

## Lecture 32 – Brain Stem -- Hen

### I Anatomy of the cranial nerves and cranial nerve nuclei

- A. The cranial nerves are functionally homologous to the spinal nerves
- B. The cranial nerves leave the skull in groups and therefore are likely to be injured together
- C. The cranial nerve nuclei follow the basic plan for sensory and motor structures in the spinal cord
  - (1) The sensory nuclei
  - (2) The motor nuclei
- D. The brain stem deviates from the organization of the spinal cord in two important ways

### II Function of the cranial nerves and cranial nerve nuclei: reflexive behavior

- A. The cranial nerves supply the sensory and motor functions of the face and head and autonomic functions of the body
- B. Neuronal ensembles in the brain stem reticular formation coordinate reflexes and simple behaviors mediated by the cranial nerves

### III Anatomy of the monoaminergic and cholinergic neuromodulatory pathways.

- A. Cell groups in the brain stem with long projections can be defined by their neurotransmitters
- B. Noradrenergic pathways
- C. Adrenergic pathways
- D. Dopaminergic pathways
- E. Serotonergic pathways
- F. Cholinergic pathways
- G. Histaminergic pathways

IV Functions of the monoaminergic and cholinergic pathways

A. descending projections

(1) pain

(2) posture, gait, and muscle tone

B. ascending projections

(1) motor control: the nigro-striatal dopaminergic system

(2) motivation and reward: the mesolimbic dopaminergic system

(3) impulsiveness and aggression: serotonin

(4) anxiety and depression: serotonin and norepinephrine

(5) sleep, arousal and consciousness

- The EEG reflects two modes of firing of thalamic neurons

- Damage to either branch of the ascending arousal system may impair consciousness (examination of the comatose patient)

**Relevant reading: chapters 44 and 45 in “Principles”**