MRVAMC: ELECTRON MICROSCOPY (EM) (ULTRASTRUCTURAL PATHOLOGY): Rotation Director: William L. Clapp, M.D.

1. Description of the rotation: The MRVAMC EM Laboratory serves as the core diagnostic EM laboratory for the University of Florida College of Medicine, Shands Hospital and the VAMC. In addition, it serves as a major diagnostic referral EM laboratory for the southeastern U.S (ACGME competency #1: Pt. care). The MRVAMC EM Laboratory has two "state of the art" transmission electron microscopes, a Phillips CM100 and a Phillips CM100-BioTwin, an AMT digital EM camera system, a darkroom, and a general laboratory for processing and thick-sectioning of specimens. Well over 300 cases/year are processed in this laboratory.

Gathered over 20 years, a comprehensive teaching set of electron micrographs (also grids and blocks) illustrating common and uncommon entities in ultrastructural pathology is a valuable learning resource for the resident (ACGME competency #2: Medical Knowledge; #3: Practice-Based Learning). The laboratory also contains an extensive collection of teaching notebooks and textbooks. Depending upon the resident's interests, other educational and/or research activities may also be included in this rotation. A research project can also be initiated during this rotation (ACGME competency #3: Practice-Based Learning). As appropriate to the individual case or consultation under review, the ethical, socioeconomic, medicolegal and cost-containment issues are reviewed and discussed (ACGME competency #6: Systems-Based Practice). As well, research design, statistics and critical review of the literature are discussed. By use of the literature, PubMed, the internet and textbooks, the residents is trained to become a lifelong learner.

2. Goals of the rotation: At the conclusion of this rotation, the resident will understand the technical aspects of specimen fixation and processing and basic principals of electron microscopy. The advantages and limitations of different methods will be discussed. "Hands on" experience with processing of specimens, handling the electron microscope and photography will be gained. The resident will become familiar with the digital EM camera system and image file management. However, the main goal of the resident will be to acquire a solid foundation in normal and neoplastic cell ultrastructure as well as other areas of ultrastructural pathology, including renal disease, muscle and nerve disease, cilia disorders and viral diseases.

3. Duration of the rotation: One month. The rotation is available to all residents but is most often selected by senior residents. It may be scheduled in combination with another GVAMC rotation.

4. Duties and responsibilities of residents: Initially, to learn the process the resident will work up a case from start to finish; specimen fixation to final interpretation of the EM prints. Independent review of active cases prior to signout with the attending pathologist is expected to enhance the learning experience of the rotation. This entails correlation with the light microscopy observed on 1 micron sections. All EM cases will be signed out with the attending pathologist and a EM report issued to the clinical service. There are *no fellows* on this rotation.

5. Teaching staff for the rotation: Byron P. Croker, M.D., Ph.D., William L. Clapp, M.D., Li Lu, M.D., Ph.D., Kenneth A. Iczkowski, M.D., George Kasnic B.A (EM Supervisor) and Jim Brown (Histology Supervisor).

6. Supervision and evaluation of residents: Residents are closely supervised by the teaching staff. Evaluation of the residents considers the resident's level of experience and is based on the resident's knowledge, accomplishments and reliability. Monthly written evaluations are performed. Revised 6-28-2004

Electron Microscopy Rotation Objectives
Submitted by William L. Clapp, M.D.

By the end of the first 4-week rotation, the resident should have a basic understanding of the following electron microscopy procedures. Also, diagnostic competencies should be achieved in the following areas.

Procedures:
Routine fixation of specimens
Embedding and processing of specimens
Thick sectioning (1 micron) of blocks
Ultrathin sectioning of blocks
Visualization of specimen image in electron microscope
EM Photography (EM digital camera system)

Diagnostic areas:
Normal cell ultrastructure
Tumors
- Squamous cell carinoma
- Adenocarcinoma
- Small cell carcinoma
- Melanoma
- Lymphoma
- Leukemia
- Neuroendocrine tumors
- Mesothelioma
- Sarcomas
- Differential diagnosis of poorly differentiated malignant neoplasm and "small blue cell tumor"

Kidney -normal glomerular ultrastructure
Kidney -glomerular diseases (common diseases such as membranous glomerulonephritis)

By the end of a second 4-week rotation, understanding and diagnostic competency should be extended to include the following: (Optional: some areas represent possible opportunities for research participation)

Procedures:
Fixation of peripheral blood and bone marrow
Processing of paraffin blocks for EM examination
Ultrastructural immunolabeling (optional-research)
Low temperature embedding (optional-research)

Diagnostic areas:
Tumors- diagnosis of specific subtypes of all tumors listed above in first rotation (example: distinguishing leiomyosarcoma vs. malignant fibrous histiocytoma vs. rhabdomyosaroma or as another example: acute myeloid leukemia vs. acute lymphoid leukemia vs. Sezary syndrome)
Kidney-glomerular diseases (also uncommon diseases such as fibrillary glomerulonephritis)
Cilia disorders
Viral diseases
Peripheral nerve/muscle disorders (correlation with UF Neuropathology Service)