

2学分生理学

考试时间：8:30-10:30; 12/28/2021 (周二)
 地点：二教306
 考试方式：可带一张正反面有文字内容的A4纸。
 试题类型：简答题和名词解释 (满分100)
 试题分数分配：王世强/罗金才/罗冬根 = 35/25/40
 考试范围：所有课堂内容

3学分生理学

考试时间：8:30-9:30; 12/28/2021 (周二)
 地点：二教319
 考试方式：可带一张正反面有文字内容的A4纸。
 试题类型：简答题 (满分100分)
 考试范围：内分泌和神经生理学的课堂内容

答疑

罗金才老师：上午8:30-11:30; 下午13:30-16:30; **12/27 (周一)**; 设备2号楼248室
 罗冬根老师：下午5:30-7:30; **12/26 (周日)**; 吕志和楼406室
 王世强老师：下午2:30-4:30; **12/27 (周一)**; 生科金光楼113室

2021 Fall "Physiology"

Movement and Brain**Dong-Gen LUO**

College of Life Sciences

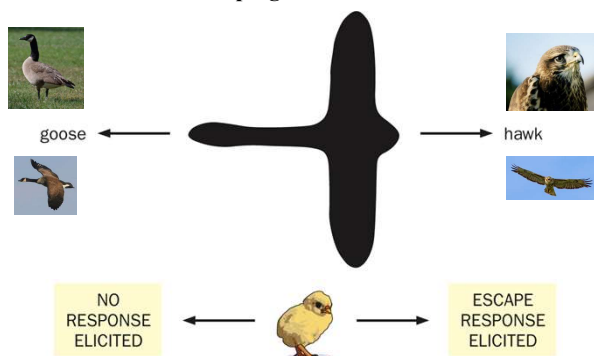
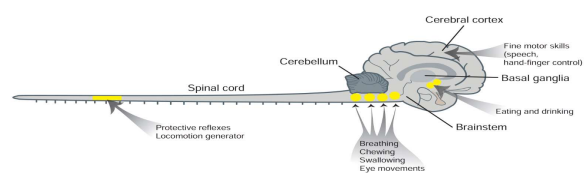
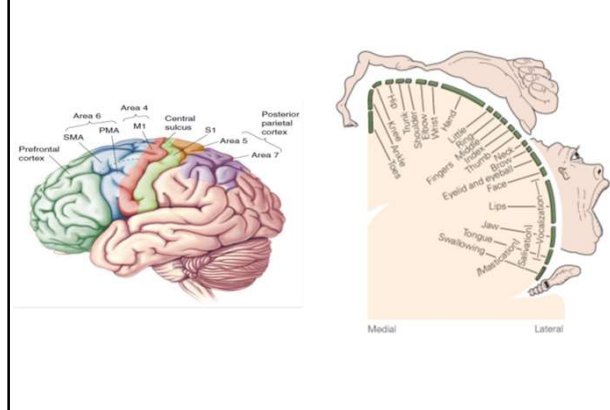
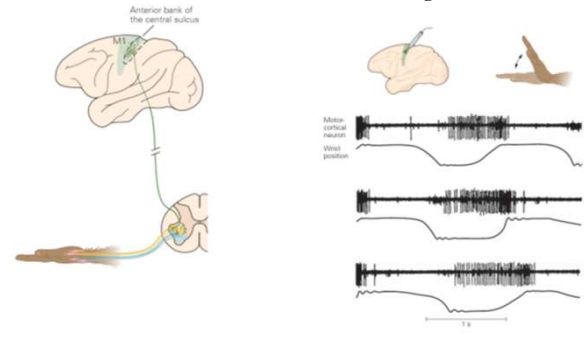
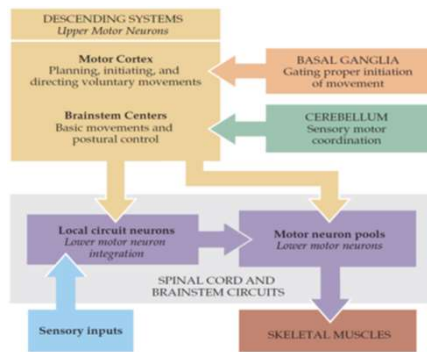
Escaping Behaviours

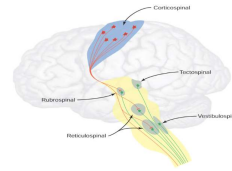
Figure 1-4 Principles of Neurobiology (© Garland Science 2016)

Somatic Motor System**Motor Cortex****Motor Cortex****Motor Cortex Neuron Controlling Wrist Extension**

Movement: Organization of Neural Control

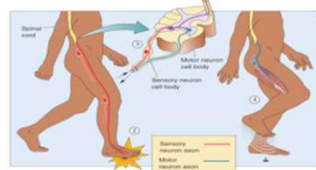
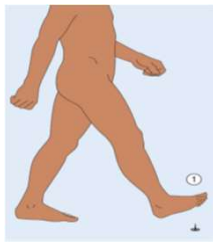


Descending Pathways

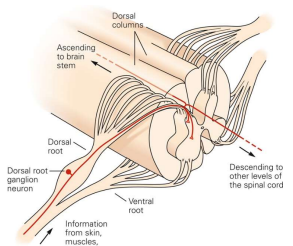
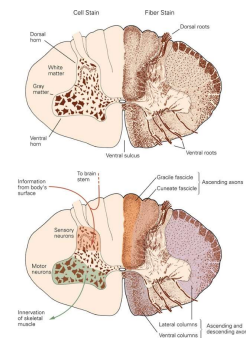


Corticospinal tract: 皮层脊髓束 (躯干、四肢)
 Rubrospinal tract: 红核脊髓束 (精细手指运动)
 Reticulospinal tract: 网状脊髓束 (维持姿势)
 Tectospinal tract: 顶盖脊髓束 (协调头和眼球运动)
 Vestibulospinal tract: 前庭脊髓束 (平衡、姿势反射)

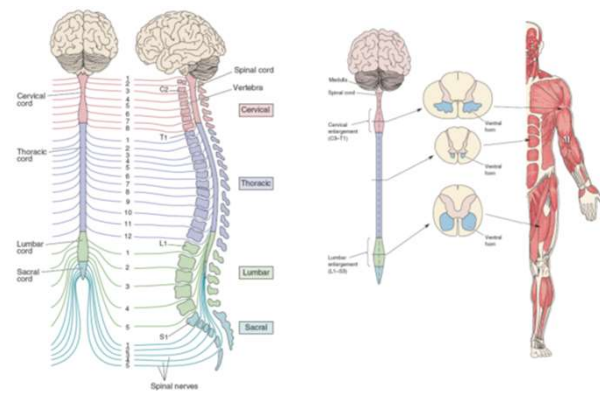
Spinal Cord



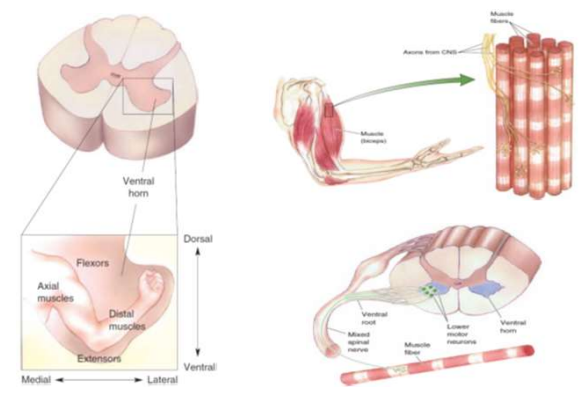
Spinal Cord and Its Roots



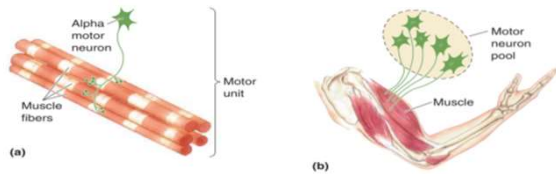
Spinal Cord: Distribution of Motor Neurons



Movement Control: Spinal Cord



Motor Unit and Motor Pool



Muscle Spindle and Sensory Innervation

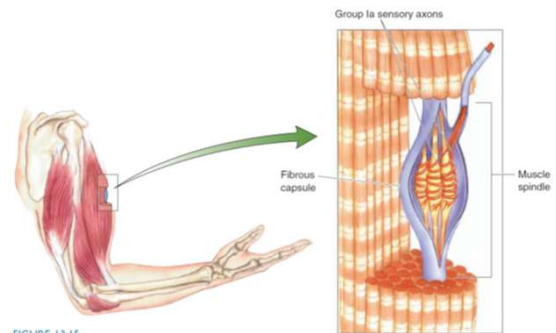
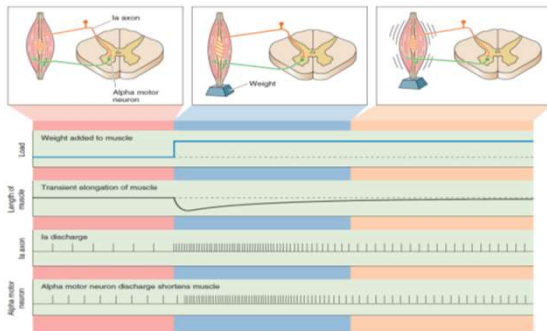
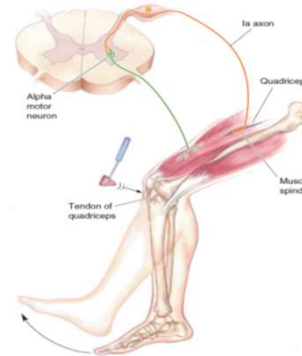


FIGURE 13.15 A muscle spindle and its sensory innervation.

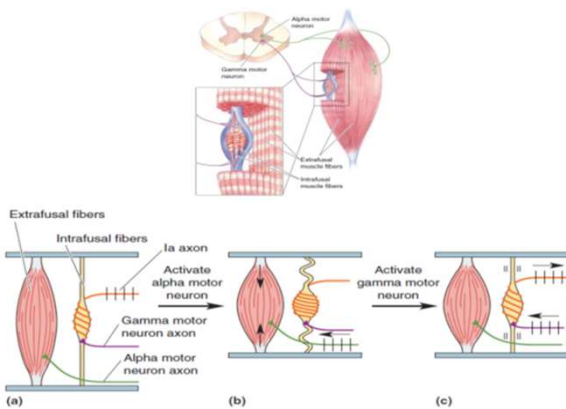
Myotatic Reflex



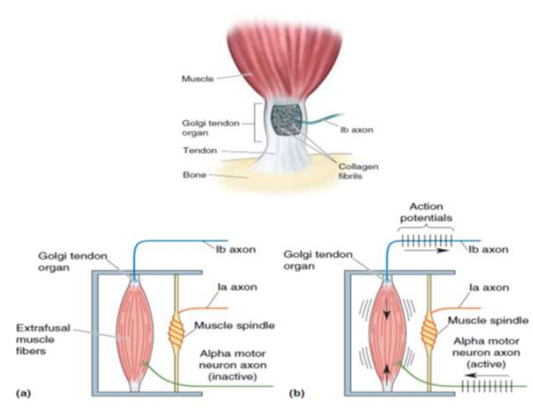
Knee-Jerk Reflex



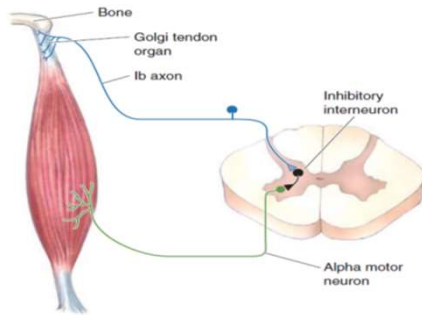
Alpha and Gamma Motor Neurons



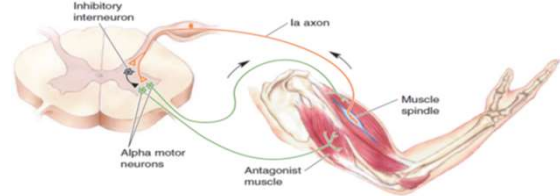
Golgi Tendon Organ



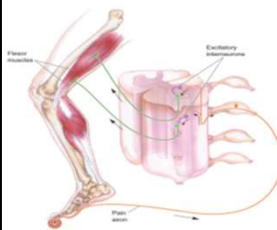
Reverse Myotatic Reflex



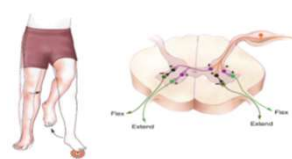
Reciprocal Inhibition: Flexor and Extensor



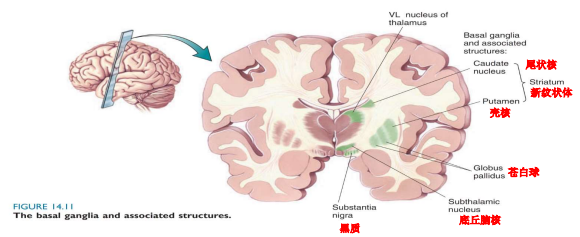
Flexor Reflex: excitation



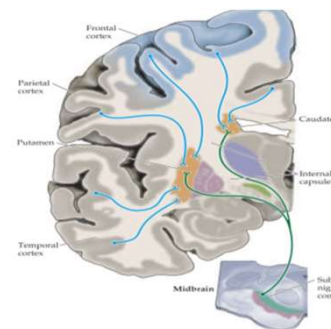
Crossed Extension Reflex



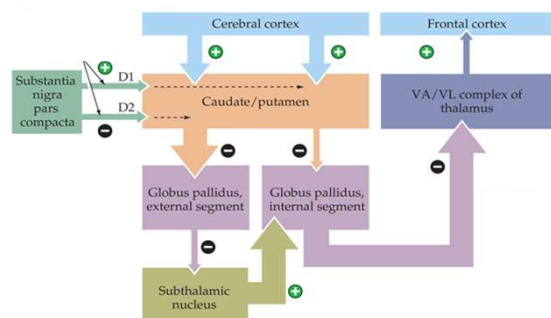
Movement Control: Basal Ganglia



Basal Ganglia: Inputs



Basal Ganglia: Outputs



Huntington's Disease

➤ **Symptoms:**

- ✓ **Slowness of movement**
- ✓ **Difficulty in initiating willed movements**
- ✓ **Increased muscle tone**
- ✓ **Tremors of the hands and jaw (at rest)**
- ✓ **Deficits of cognition**

➤ **Symptoms:**

- ✓ Hyperkinesia and abnormal movements
- ✓ Impaired cognitive abilities
- ✓ Disorder of personality
- ✓ Appear in adulthood (pass the gene)
- ✓ Spontaneous, uncontrollable and purposeless movements with rapid, irregular flow and flicking motions

Basal Ganglia and Diseases

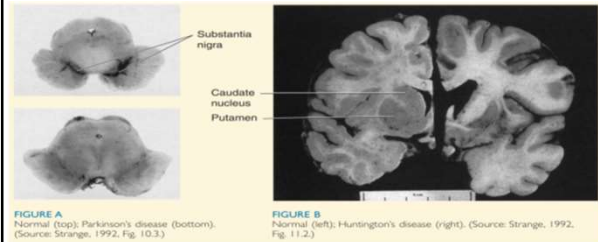
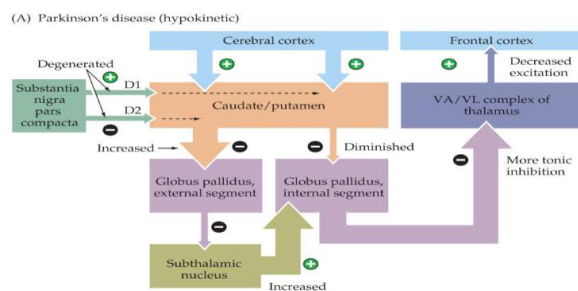


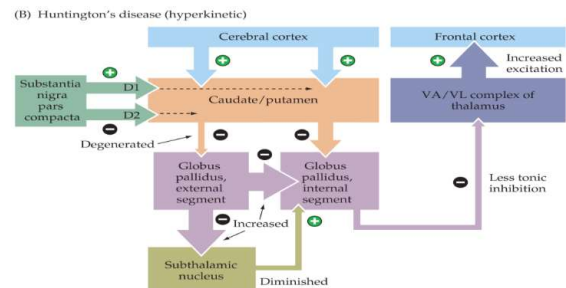
FIGURE A
Normal (top); Parkinson's disease (bottom).
(Source: Strange, 1992, Fig. 10.3.)

FIGURE 8
Normal (left); Huntington's disease (right). (Source: Strange, 1992, Fig. 11.2.)

Basal Ganglia and Diseases



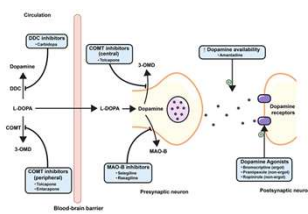
Basal Ganglia and Diseases



Parkinson's Disease Treatment

Deep Brain Stimulation

Drug Treatment



Pacemakers for the brain

Deep brain stimulation has proven effective in fighting the symptoms of Parkinson's disease. Doctors implant electrodes into affected parts of the brain. The doctors know they're stimulating the correct area when the patient's symptoms ease — shaking or twitching, in the case of movement disorders such as Parkinson's.

How deep brain stimulation works

-
- The diagram shows a cross-section of a human brain. Several electrodes, represented by small circles, are inserted into the brain tissue. Wires connect these electrodes to a rectangular box labeled 'Pacemaker' located outside the brain. The pacemaker is connected to a 'Pacemaker lead' that enters the brain. The electrodes are placed in various regions of the brain, including the cerebral cortex and subcortical areas.
- 1 Images of the patient's brain show where the tiny implanted electrodes should go. Some patients need electrodes on only one side of the brain; others need them on both sides.
- 2 Wires from the electrodes are connected to a pacemaker (like a device implanted under a few weeks of the surgery).
- 3 After the skin is healed, the pacemaker is activated and the signals are fine-tuned to modify the brain's abnormal activity.
- 4 Notes the size of a tickle as the patient is drilled in the brain to place the electrodes.
- 5 Using high-resolution imaging and mapping equipment to guide the neurosurgeon's team through the brain, each case containing four electrodes, contact points are made into the sides of the brain.

