INTERNAL CAPSULE
• Projection fibres - Internal capsule
DEFINITION

- Projection fibres (white matter) between
- caudate nucleus and thalamus medially
- lentiform nucleus laterally
• **Internal Capsule**- A compact bundle of fibres through which the large collections of fibres pass, including:

- Thalamocortical fibres
- Corticothalamic fibres
- Corticopontine fibres
- Corticobulbar fibres
- Corticospinal fibres
• The fibres project from the **cerebral cortex** to the **various nuclei** of the **extrapyramidal system** (e.g., the putamen and caudate nucleus).

• It is a **continuous sheet of fibres** that forms the **medial boundary** of the **lenticular nucleus**.

• It continues around **posteriorly and inferiorly** to **partially envelop** this nucleus.

• **Inferiorly**, many of the fibres of the internal capsule **funnel** into the cerebral peduncles.
• **Superiorly**, the fibres **fan out** into the **corona radiata**.

• Here, they travel in the **cerebral white matter** to reach their **cortical origins** or **destinations**.

The internal capsule is **divided** into **5 regions**:

• The **anterior limb** is the portion between the **lenticular nucleus** and the head of the **caudate nucleus**;

• The **posterior limb** is the portion between the **lenticular nucleus** and the **thalamus**;

• The **genu** is the portion at the **junction** of the **above 2 parts** and is **adjacent** to the **interventricular foramen**;

• The **retrolenticular part** is the portion **posterior** to the **lenticular nucleus**;

• The **sublenticular part** is the portion **inferior** to the **lenticular nucleus**.
<table>
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<tr>
<th>Portion</th>
<th>Description</th>
<th>Origin</th>
<th>Destination</th>
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<td><strong>Anterior Limb</strong></td>
<td>Anterior thalamic radiation</td>
<td>Anterior nucleus</td>
<td>Cingulate gyrus</td>
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<td></td>
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<td>DM</td>
<td>Prefrontal cortex</td>
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<tr>
<td>Genu</td>
<td>Relays to motor areas</td>
<td>VA</td>
<td>Premotor cortex</td>
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<td>VL</td>
<td>Primary motor cortex</td>
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<tr>
<td></td>
<td>- Corticospinal tract</td>
<td>2. VPL/VPM</td>
<td>- Spinal cord</td>
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<td></td>
<td>- Corticobulbar tract</td>
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<td>2. Somatosensory relays</td>
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<td>- somatosensory cortex</td>
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<tr>
<td>Retrolenticular</td>
<td>Association relay</td>
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<td>Optic radiation</td>
<td>LGN</td>
<td>Visual cortex</td>
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<td>Sublenticular</td>
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<td>Auditory radiation</td>
<td>MGN</td>
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<tr>
<td>Portion</td>
<td>Descending fibres</td>
<td>Ascending fibres</td>
<td>Radiations</td>
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<td>----------------------------------------</td>
</tr>
<tr>
<td>Anterior Limb</td>
<td>• Frontopontine&lt;br&gt;• Frontothalamic</td>
<td>Thalamofrontal</td>
<td>Anterior thalamic radiation</td>
</tr>
<tr>
<td>Genu</td>
<td>• Frontopontine&lt;br&gt;• Corticonuclear</td>
<td>Fibres carrying somaesthetic sensations from thalamus (VP nu.) to postcentral gyrus</td>
<td></td>
</tr>
<tr>
<td>Posterior Limb</td>
<td>• Frontopontine&lt;br&gt;• Corticospinal&lt;br&gt;• Corticorubral&lt;br&gt;• Corticoreticular&lt;br&gt;• Parietothalamic</td>
<td>• Thalamoparietal fibres&lt;br&gt;• Subthalamic fasciculus</td>
<td>Superior or Dorsal thalamic radiation</td>
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<tr>
<td>Retrolenticular</td>
<td>• Parietopontine&lt;br&gt;• Occipitopontine&lt;br&gt;• Corticorubral&lt;br&gt;• Occipitothalamic</td>
<td>• Optic radiation&lt;br&gt;• Thalamo-occipital&lt;br&gt;• Thalamo-parietal</td>
<td>Posterior or Caudal thalamic radiation</td>
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<tr>
<td>Sublenticular</td>
<td>• Parietopontine&lt;br&gt;• Temporopontine&lt;br&gt;• Temporothalamic</td>
<td>• Acoustic radiation&lt;br&gt;• Thalamotemporal</td>
<td>Inferior thalamic radiation</td>
</tr>
</tbody>
</table>
CAUDATE NUCLEUS
LENTIFORM NUCLEUS
THALAMUS
Globus palidus
Putamen
CLAUSTRUM
Internal capsule
External capsule
Extreme capsule
Parts of internal capsule

- Caudate nucleus
- Thalamus
- Lentiform nucleus
- Genu
- Anterior limb
- Posterior limb
- Sublentiform
- Retrolentiform

Fibres:
- Thalamocortical fibres
- Corticopontine fibres
- Corticonuclear & corticospinal fibres
Types of fibres

• **Thalamic radiation**
  – Superior thalamic radiation
  – Anterior thalamic radiation
  – Posterior thalamic radiation
  – Inferior thalamic radiation

• **Corticospinal**

• **Corticonuclear**

• **Corticopontine**
  – Fronto pontine
  – Parieto pontine
  – Temporo pontine

• **Extrapyramidal**
Thalamic radiation

- Thalamocortical fibres
  - Thalamic nuclei - project to ipsilateral cerebral cortex (except for reticular nucleus)
- Reach neocortex
- Located entirely within internal capsule

- Superior - from ventral nucleus
  - Becomes corona radiata
- Anterior - from anterior & medial nuclei
- Posterior - from optic radiation
- Inferior - from auditory radiation
Thalamocortical fibres

Corticopontine fibres

Corticonuclear & corticospinal fibres

ANTERIOR LIMB
- Anterior thalamic radiation
- Frontopontine

GENU
- Part of superior thalamic radiation
  - Frontopontine
  - Corticonuclear

POSTERIOR LIMB
- Superior thalamic radiation
  - Frontopontine
  - Corticonuclear (corticobulbar)
  - Corticospinal
  - Extrapyrimidal

RETROLENTIFORM
- Post thalamic radiation - Optic radiation
  - Parieto-pontine
  - Temporo-pontine

SUBLENTIFORM
- Inf thalamic radiation - Auditory radiation

Thalamocortical fibres
Corticopontine fibres
Corticonuclear & corticospinal fibres
BLOOD SUPPLY

- Lateral striate fr middle cerebral artery
  - Ant limb
  - Genu
  - Post limb
  - Basal ganglia
- Medial striate fr anterior cerebral artery
  - Ant limb
  - Genu
  - Basal ganglia
- Ant choroidal fr internal carotid
  - Post limb
  - Retrolenticular part
ANTERIOR LIMB

• Ant cerebral artery through medial striate br.
• Middle cerebral artery through lateral striate and lenticulostriate br.

- pass through the lentiform N to supply the striate
GENU

• Ant cerebral artery through medial striate br.
• Middle cerebral artery through lateral striate and lenticulostriate br.
• Branches of internal carotid artery
Arteries of Brain
CORONAL SECTION

- Lenticulostriate arteries
- Internal capsule
- Anterior cerebral artery
- Medial striate arteries
- Middle cerebral artery
- Internal carotid artery

*Most commonly arises distal to anterior communicating artery*
POSTERIOR LIMB

• Middle cerebral artery through lateral striate and lenticulostriate br.
  – Charcot’s artery of cerebral haemorrhage

• Anterior choroidal artery, direct branch of internal carotid artery
  – Long and slender, thus has tendency to get thrombosis
Projection fibres from cerebral cortex to basal ganglia and midbrain

- Caudate Nucleus
- Lentiform Nucleus
- Globus Pallidus
- Putamen
- Thalamus
- Claustrum
- External Capsule
APPLIED ANATOMY

– Microaneurysm to lenticulostriate arteries -
  • contralateral side of the body –
    – Hemiplegia
    – Impaired sensation
    – Paralysis of lower half of face

– Thrombosis – recurrent br of ACA
  • contralateral side of the body –
    – Upper limb
    – Paralysis of lower half of face

– Anterior choroidal artery
  • may be symptomless – collateral circulation