

Diseases and Injuries

For each disease or injury...

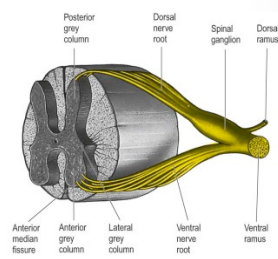
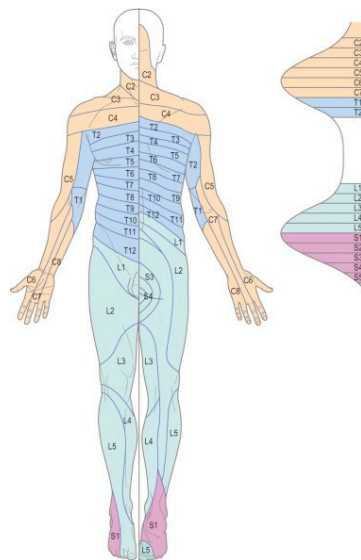
- Recognize 1-3 key symptoms
- Identify the specific region of the brain or body involved
- Name 1-2 common treatments
- Think about ways neural engineering could be used...

[2]

INJURIES

[3]

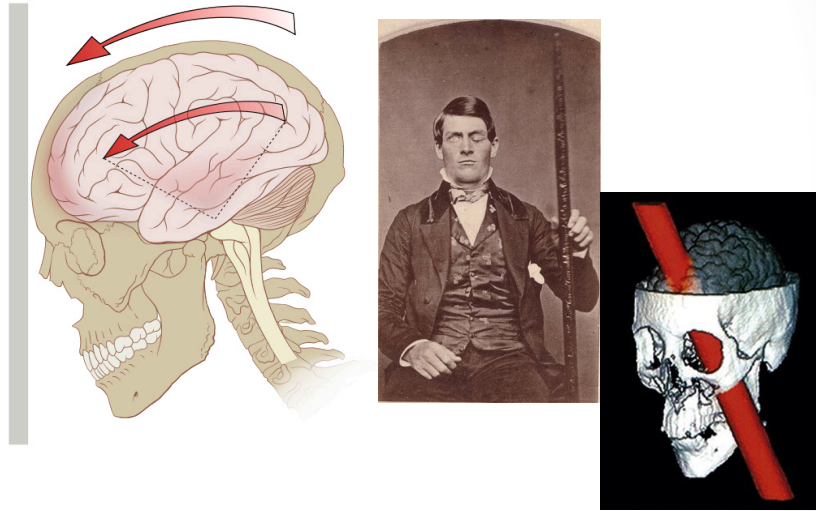
Spinal cord damage



- Level
- Location in cord
- Complete vs incomplete

[4]

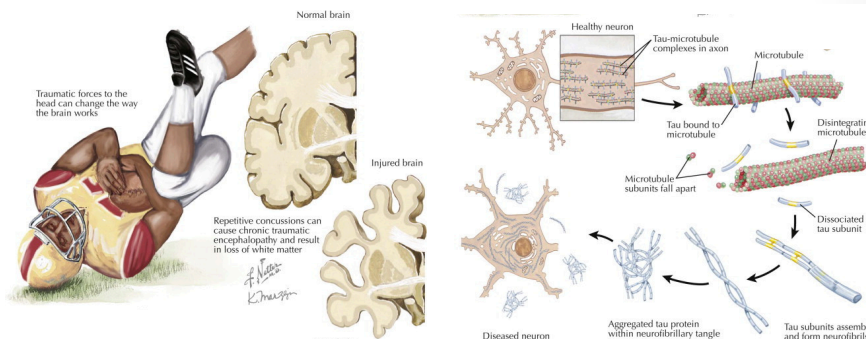
Concussion vs open head injury



Lynch, Squire

[5]

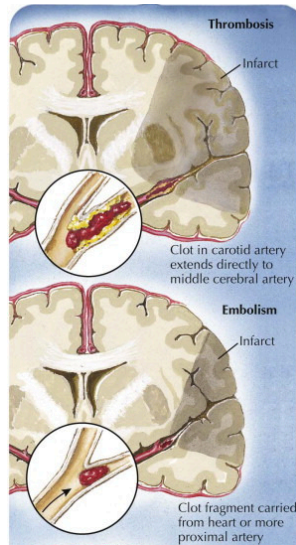
Chronic traumatic encephalopathy



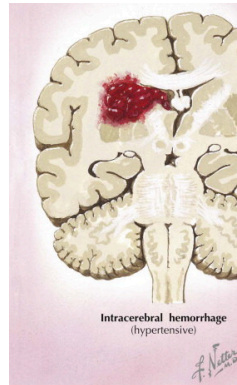
Jones

[6]

Stroke, aneurysm, hypoxia



Jones



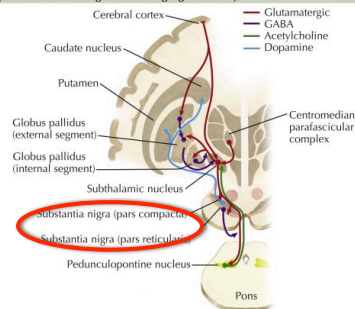
[7]

DEGENERATIVE AND
DEVELOPMENTAL DISORDERS

[8]

Parkinson's

SCHEMATIC AND CROSS SECTION OF BASAL GANGLIA
Simplified schematic diagram of basal ganglia circuitry



NEUROPATHOLOGY OF PARKINSON DISEASE



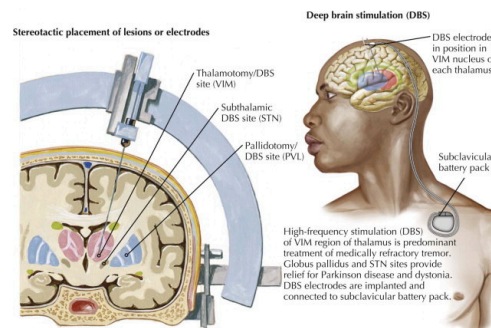
Normal: section through cerebral peduncles and substantia nigra

Parkinson disease: substantia nigra depigmented

Jones

{ 9 }

Deep brain stimulation

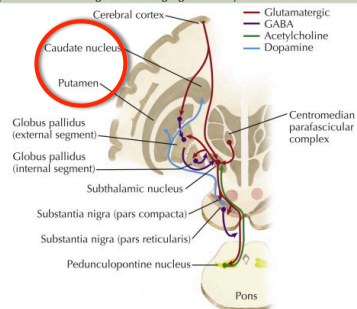


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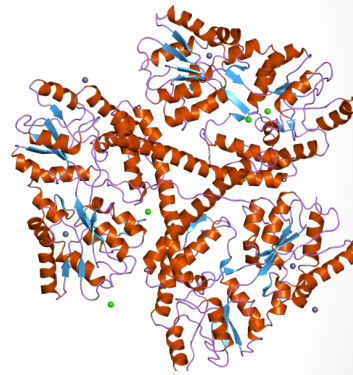
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Huntington's

SCHEMATIC AND CROSS SECTION OF BASAL GANGLIA
Simplified schematic diagram of basal ganglia circuitry



First the striatum
Then other parts of basal ganglia, cortex

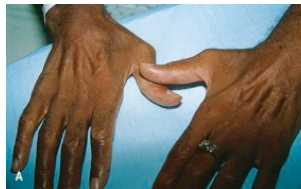


Huntingtin

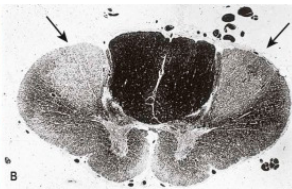
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Amyotrophic lateral sclerosis

Aka motor neuron disease, aka Lou Gehrig's disease



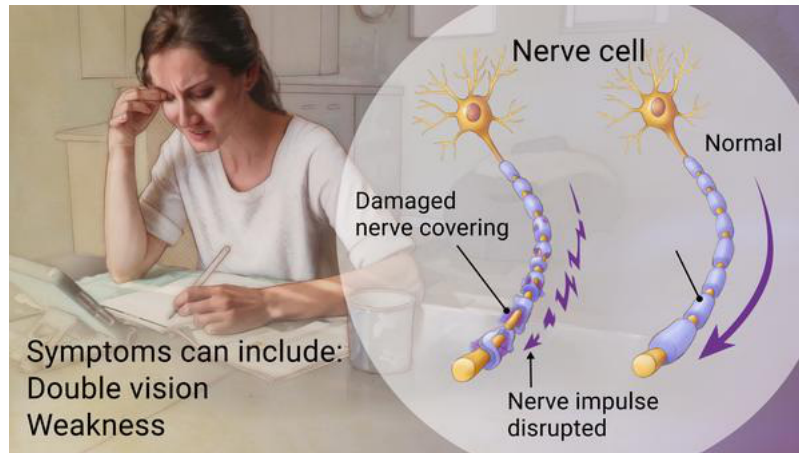
Muscle atrophy



Spinal atrophy

(12)

Multiple sclerosis



(13)

Mayo Clinic

Epilepsy

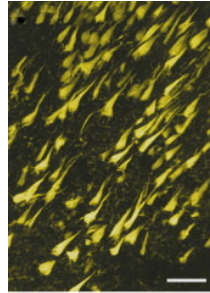


* seizure

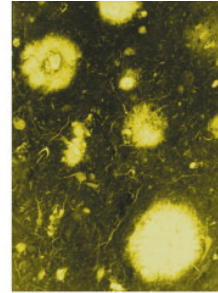
(14)

Jones

Alzheimer's



(A)
Tangles



(B)
Plaques

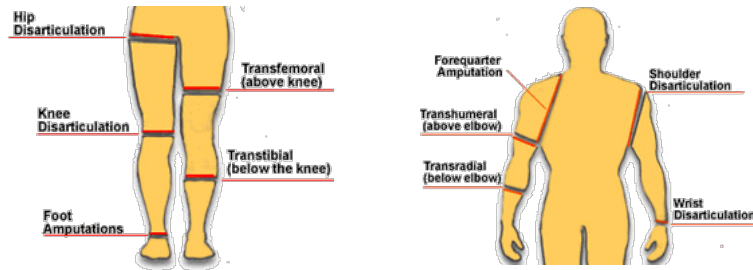
[15]

University of Buffalo, Squire

OTHER CONDITIONS

[16]

Amputations, congenital missing limbs

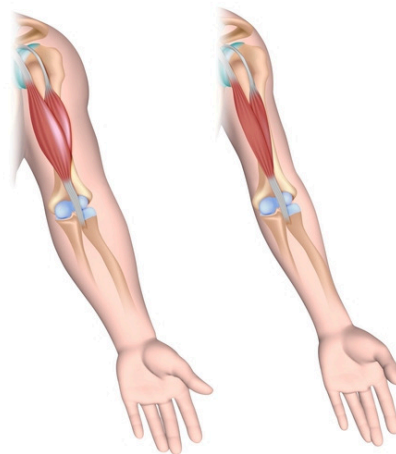


(17)

NSHA

Muscular dystrophy

Normal biceps Muscular dystrophy



(18)

Genetics Home Reference - NIH

Neural engineering: why does it matter?

- What can engineering contribute?
 - ... that is distinct from other areas of study
 - ... where other solutions are not available
- What neuroscience do we need to consider when discussing disease/injury treatments?
- What challenges do we need to address presented by the nervous system? Presented by technology?
- What can we do or not do right now?
 - And what do we wish we could do?

(19)