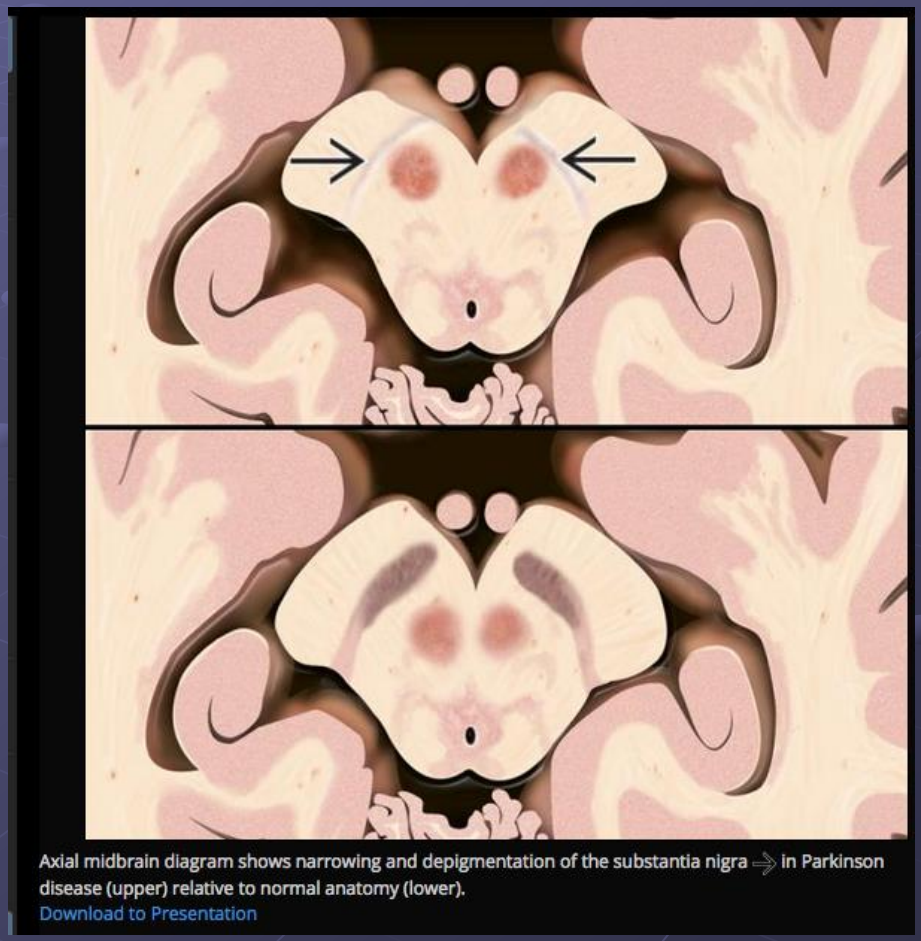
Parkinson disease

- Resting tremor, rigidity and hypokinesia
- Due to progressive degeneration of dopaminergic neurons in the substancia nigra.
- Primarily affects pars compacta of substantia nigra



Axial midbrain diagram shows narrowing and depigmentation of the substantia nigra ⇨ in Parkinson disease (upper) relative to normal anatomy (lower).

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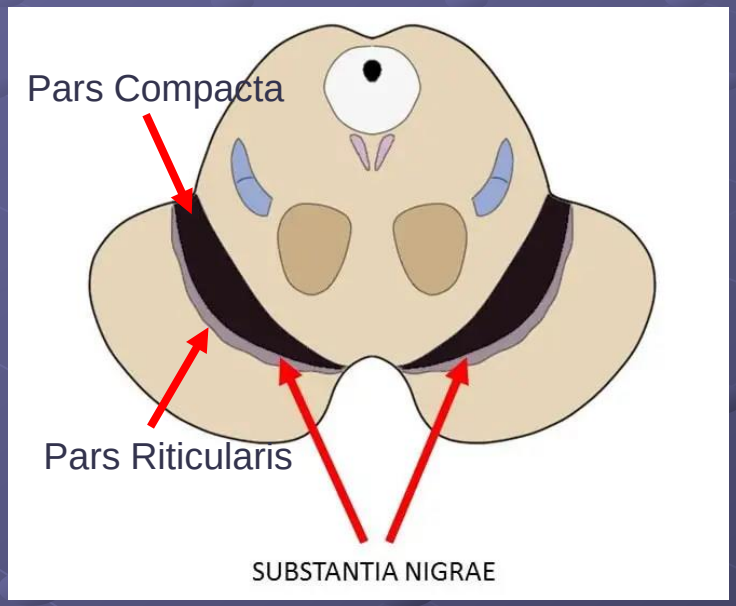
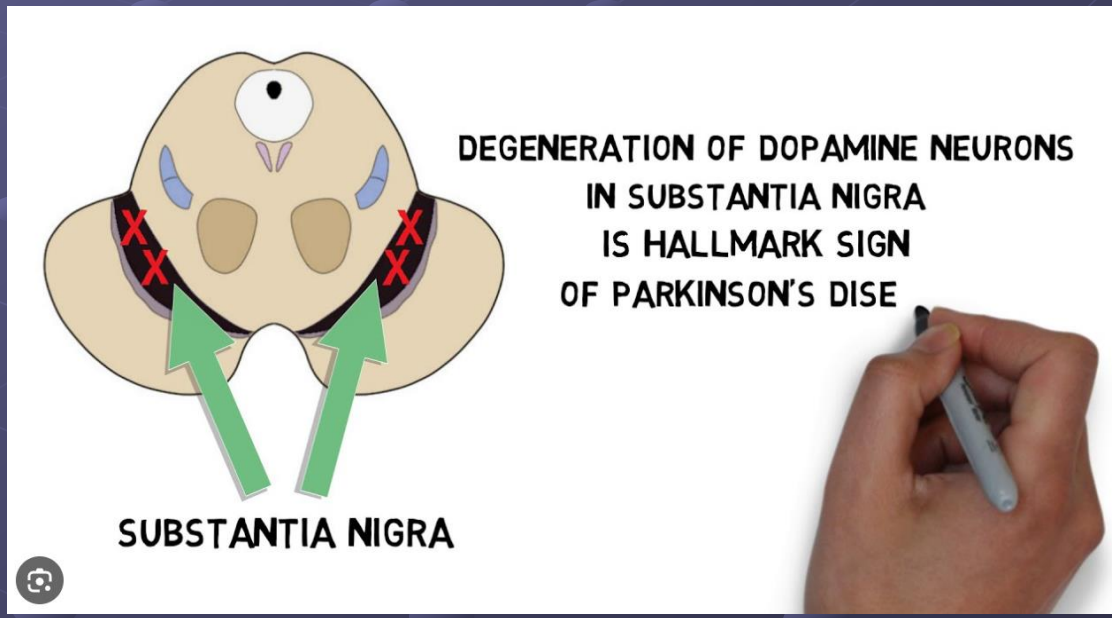
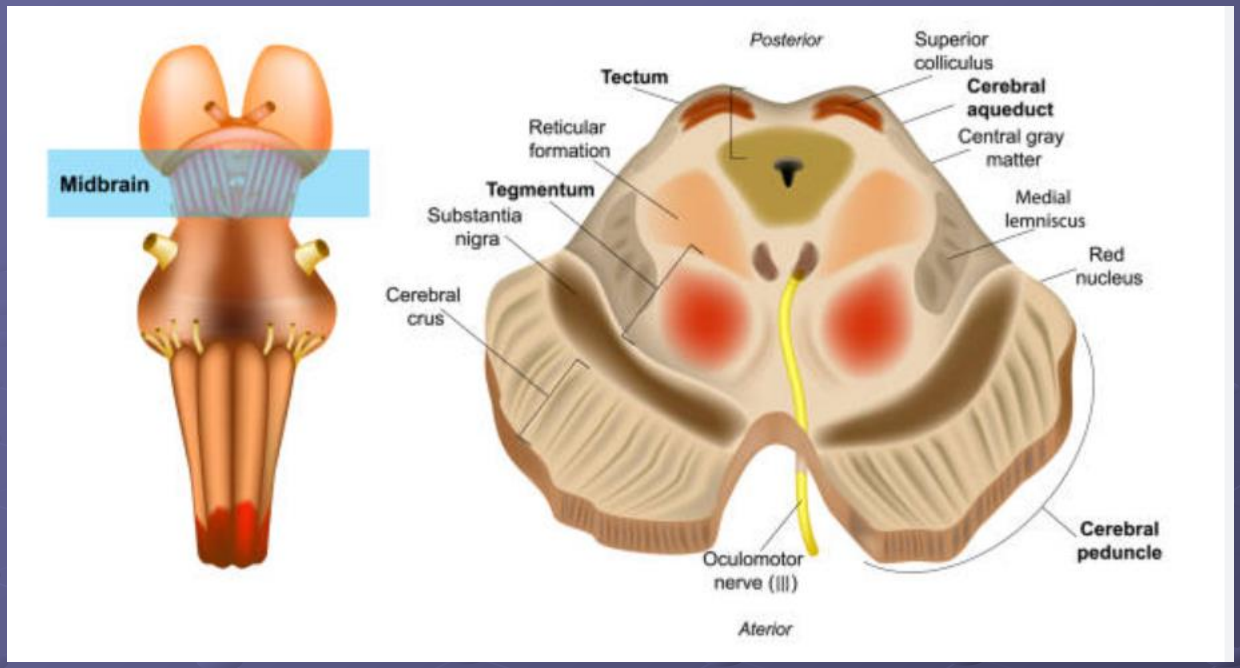
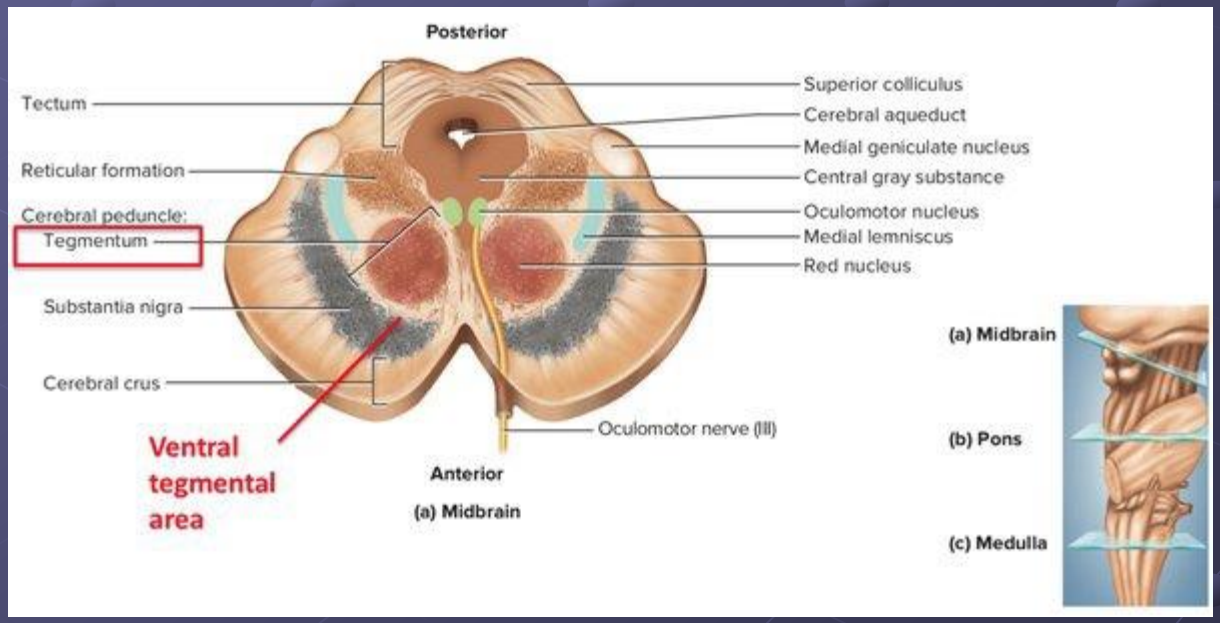
Substantia Nigra

- Divided into
  - Superficial - pars reticularis
  - Deep - pars compacta



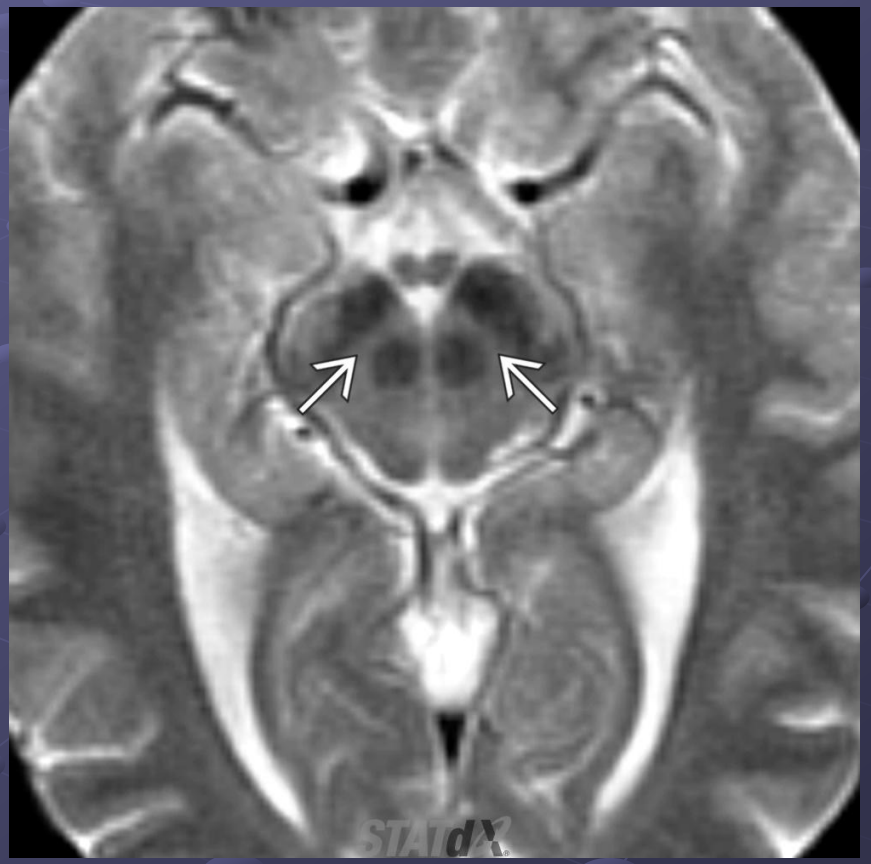



Midbrain
Posterior
Superior colliculus
Tectum
Cerebral aqueduct
Reticular formation
Central gray matter
Tegmentum
Medial lemniscus
Substantia nigra
Red nucleus
Cerebral crus
Cerebral peduncle
Oculomotor nerve (III)
Aterior


Posterior
Tectum
Superior colliculus
Cerebral aqueduct
Reticular formation
Medial geniculate nucleus
Central gray substance
Cerebral peduncle:
Tegmentum
Oculomotor nucleus
Medial lemniscus
Red nucleus
Substantia nigra
Cerebral crus
Oculomotor nerve (III)
Ventral tegmental area
Anterior
(a) Midbrain
(a) Midbrain
(b) Pons
(c) Medulla

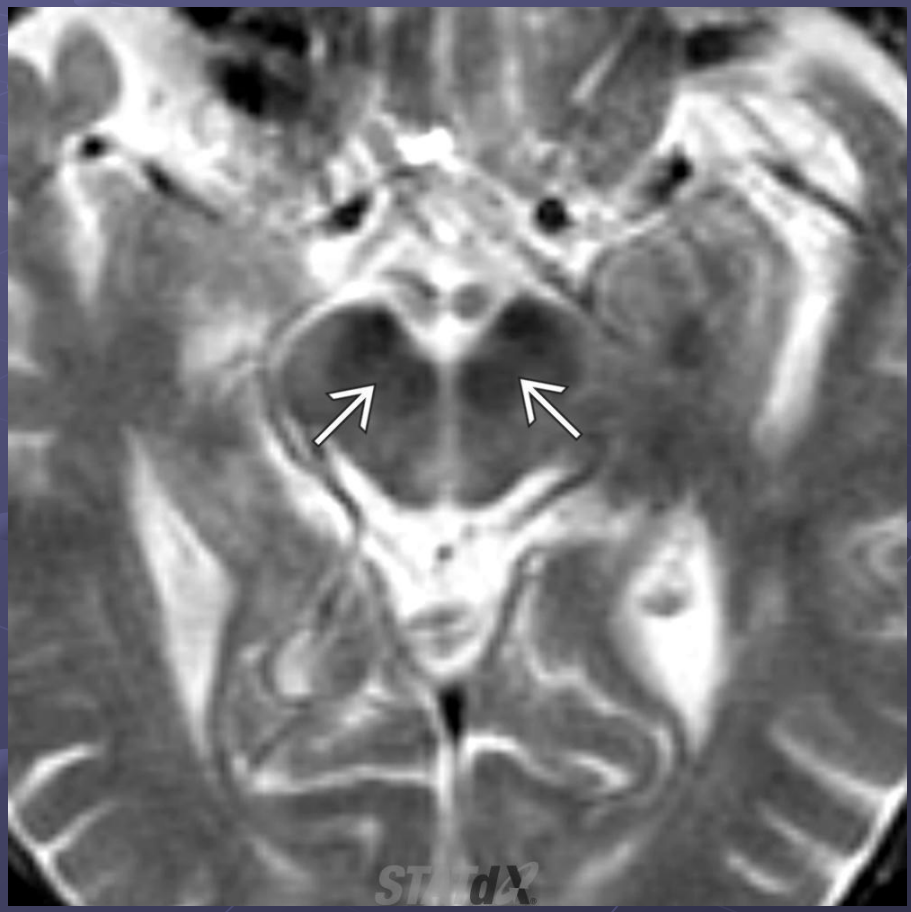
Normal

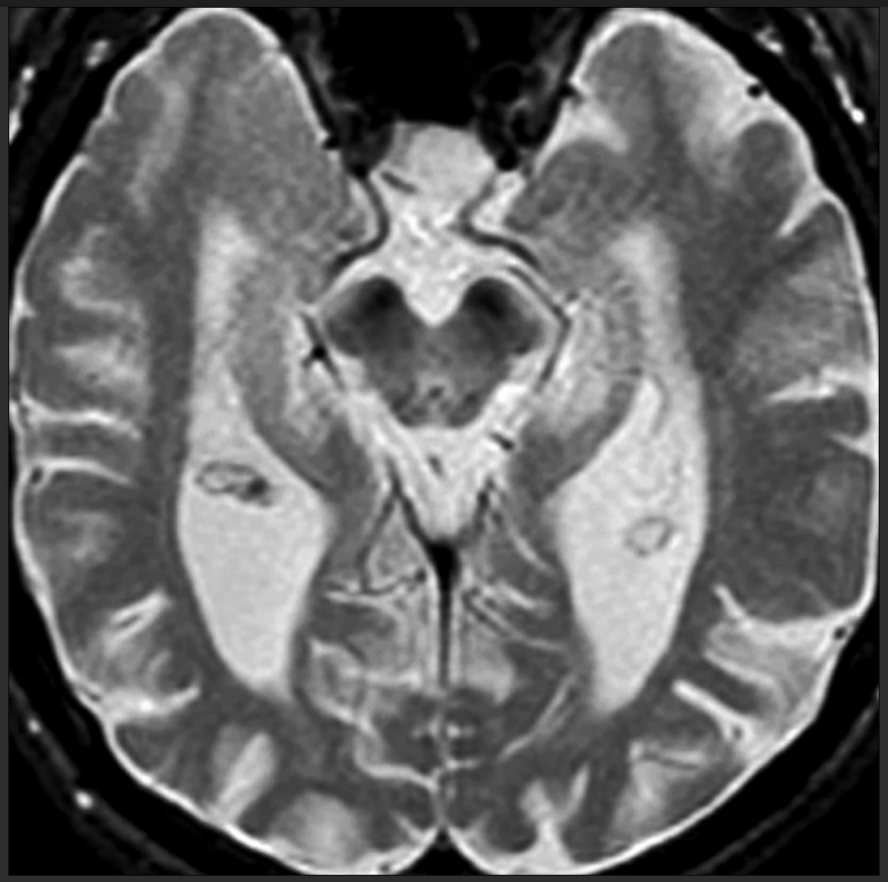
- Appropriate width of the pars compacta (white solid arrow)
- a striking contrast to the abnormal findings seen in a patient with Parkinson disease.



Parkinson disease

- "blurring" and thinning of pars compacta (white solid arrow) between 2 hypointense structures, i.e., the pars reticulata of substantia nigra and red nucleus.
- As a result, the red nuclei and substantia nigra are almost touching.





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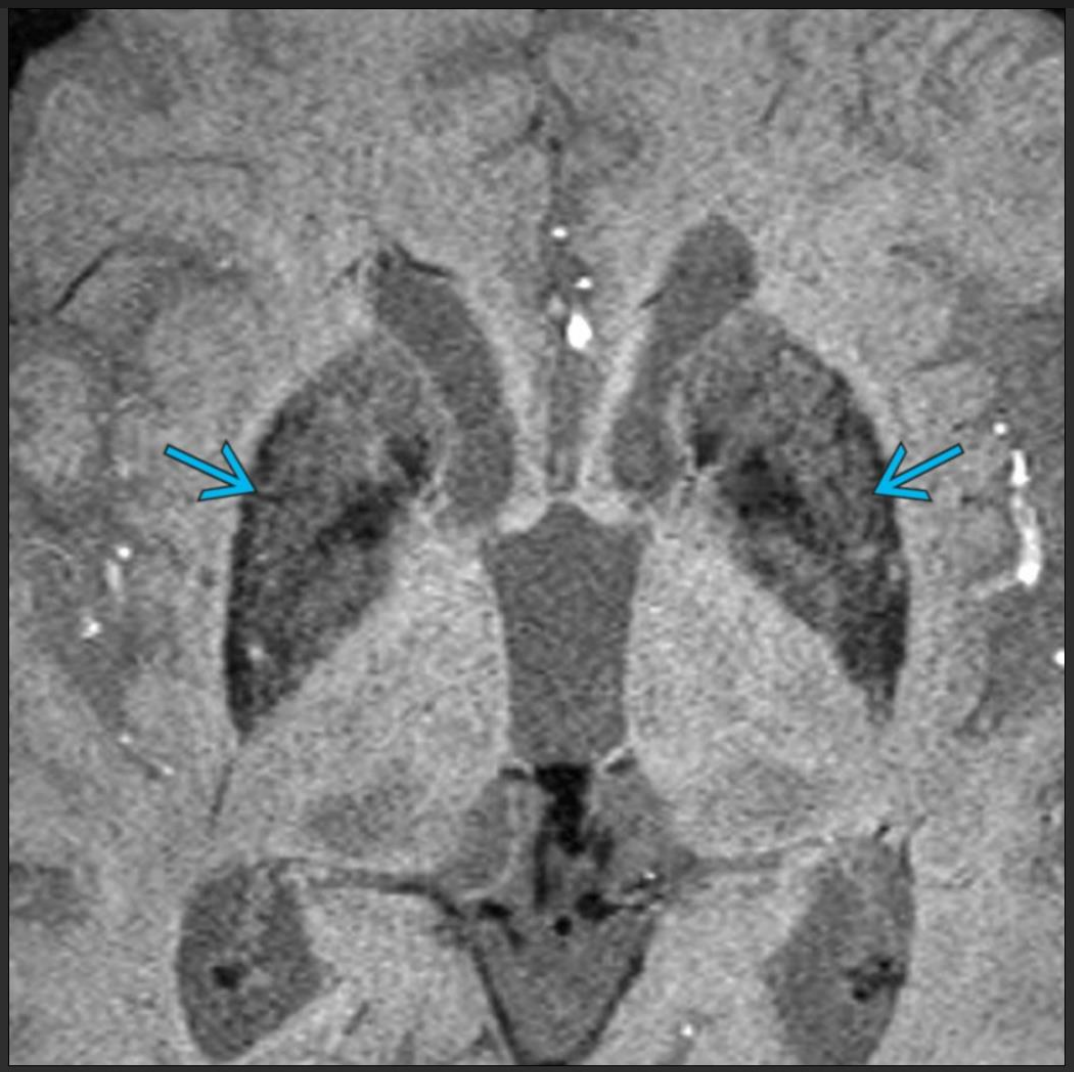
Axial T2WI MR shows hypointensity and narrowing of the substantia nigra.



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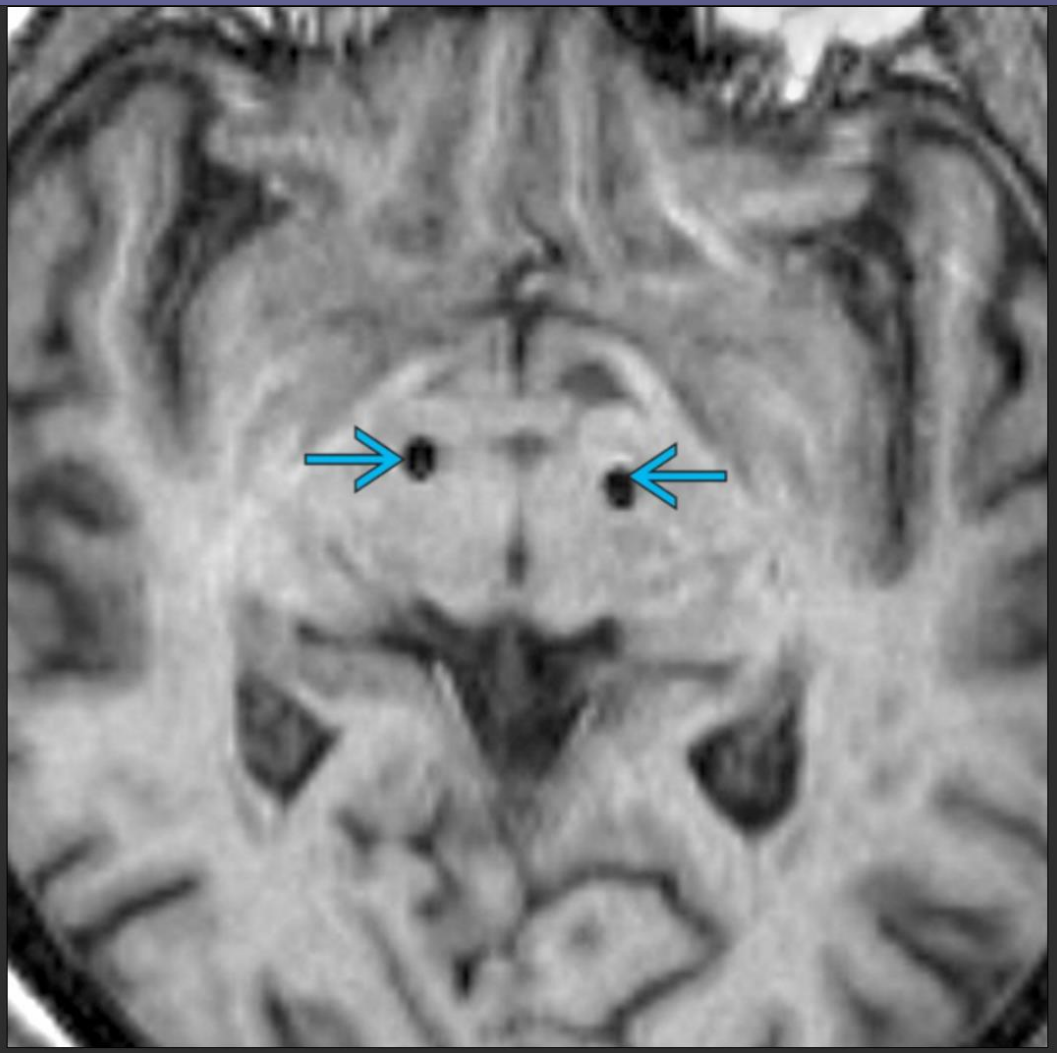
Axial T2* SWI MR in the same patient shows increased susceptibility in the bilateral putaminal region → due to increased iron deposition.



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The same patient underwent placement of bilateral deep brain stimulator (DBS). Axial 3D T1WI through the upper midbrain region demonstrate correct positioning of the tip of electrodes → in the region of subthalamic nuclei ~ 9 mm lateral to midline.