# MST NOTES | Complex Functions in Neuroscience

## BRAIN CORTICAL DEVELOPMENT

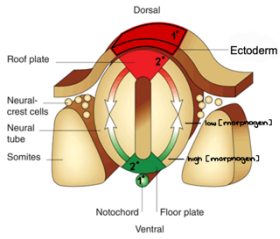
The cortex is broadly arealised into functionally defined regions → specified during development by extrinsic/intrinsic factors.

**Morphogenesis:**

- **Morphogenesis:** patterning of the neural tube during development → along the ant-post axis
- Neural tube closure → 1° and 2° vesicles form → 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
  - *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