

# CHECKLISTS FOR NEURODIAGNOSIS

**James G. Smirniotopoulos, MD**  
George Washington University  
Washington DC

MedPix®, National Library of Medicine  
Bethesda, MD

A focused differential diagnosis begins with: 1) identifying the abnormality (“lesion”); 2) accurate localization of the lesion; 3) analysis of the lesion morphology; and, 4) noting secondary effects of the lesion (edema, herniation, etc.)

Intracranial lesion locations must be separated into intraaxial (neural parenchyma) and extraaxial. Locations are often sub-categorized:

## ■ Anatomic Locations

- **Sagittal Images**
  - Sup. Sag. Sinus
  - Corpus Callosum
  - Sella Region
  - Clivus
- **Axial Images**
  - Skull, Epi/Sub Dural
  - SAS
  - Cortical Gray Matter
  - White Matter
  - Deep Gray Matter
  - Ventricles

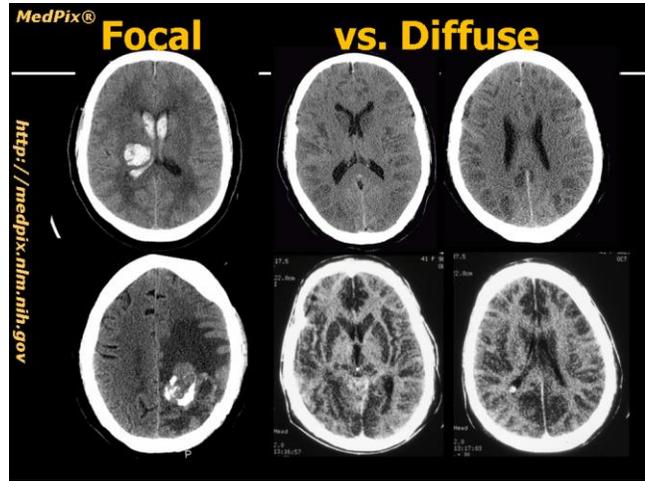
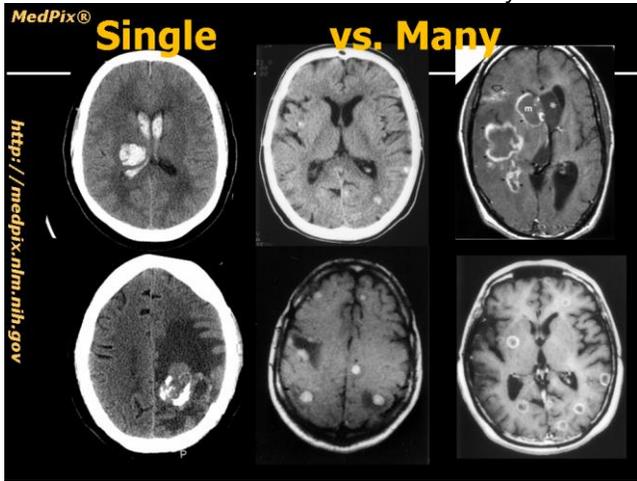
Lesion morphology maybe classified by:

- Morphologic Features
  - Mass Effect
    - Yes, proportional
    - Less than expected
    - No mass effect
  - Abnormal WM Signal
    - Vasogenic Edema
    - Demyelination
    - Infiltrating neoplasm
  - Enhancing Ring Lesion
    - Necrotic Neoplasm
    - Reactive (e.g. abscess)
    - Fluid or Inflammatory

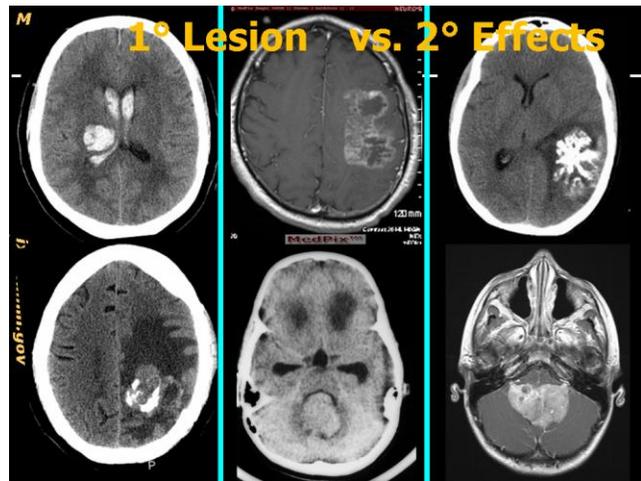
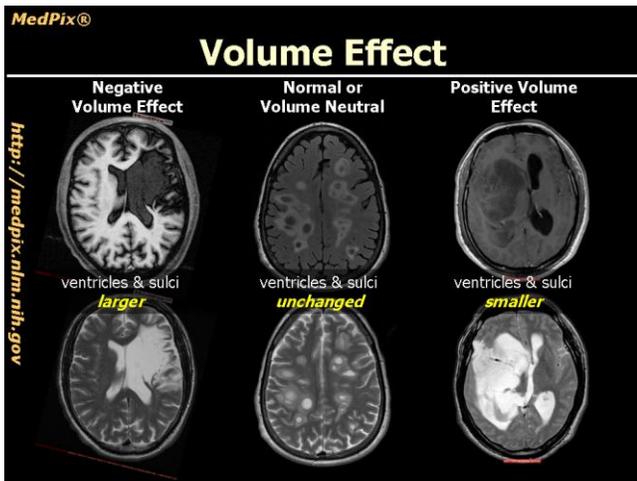
We are all familiar with the value of clinical history – especially the duration of symptoms and signs; and, the rapidity of onset of those symptoms and signs. Similarly, there are tools for differential diagnosis of images:

- Number and Distribution of Lesions
  - Single Lesions
  - Multiple Lesions
    - Random distribution
    - Gray Matter localization
    - White Matter localization
    - Complex locations

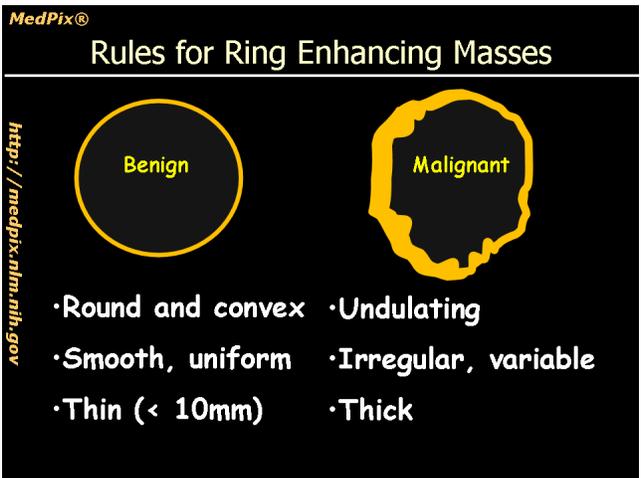
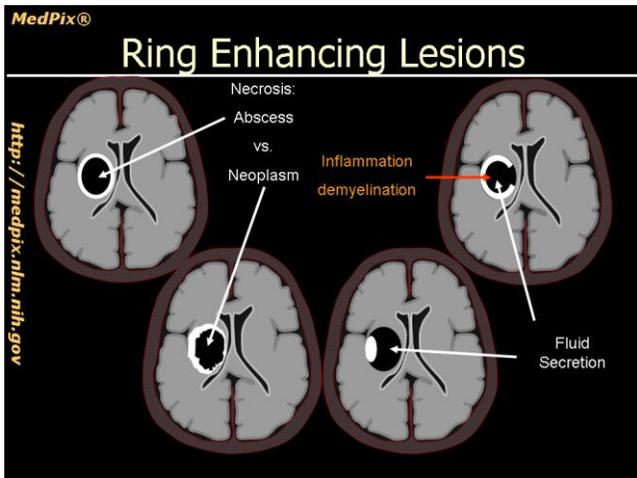
- Diffuse abnormality



Another analysis – similar to sorting clinical history – is comparing lesion volume with overall mass-effect; and, noting secondary effects like “vasogenic edema”, mass-effect, herniation and shift.

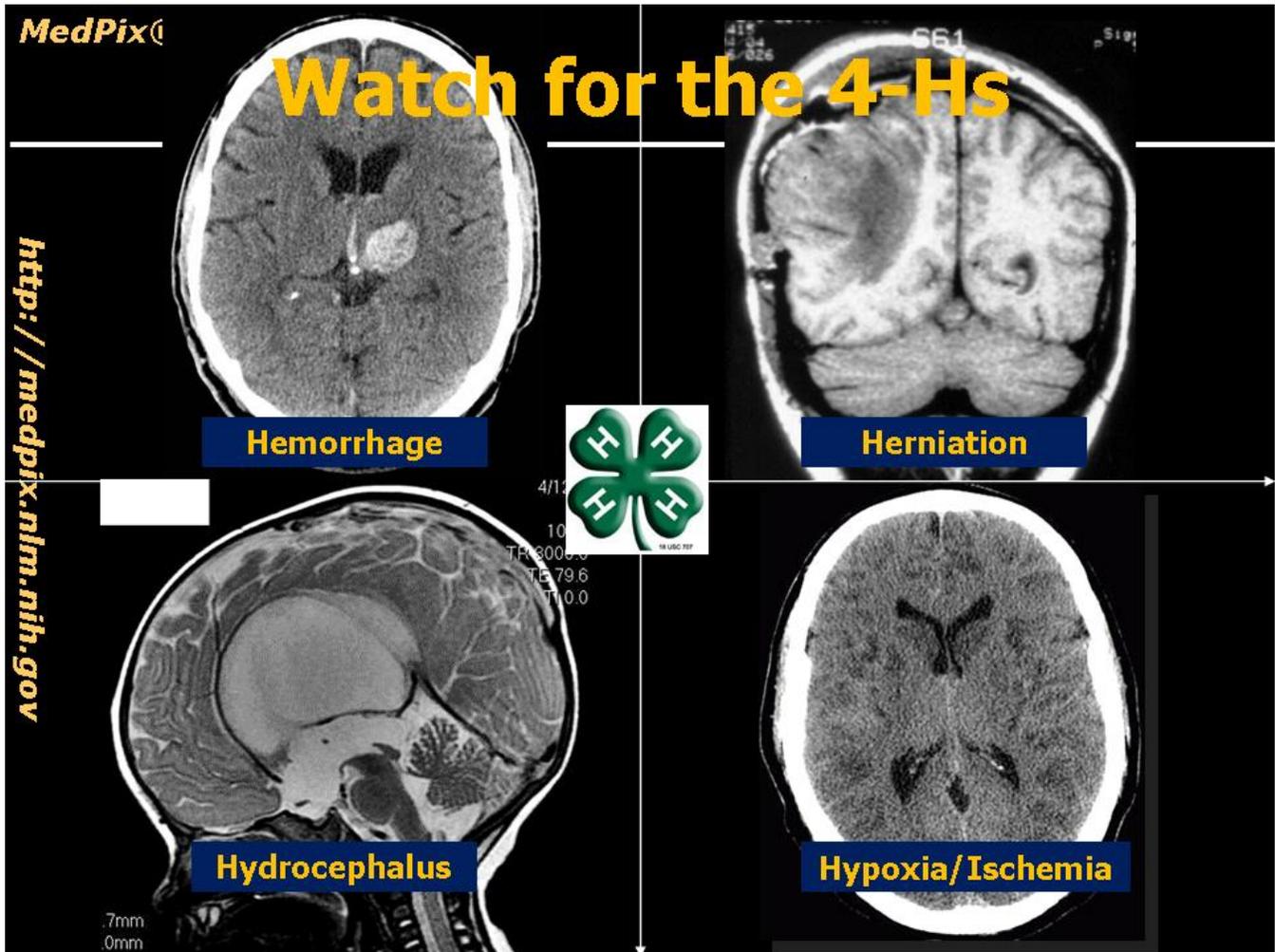


Lesion morphology is another tool for differential diagnosis. Lesions may be homogeneous or heterogeneous. Contrast-enhancement may be solid, “necrotic”, “cystic with nodule”, or form an “open-ring” or “horseshoe”.



Lastly – and certainly not least – we must learn to recognize life-threatening image findings that require urgent treatment – either surgical (decompression, ventricular drainage) or medical (hyperventilation, osmotic agents, corticosteroids). These urgent findings are often called the “Four H’s”:

- Hemorrhage
  - Herniation (and shift)
  - Hydrocephalus
  - Hypoxia and Hinfarction
- } **Mass Effect**



Suggest References