Cerebral Vascular Structures and Disorders
Psychology 372
Physiological Psychology
Steven E. Meier, Ph.D.

Listen to the audio lecture while viewing these slides

Psyc 372 – Physiological Psychology
Circulatory System Overview
• View Figure 99 in DeArmond et Al
• From the Heart, blood enters the Aorta
• Branches off into two arteries
  • Carotid
  • Subclavian

Psyc 372 – Physiological Psychology
Carotid Artery
• Again, comes from the Aorta
• Is the artery in the neck and under the jaw
• Branches into the internal carotid artery
• Enters the cranium
• Traverses the sinuses
• Branches off the opthalmic artery
• Penetrates the dura
• Branches into the Anterior and Middle cerebral arteries
• Emerges from the sinuses and branches off anterior choroidal artery

Psyc 372 – Physiological Psychology
Anterior Cerebral Artery
• Supplies
  • the cortex
  • White matter of the inferior frontal lobe
  • Medial surface of frontal and parietal lobes
  • Anterior corpus callosum
  • Branches into smaller branches

Psyc 372 – Physiological Psychology
Also Supplies
• Deep cerebrum
• Diencephalon
• Limbic structures
• Head of the caudate
• Anterior limb of the internal capsule

Psyc 372 – Physiological Psychology
Middle Cerebral Artery
• Supplies
  • Most of the cortex and white matter
  • Smaller branches supply
    • Deep white matter
    • Diencephalic structures
      • Posterior limb of the internal capsule
      • Putamen
      • Outer Globus Pallidus
      • Body of the Caudate
Anterior Choroidal Artery
- Supplies
  - Anterior hippocampus
  - Posterior limb of the internal capsule

Subclavian Artery
- Come from the Aorta or Innominate artery
- Supply the upper extremities (arms)
- Each sends off a branch called vertebral artery
- Vertebral artery enters the cranium through the Foramen Magnum
- Each gives off anterior spinal artery and a posterior inferior cerebellar artery.
- Join at the junction of the pons and medulla to form the basilar artery

Basilar Artery
- Divides into the Posterior Cerebral arteries
- Supplies
  - Inferior Temporal Lobe
  - Medial Occipital Lobe

Circle of Willis
- Is a collection of major vessels that all connect together
- Is located at the bottom of the cerebral cavity
- Generally loops around the brain stem
- Nice place for tumors to develop

Structures
- Anterior Communicating Artery
- Internal Carotid
- Anterior Cerebral Arteries
- Posterior Communicating arteries
- Posterior cerebral arteries

Loop
- Two anterior cerebral arteries are connected by anterior communicating artery.
- Two posterior cerebral arteries are connected to the internal carotid by the posterior communicating arteries
Psyc 372 – Physiological Psychology

Anastomoses

• Are interconnections between blood vessels
• Generally protect the brain or other structures when blood supplies are blocked.
  • E.g. Circle of Willis

Psyc 372 – Physiological Psychology

Cerebral Vascular Accidents

• Strokes

Psyc 372 – Physiological Psychology

Two Major Types

• Occlusive
• Hemorrhagic
• Are due to problems with some blood vessels.

Psyc 372 – Physiological Psychology

Occlusive

• Blood flow in the brain is obstructed for some reason.
• There is no blood loss
• Unless blood gets to the tissue, it will die – insufficient supply
  • Called ischemia

Psyc 372 – Physiological Psychology

Hemorrhagic

• Occurs from the rupture of a vein or artery
• Blood flows out of veins and/or arteries
  • Blood is acidic
  • Destroys membranes and kills neurons
• We all may have some small, minor strokes
• Good clotting, damage is minimal or does not occur
• If damage occurs to a major artery, it can be a serious problem.

Psyc 372 – Physiological Psychology

Brain Damage

• Depends on which structure is blocked or ruptured.
• Depends on the duration of blockage
• Symptoms are related to the vessels that are impacted
Middle Cerebral Artery
- Is the most frequent disorder
- Symptoms
  - Contralateral weakness
  - Sensory loss
  - Visual problems
  - May have language problems

Damage
- Affects arms and face more due to location of the damage
- Motor and sensory loss greatest in the hands
- May get aphasia or other language problems
- Other symptoms

Symptoms of CVA’s
- Sudden weakness or numbness in a body structure.
- May also be gradual
  - Mistake for old age problems
- Lack of coordination
- Loss of memory, confusion
- Pupils may not be equal or constrict together
- May be unconscious

Treatment
- If having gradual weakness or problems with one side, see your physician
- Sudden symptoms
- Keep the person from moving around
- Get the person to a hospital ASAP
- Lots of newer drugs in development