Neurological Disorders (Class 24) 11/22

- Disorders

- **Tumors** - Growth of non-functional cells.
  - **Benign** - Cells grow with their own membrane. Clear boundaries, can usually be removed surgically.
  - **Malignant** - No ‘border’ between cell and tissue. Infiltrating tumor, cancerous.
  - **Metastatic tumors** - Cells coming from malignant tumors in other organs (e.g. lungs), that reach the brain and develop.

Meningioma- Benign brain tumor (round white spot).

- Because neurons cannot divide, they are NOT responsible for tumors.
- **Gliomas** (from glial cells) - Malignant. Can be removed surgically & with radiations.
- **Meningioma** (from Dura Mater): Benign.

- Malignant and Benign -→ compression.

- Malignant -→ take-up space, use-up oxygen/glucose, destroy cells.

*NOTE* - TABLE 14.1 (Too complicated!)

WHERE IS THE BRAIN DAMAGE?

1. Tumor - smooth (right, center)
2. Left- ventricle- asymmetrical
3. Gunshot
- **Seizure Disorders**
  - Uncontrollable spread of neural activity (excitatory), sometimes leading to convulsion. Recurring seizures: Epilepsy.
  - Partial Seizures VS. Generalized Seizures. Partial seizure can be simple (no loss of consciousness) or complex.

Seizures:
- **Grand Mal** - generalized seizure with convulsions.
- **Petit Mal** - absence seizures (generalized, complex). Stop of activity (~ secs), unconscious.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aura</td>
<td>~Secs</td>
</tr>
<tr>
<td>Tonic Phase</td>
<td>15 Secs</td>
</tr>
<tr>
<td>Clonic Phase</td>
<td>30 Secs</td>
</tr>
<tr>
<td>Sleep</td>
<td>Mins/Hrs</td>
</tr>
</tbody>
</table>

Stop breathing, increase in inhibition

Seizures

**Epilepsy:** repeated seizures.

- Primary damage in the temporal lobes (hippocampus, amygdala).
- **Status Epilepticus** - repeated complex seizures without regaining consciousness.

Temporal Lobe: hippocampus (memory) + amygdala (emotion)

(Video- John has temporal lobe seizure, he feels intense spirituality, those with similar seizures feel more spiritual. (Memories and emotions are linked.))

**Neural Substrate** - hippocampus, among others.

**Excitotoxicity** - neuron death because of too much excitation through NMDA channels.

**Treatments:**

- Anticonvulsants (Benzodiazepines/barbiturates).
- Surgery (side effects, remember HM?)
Vagus nerve stimulation (partial seizures).

**Disorders: Cerebrovascular Accidents**

- **Stroke**
  - ½ million strokes per year. Age related
  - Hemorrhagic: bleeding in the brain.
  - Obstructive: blood clot→Ischemia (loss of blood flow).
  - Hypoxia→ shortage of oxygen. Prevented with aspirin.
  - Thrombus and embolus→ loss of oxygen & glucose, osmolarity variations, bacterial infections.

Thrombus & embolus/ intracerebral hemorrhage

Stroke produces permanent brain damage. Can be prevented.

  - Medications to reduce blood pressure
  - Brain surgery (on vasculature)
  - Antibiotics (embolus & bacterial infection)
  - Anticoagulant (prevent blood clot up to 9 hours after stroke).

**Plaques**- Atherosclerosis- build-up of material (cholesterol, calcium deposits) on walls of blood vessels.

Detected by **Angiography** (x-ray of blood circulation).

Treated by surgery: Plaque removal (‘cleaning’ of blood vessel) stent.

Treatment of obstructive stroke: Stent.

Rehabilitation after stroke:

  - Therapies depend on type of brain damage (speech, motor impairments...)
  - Case of limb movement impairment. Constraint- Induced Therapy: inducing
  - Brain plasticity by artificially ‘amputating’/restricting movement in good limb.
  - Brain Machine Interface- Linking neural activity to an external artificial device.

**{QUIZ}**

**DEVELOPMENTAL DISORDERS**

- Generally induced by viruses or drugs.
  - Result in non-viability or retardation.
- **Fetal Alcohol Syndrome**- Affects axonal growth & synaptic plasticity (LTP/LTD). Low doses of alcohol during pregnancy are sufficient.