

# Reticular formation

**The reticular formation (RF)** is a phylogenetically old network of interconnected neurons. It permeates the brainstem, continues into the thalamus and hypothalamus, and connects caudally to the propriospinal spinal network.<sup>[1]</sup>

It begins as a band of grey matter in the cervical part of the spinal cord. A large portion are interneurons.

## Functions:

- sensory, motor and autonomic function, complex reflexes
- control centre for respiration, cardiovascular system, vasomotor, sleep, wakefulness
- ARAS - ascending reticular activating system - maintenance of wakefulness, circadian cycle (24 hour)
- reticulospinal system - motor functions

**3 main zones of nuclei:** a) nuclei raphe b) medial region c) lateral region

## Nuclei:

1. At the midline of the pontus (nuclei raphe),
2. lateral magnocellular RF (mostly efferent),
3. at the border of the pontus and oblongata, gigantocellular RF + central reticular nucleus + parvocellular RF (mostly afferent) extending into the mesencephalon,
4. in the oblongate nuclei paramedian (connecting the cerebellum) + lateral (connecting the cerebellum and spinal cord),
  - function: gigantocellular nucleus - standing + walking, nucleus in lat. pontus - bladder control, central nuclei of the oblongata - circulation + respiration

## Nuclei raphe

- along the midline of the brainstem, different species - heterogeneous, produce neurotransmitters such as serotonin, GABA, glycine, neuropeptides, substance P, cholecystokinin

## Medial region of nuclei

- source of efferent pathways - effector part

## Lateral region of nuclei

- afferent fibres, sensory part

- of the spinal cord, rhombencephalon, cranial nerve nuclei, mesencephalon, cortex, basal nuclei

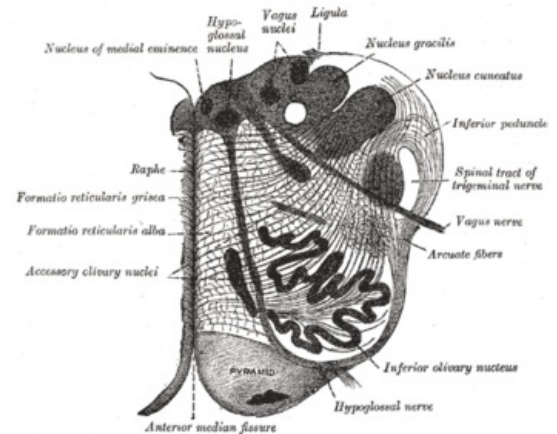
## RF neurons produce:

- *serotonin* - with a maximum in the ncl. raphe in the oblongata, pontus and mesencephalon,
- *dopamine* - in the tegmentum of the mesencephalon,
- *noradrenaline* - in the pontus - locus coeruleus + laterobasally in the wall of the IVth ventricle,
- *adrenaline* in the oblongata,
- aminergic neurons controlling sleep and wakefulness, attention and mood, with a close relationship to sensation,
- serotonin + noradrenaline in depression, dopamine in schizophrenia<sup>[1]</sup>.

# Ascending reticular formation ARAS

- receives all stimuli from all afferent sensory + sensory pathways (exteroceptors, proprioceptors, receptors from internal organs),
- connected to the cerebral cortex,
- its constant activity ensures wakefulness (ARAS - the part of the RF that influences consciousness and wakefulness by its action on the cerebral cortex)
- when disturbed, impaired consciousness (up to coma)<sup>[1]</sup>.

# Descending RF



The reticular formation the oblong section.

1. Facilitatory RF - has constant activity, in the rostral region of the trunk,
2. inhibitory RF - no spontaneous activity, controlled by cortex + basal ganglia,

Both of these parts are related to momentum, especially  $\gamma$ -motoneuron excitability<sup>[1]</sup>.

## Links

### Related articles

- Cerebellum
- Basal ganglia
- Capsula interna
- Impaired consciousness

### References

1. SEIDL, Zdeněk – OBENBERGER, Jiří. *Neurologie pro studium i praxi*. 2. edition. Grada Publishing, 2004. ISBN 80-247-0623-7.