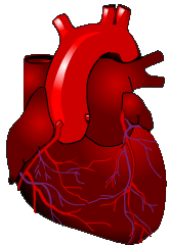


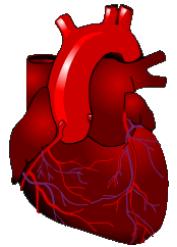


Systematic Anatomy



Nervous system – Part 3

Cranial nerves 脑神经 (1)



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English into Chinese

Chinese into English

1. Intercostal nerve
2. Lat. cutaneous n. of forearm
3. Axillary nerve
4. Intercostal nerve
5. Phrenic nerve

1. 肋下神经
2. 股神经
3. 坐骨神经
4. 胫神经
5. 腓总神经

English into Chinese

Chinese into English

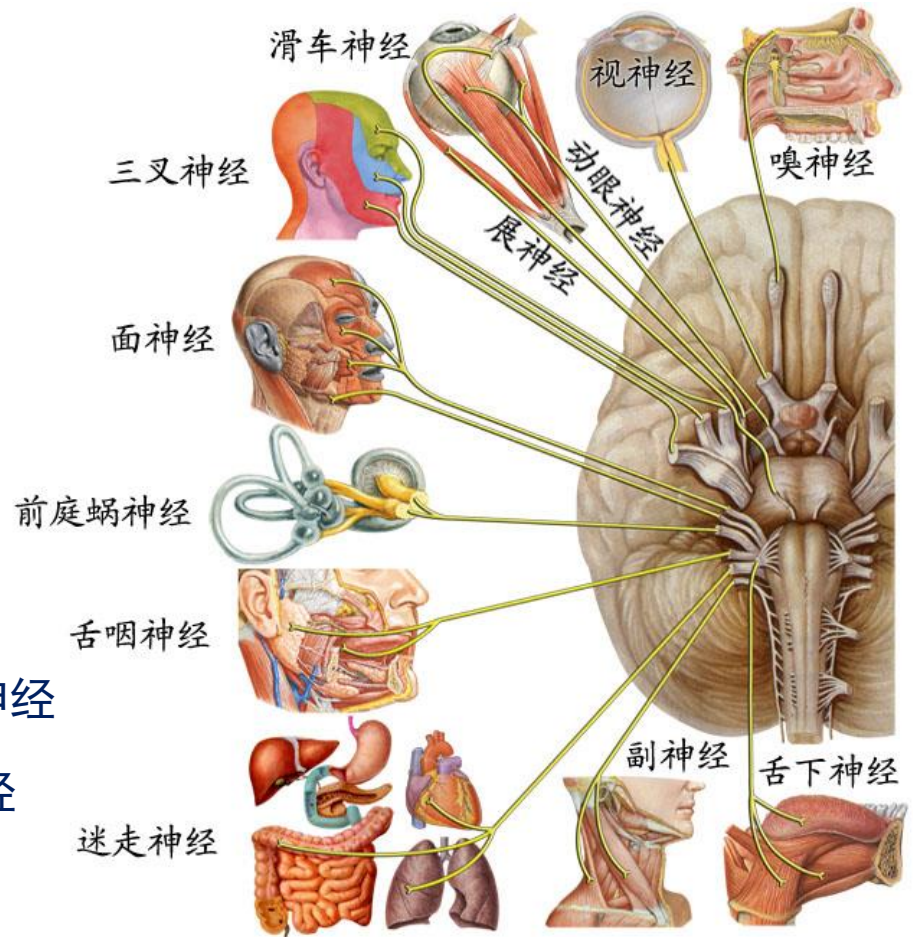
-
1. Musculocutaneous nerve 肌皮神经
 2. Lat. cutaneous nerve of forearm 前臂外侧皮神经
 3. Axillary nerve 腋神经
 4. Intercostal nerve 肋间神经
 5. Phrenic nerve 膈神经

1. 正中神经 median nerve
2. 耳大神经 great auricular nerve
3. 肋下神经 subcostal nerve
4. 坐骨神经 sciatic nerve
5. 腓总神经 common peroneal nerve

1. **Concept**: the nerves to connect with brain.
2. **Name** of 12 pairs of cranial nerves.
3. **Distribute**: head, neck, some to thorax & abdomen
4. Functional fiber component 纤维成分
5. Related **nuclei** 神经核
6. Related **ganglions** 神经节
7. **Position to connect brain** 连接脑的部位
8. **Foramen to transmit cranial bones** 穿颅底孔裂
9. **Main branches & distribution** 分支分布
10. **Clinical symptom after injury** 损伤后临床表现

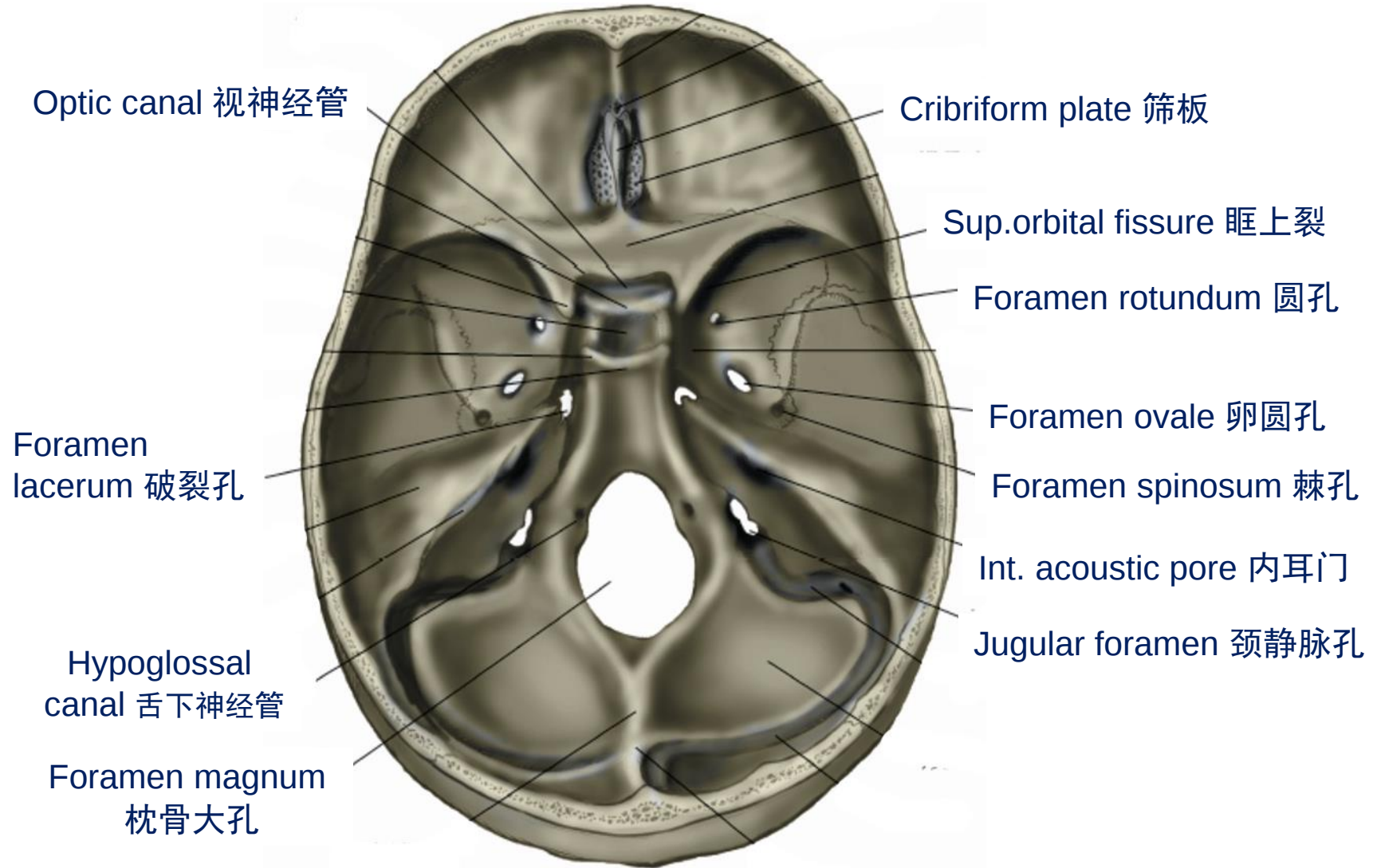
Cranial nerves-nerves to connect to brain

- I. Olfactory nerve 嗅神经
- II. Optic nerve 视神经
- III. Oculomotor nerve 动眼神经
- IV. Trochlear nerve 滑车神经
- V. Trigeminal nerve 三叉神经
- VI. Abducent nerve 展神经
- VII. Facial nerve 面神经
- VIII. Vestibulocochlear nerve 前庭蜗神经
- IX. Glossopharyngeal nerve 舌咽神经
- X. Vagus nerve 迷走神经
- XI. Accessory nerve 副神经
- XII. Hypoglossal nerve 舌下神经



一嗅二视三动眼 四滑五叉六外展
七面八听九舌咽 十迷一副舌下全

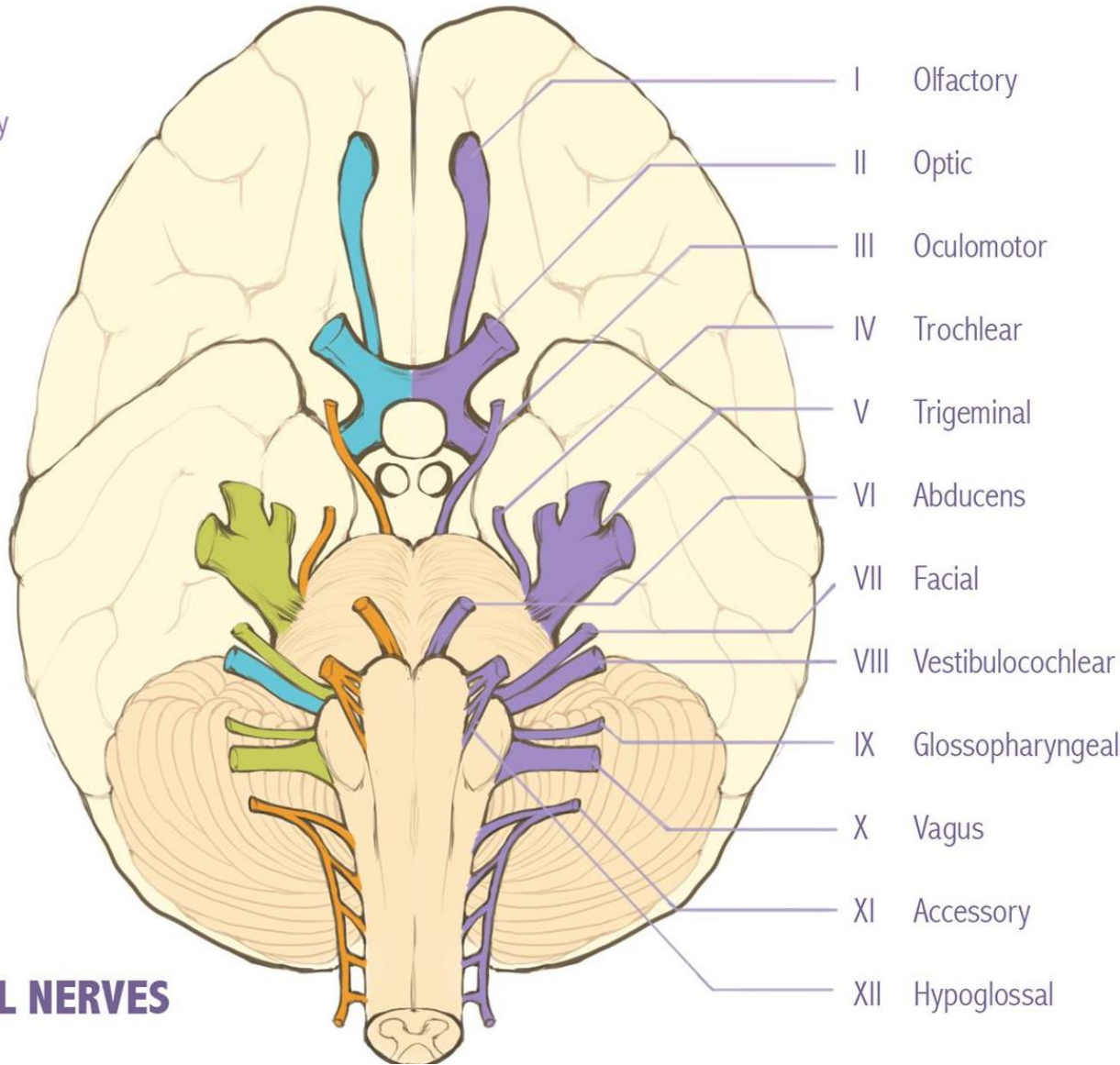
Base of the skull (internal view)



The structures passing the opening or fissure of cranial base

Opening or fissure 孔裂	Pass structure 通过结构
Cribriform foramina 筛孔	Olfactory n. 嗅神经
Sup.orbital fissure 眶上裂	Optic n. 视神经
	Oculomotor n. 动眼神经
	Trochlear n. 滑车神经
	Trigeminal 1-ophthalmic nerve. 眼神经 (V-1)
Foramen rotundum 圆孔	Maxillary n. 上颌神经 (V-2)
Foramen ovale 卵圆孔	Mandibular n. 下颌神经 (V-3)
Foramen spinosum 棘孔	Mid. Meningeal a. 脑膜中动脉
Foramen lacerum 破裂孔	Int. carotid a. 颈内动脉
Internal. acoustic pore 内耳门	Facial n. 面神经
	Vestibulocochlear n. 前庭蜗神经
Jugular foramen 颈静脉孔	Int. jugular v., vagus n. 颈内静脉, 迷走神经
	Glossopharyngeal n. 舌咽神经
	Accessory n. 副神经
Hypoglossal canal 舌下神经管	Hypoglossal n. 舌下神经

● Sensory
● Motor
● Mixed



I. 嗅神经

II. 视神经

III. 动眼神经

IV. 滑车神经

V. 三叉神经

VI. 外展神经

VII. 面神经

VIII. 前庭蜗神经

IX. 舌咽神经

X. 迷走神经

XI. 副神经

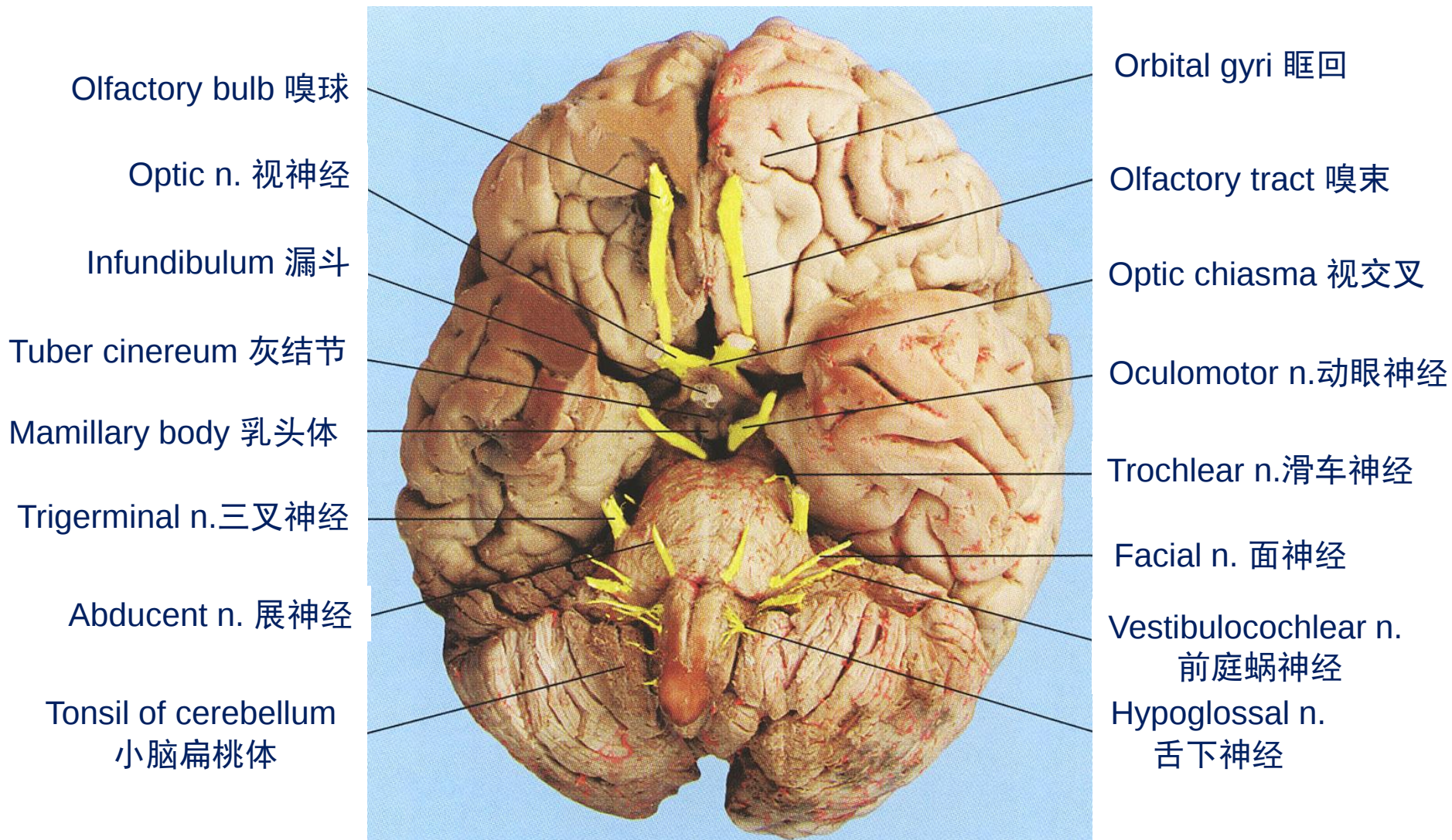
XII. 舌下神经

CRANIAL NERVES

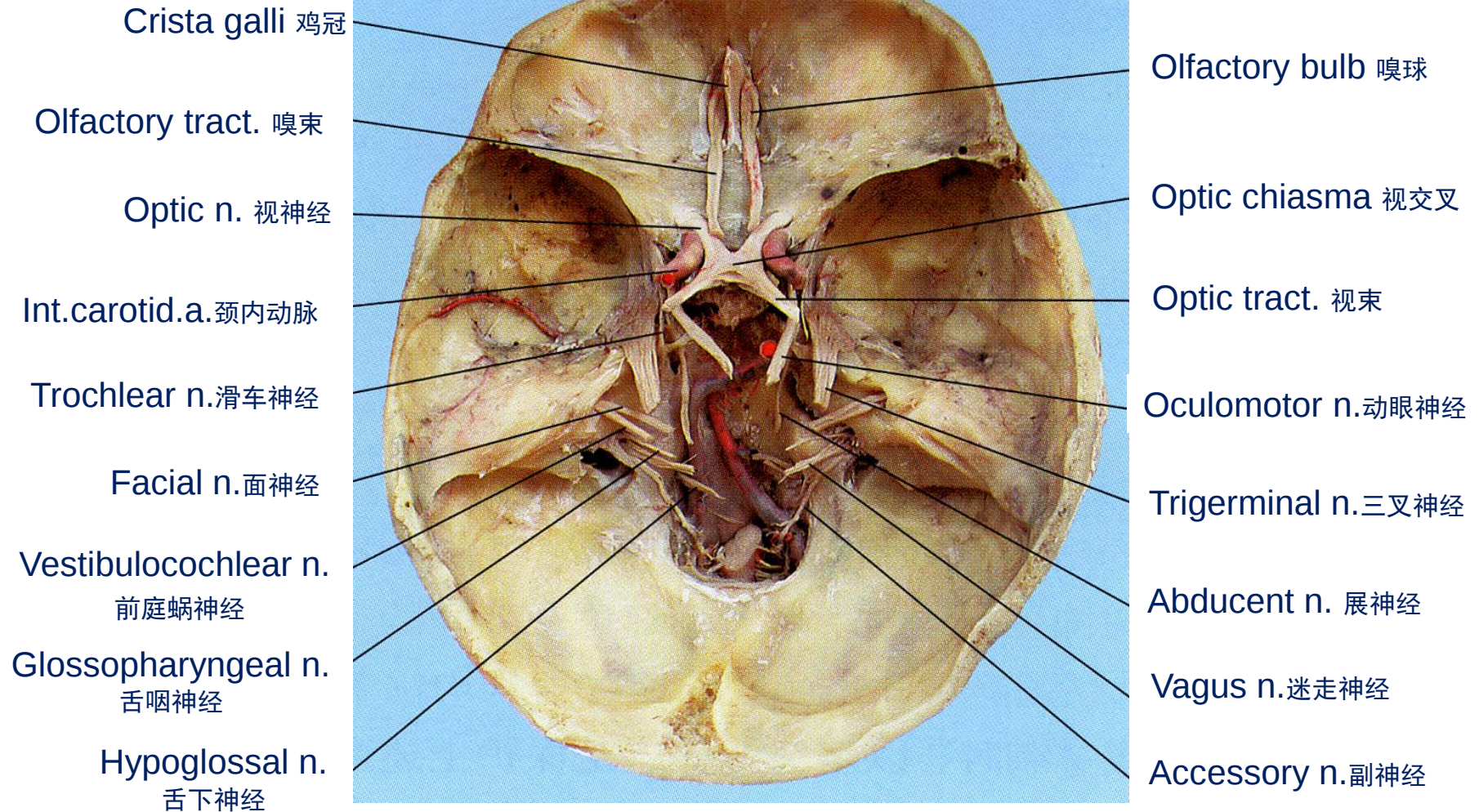
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Fudan University

Inferior view of brain- cranial nerve roots



The cranial nerve roots



脑神经的七种纤维成分

运动

一般内脏运动 **GVMF** 平滑肌、心肌和腺体

General visceral motor fiber

特殊内脏运动 **SVMF** 咀嚼肌、表情肌和咽喉肌 (腮弓演化的骨骼肌)

Special visceral motor fiber

一般躯体运动 **GSMF** 眼外肌、舌肌 (肌节演化的骨骼肌)

General somatic motor fiber

感觉

一般躯体感觉 **GSSF** 皮肤、肌、肌腱、口鼻粘膜

General somatic sensory fiber

特殊躯体感觉 **SSSF** 视器和前庭蜗器

Special somatic sensory fiber

一般内脏感觉 **GVSF** 头、颈、胸、腹腔脏器

General visceral sensory fiber

特殊内脏感觉 **SVSF** 味蕾和嗅粘膜

Special visceral sensory fiber

Fiber composition of cranial nerves

感觉 I II VIII

运动 III IV VI XI XII

混合 V VII IX X

-  一般躯体运动
-  特殊内脏运动
-  一般内脏运动
-  一般内脏感觉
-  特殊内脏感觉
-  一般躯体感觉
-  特殊躯体感觉

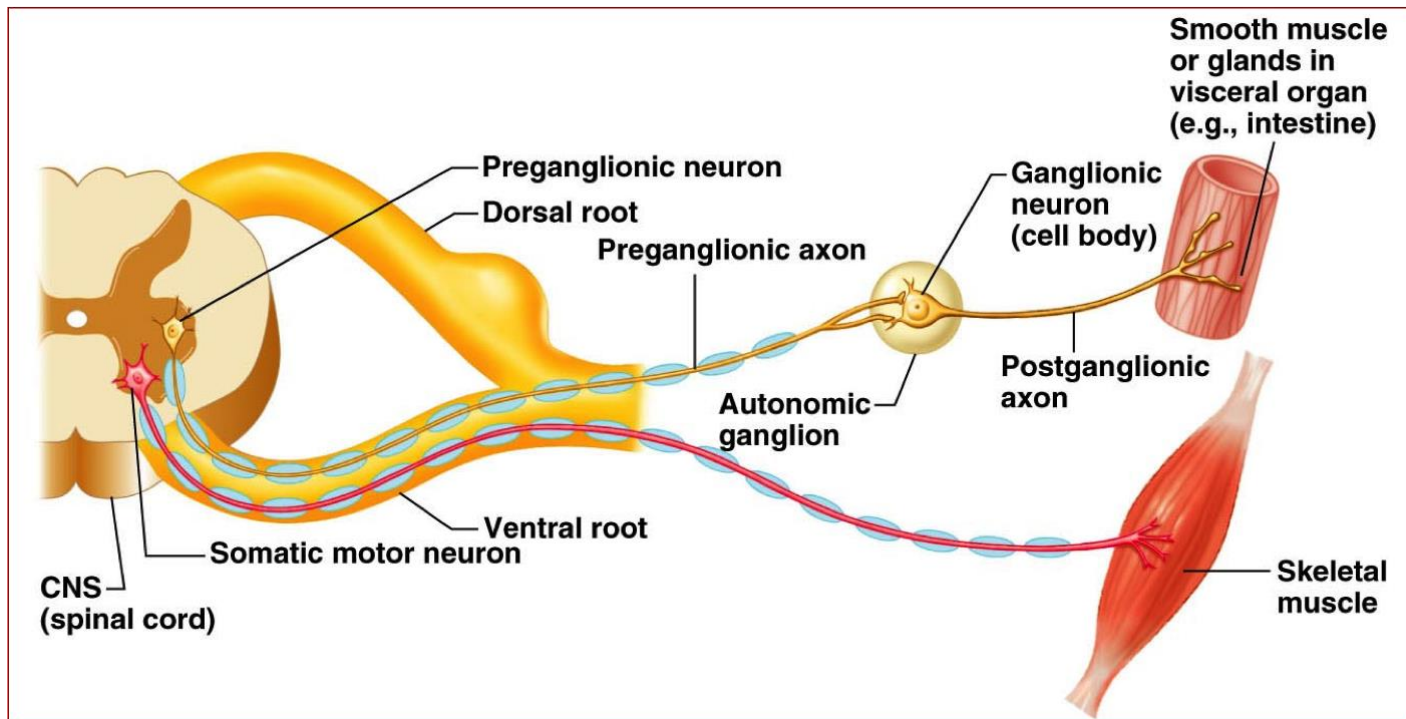
十一二三四五六运
五七九十混余感

Visceral motor fiber & related ganglions of cranial n.

Visceral motor fiber of cranial nn. is parasympathetic n. & they are contained in III、VII、IX、X nn. From CNS to effector, two neurons are needed. Their cell bodies are situated in brain stem & visceral ganglion.

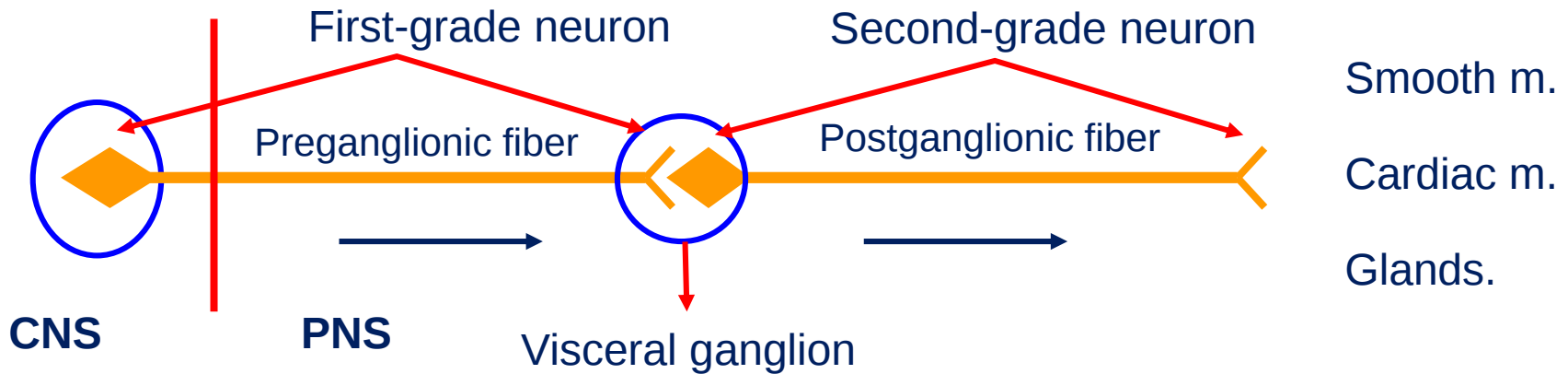
Visceral motor fibers innervate smooth muscle, cardiac muscle & glands.

内脏运动纤维从脑干发出后必须在副交感节内交换神经元后分布于平滑肌, 腺体和血管。

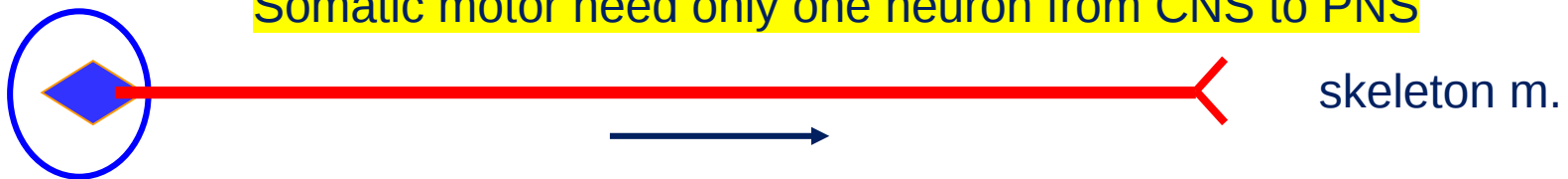


Visceral motor fiber & related ganglions of cranial n.

Visceral motor need two neuron from CNS to PNS



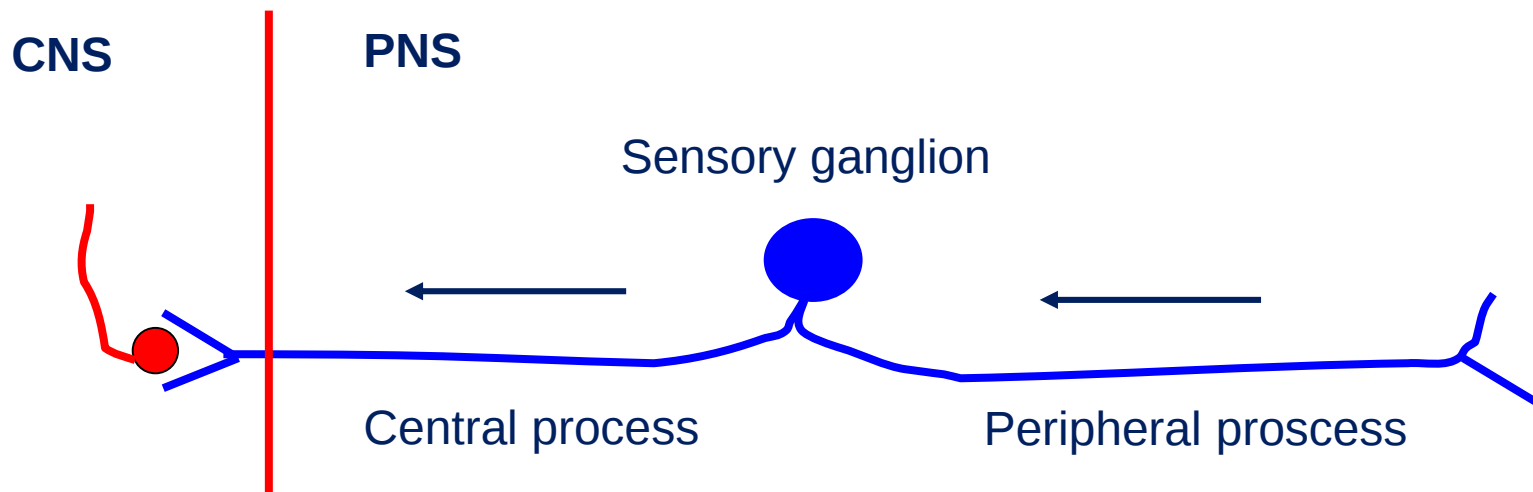
Somatic motor need only one neuron from CNS to PNS



Sensory fiber & related ganglions in cranial nn.

Cell body of both somatic sensory & visceral sensory neuron are located in sensory ganglion, their peripheral processes distributes to receptor & central processes to related sensory nuclei. There are six pairs of sensory ganglions in cranial nn.

内脏和躯体感觉第一级神经元均位于神经节内。



Classification of cranial nerves

- **Sensory cranial nerves** 感觉性 are composed entirely of afferent (sensory) nerve fibers bringing sensations the brain
 - I Olfactory nerve 嗅神经
 - II Optic nerve 视神经
 - VIII Vestibulocochlear nerve 前庭蜗神经
- **Motor cranial nerves** 运动性: are composed entirely of efferent (motor) fibers
 - III Oculomotor nerve 动眼神经
 - IV Trochlear nerve 滑车神经
 - VI Abducent nerve 外展神经
 - XI Accessory nerve 副神经
 - XII Hypoglossal nerve 舌下神经
- **Mixed cranial nerves** 混合性: possess both sensory & motor fibers
 - V Trigeminal nerve 三叉神经
 - VII Facial nerve 面神经
 - IX Glossopharyngeal nerve 舌咽神经
 - X Vagus nerve 迷走神经

Olfactory nerve - 嗅神经

Olfactory cells (SVA) → Cribriform foramina → Olfactory bulb

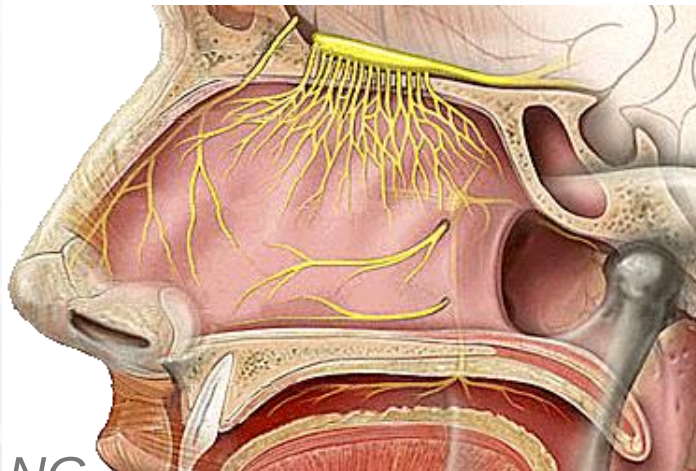
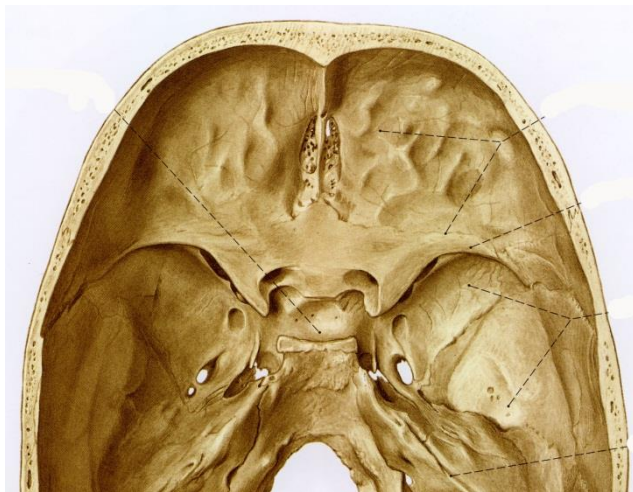
Component 纤维成分：特殊内脏感觉-SVSF

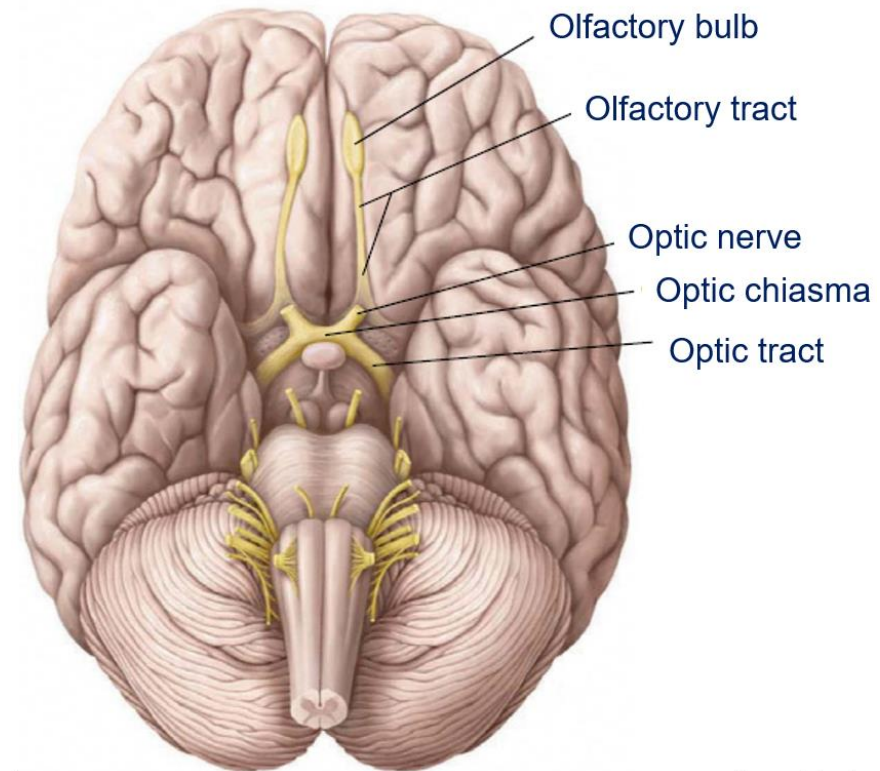
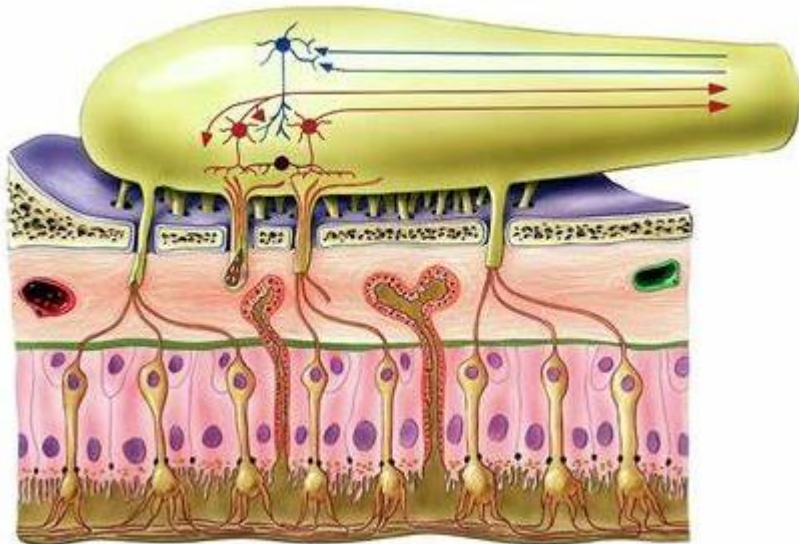
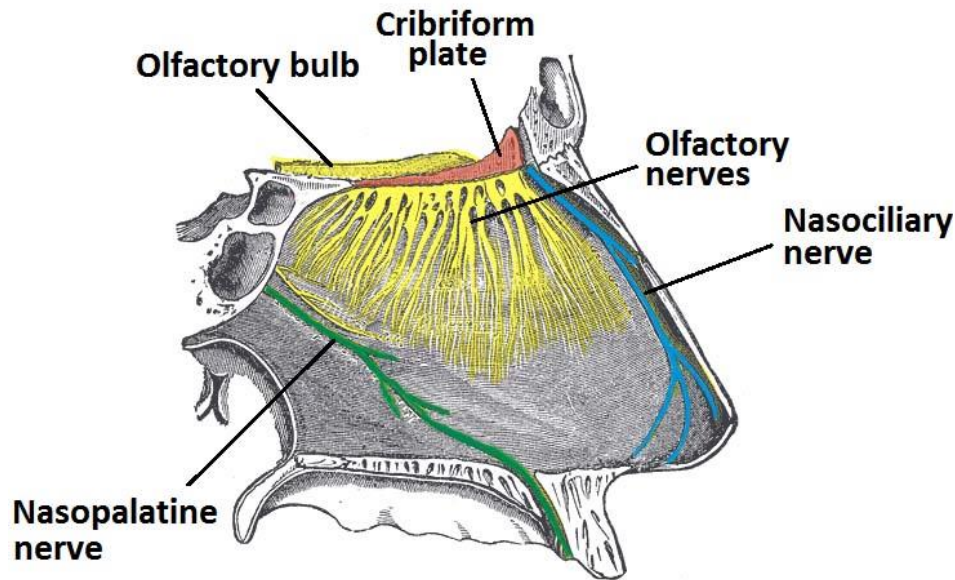
Connect 连接脑部位：间脑

Opening 穿颅骨孔裂：筛板

Distribution 分布：鼻腔嗅区

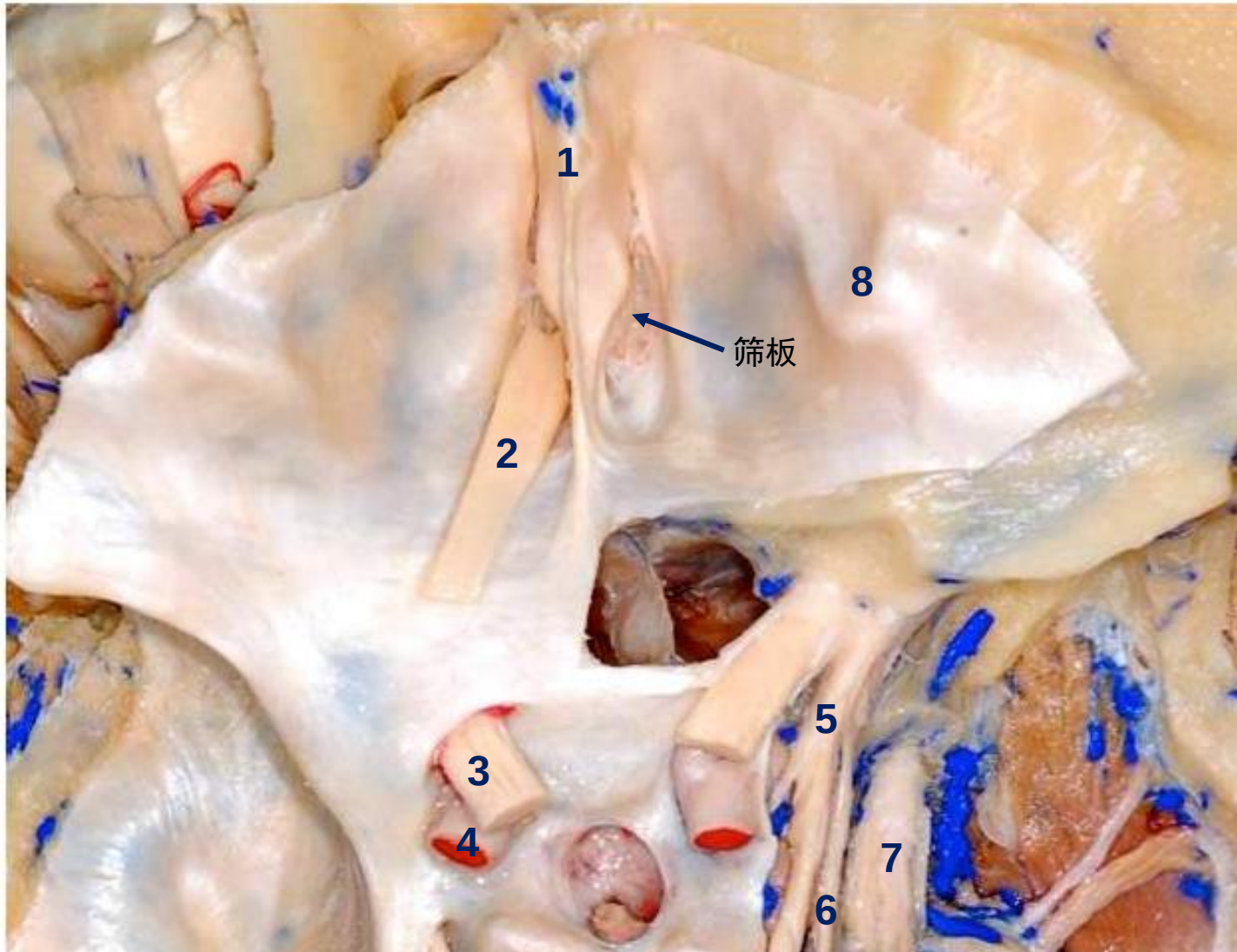
Clinic: 临床联系：颅底骨折，感冒





Superior view of anterior crainial base

iversity



1. 鸡冠
2. 嗅束
3. 视神经
4. 颈内动脉
5. 动眼神经
6. 外展神经
7. 眼神经
8. 颅前窝

Component 纤维成分: 特殊躯体感觉SSSF

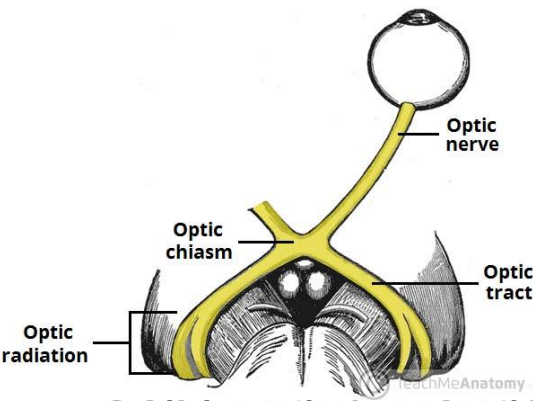
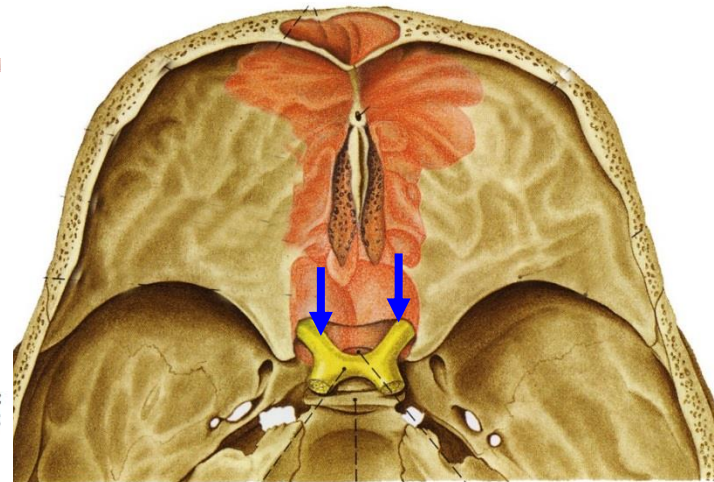
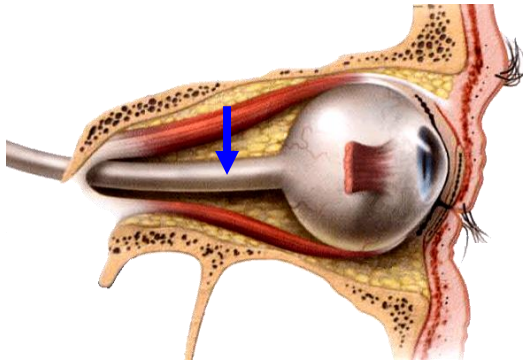
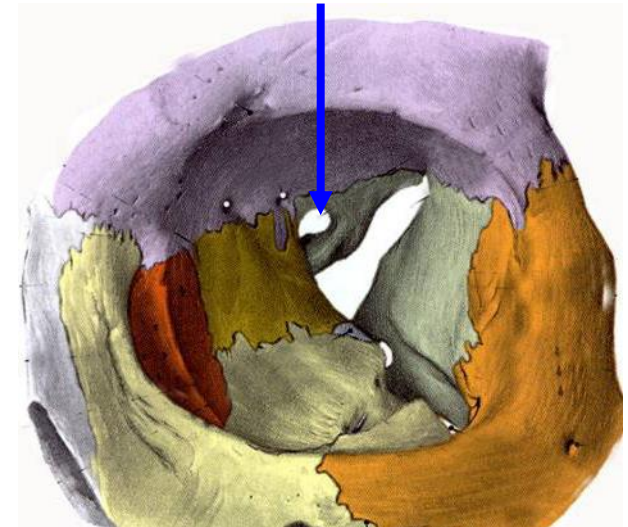
Connect 连接脑部位: 间脑-diencephalon

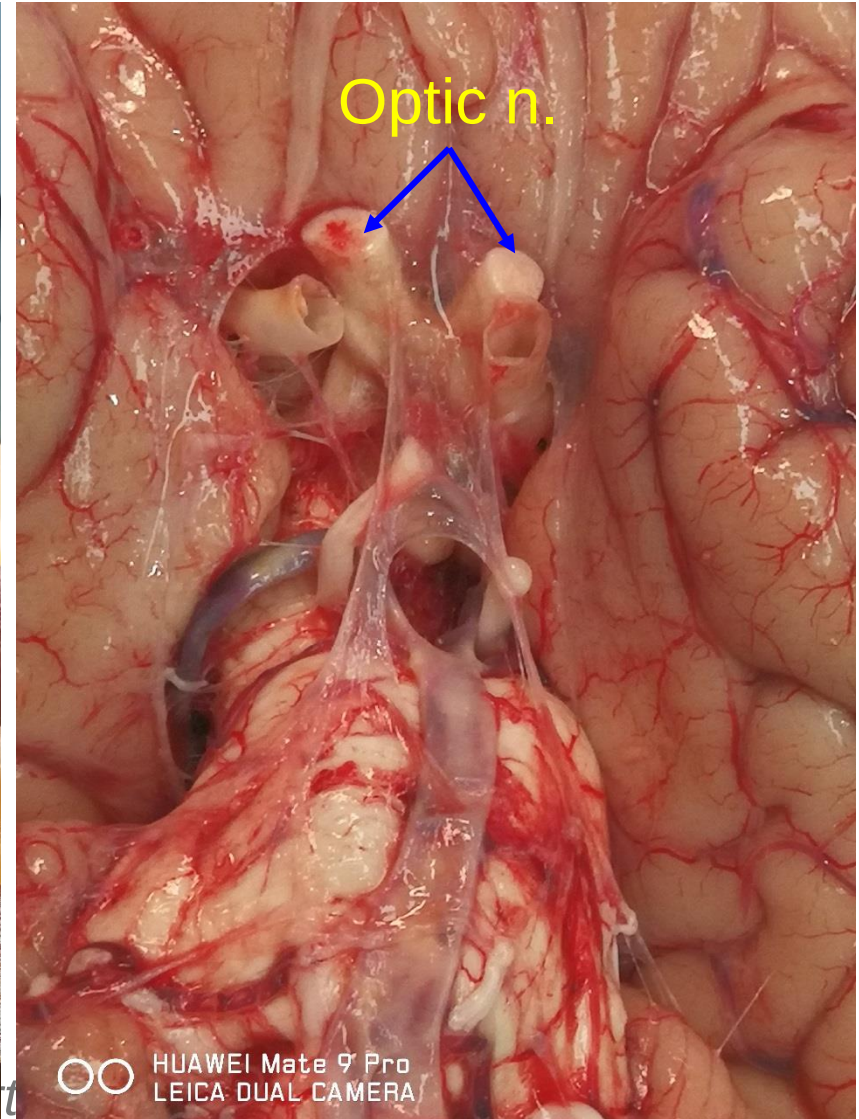
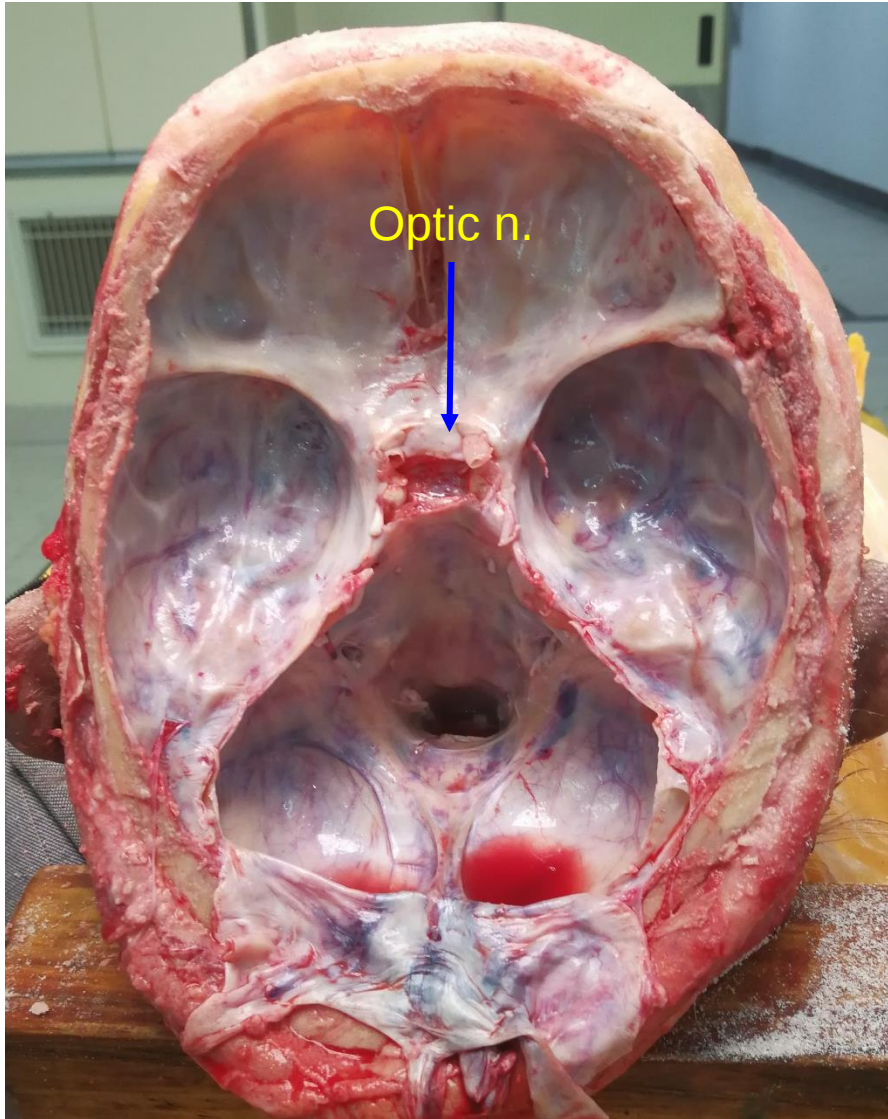
Opening 颅底孔裂: 视神经管-optic canal

Distribution 分布: 视网膜-retina

Clinic 临床: 部分或全盲-partial or full blind

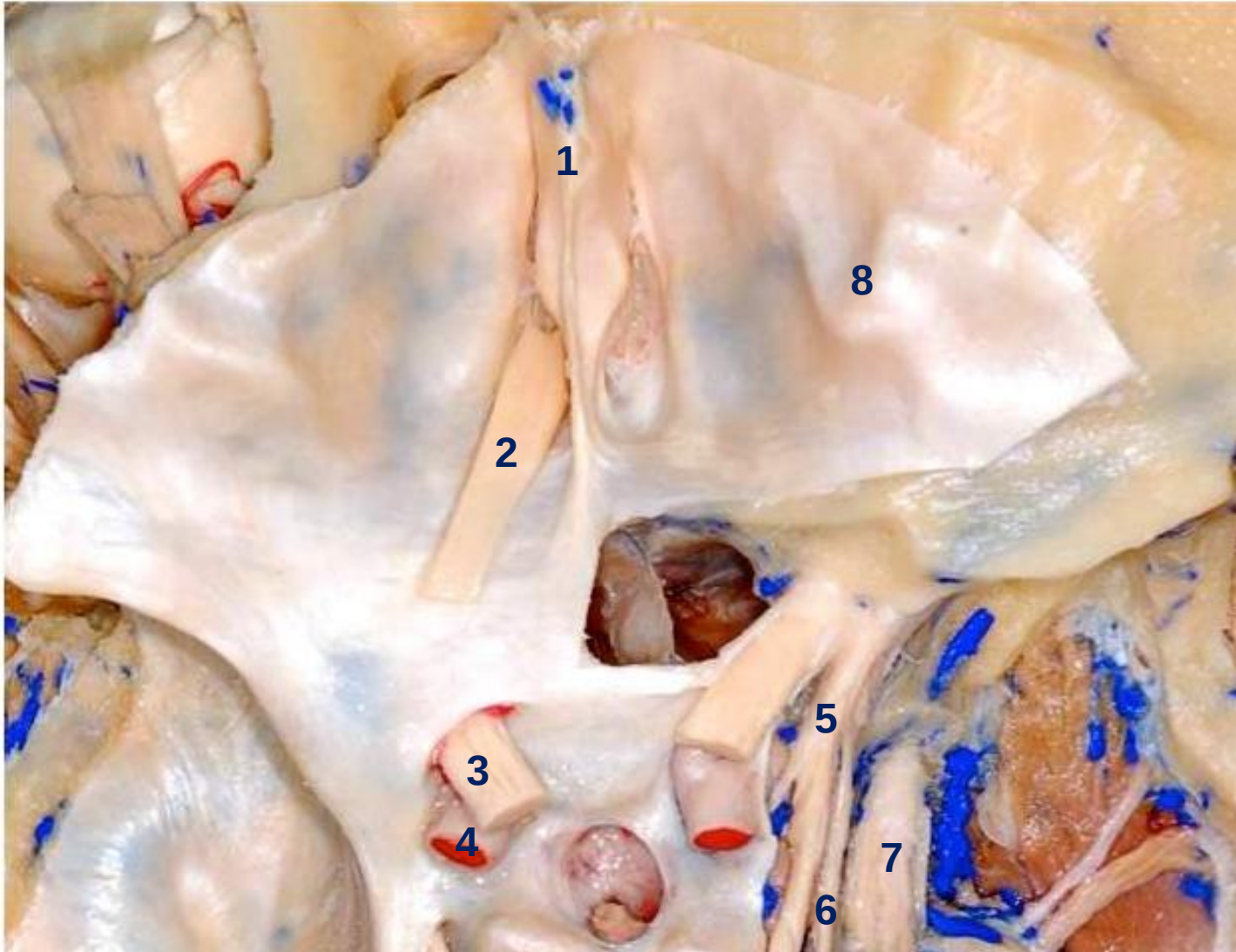
Optic canal





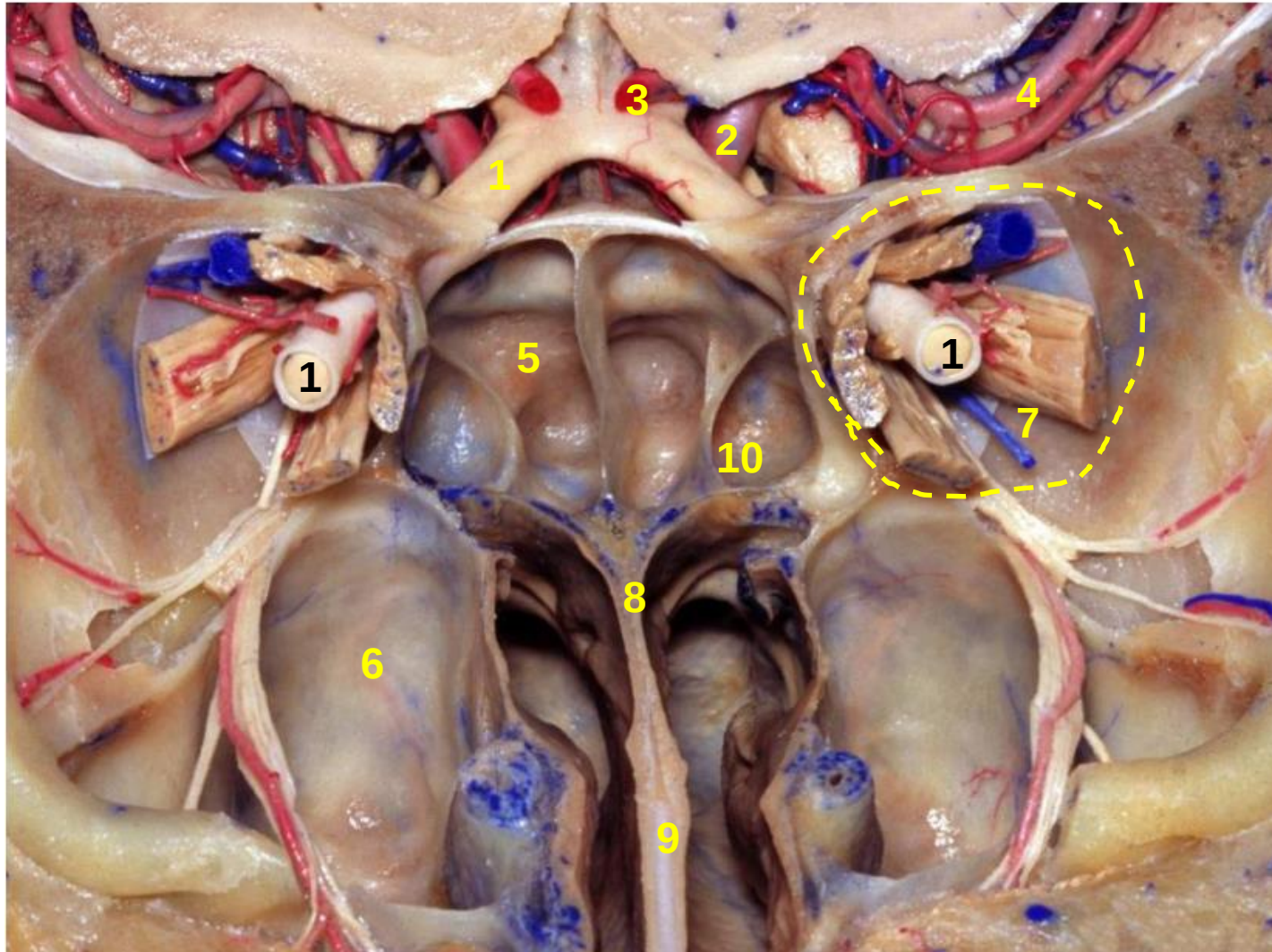
Superior view of anterior cranial base

iversity



1. 鸡冠
2. 嗅束
3. 视神经
4. 颈内动脉
5. 动眼神经
6. 外展神经
7. 眼神经
8. 颅前窝

Anterior perspective of the orbital apex



1. 视神经
2. 颈内动脉
3. 大脑前动脉
4. 大脑中动脉
5. 蝶窦
6. 上颌窦
7. 眶尖
8. 犁骨
9. 鼻中隔

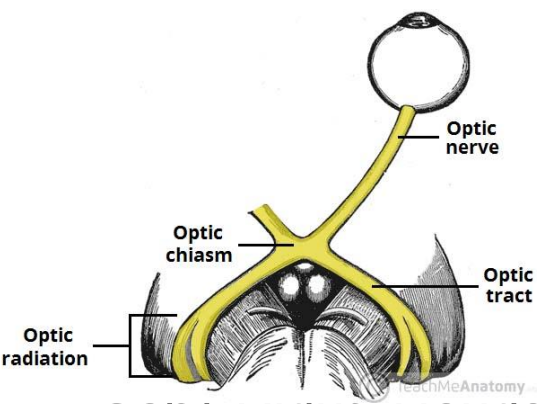
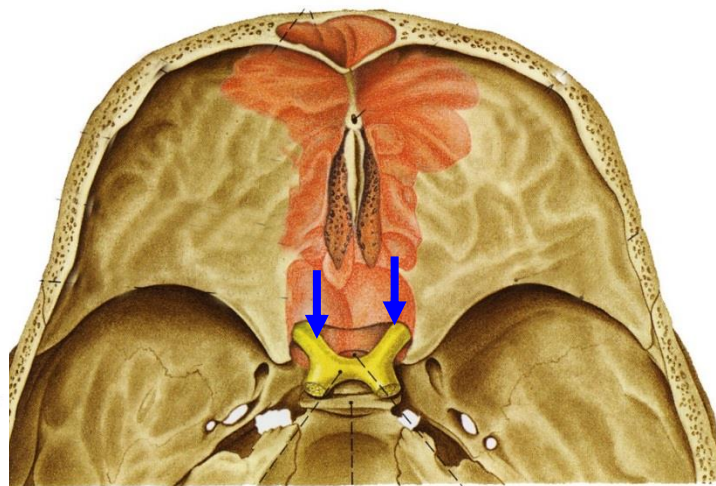
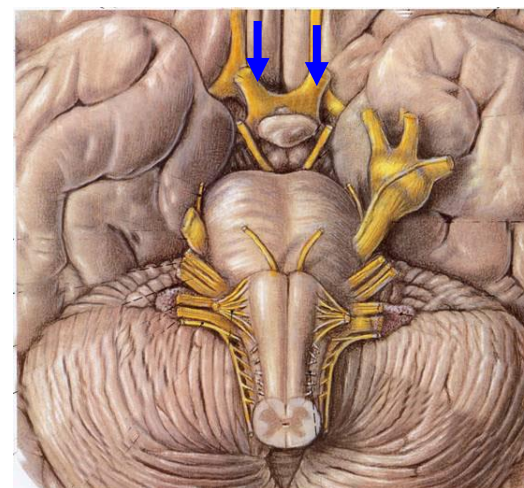
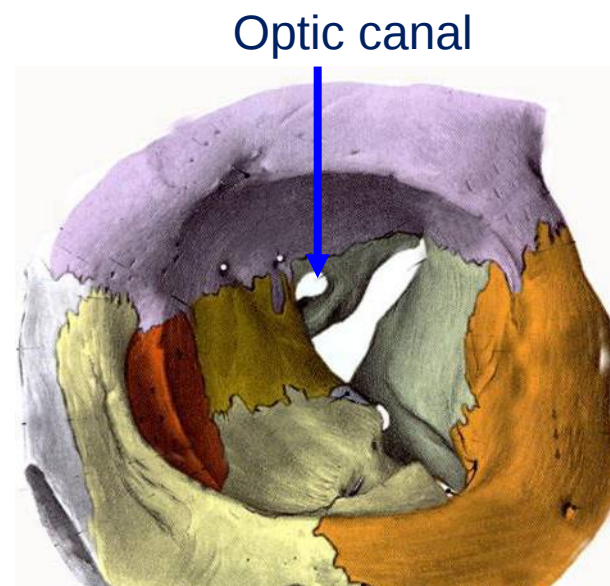
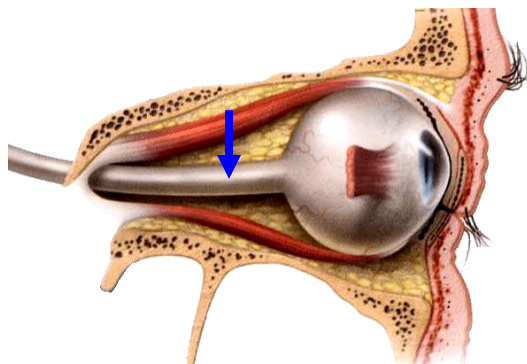
Component 纤维成分：特殊躯体感觉SSSF

Connect 连接脑部位：脑桥延髓沟。

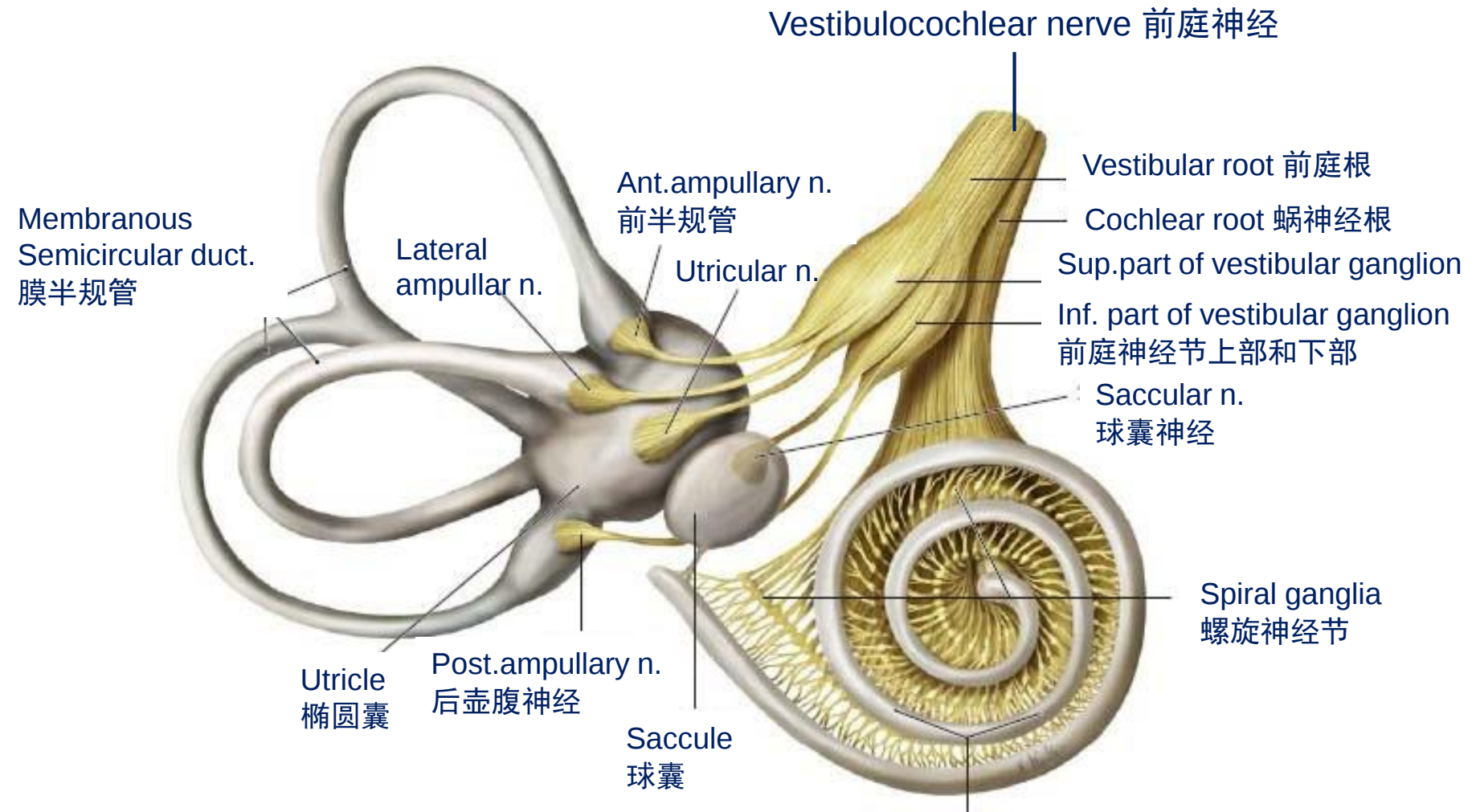
Opening 颅底孔裂：内耳门。

Distribution 分布：膜迷路相关感受器。

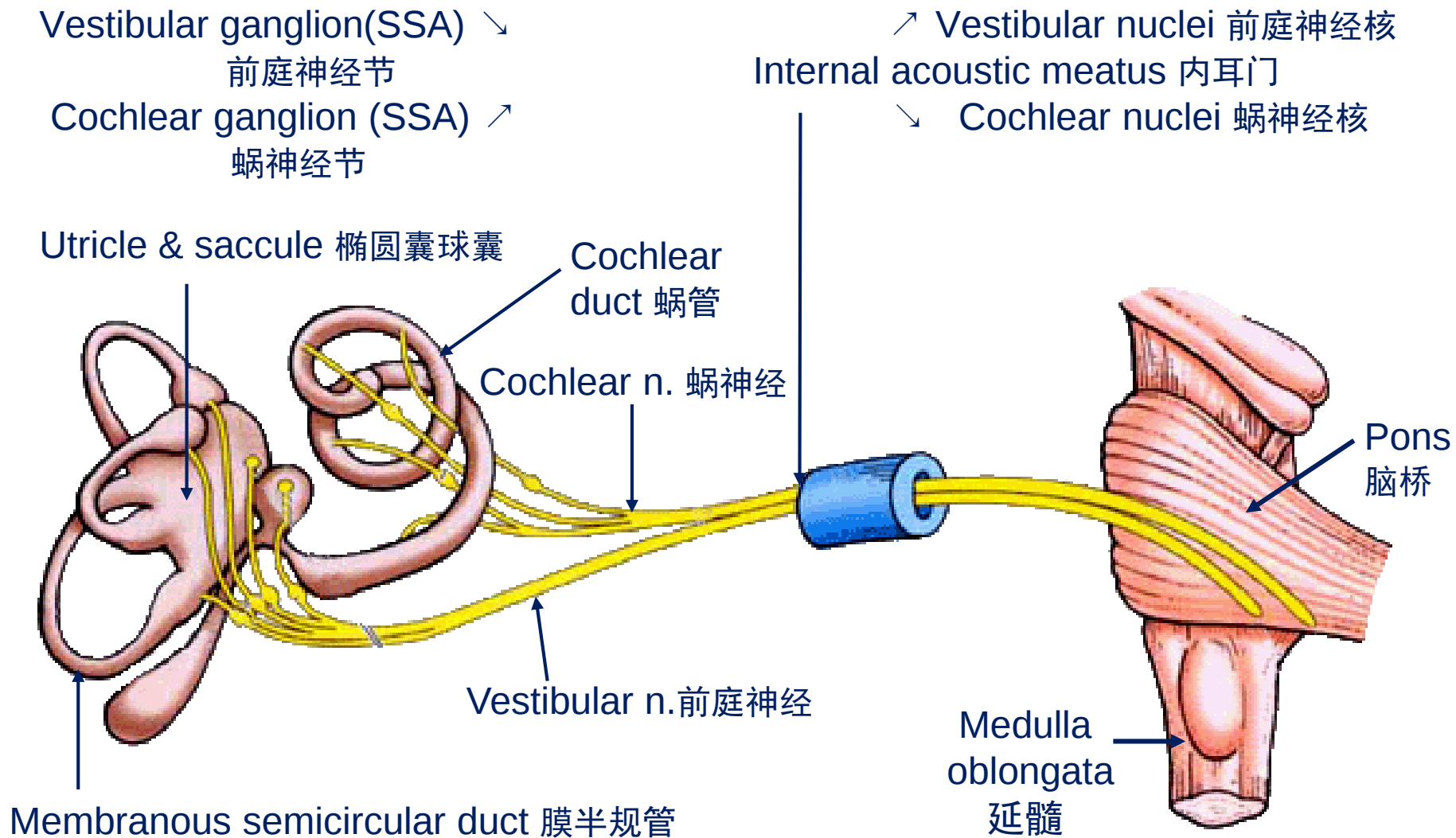
Clinic 临床：听力与平衡障碍等。



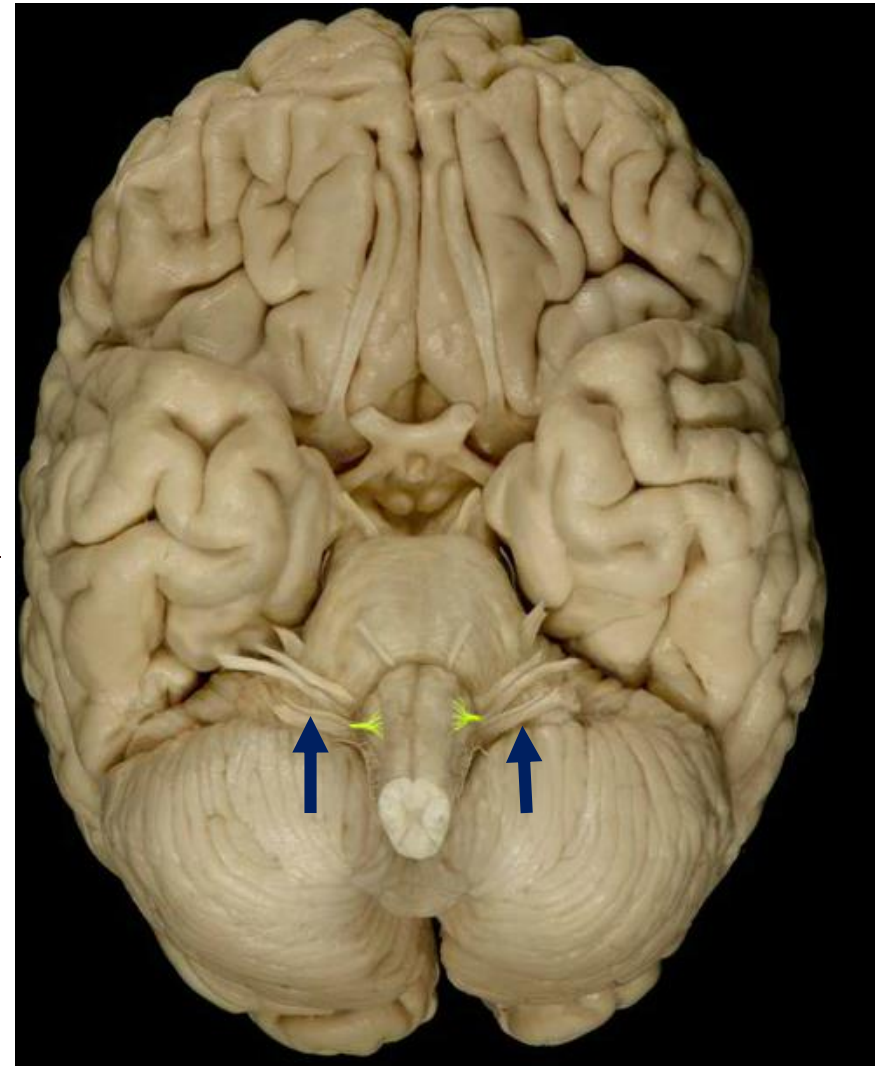
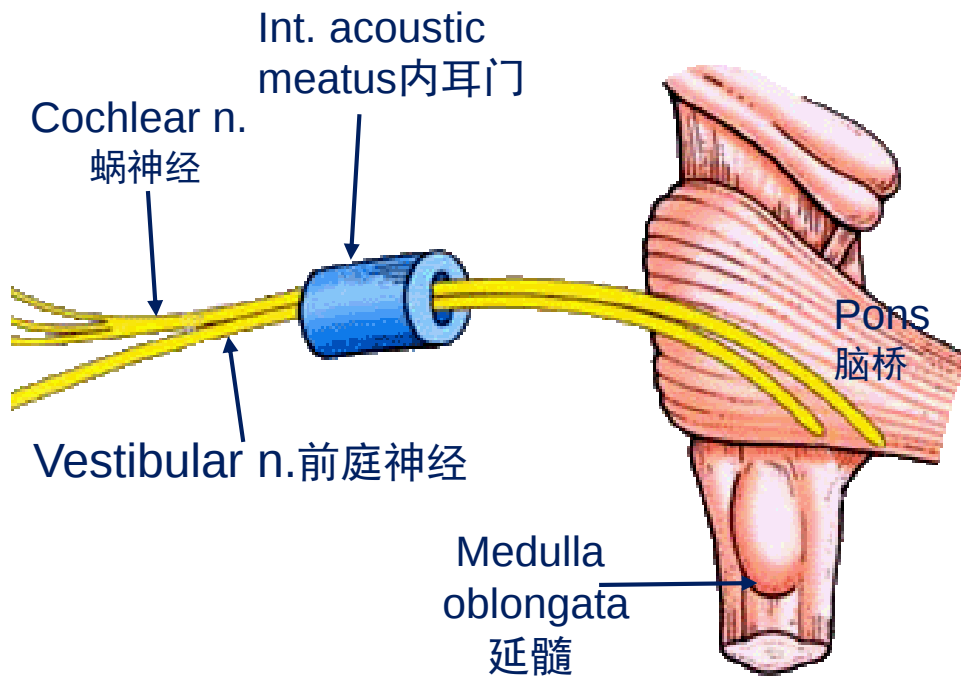
Vestibulocochlear nerve 前庭蜗神经



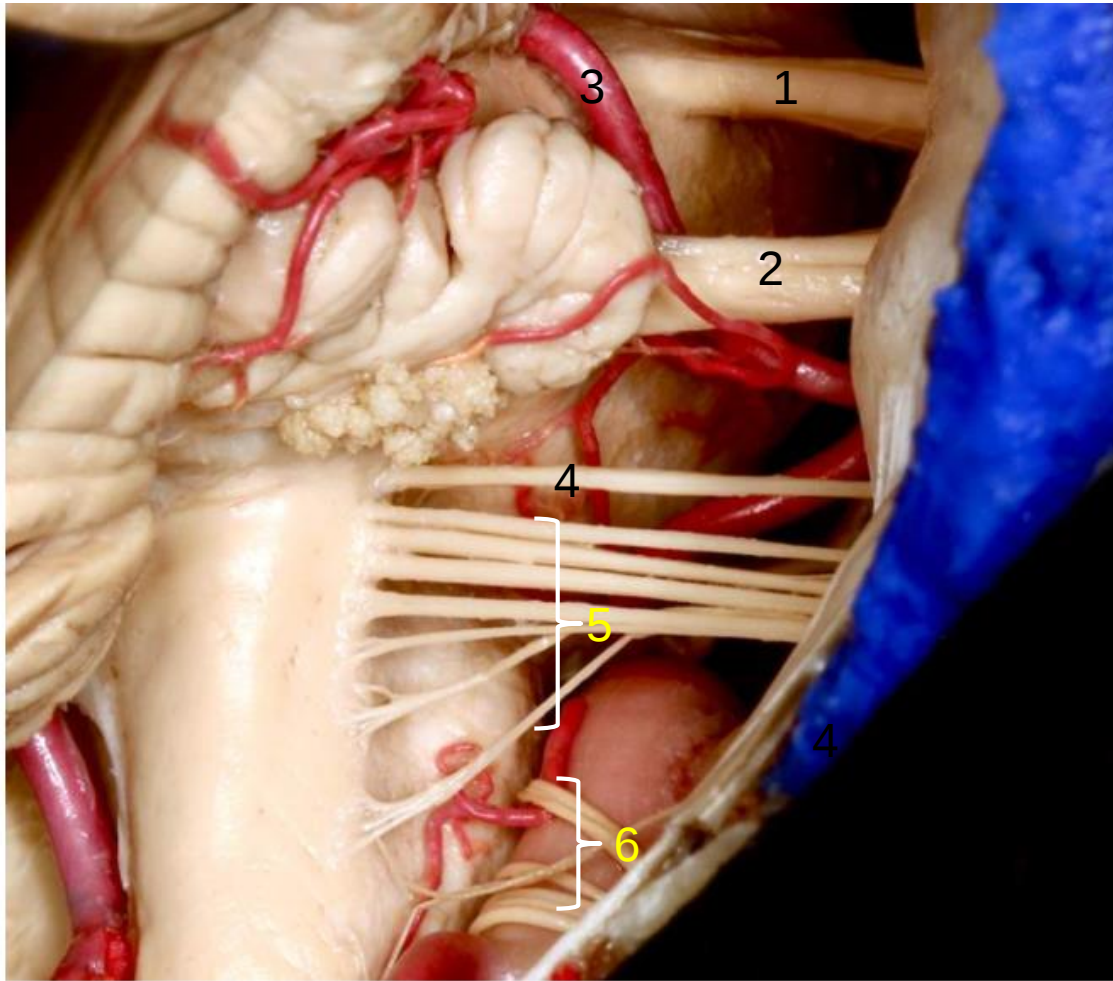
Vestibulocochlear nerve 前庭蜗神经



Vestibulocochlear n. 前庭蜗神经



Magnified view of R.cerebellopontine angle

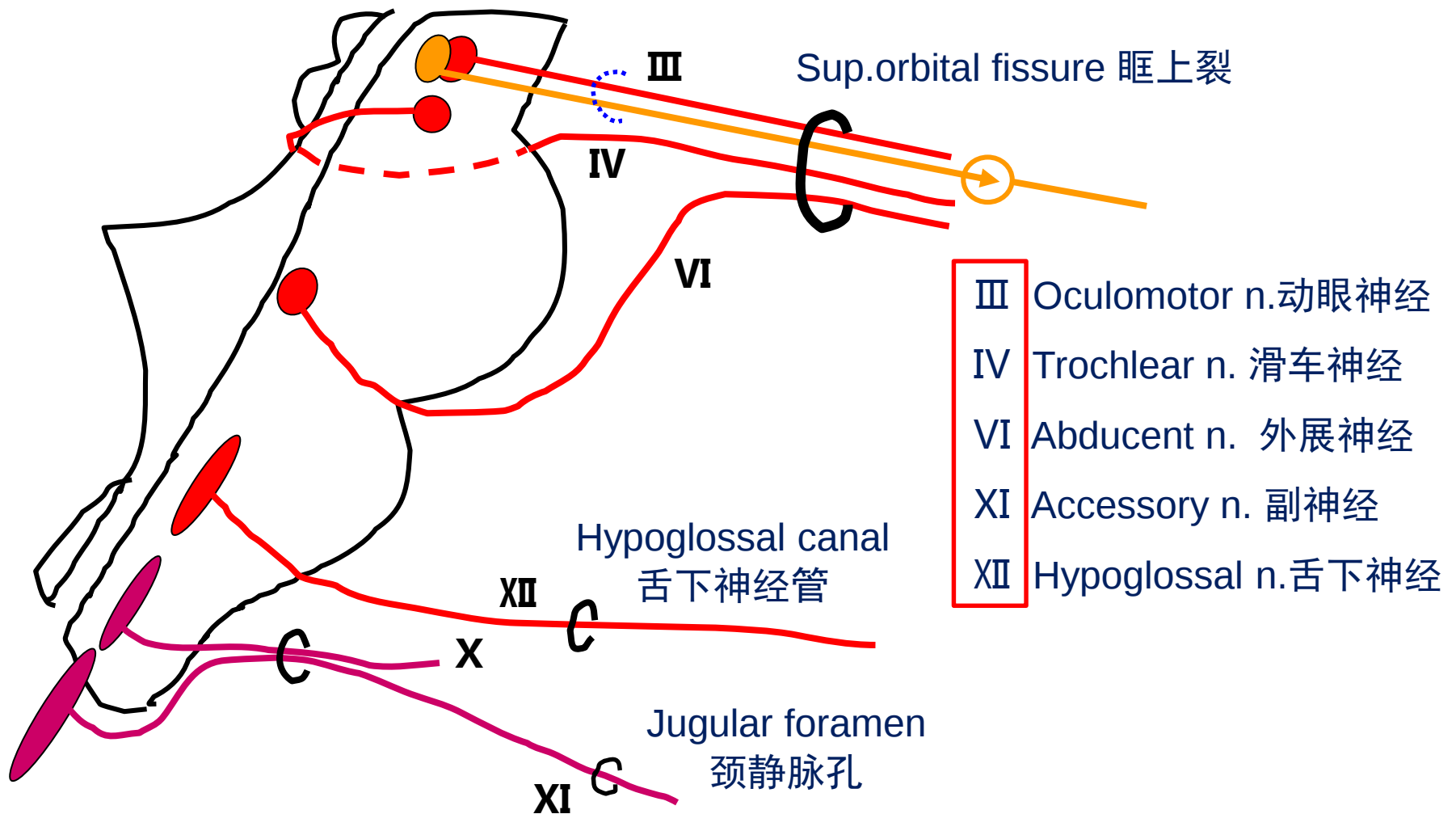


1. 三叉神经
2. 前庭蜗神经
3. 小脑下前动脉
4. 舌咽神经
5. 迷走神经
6. 舌下神经

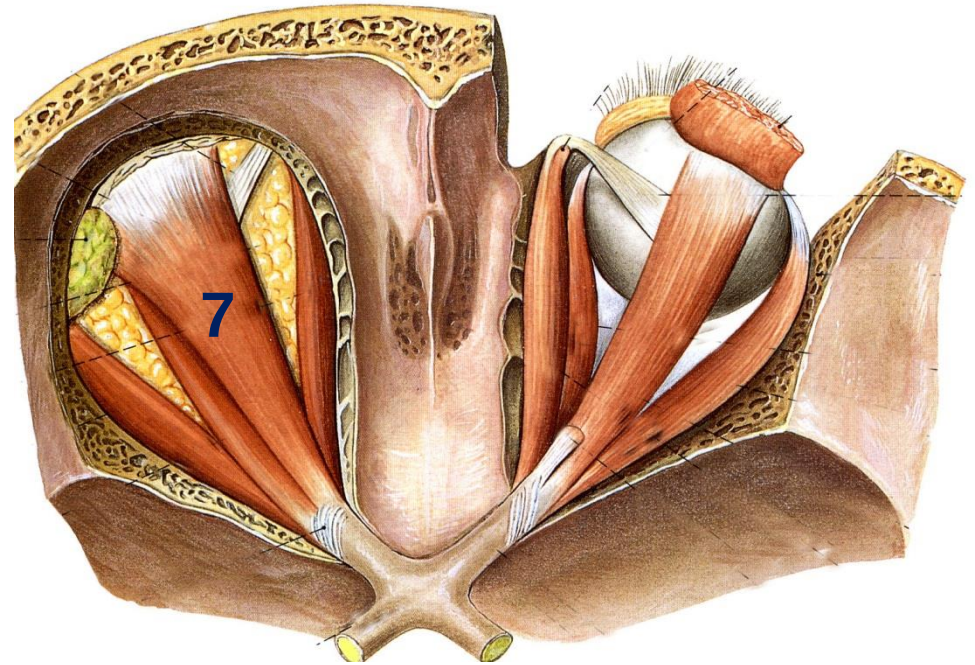
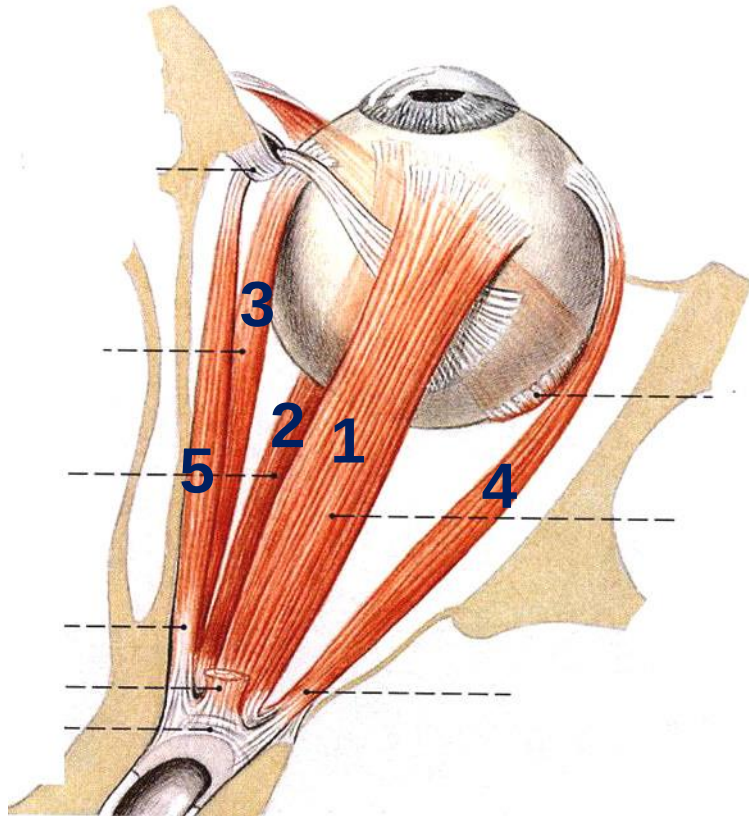
Sensory cranial nerves - summary

N.	Location of cell body and axon categories 神经细胞体部位	Cranial exit 入颅部位	Terminal nuclei 终核	Main action 功能
I	Olfactory cells (SVA) 嗅细胞	Cribriform foramina	Olfactory bulb 嗅球	Smell 嗅觉
II	Ganglion cells (SSA) 神经节细胞	Optic canal 视神经管	Lat. geniculate body 外侧膝状体	Vision 视觉
VIII	Vestibular ganglion (SSA) 前庭神经节	Internal acoustic meatus 内耳门	Vestibular nuclei 前庭神经核	Equilibrium 平衡
	Cochlear ganglion (SSA) 蜗神经节		Cochlear nuclei 蜗神经核	Hearing 听觉

Motor cranial nerves 运动性脑神经

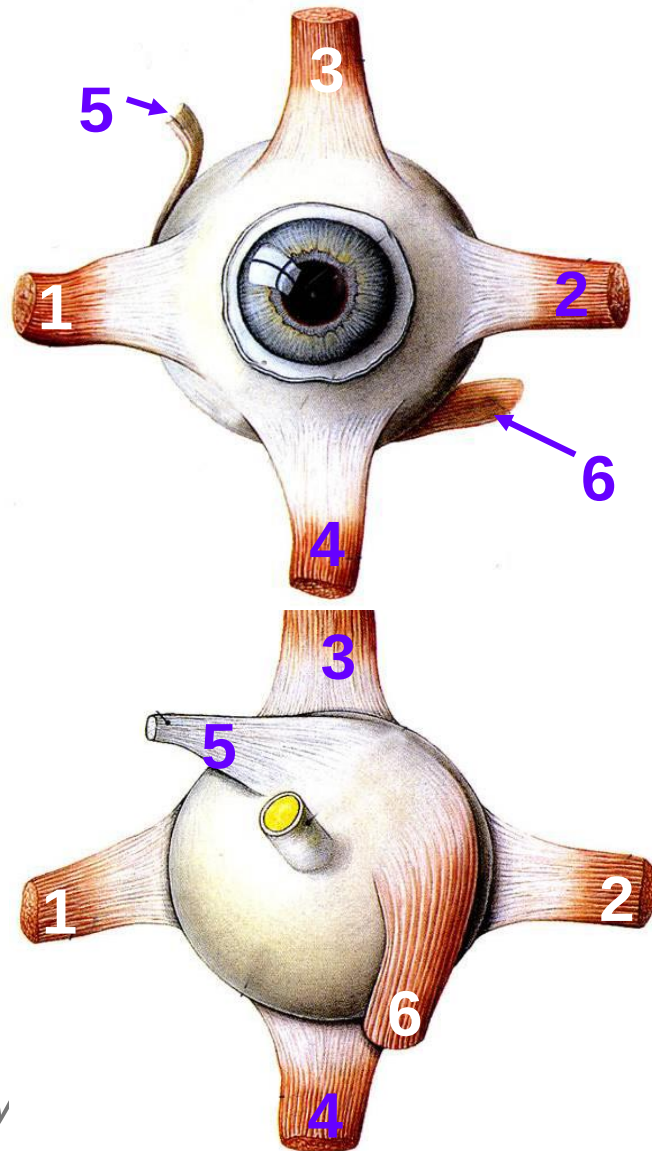


Review of extraocular muscles 眼外肌

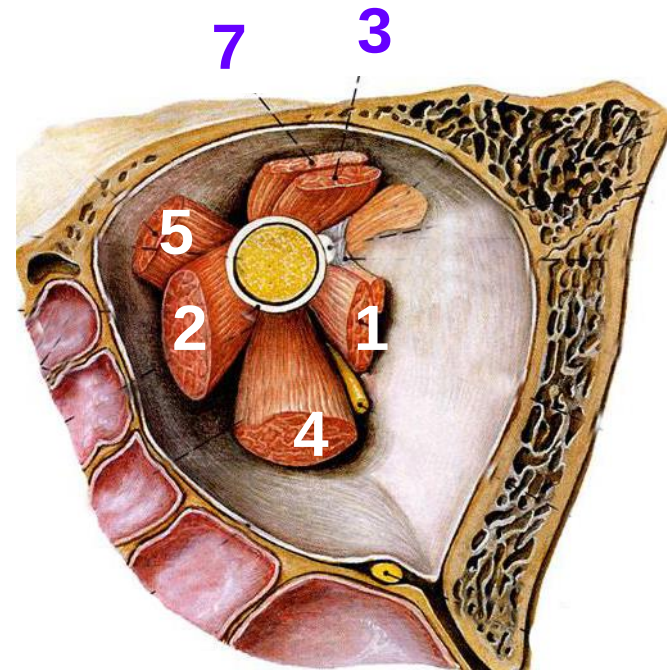


- 1 - Superior rectus 上直肌
- 2 - Inferior rectus 下直肌
- 3 - Medial rectus 内直肌
- 4 - Lateral rectus 外直肌
- 5 - Superior obliquus 上斜肌
- 6 - Inferior obliquus 下斜肌
- 7 - levator palpebrae superioris 提上睑肌

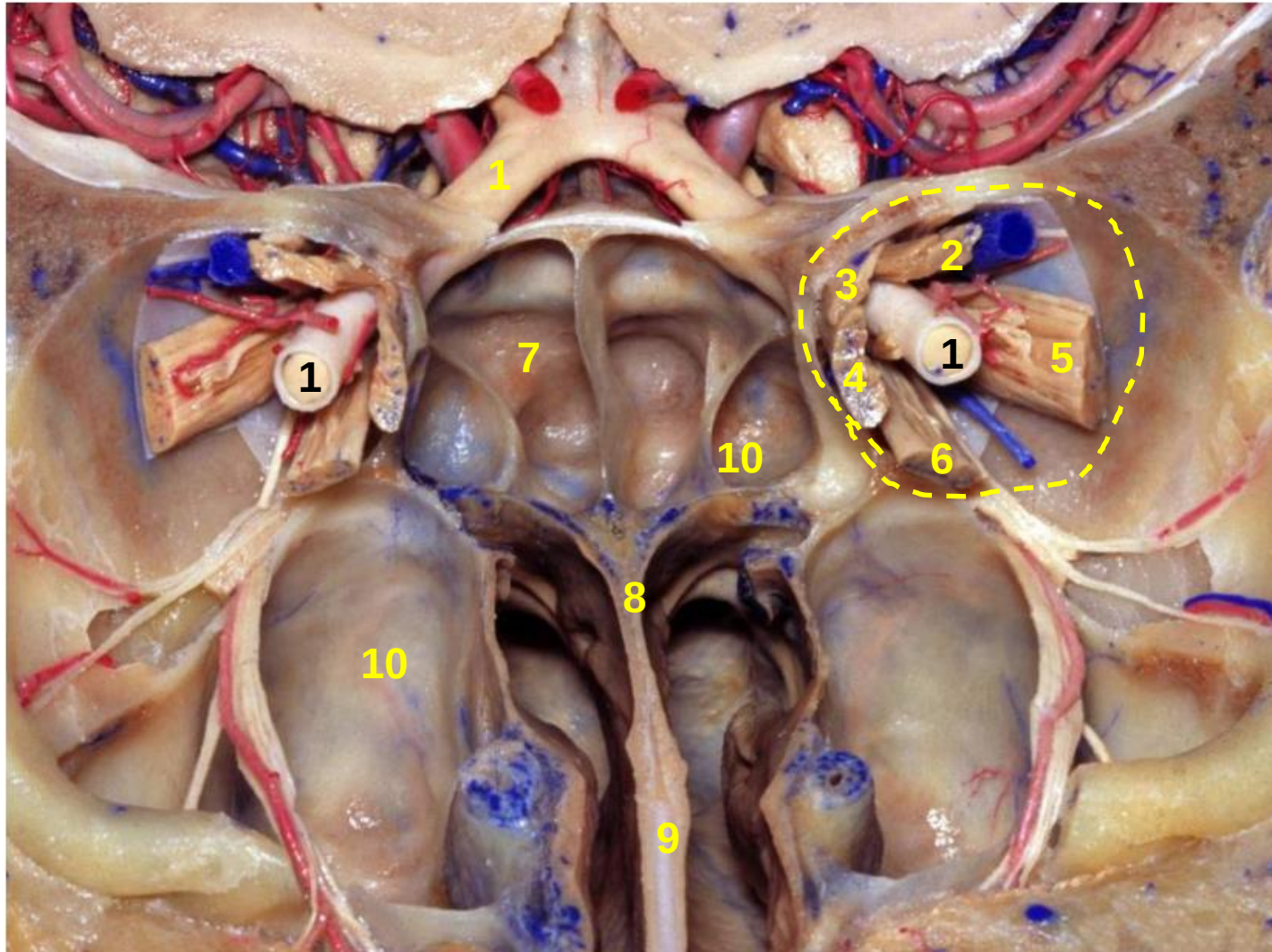
Review of extraocular muscles 眼外肌



- 1 - Medial rectus
- 2 - Lateral rectus
- 3 - Superior rectus
- 4 - Inferior rectus
- 5 - Superior obliquus
- 6 - Inferior obliquus
- 7 - levator palpebrae superioris



Anterior perspective of the orbital apex



1. 视神经
2. 上睑提肌与
上直肌
3. 上斜肌
4. 内直肌
5. 外直肌
6. 下直肌
7. 蝶窦
8. 筛骨垂直板
9. 犁骨
10. 上颌窦

Oculomotor nerve 动眼神经

◆ Components

一般躯体运动纤维(GSEF) – 5 extraocular mm.

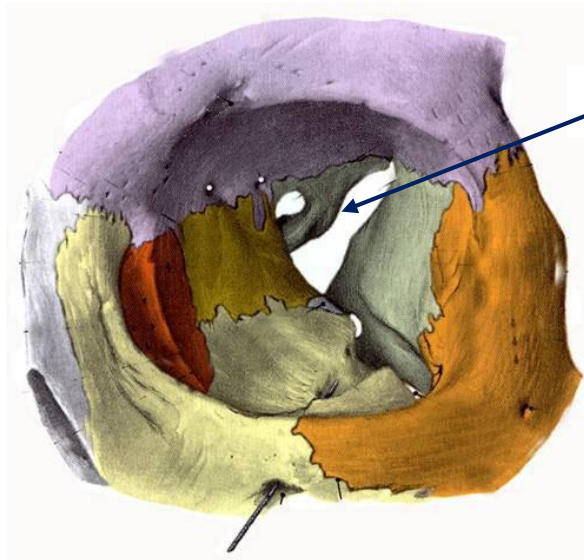
一般内脏运动纤维(GVEF) - smooth muscles

◆ Main action – supplies

Sup. Inf. & medial recti; inf. obliquus; levator palpebrae superioris 5/7

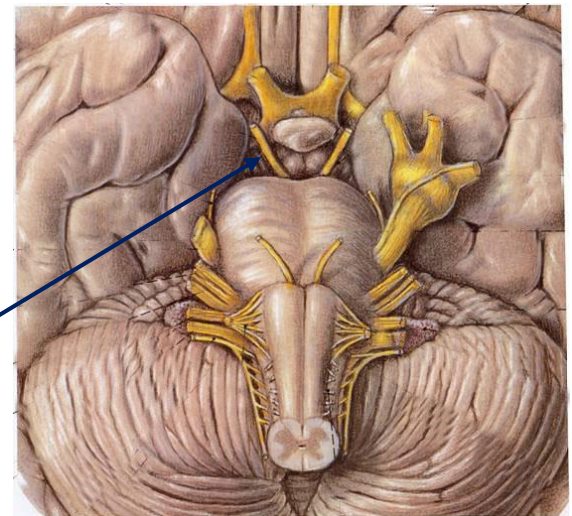
Sphincter pupillea and ciliary muscle 瞳孔括约肌

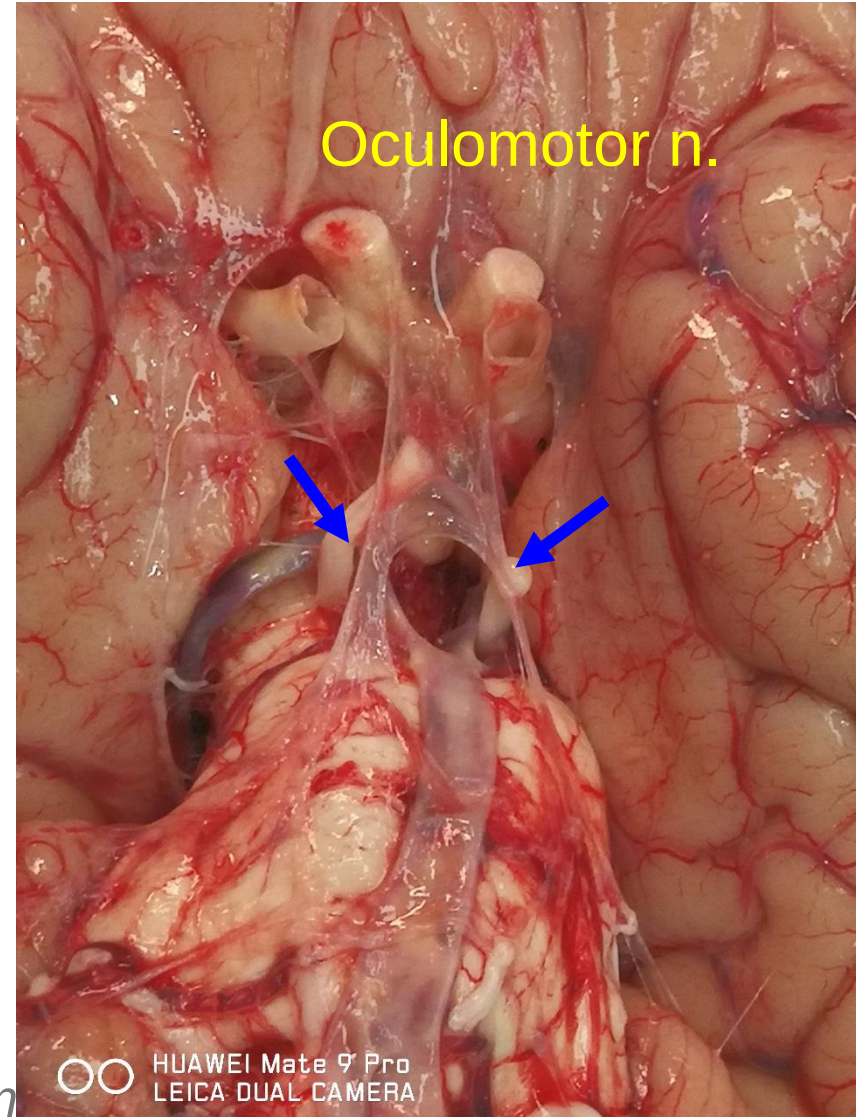
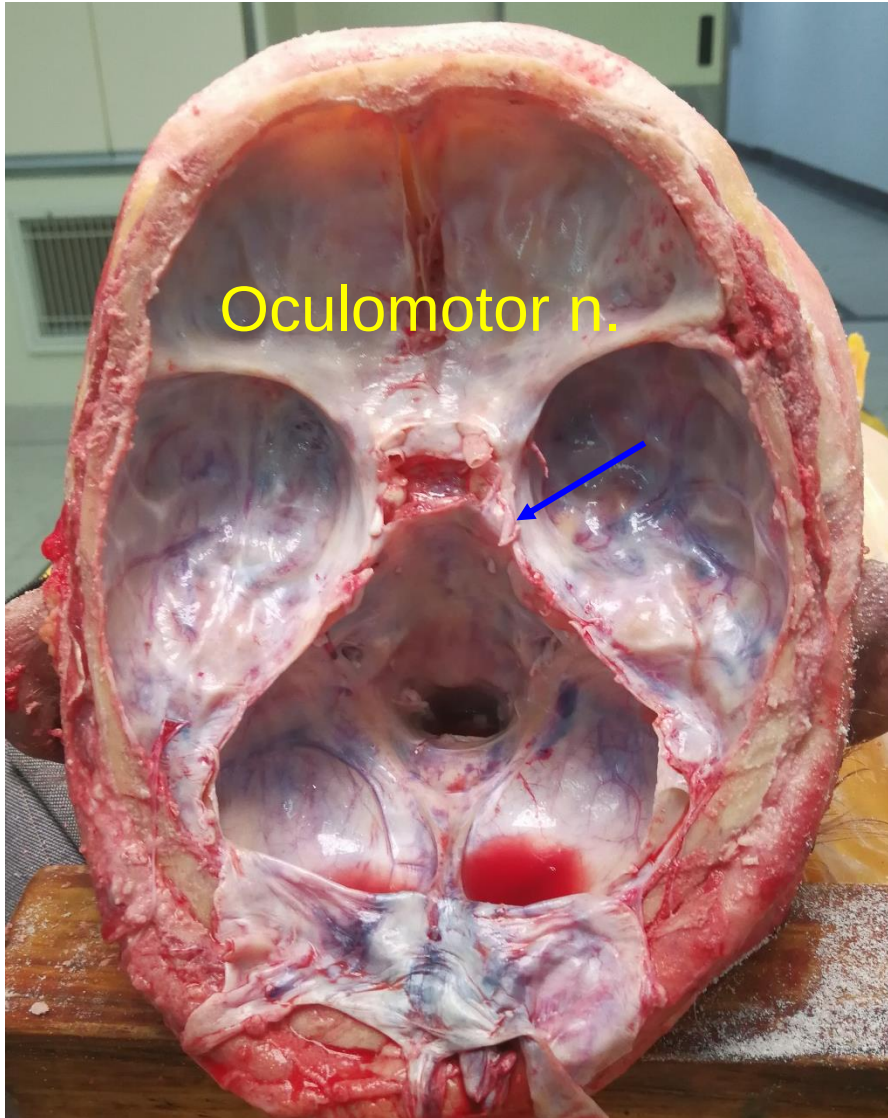
◆ Ciliary ganglion 睫状神经节: lies between optic nerve and lat. rectus



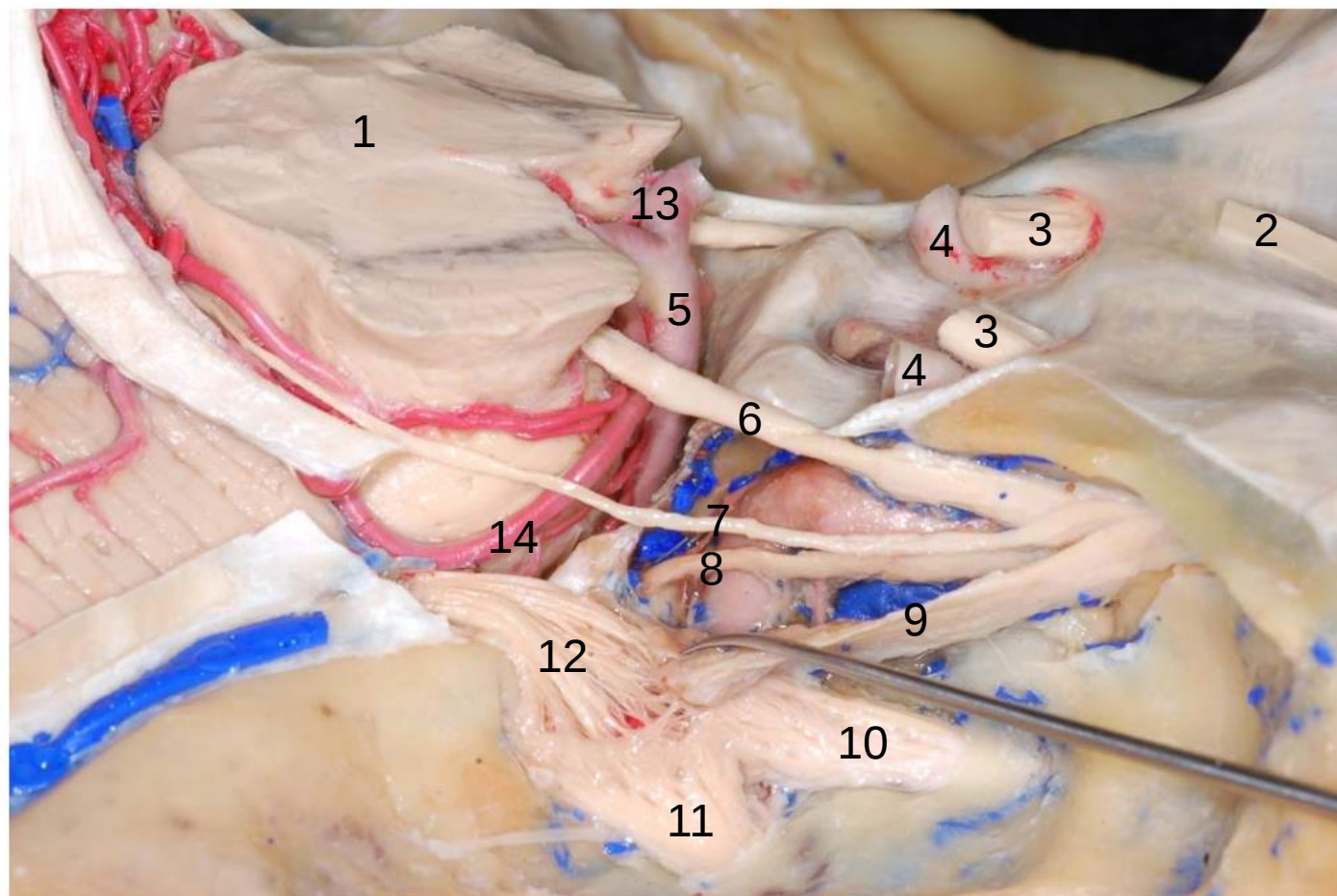
Supraorbital
fissure 眶上裂

Oculomotor n.
动眼神经

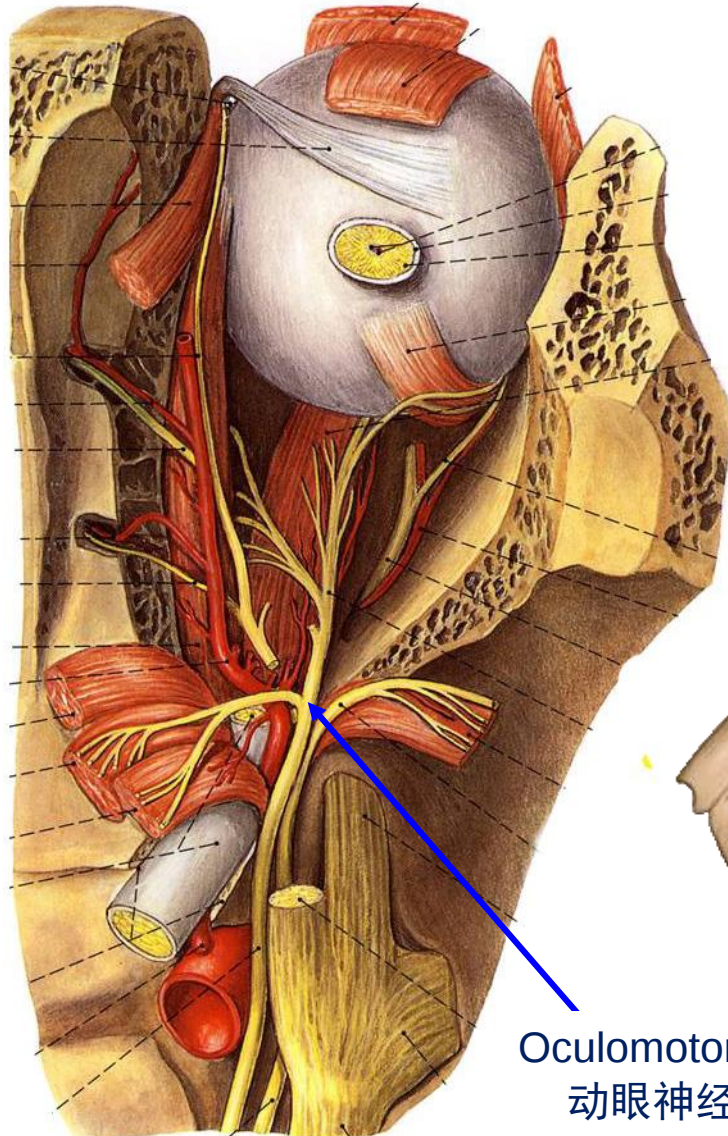




海绵窦的侧壁，中脑，颅中窝底与鞍结构

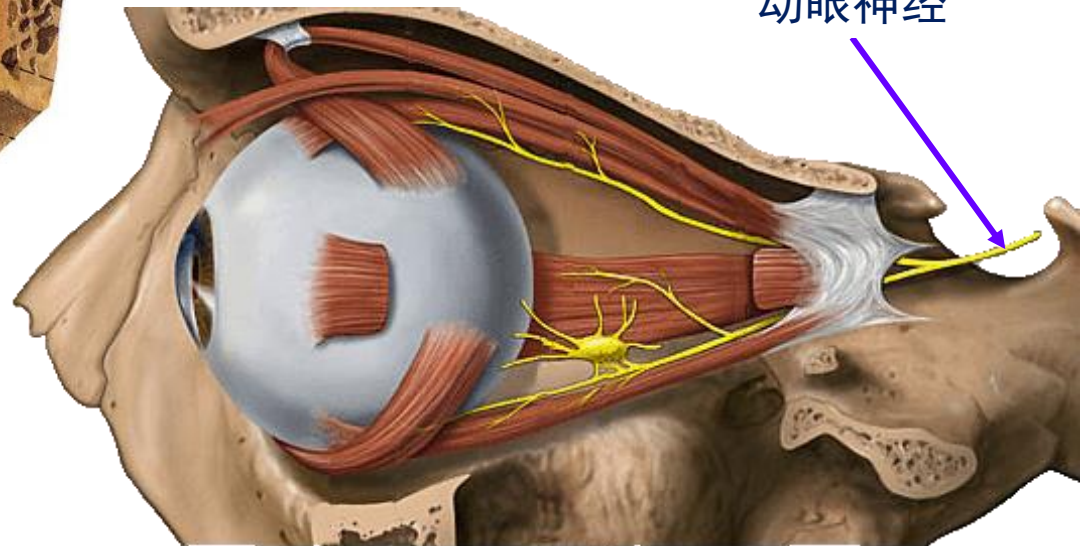


1. 中脑
2. 嗅束
3. 视神经
4. 颈内动脉
5. 基底动脉
6. 动眼神经
7. 滑车神经
8. 外展神经
9. 眼神经
10. 上颌神经
11. 下颌神经
12. 三叉神经节

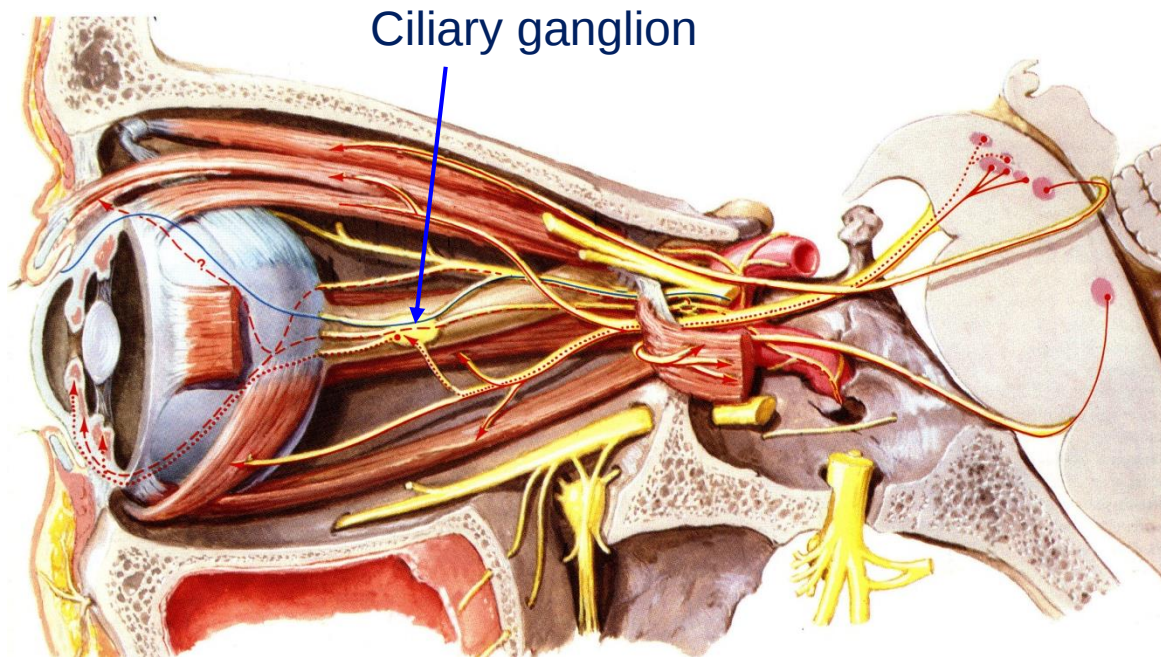


Oculomotor n.
动眼神经

上支：小，支配上直肌与上睑提肌
下支：大，支配下直肌，下斜肌，内直肌。



Oculomotor n.
动眼神经



感觉：三叉神经

交感：颈动脉丛

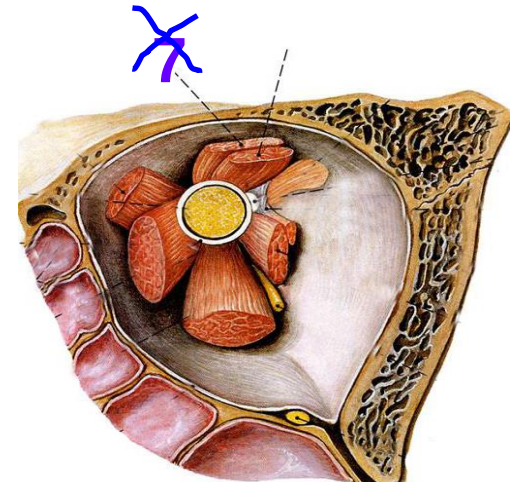
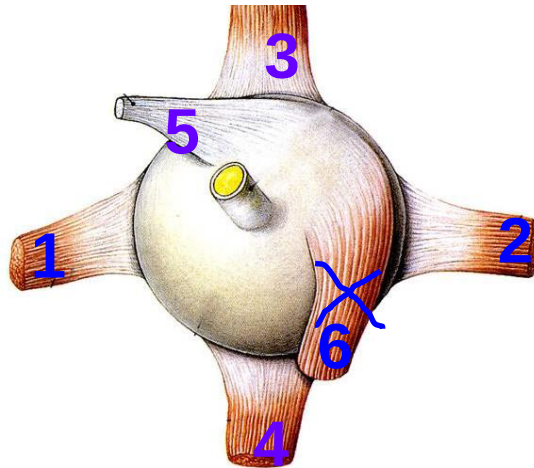
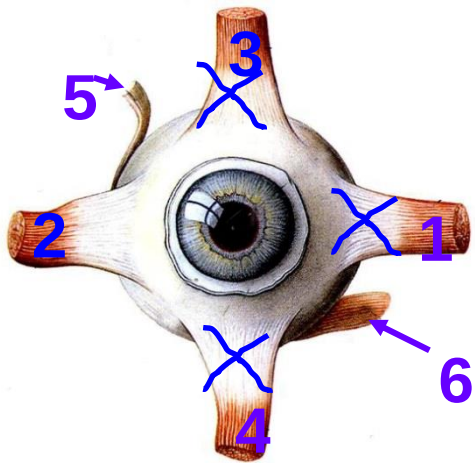
副交感：动眼神经副核

- ◆ Ellipse size, be parasympathetic 副交感性质
- ◆ Situated between optic n. & lateral rectus 位于视神经与外直肌之间
- ◆ 3 component: sensory, sympathetic & parasympathetic 感觉，交感，副交感
- ◆ 6-10 short ciliary n. in the front part, enter the eyeball via around optic n.
- ◆ 睫状短神经，通过视神经进入眼球

Oculomotor nerve injury-symptom 损伤后表现

- 1 – 内直肌 Medial rectus
- 2 – 外直肌 Lateral rectus
- 3 – 上直肌 Superior rectus
- 4 – 下直肌 Inferior rectus
- 5 – 上斜肌 Superior obliquus
- 6 – 下斜肌 Inferior obliquus
- 7 – 提上睑肌 levator palpebrae superioris

- 1. Look sideways laterally 外斜视
- 2. Don't look superior laterally 不能向上外看
- 3. Dilated pupil 瞳孔散大
- 4. Double vision 复视
- 5. Ptosis 眼睑下垂
- 6. Light reflex disappear 对光反射消失





右侧动眼神经损伤出现**外斜视**-内直肌瘫痪所致后，
外直肌牵拉所致（内直肌与外直肌的平衡被打破）。

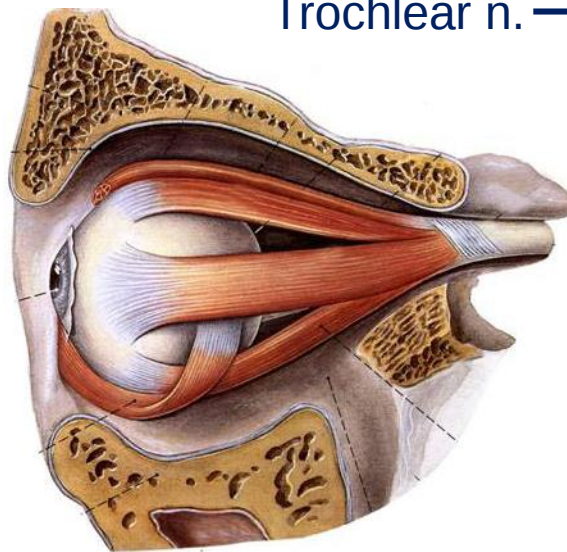
Component 成分: 一般躯体运动纤维-GSEF

Connect 连接脑部位: midbrain 中脑

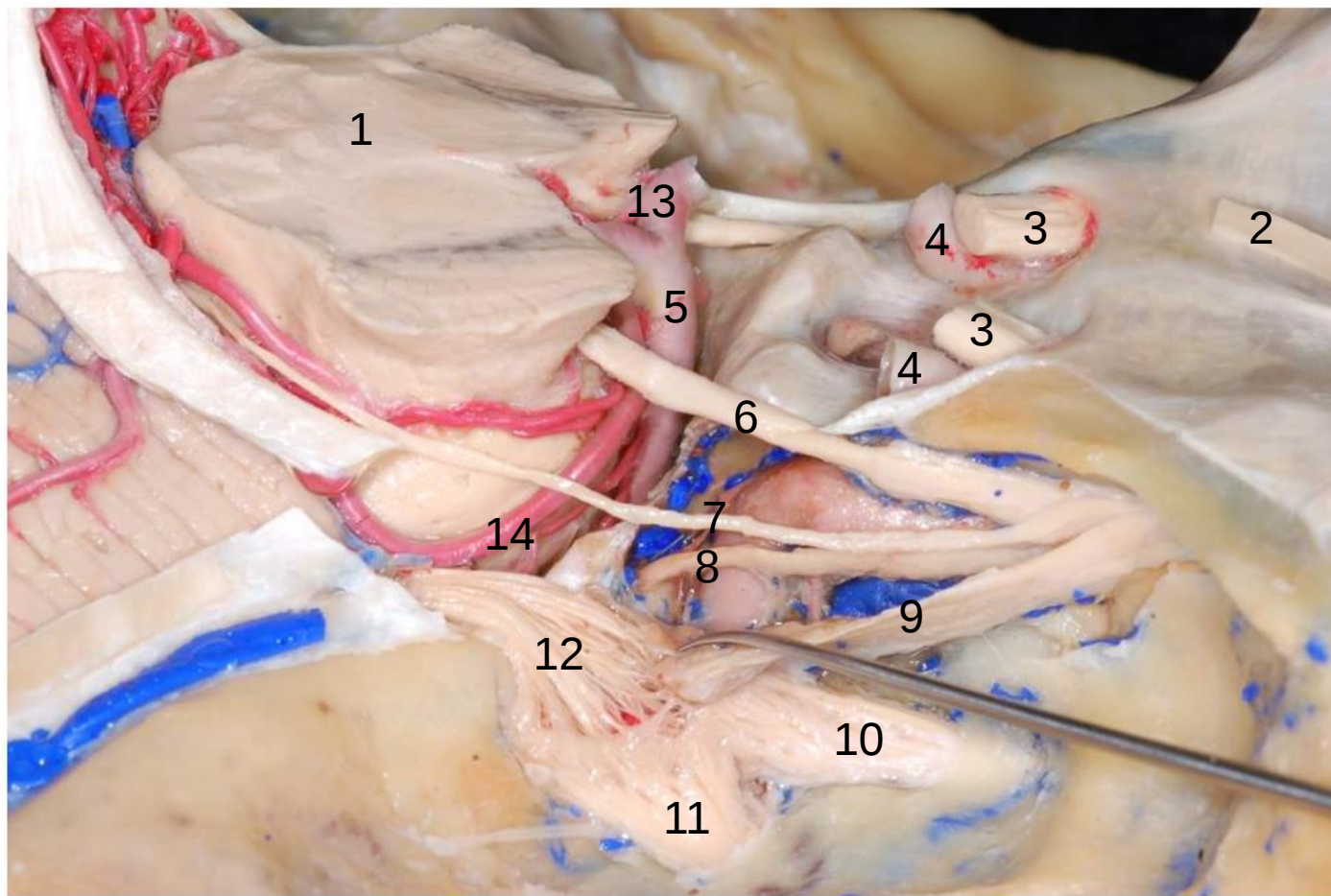
Opening : sup. orbital fissure 眶上裂

Distribution : superior obliquus 上斜肌

Clinic : muscles paralysis 肌肉瘫痪



海绵窦的侧壁，中脑，颅中窝底与鞍结构



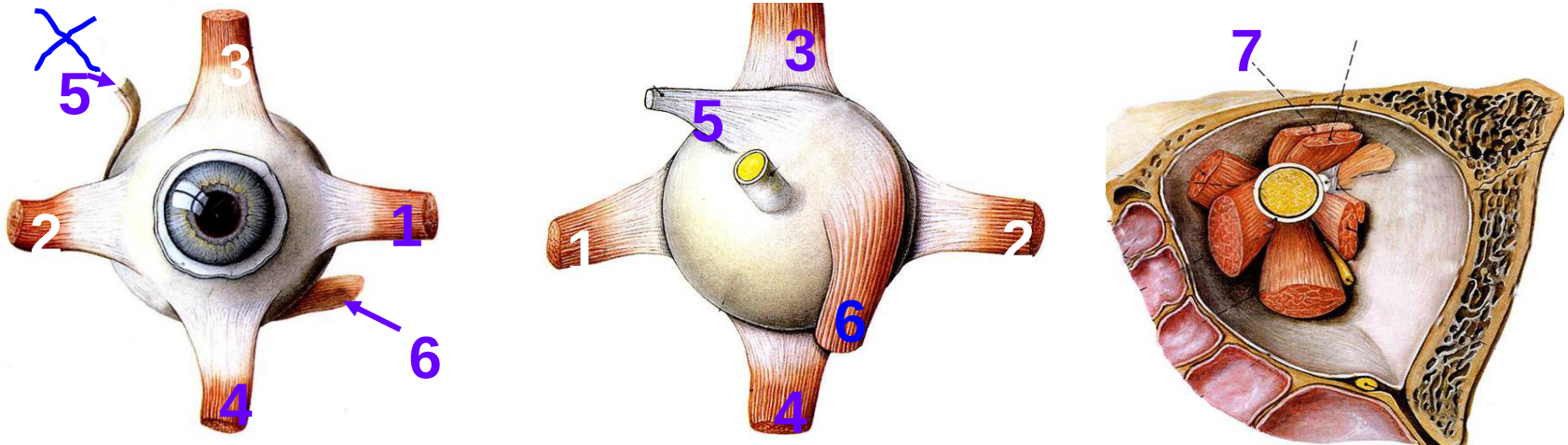
1. 中脑
2. 嗅束
3. 视神经
4. 颈内动脉
5. 基底动脉
6. 动眼神经
7. 滑车神经
8. 外展神经
9. 眼神经
10. 上颌神经
11. 下颌神经
12. 三叉神经节
13. 大脑后动脉
14. 小脑上动脉

Trochlear nerve injury – symptom 损伤后表现

- 1 - Medial rectus
- 2 - Lateral rectus
- 3 - Superior rectus
- 4 - Inferior rectus
- 5 - Superior obliquus 上斜肌
- 6 - Inferior obliquus
- 7 - levator palpebrae superioris

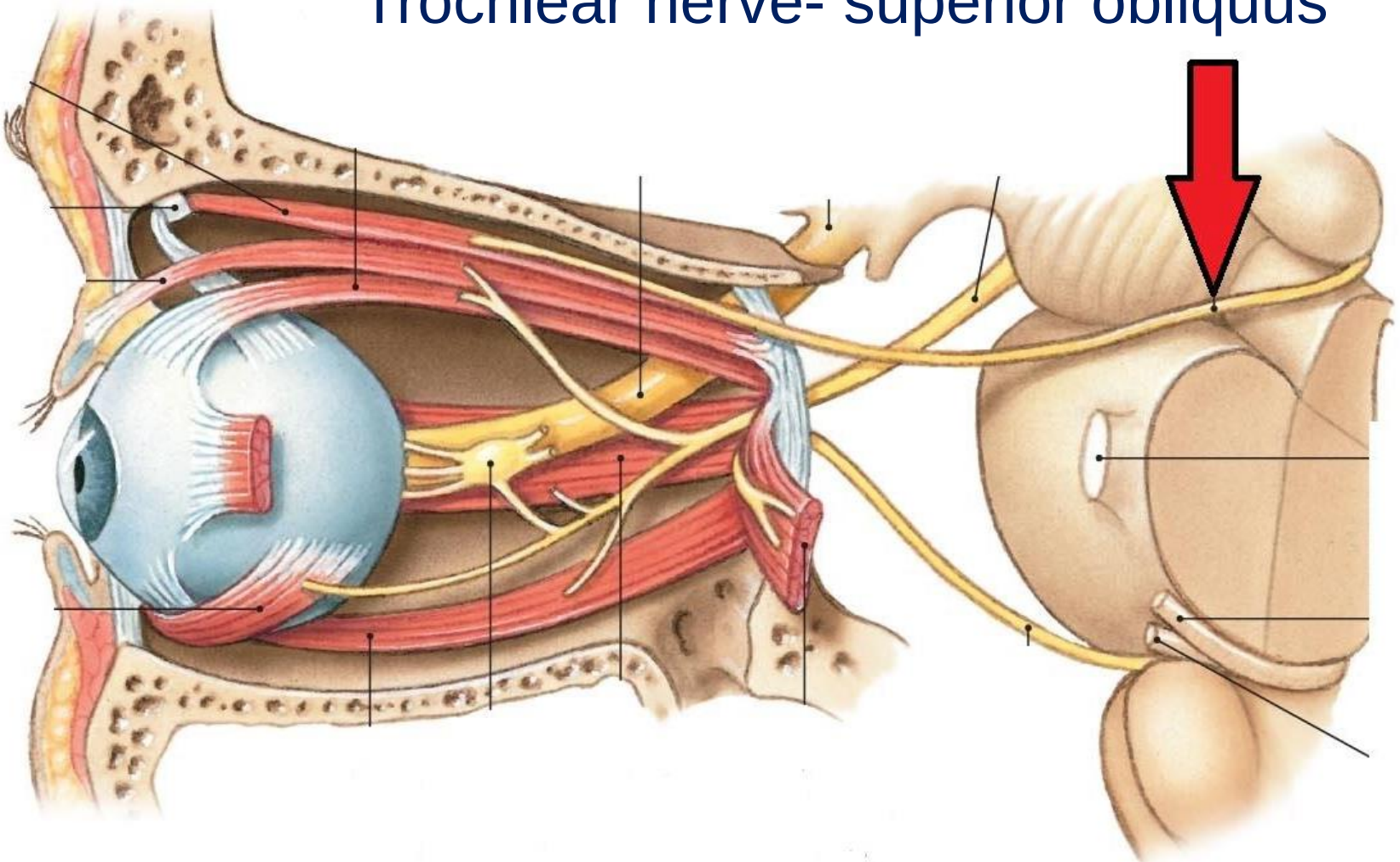
Don't look inferior laterally

眼不能向外下看



Trochlear nerve injury – symptom 损伤后表现

Trochlear nerve- superior obliquus



Abducent nerve 外展神经

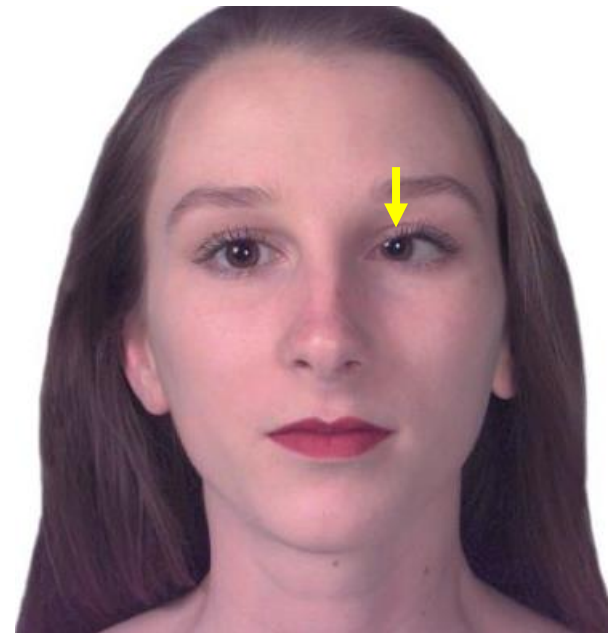
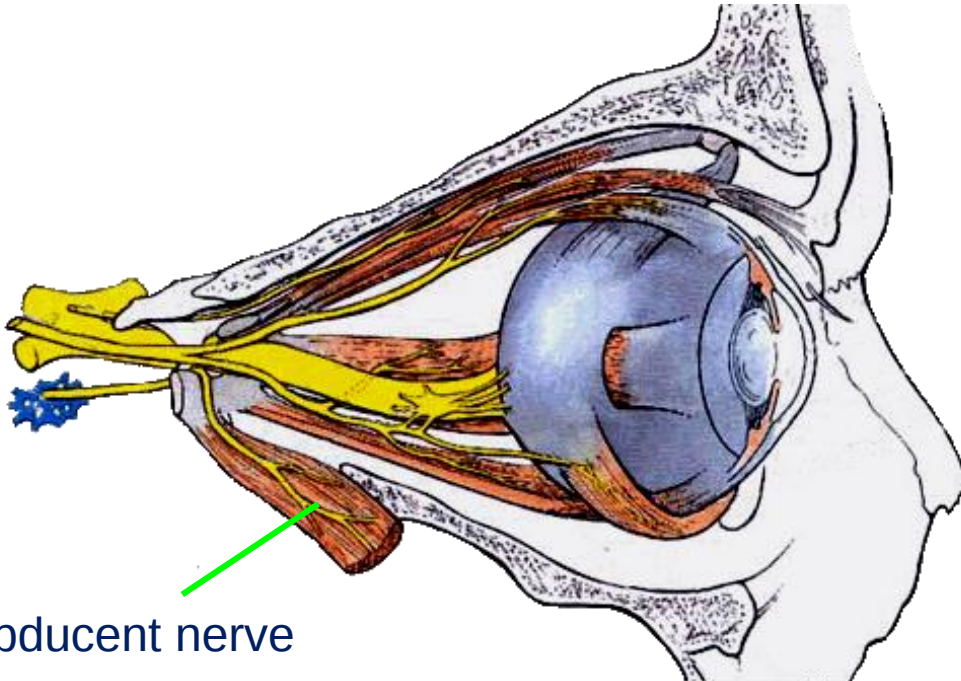
Component : 一般躯体运动纤维-GSEF

Connect : bulbopontine sulcus 脑桥延髓沟

Opening : sup. orbital fissure 眶上裂

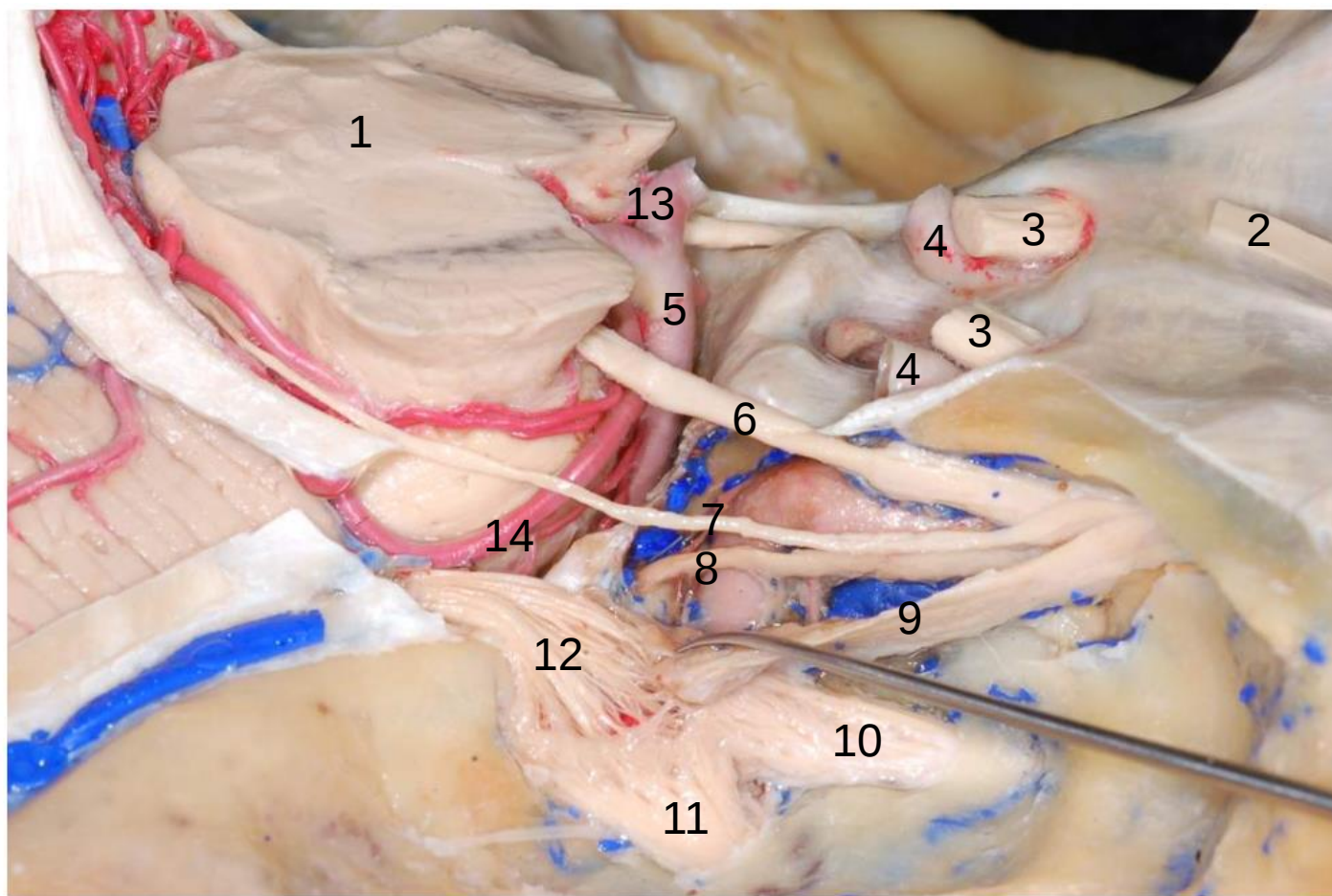
Distribution : lateral rectus 外直肌

Clinic : muscles paralysis 肌瘫痪



Left abducent nerve injury

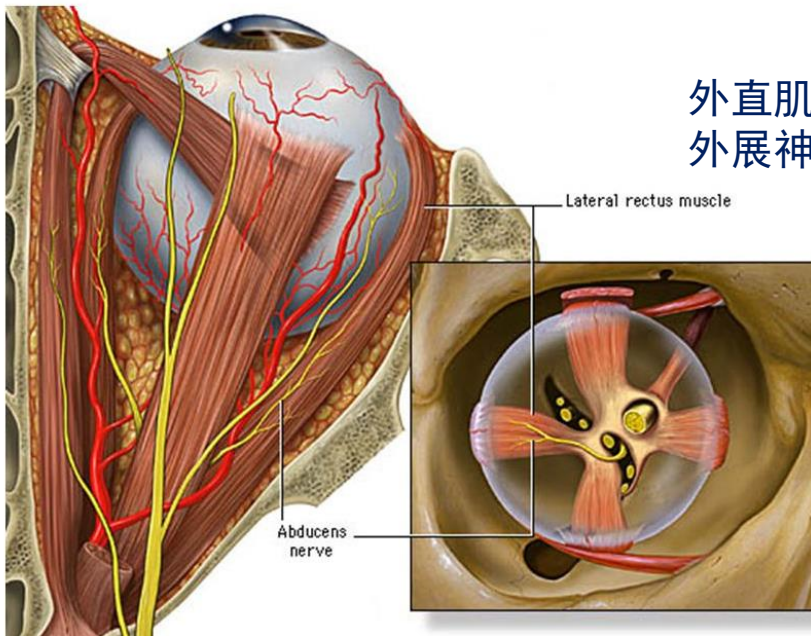
海绵窦的侧壁，中脑，颅中窝底与鞍结构



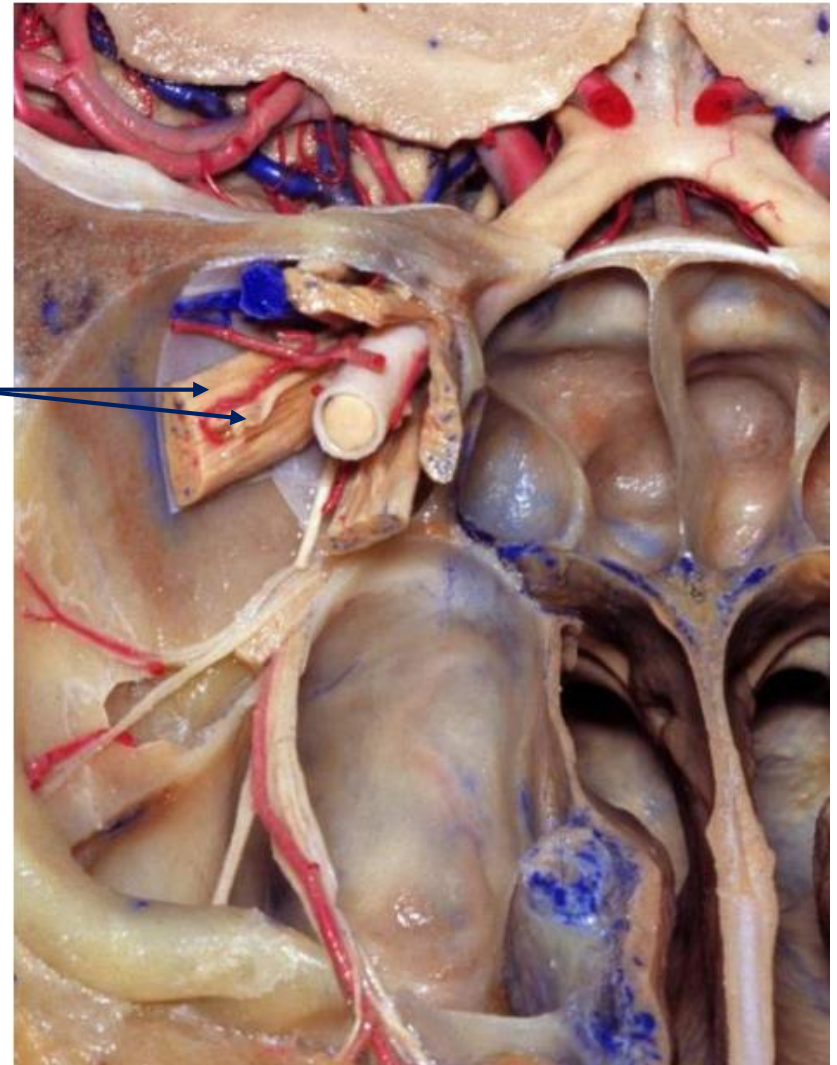
1. 中脑
2. 嗅束
3. 视神经
4. 颈内动脉
5. 基底动脉
6. 动眼神经
7. 滑车神经
8. 外展神经
9. 眼神经
10. 上颌神经
11. 下颌神经
12. 三叉神经节

Abducent nerve 外展神经

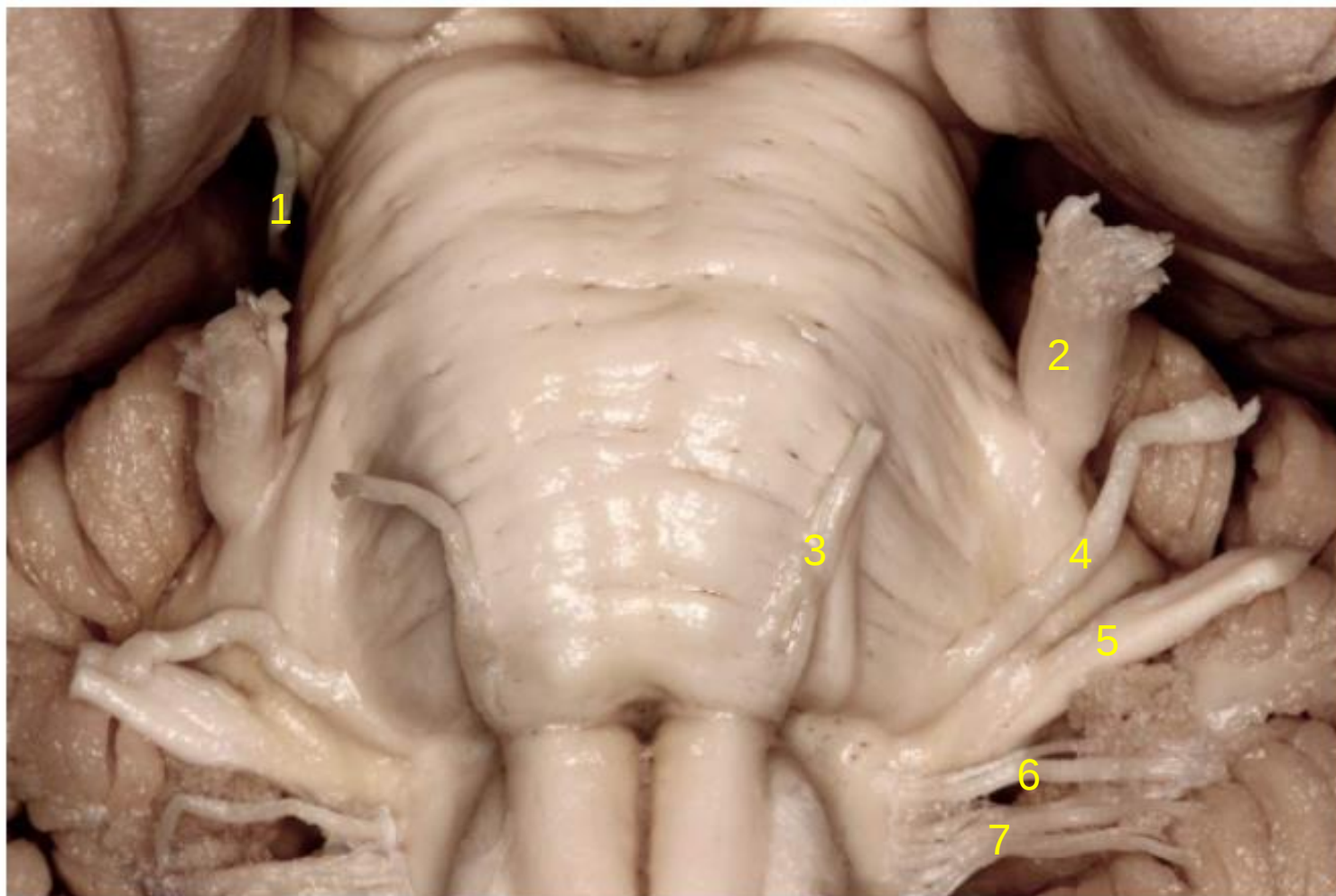
Abducens nerve



外直肌与
外展神经



脑桥与延髓上面前面观（脑神经）

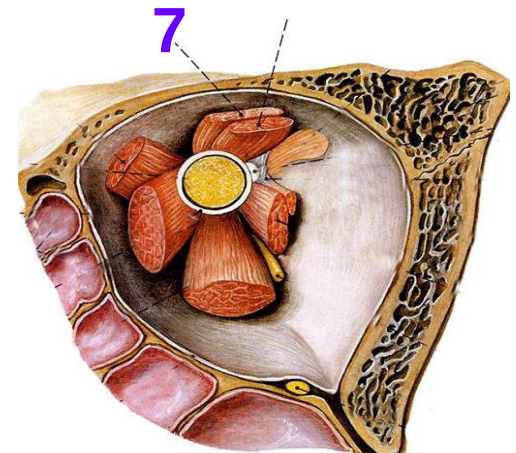
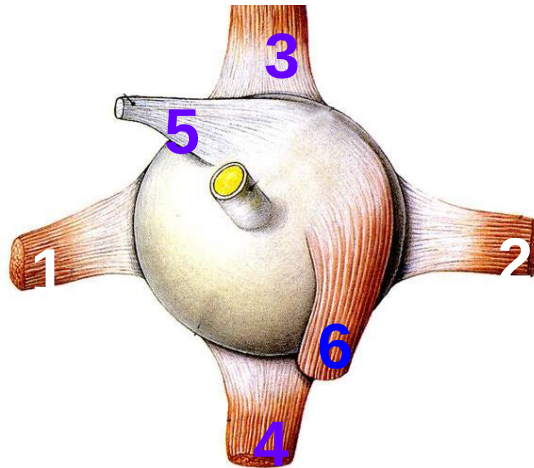
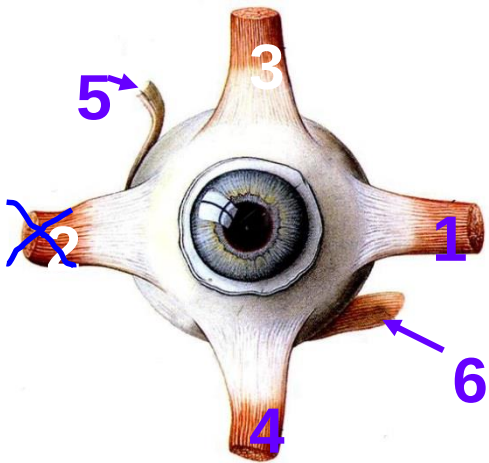


1. 滑车神经
2. 三叉神经
3. 展神经
4. 面神经
5. 前庭蜗神经
6. 舌咽神经
7. 迷走神经

Abducent nerve injury – symptom 损伤后症状

- 1 - Medial rectus
- 2 - Lateral rectus
- 3 - Superior rectus
- 4 - Inferior rectus
- 5 - Superior oblique
- 6 - Inferior oblique
- 7 – levator palpebrae superioris

Look sideways **medially**



Accessory nerve 副神经

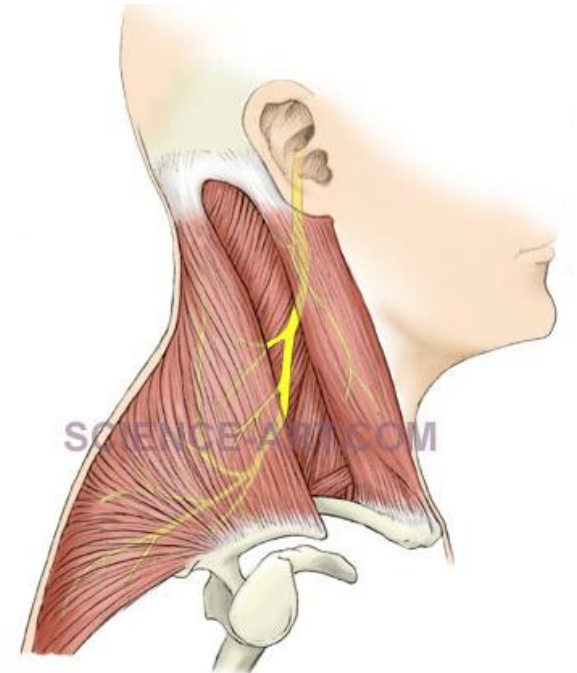
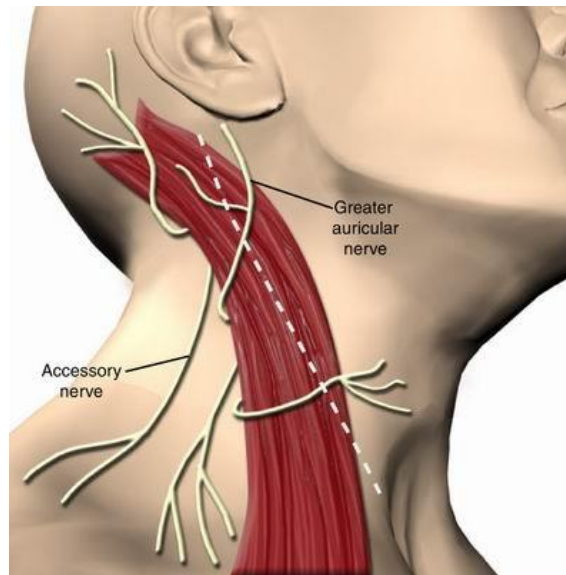
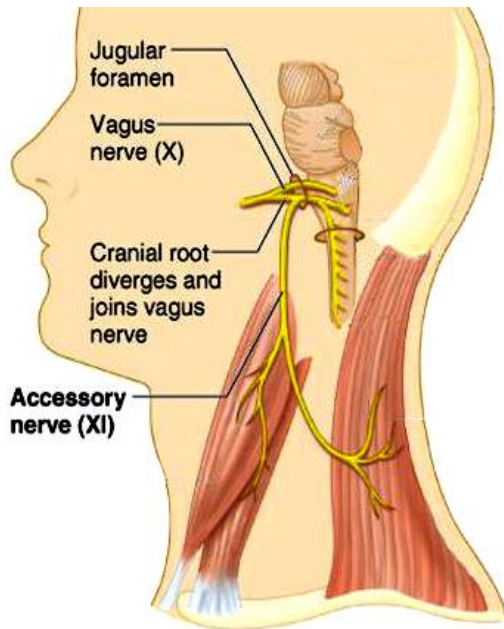
Component : 特殊内脏运动纤维-SVEF

Connect : medulla oblongata 延髓

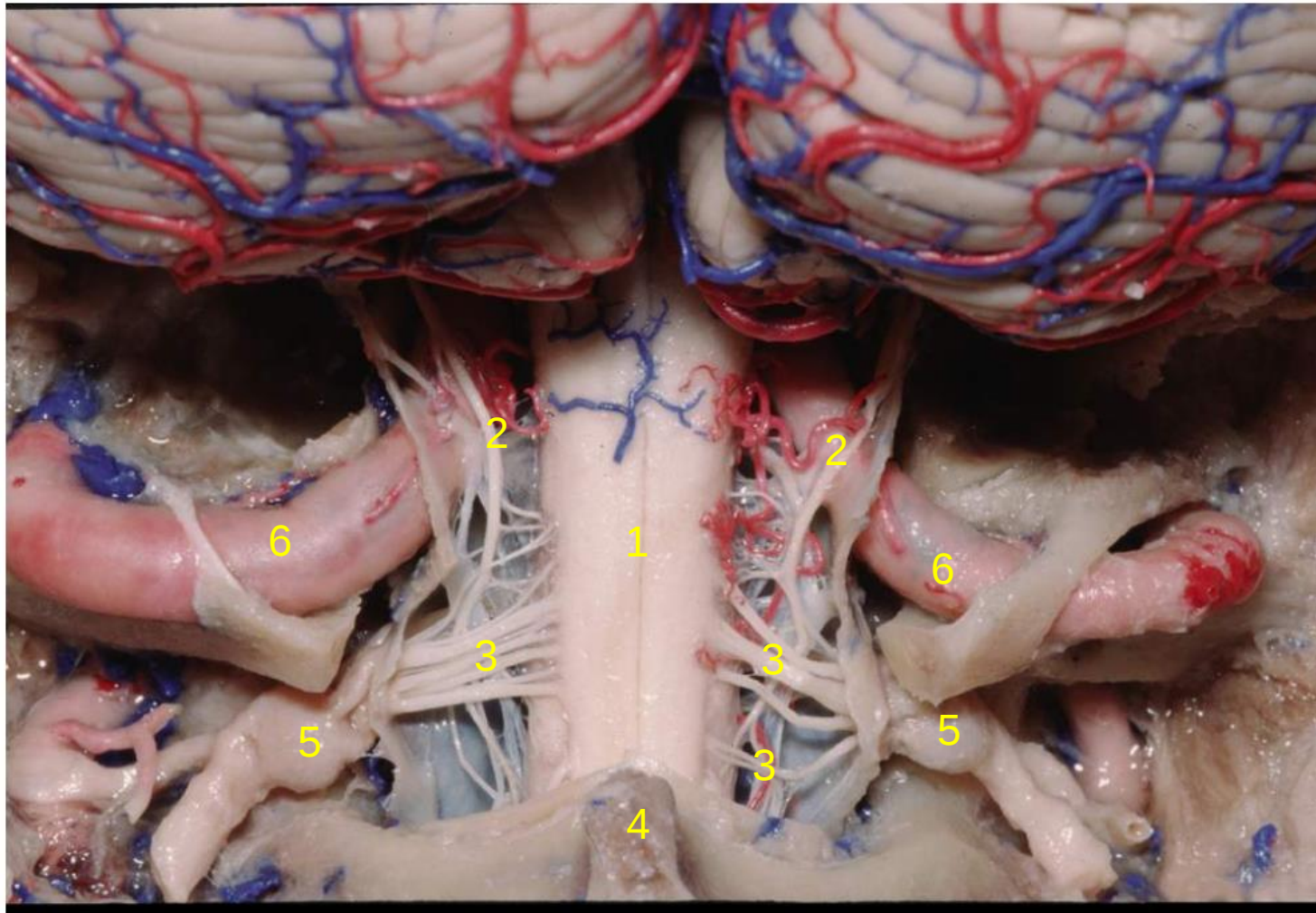
Opening : jugular foramen 颈静脉孔

Distribution : trapezius 斜方肌, sternocleidomastoid 胸锁乳突肌

Clinic : above muscle paralysis 肌肉瘫痪

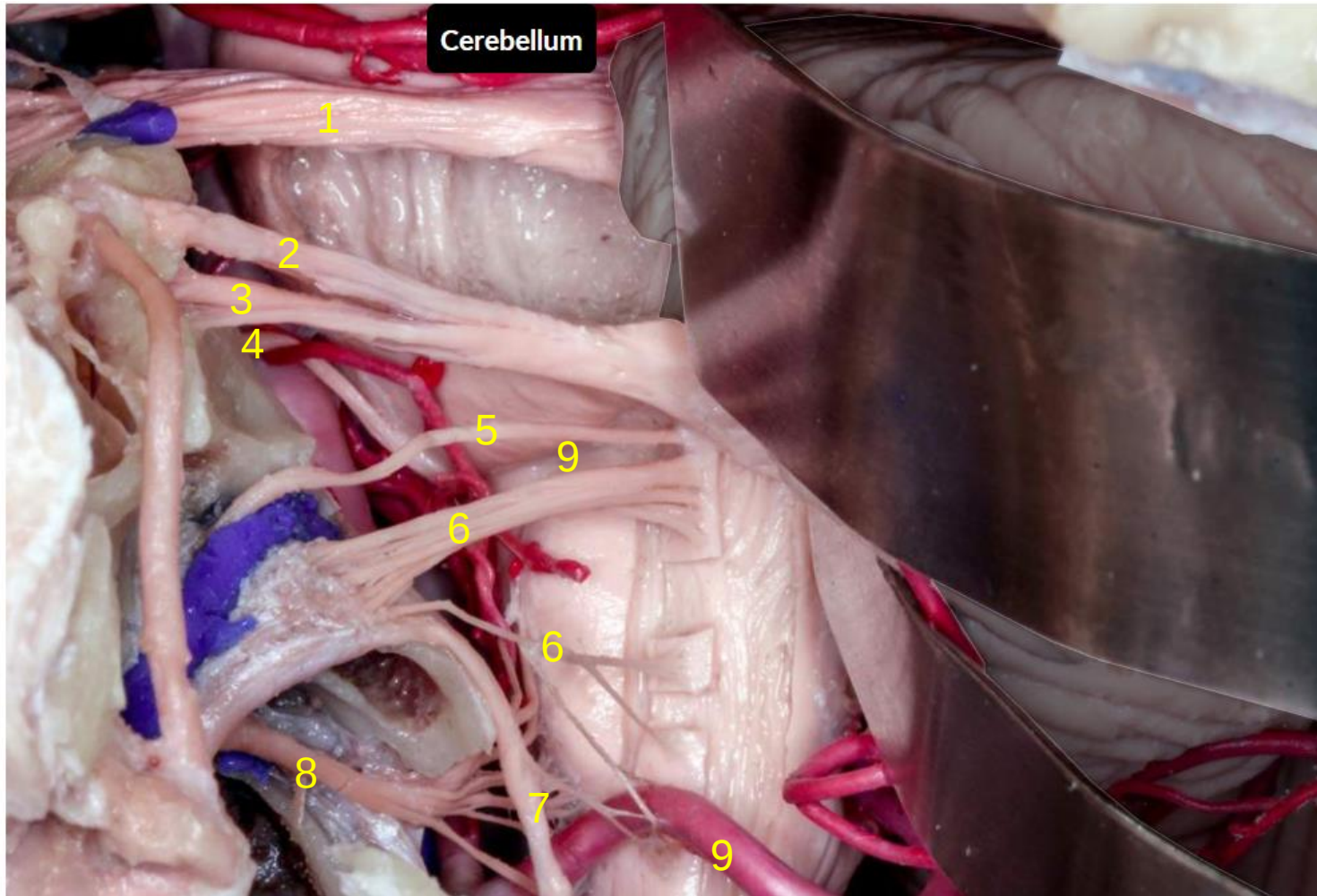


Post.view of spinal cord at foramen magnum



1. 脊髓后面
2. 副神经脊髓根
3. 脊神经背根
4. 棘突
5. 脊神经节
6. 椎动脉

Lateral surface of pone and medulla



1. 三叉神经
2. 面神经
3. 前庭蜗神经
4. 展神经
5. 舌咽神经
6. 迷走神经
7. 副神经脊髓根
8. 舌下神经
9. 小脑下后动脉

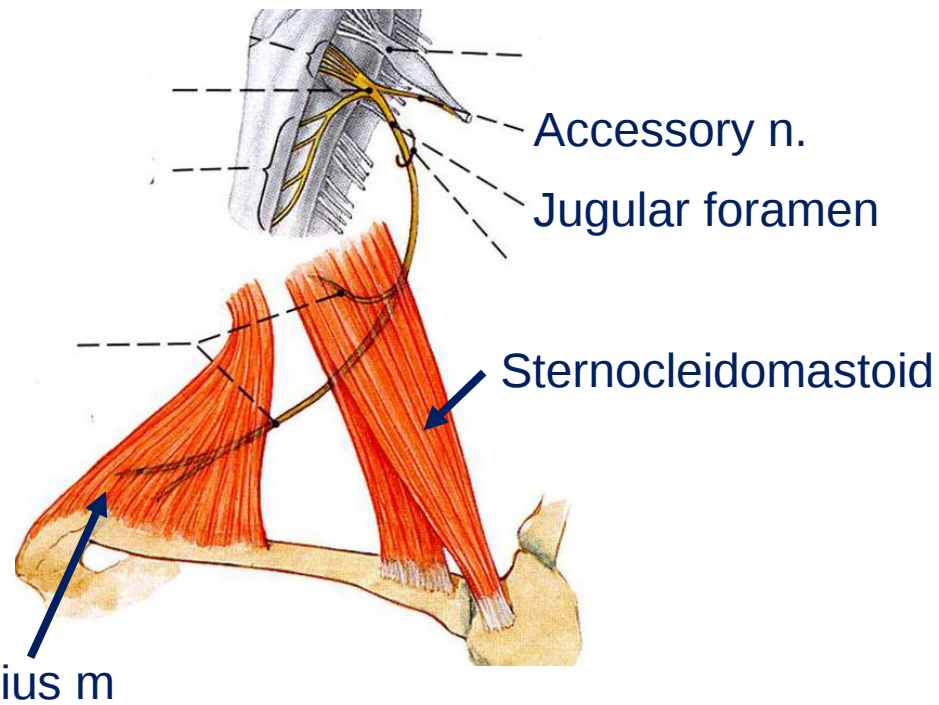
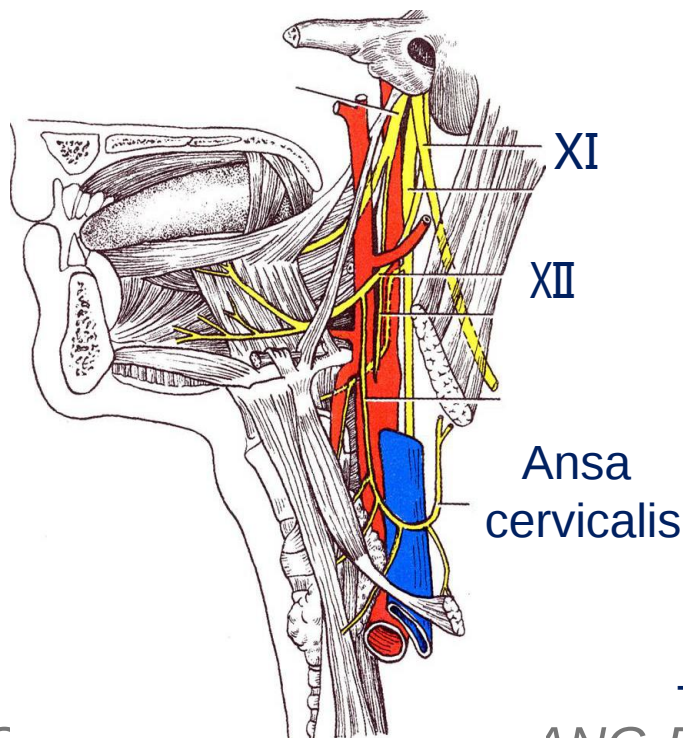
◆ Cranial roots 颅根

from nucleus ambiguus, Join the spinal roots to exit the jugular oramen, Join the vagus nerve & distribute to the muscles of pharynx & larynx

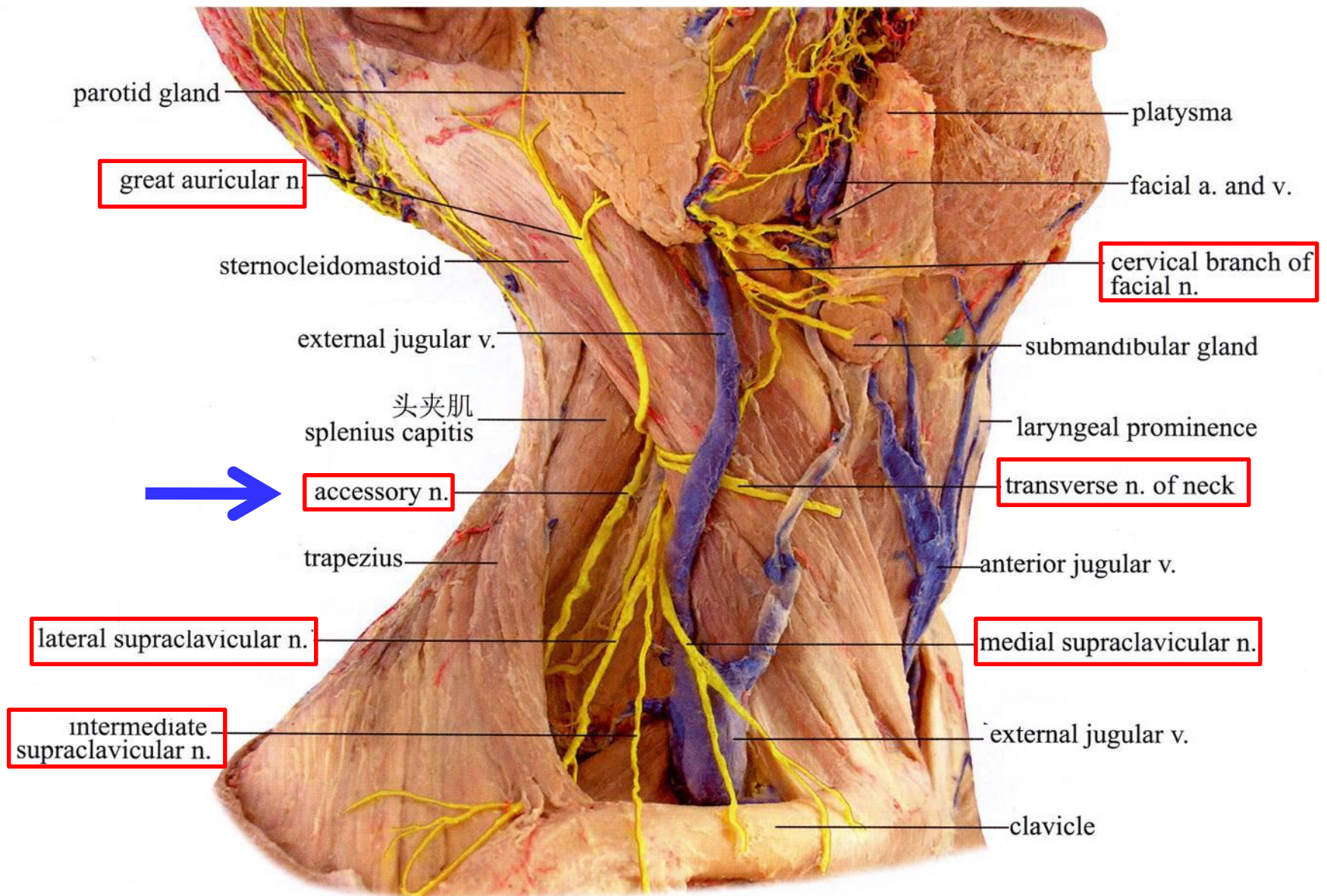
◆ Spinal roots 脊髓根

from nucleus of accessory nerve, Ascend through the foramen magnum and exit the cranium through the jugular foramen.

Innervate the sternocleidomastoid and trapezius muscles



C Muscles, sup. blood vessels & nn. of neck



Component : 一般躯体运动纤维-GSEF

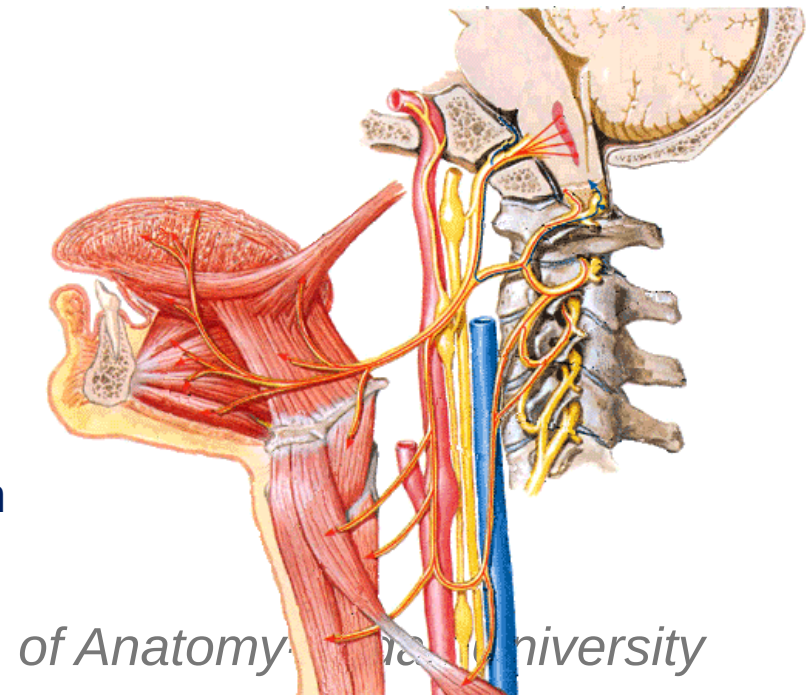
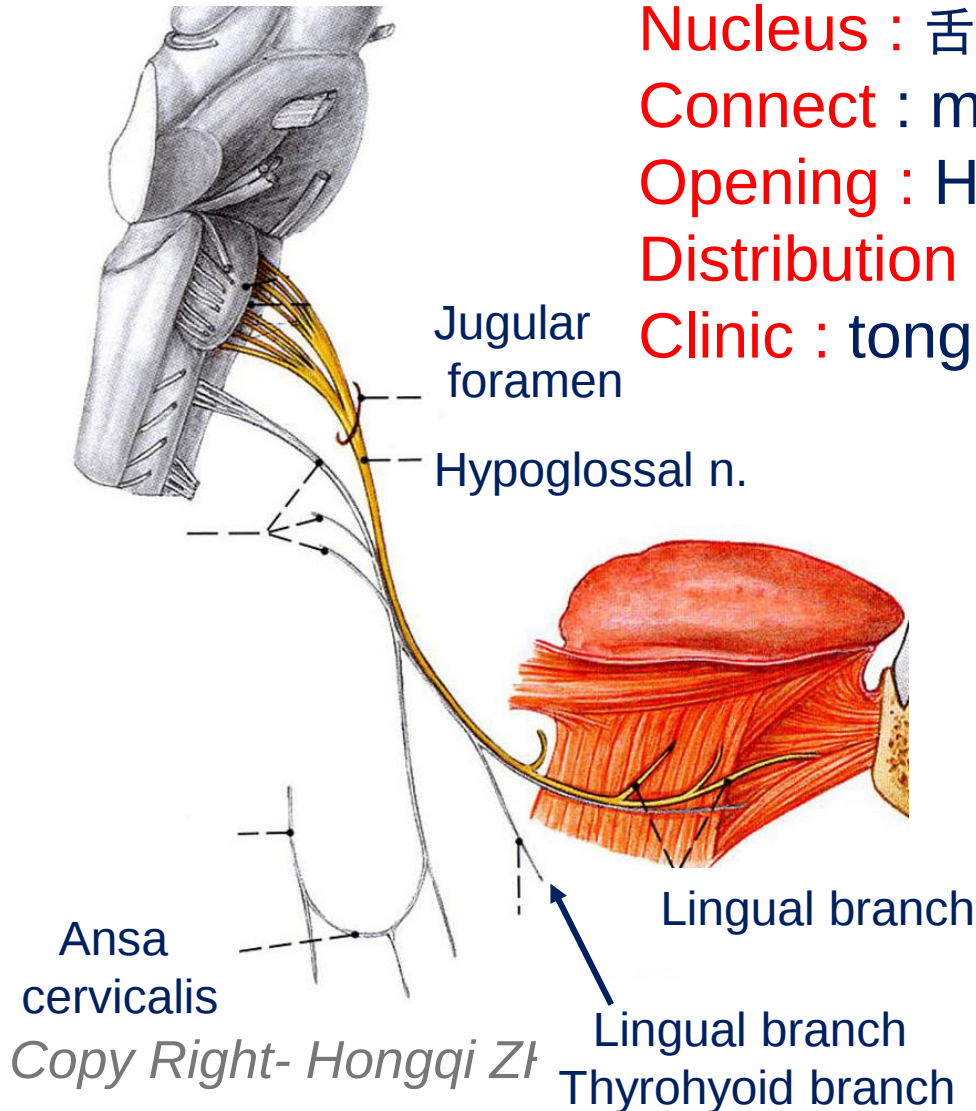
Nucleus : 舌下神经核.

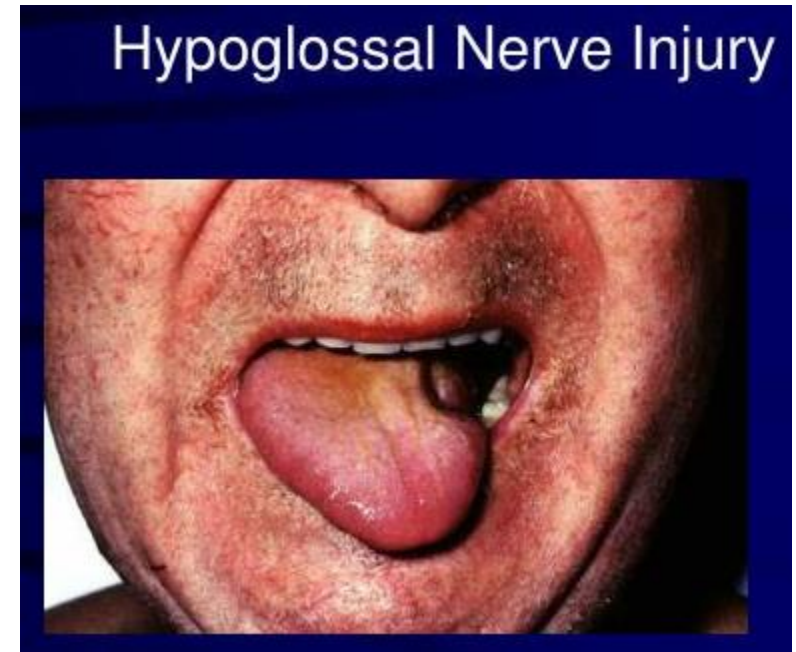
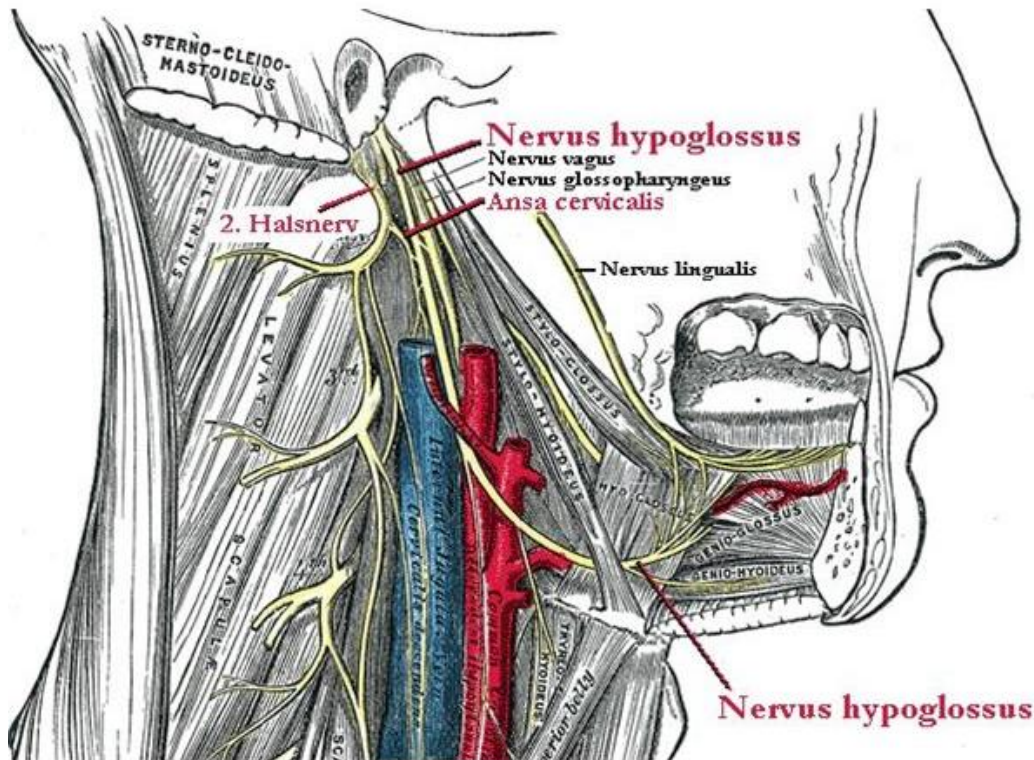
Connect : medulla oblongata 延髓

Opening : Hypoglossal canal 舌下神经管

Distribution : muscles of tongue 舌肌

Clinic : tongue muscle paralysis 舌肌瘫痪





Left hypoglossal nerve injury.

- I. Olfactory nerve 嗅神经
- II. Optic nerve 视神经
- III. Oculomotor nerve 动眼神经
- IV. Trochlear nerve 滑车神经
- V. Trigeminal nerve 三叉神经
- VI. Abducent nerve 展神经
- VII. Facial nerve 面神经
- VIII. Vestibulocochlear nerve 前庭蜗神经
- IX. Glossopharyngeal nerve 舌咽
- X. Vagus nerve 迷走神经
- XI. Accessory nerve 副神经
- XII. Hypoglossal nerve 舌下神经

The end!

See you next time!