# MST NOTES | Complex Functions in Neuroscience

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## **BRAIN CORTICAL DEVELOPMENT**

The cortex is **broadly arealised** into functionally defined regions → specified during development by extrinsic/intrinsic factors.

### Morphogenesis:

- Morphogenesis: patterning of the neural tube during development  $\rightarrow$  along the ant-post axis
- Neural tube closure  $\rightarrow$  1° and 2° vesicles form  $\rightarrow$  segmentation into 5 vesicle phase

#### - Neural Tube Structures:

- Wall: neuroepithelium
- Fluid-filled cavity: ventricular system
- Primary (1°) Vesicles:
  - Prosencephalon (forebrain)
  - Mesencephalon (*midbrain*)
  - Rhombencephalon (hindbrain)
- Secondary (2°) Vesicles:
  - Prosencephalon → telencephalon + diencephalon
  - Rhombencephalon → metencephalon + myelencephalon

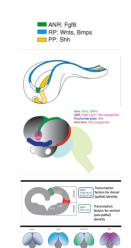
### - Neuroepithelium:

- Single layer, but appears multilayered as cell bodies migrate along the apical-basal axis through cell cycles

Organiser (primary & secondary)

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- Roof plate: ectoderm
  - Specifies interneurons
  - Induces the organiser
- *Floor plate*: notochord
  - Specifies motoneurons
  - Induces the organiser
- Gradients of [morphogens] along the dorso-ventral axis activate different TFs, giving rise to various cell fates
- Telencephalon Organisers:
  - Early:
    - Anterior neural ridge (ANR)/commissural plate
    - Roof plate (RP) & cortical hem
    - Prechordal plate (PP)/ventral telencephalon
  - Secondary:
    - Hem
    - ANR
    - PP
    - Anti-Hem



Morphogen

Cell Fate

Transcription Factors