application of diagnostic methods in adult neuro-oncology, including the clinical history and examination, as well as laboratory, neuroimaging, neuropathologic and other neurodiagnostic procedures in the evaluation of such patients.
   2. Indications for standard and experimental surgical, radiation, and medical therapies for primary CNS tumors.
   3. Comprehensive training and experience with the use of medical neuro-oncologic therapeutics, including appropriate chemotherapy, targeted and novel therapies, and therapy for commonly associated medical complications in neuro-oncology patients or as they apply to adult neuro-oncology.

B. Management of Pediatric Primary Nervous System Tumors
   Knowledge of advanced principles of management of primary and metastatic nervous system tumors in pediatric neuro-oncology patients:
   1. Proper application of diagnostic methods in pediatric neuro-oncology, including clinical history and examination, laboratory, neuroimaging, neuropathologic and other neurodiagnostic procedures in the evaluation of such patients.
   2. Indications for standard and experimental surgical, radiation, and medical therapies for primary CNS tumors.
   3. Comprehensive training and experience with the use of medical neuro-oncologic therapeutics, including appropriate chemotherapy, targeted and novel therapies, and therapy for commonly associated medical complications in neuro-oncology patients or as they apply to pediatric neuro-oncology.
   4. Specialized modifications of diagnostic evaluations and treatments, which are necessary due to the age of the patient (newborns, infants, young or older children)

C. Treatment of Metastatic Cancer to the Nervous System
   1. Brain and spinal cord metastases
   2. Base of skull metastases
   3. Leptomeningeal metastases
   4. Epidural metastases and spinal cord compression
   5. Plexus and peripheral nerve metastases

D. Systemic Cancer-Related Neurologic Disorders
   1. Adverse events and reactions to surgical, medical, and radiation treatment of neuro-oncology patients
   2. Toxic, nutritional and metabolic encephalopathy
   3. CNS and systemic infections
   4. Cerebrovascular disease
   5. Seizures
   6. Increased intracranial pressure
   7. Deep venous thromboembolism
   8. Neutropenia, thrombocytopenia, anemia and related complications
   9. Use of blood products and growth factor support
10. Neuro-oncologic complications of bone marrow transplantation
11. Paraneoplastic syndromes
12. Pain and headache management
13. Palliative and end-of-life care

II. CORE CURRICULUM

A. Program Content
The subject matter upon which the program is based is summarized in the Core Content above. Neuro-Oncology is a discipline with foundations in both neurosciences and medical oncology. The scope of this subspecialty includes: the diagnosis and clinical management of primary and metastatic central and peripheral nervous system neoplasms; the neurologic complications of cancer and related systemic disorders; the neurologic complications of surgical, radiation and medical oncologic therapy; and supportive and terminal care management of Neuro-Oncology patients.

Proper management of Neuro-Oncology patients requires training and experience in at least two essential disciplines, which together define Neuro-Oncology as a unique subspecialty. Training in neurology or neurosurgery is required to properly assess and manage the neurologic component of the patient's disease. Training in Medical Neuro-Oncologic Therapeutics is required to establish competency in the use of chemotherapy and related medical treatments and supportive measures.

B. Goals
The overall goals of the educational program are:
1. To provide supervised training, with increasing responsibility, in the inpatient and outpatient practice of Neuro-Oncology. This training will include principles of diagnosis and management of primary and secondary central and peripheral nervous system neoplasms, neurologic complications of cancer and related disorders, side effects of related treatments, and related supportive care measures.
2. To provide supervised training in aspects of clinical and/or basic research in Neuro-Oncology.
3. To develop independence and evidence of competence of the Neuro-Oncology trainees.
4. To provide training in the technical aspects and procedures related to Neuro-Oncology, including administration of chemotherapy, other anti-neoplastic therapy, and related specialized procedures.
5. To develop, in the trainee, skills and a familiarity with the process of clinical trial development and conduct; academic presentations and/or publications; federal and private grant submissions; and independent research.
6. To provide guidelines and counsel with regards to the transition to an independent career as a competent Neuro-oncologist. Upon completion of training, trainees will be able to participate in the academic life of their institution, and in the national and international community of Neuro- oncologists.

C. Objectives
Advanced training programs in Neuro-Oncology will have specific purposes and goals (adapted from the Accreditation Council for Graduate Medical Education (ACGME) Core Competencies). The Program Director, via direct observation and performance evaluations, will assess competence in the following areas:
1. Patient Care:
   i. Provide patient care that is compassionate, appropriate and effective for the promotion of health, prevention of illness, treatment of disease, and care at the end of life.
   ii. Gather accurate, essential information from all sources, including medical interviews, physical examinations, medical records and diagnostic/therapeutic procedures.
iii. Make informed recommendations about preventive, diagnostic and therapeutic options and interventions that are based upon sound clinical judgment, scientific evidence, and patient preference.

iii. Develop, negotiate and implement effective patient management plans and integrate patient care.

iv. Perform the diagnostic and therapeutic procedures considered essential to the practice of Neuro-Oncology with competency.

2. Medical Knowledge:
Demonstrate knowledge of established and evolving biomedical and clinical sciences, and apply knowledge to patient care and the education of others. Trainees must:

i. Apply an open-minded, analytical approach to acquisition of new knowledge.

ii. Access and critically evaluate current medical information and scientific evidence, including evidence-based practice guidelines pertaining to Neuro-Oncology.

iii. Develop a clinically applicable knowledge of the basic and clinical sciences that underlie the practice of Neuro-Oncology.

iv. Apply this knowledge to clinical problem solving, clinical decision-making, and critical thinking.

3. Practice-Based Learning and Improvement:
Neuro-Oncology trainees are expected to be able to use scientific evidence and methods to investigate, evaluate and improve patient care practices. Trainees must be able to:

i. Identify areas for improvement and implement strategies to enhance knowledge, skills, attitudes and processes of care.

ii. Analyze and evaluate practice experiences and implement strategies to continually improve the quality of patient practice.

iii. Develop and maintain a willingness to learn from experience to improve the system or processes of care.

iv. Use information technology or other available methodologies to access and manage information, support patient care decisions, and enhance both patient and physician education.

v. Gain information and experience from ongoing educational conferences, e.g. multidisciplinary patient conferences, neuropathology and neuroradiology conferences, and journal clubs.

4. Interpersonal and Communication Skills:
Neuro-Oncology trainees are expected to demonstrate interpersonal and communication skills that enable them to establish and maintain professional relationships with patients, families, and other members of the health care team. Trainees must be able to:

i. Provide effective and professional consultation to other physicians and health care professionals, and sustain therapeutic and ethically sound professional relationships with patients, their families and colleagues.

ii. Use effective listening, nonverbal, questioning, and narrative skills to communicate with patients and families.

iii. Interact with consultants in a respectful, appropriate manner.

iv. Maintain comprehensive, timely, and legible medical records.

5. Professionalism:
Neuro-Oncology trainees are expected to demonstrate behaviors that reflect a commitment to continuous professional development, ethical practice methods, an understanding and sensitivity to diversity and a responsible attitude toward their patients, their profession, and society.