RETICULAR FORMATION

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- Complex network of neurons and nerve fibers occupying midventral portion of brain stem around central cavity
- Ascending reticular formation
- Descending reticular formation:
  - Pontine facilitatory
  - Medullary inhibitory

- Reticular nuclei:
  - Limits are ill defined
  - Can be divided in three longitudinal columns
  - Nuclei of median column: Raphae Nucl.
  - Nuclei of medial column
    - Magnocellular nuclei in pons and medulla
  - Nuclei of lateral column: parvo cellular nuclei

- Other functional neuronal aggregates:
  - Cardiac centers
  - Respiratory centers
  - Vasomotor centers
  - Salivary centers
  - Chemoreceptor neurons
- Connections of R.F.
- Cortico reticulospinal pathways
- From motor cortex to R.F. - Bulber
- Pontine
- Cortex → RF → Cerebellum → Basal ganglia
- Cerebello-reticular pathway
- Visceral control pathway
- RAS is polysynaptic pathway project to cerebral cortex

Other inputs
- All ascending sensory pathways give collateral specially old pain pathway
- Collaterals from trigeminal, auditory, visual and olfactory pathways
- Efferent to:
  - Nonspecific thalamic nuclei → Neocortex
  - To all parts of cortex bypassing thalamus

Functions
- Sends strong facilitatory drive to central neurons raising their background excitability → response to specific stimuli increases alertness
- Help in selective attention and sensory inattention
• Thalamic reticular nuclei due to intrinsic spontaneous activity contribute to alpha rhythm of EEG

• Descending reticular formation modulate muscle tone and pain

• RAS is under feed back control of
  • Cerebral cortex  facilitatory
  • Limbic cortex  inhibitory

neurotransmitters

• Cholinergic - midbrain and pontine RF to thalamus and cortex.
• Adrenergic - intralaminar thalamic nuclei to cerebral cortex.
• Noradrenergic  to cerebellum
• Dopaminergic  to basal ganglia
• Serotonergic  to thalamus, cerebral cortex and spinal cord.

Functions

➢ Sleep and wakefulness
➢ Selective attention and inattention
➢ Needed for conditioning and learning
➢ control of tone and posture
➢ Autonomic functions
➢ Respiratory centers, vasomotor centers part of reticular formation
➢ Pain modulation