Case 1
Describe the normal gross brain in the image.
On the low power H&E stained section of the cortex, identify the gray matter and the white matter.

Case 1
Identify the arachnoid and the subarachnoid space. Where is the pia mater? Identify blood vessels in the subarachnoid space. Identify Virchow Robin Spaces.
Case 1 What cell type is highlighted by the arrows on the 20x image? What other general cell type of the CNS is present on the 20x image?

Case 1 Describe the characteristic histologic features of neurons on 40x

Case 1 What is the predominant cell type in the high power section? What are its characteristic histologic features? What is its function?
Case 1 – The histologic section corresponds to what area of the gross brain? Describe the low power histologic findings.

Case 1 – Describe the findings on high power. What is the function of the circled structures?

Case 2

**CHIEF COMPLAINT:** Inability to move right arm and leg

**HISTORY:** A 68 year-old man is brought to the emergency department by paramedics who were called by the patient’s daughter. The patient was playing with his grandchildren in the backyard when he suddenly stumbled and collapsed to the ground. The children called their mother who found the patient lying on his back, awake but unable to move his right arm and leg. In response to questions, he mumbled with slurred speech and answered incoherently.
The patient has diabetes mellitus, type 2. He has been treated for hypertension with hydrochlorothiazide and enalapril. His has hyperlipidemia but has not tolerated statin therapy due to myalgias. Six months ago, the patient had a transient episode of (R) arm and leg weakness from which he recovered completely.

**Case 2**

The patient is drowsy but arousable. He seems unable to comprehend most commands but he does not appear to be in acute distress. Vital signs: blood pressure 164/90 mmHg, apical heart rate 66/minute and regular, respiratory rate 20/minute, temperature 99°F. Examination of the head and neck: The right corner of his mouth droops. He is unable to puff up the right cheek. The left pupil is dilated and reacts sluggishly to light and accommodation. Although he reacts appropriately to visual threats from the left side, he does not do so from the right side. The right pupil is 4mm in diameter and reacts to light appropriately.

The retinal show arteriolar narrowing but no flame hemorrhages or papilledema. On auscultation of the heart there is a grade II early systolic murmur heard best in the right second intercostal space. The abdomen is soft and non-tender. There are no palpable masses. The bowel sounds are normal.

The neurologic examination reveals the following findings: Refer to the head and neck for cranial nerve findings. Examination of the sensory system reveals an absence of pin-prick sensation of the right side of the body.

Upon command the patient is unable to move his right arm and leg. He is barely able to wiggle the toes of his right foot. The deep tendon reflexes are hyperreactive on the right side. The right plantar response is extensor (positive Babinski).

The sensory and motor systems of the left side of the body are normal.
Case 2

Localize the lesion based on the clinical data.

Develop a differential diagnosis for the etiology of the findings.

Case 2

Discuss the significance of the following physical findings and clinical history:
- dilated left pupil with sluggish reaction
- right extensor plantar response
- previous attack of weakness of the right leg and arm

Case 2

Describe the findings
Case 2

Considering the imaging findings and onset of the patient's symptoms, what treatment should be considered?

Case 2 – Describe the gross findings.

Case 2

Describe the 20x histologic findings, in particular identify and describe the appearance of the neurons.
Case 2
Contrast the neurons with the normal neuron

Case 2
The patient’s daughter wants to understand why this happened to her father. How would you explain the pathogenesis to her?

Case 2
Different patient after the same pathologic process. Time has passed. Describe the gross findings.
Case 2:
Describe the low power histologic findings.

Case 2: Describe the high power findings. What is the predominant cell type?
Approximately how many days after the patient’s initial presentation will one see these cells?

Case 2 — months later.
Describe the gross findings—where is the primary pathologic abnormality?
Case 2
Section correlates with the primary gross abnormality. Describe the histologic findings.

Case 3
History
A 34-year old man fell from his bicycle striking his head on the curb. A passerby witnessed a brief period of unconsciousness lasting approximately 30 seconds. He regained consciousness but remained somewhat confused. When paramedics arrived, he was still disoriented but was moving all extremities on command and had normally reactive pupils. He was placed on a spine board and in a stiff cervical collar and was transported to the hospital.

Physical exam: BP 126/78, HR 82/minute and regular; respiratory rate 20/minute; temperature 99°F
A frontotemporal scalp hematoma was noted.
Patient was confused with an initial GCS of 14.
Case 3

What is your differential diagnosis?

What diagnostic tests are indicated?

Case 3 Describe the key findings

Case 3

What is your diagnosis?

What is the treatment?
Case 3 - Describe the autopsy findings.

Case 3
Describe the pathogenesis of this disease process. What is the most common source of bleeding?

Case 3 – patient #2
Compare the prior case with the imaging and autopsy findings of this patient. What is your diagnosis? How does the pathogenesis differ?
Case 3 - Correlate the image with the prior two patient scenarios

![Brain Cross-Section Image]

Case 3 - Patient #3

Describe the gross findings.
What kind of trauma may have led to the development of these findings?

Case 4 History

Cc: Progressive ataxia, weakness of limbs and blurred vision with remissions and relapses of 5 years’ duration

HPI: The patient is a 40-year old woman who was well until 5 years ago, when following a “flu”, she developed tremors of her arms and loss of balance while walking or standing. The symptoms improved but 6 months later she complained of blurred vision in her right eye. Approximately 1 month later she had another episode of ataxia and weakness and was seen in the ED.
Physical exam: BP 110/80; HR 80/minute and regular; respiratory rate 20/minute; temperature 99°F

Head/Neck: No facial asymmetry. Extraocular movements are full. Visual acuity: Right 20/200; Left 20/20. The right pupil is 5mm in diameter and does not react to direct light.

Fundus exam: normal

Heart, lung, abdominal exams: normal

Neurological exam: Mental status – oriented to time, person, and place. The patient has ataxia and dysarthria and is unable to stand or walk without support.

Motor Exam: Weakness of lower extremities, right 4/5; left 2/5; Reflexes: Deep tendon reflexes are hyperactive; Babinski sign in present on the left side.

Sensory Exam: decreased vibration and position sense to both legs, pain and touch are intact

Case 4

Develop a problem list

Can you name a single lesion in the nervous system which could explain this patient’s neurologic findings? Why or why not?

Case 4

Cite data which support or refute the following differential diagnoses:
- Amyotrophic lateral sclerosis (ALS)
- Cervical spondylosis with myelopathy
- Benign tumor of spinal cord
- Systemic Lupus Erythematosus (SLE)
- Multiple Sclerosis
Case 4 Diagnostic evaluation:

Complete blood count (CBC), Basic metabolic panel (BMP) and urinalysis are within normal limits

An MRI of the brain is performed.

What is the primary abnormal finding?

Case 4
Lumbar Puncture is performed:

CSF examination:
Protein 65mg/dL  (normal 15-45 mg/dL)
Glucose 70mg/dL  (serum glucose 90mg/dL)
Cells : Lymphocytes 50

Gammaglobulin (IgG) is increased; oligoclonal bands are identified
Case 4 - Interpret the CSF. Explain what “oligoclonal bands” are and the significance of their presence in this case.

Oligoclonal Bands in CSF

Case 4

Based on the provided clinical and diagnostic data, what diagnosis do you favor?

Case 4 Describe the gross pathologic findings. Do they correlate with the MRI findings?
Case 4 Describe the gross findings.

Case 4 "Whole Mount" of a section of brain hemisphere. Luxol Fast Blue stain: Stains myelin blue. Describe the findings. Where is the primary abnormality? Compare with normal. Correlate with the gross and radiologic findings.

Case 4 Identify the structure and the pathology on this myelin stained whole mount section. What is its relevance to the pathologic process we are discussing? Do the findings correlate with the clinical findings?
Case 4

Describe the histopathologic findings of this disease process in each of the following histologic sections (A-C)

A - Luxol fast blue stain. High power.
Identify an area with remnant myelin present. What cell type is lost in this disease process? What do you suspect is the predominant cell type in the circle?

What is the cell type? What is in its cytoplasm?
1/29/2019

C – What structure is in the center of the image? What cell type is cuffing it. Do these cells play a role in the pathogenesis of this disease process?

Case 4 Summary

What is the “usual” course of this disease process?