

Pathological Physiology of Nervous System Talk Neuro 2 – Syndromes in Neurosciences

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Talks on NS

Talk 1 - Pain and Motor disorders

Talk 2 - This - Syndromes in neurosciences

Talk 3 - Disorders of special senses

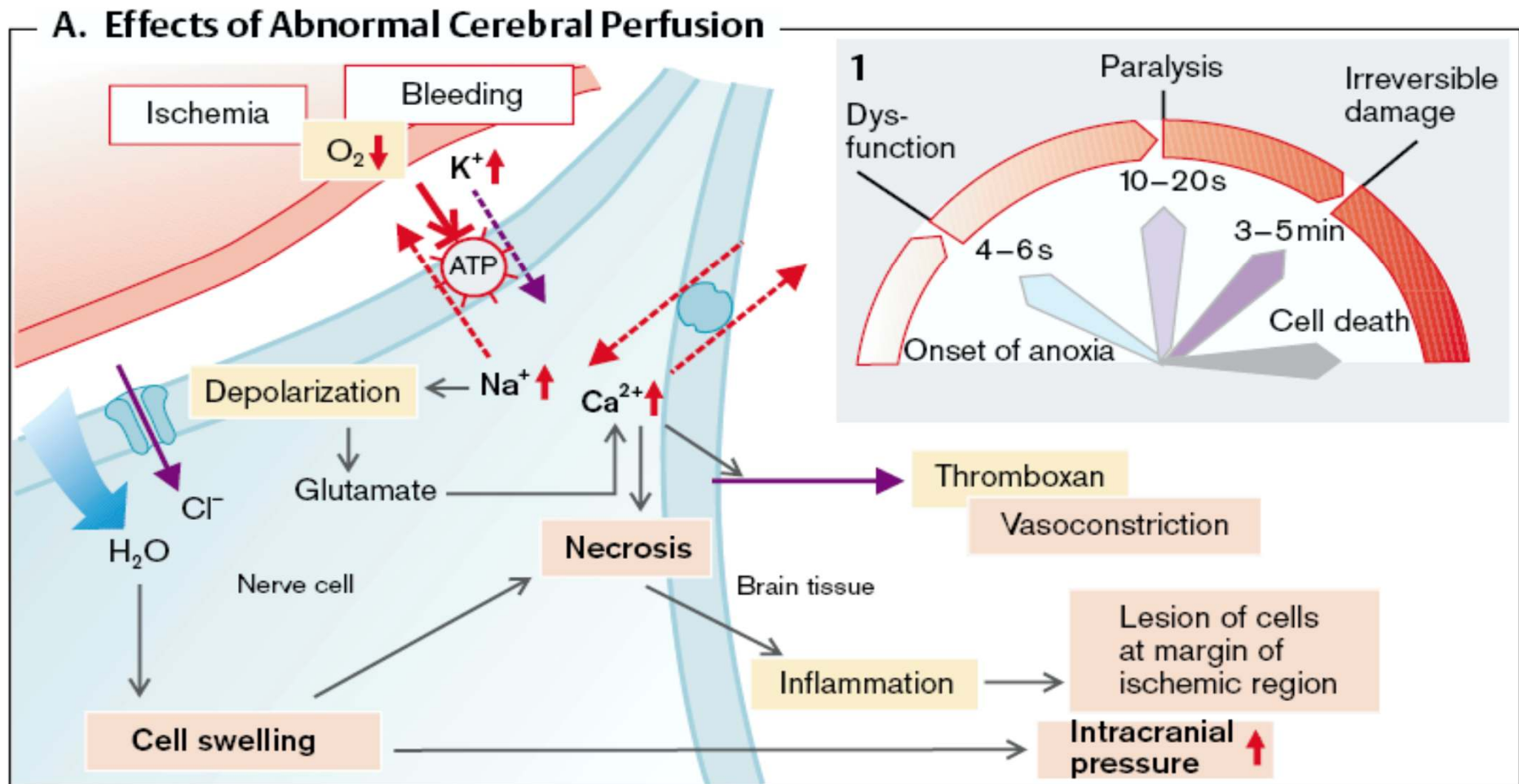
Talk 4 - Cognitive functions, dementias, etc.

Syndromes

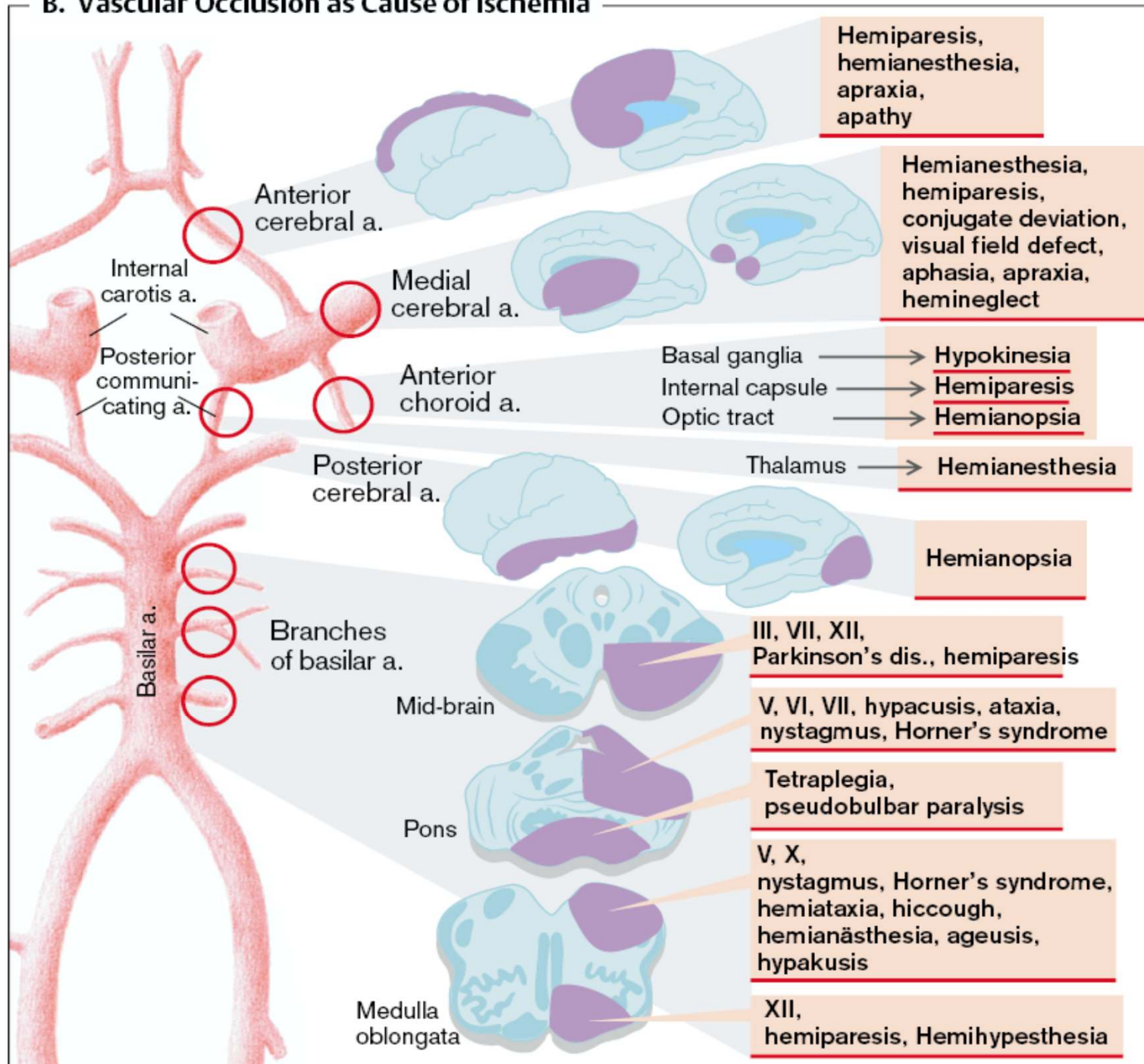
- 1) hypoxia of CNS
- 2) carbon mono-oxide poisoning
- 3) liquor circulation disorders
- 4) cerebral oedema
- 5) intra-cranial hypertension
- 6) intra-cranial hemorrhage
- 7) systemic neuro-muscular plate disorders
- 8) seizures – epilepsy and migraine
- 9) sleep/ wake cycle disorders
- 10) vomiting as a sign of NS

1. Cerebrovascular brain disease.

Hypo-perfusion, brain hypoxia



B. Vascular Occlusion as Cause of Ischemia

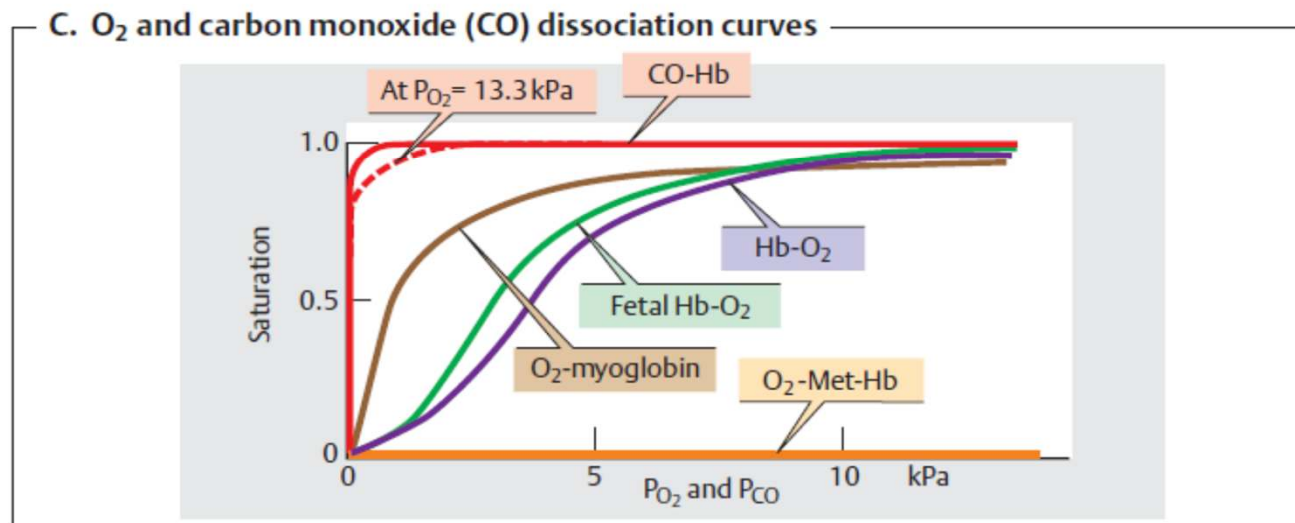
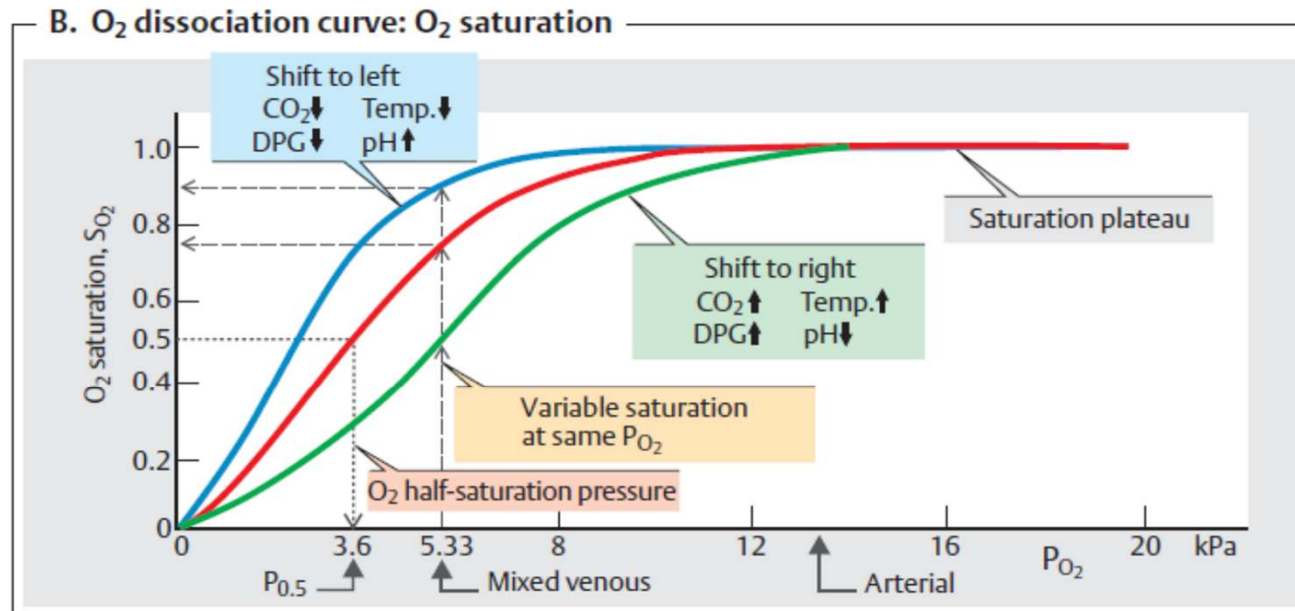


Topic signs

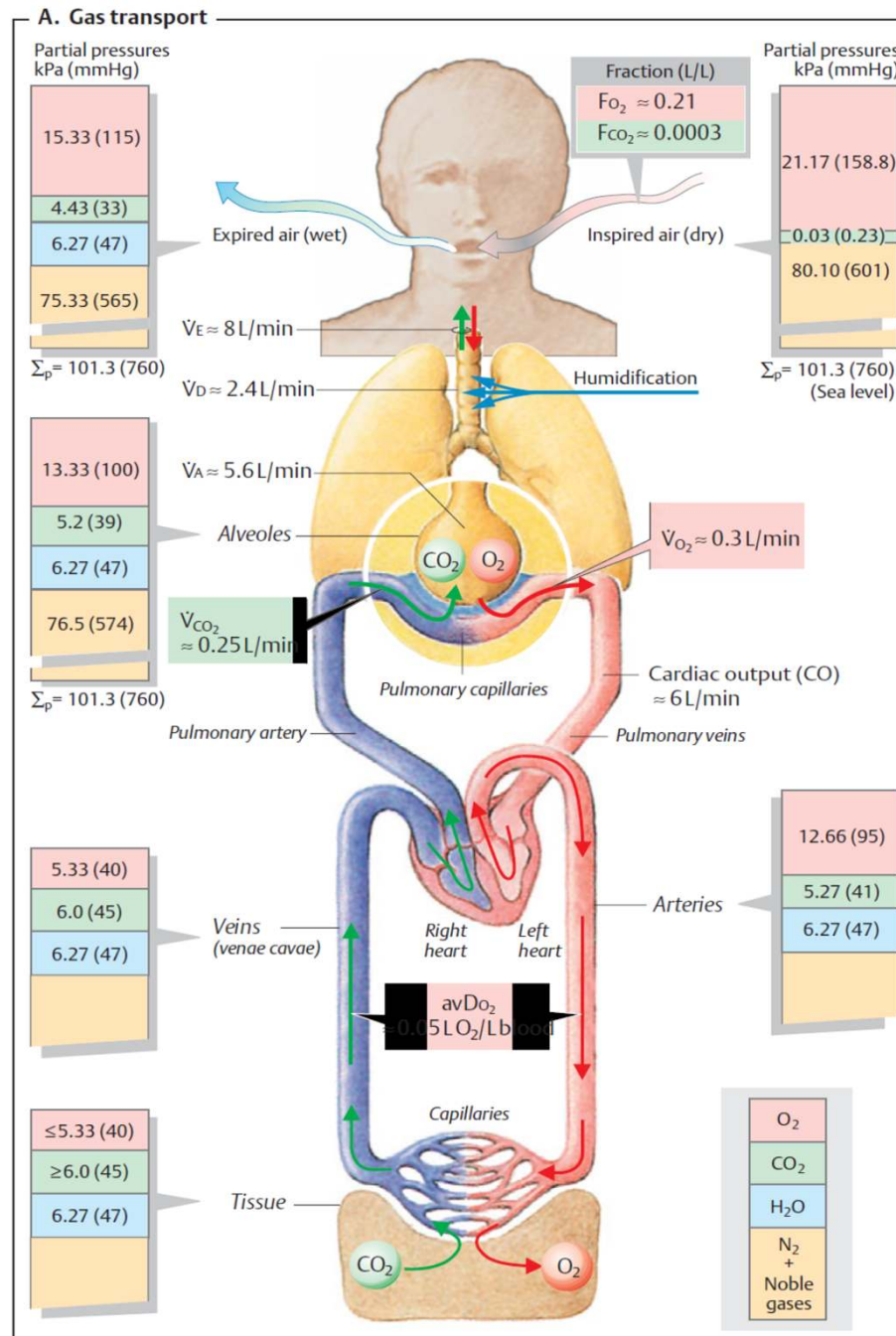
2. Acute carbon-monoxide poisoning

Concentration	Symptoms
35 ppm (0.0035%)	Headache and dizziness within six to eight hours of constant exposure
100 ppm (0.01%)	Slight headache in two to three hours
200 ppm (0.02%)	Slight headache within two to three hours; loss of judgment
400 ppm (0.04%)	Frontal headache within one to two hours
800 ppm (0.08%)	Dizziness, nausea, and convulsions within 45 min; insensible within 2 hours (700 ppm – Mars atmosphere)
1,600 ppm (0.16%)	Headache, tachycardia, dizziness, and nausea within 20 min; death in less than 2 hours
3,200 ppm (0.32%)	Headache, dizziness and nausea in five to ten minutes. Death within 30 minutes.
6,400 ppm (0.64%)	Headache and dizziness in one to two minutes. Convulsions, respiratory arrest, and death in less than 20 minutes.
12,800 ppm (1.28%)	Unconsciousness after 2-3 breaths. Death in less than three minutes.

Acute CO poisoning – blood gases affinity to Hb

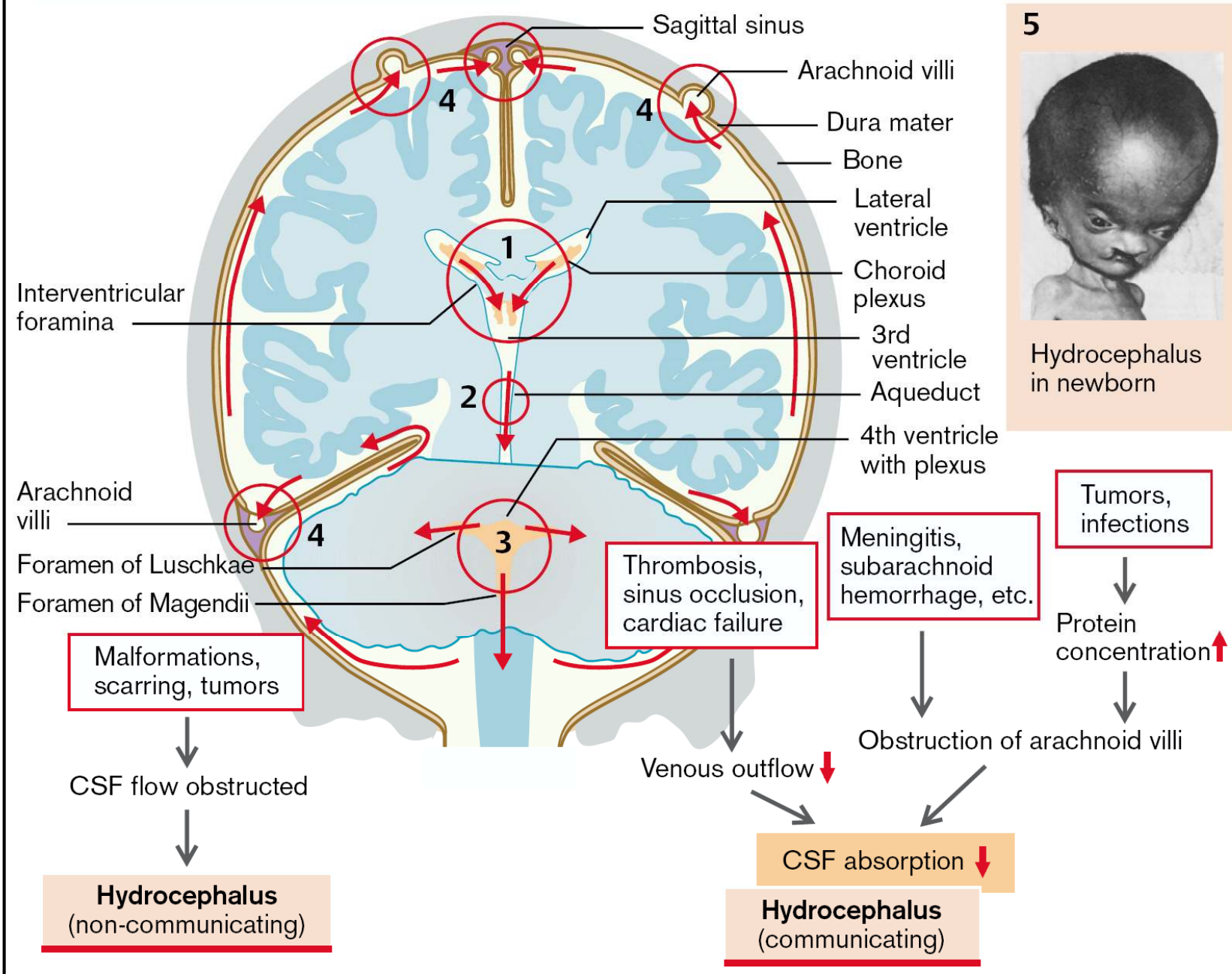


Blood gases

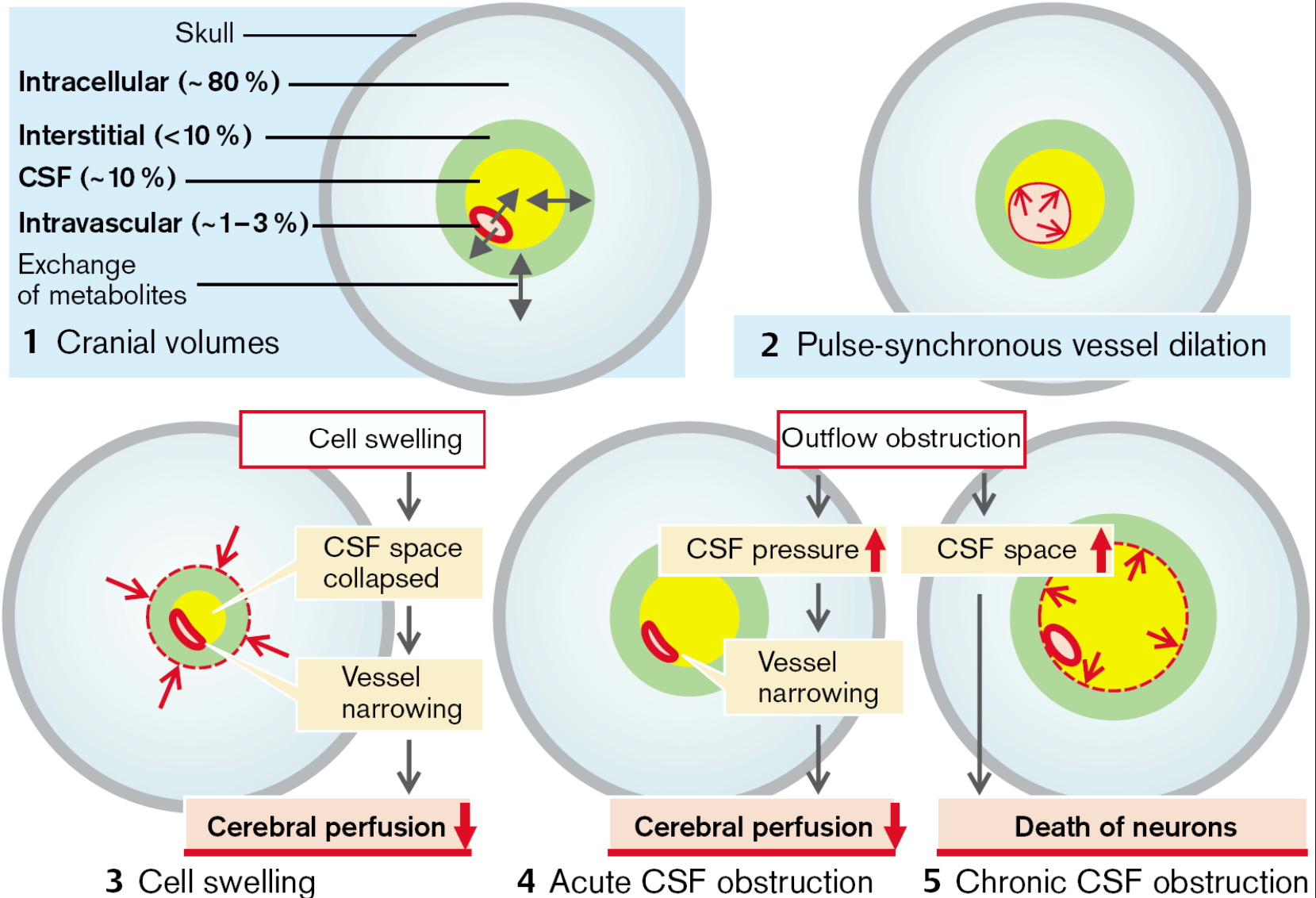


4. Cerebrospinal fluid (CSF) Flow in Norm and Pathology

A. Cerebrospinal Fluid (CSF) Flow

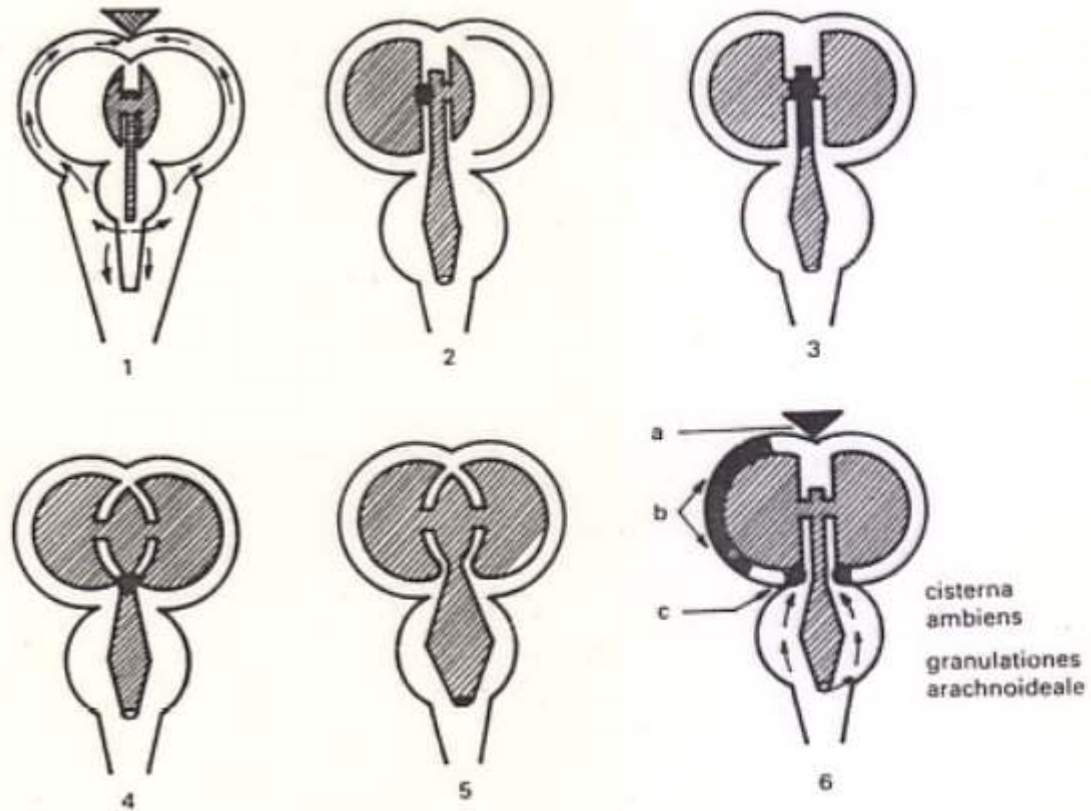


A. Volume Changes of Brain Compartments



Obstructive hydrocephalus

Obr. 56. Rozličné príčiny vzniku obštrukčného hydrocefalu
1 – normálna cirkulácia likvoru,
2 – uzáver foramen interventriculare, 3 – uzáver III. komory,
4 – uzáver v oblasti corpora quadrigemina, 5 – uzáver na konci IV. komory, 6 – uzáver vonkajších likvorových ciest



5. Intracranial hypertension,

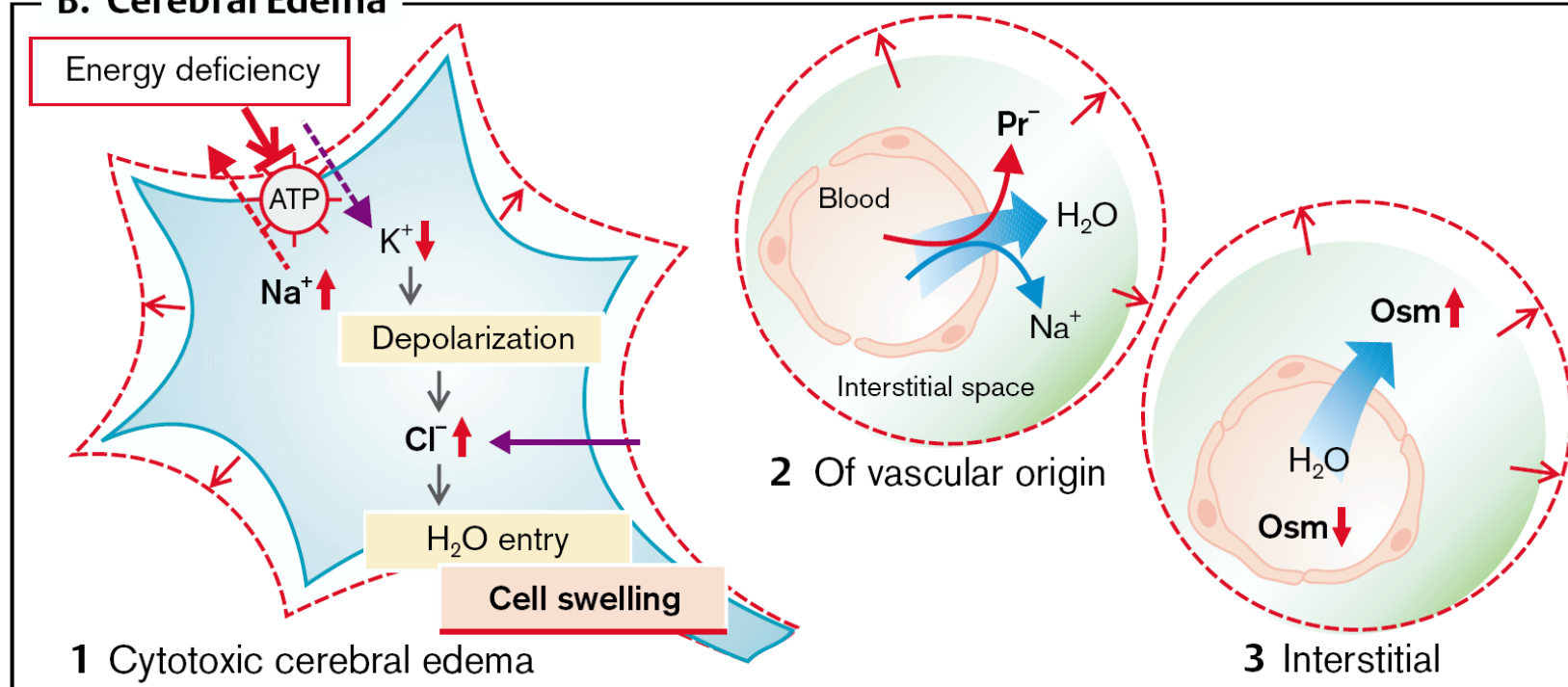
subjective signs

headache, nausea, vomiting, blurred vision

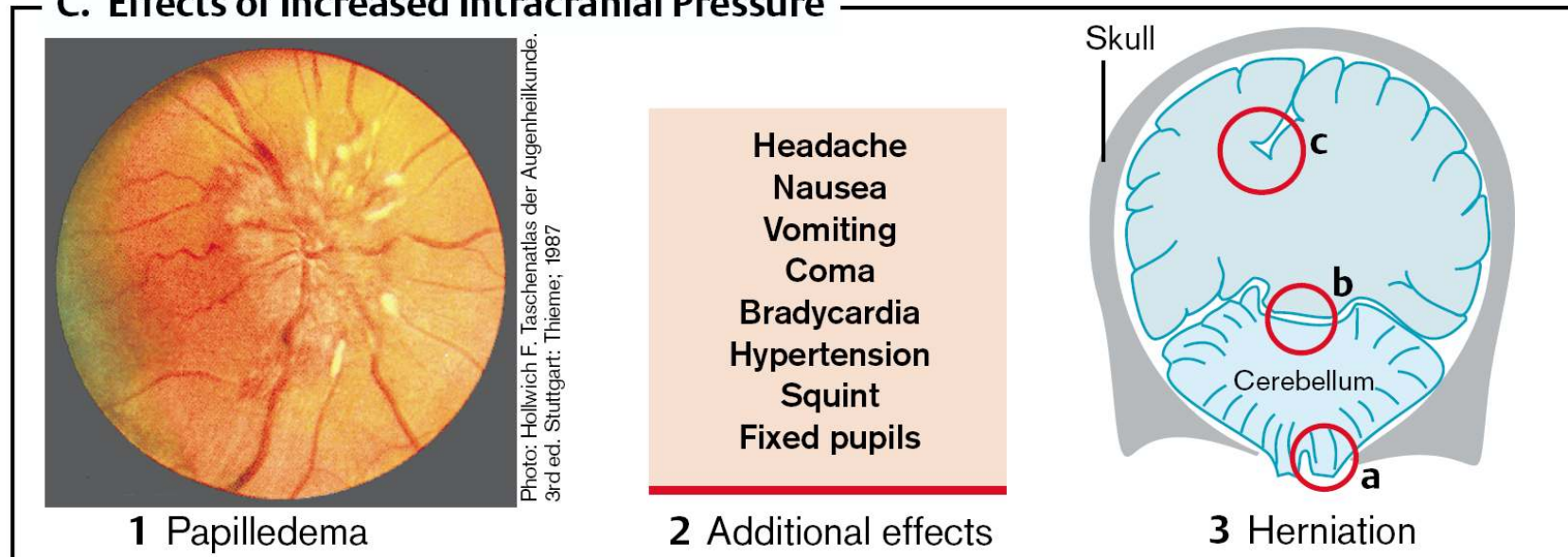
objective signs

vomiting, papilla nervi optici (n. II)
bradycardia, hypertension, loss of consciousness,
coma

B. Cerebral Edema



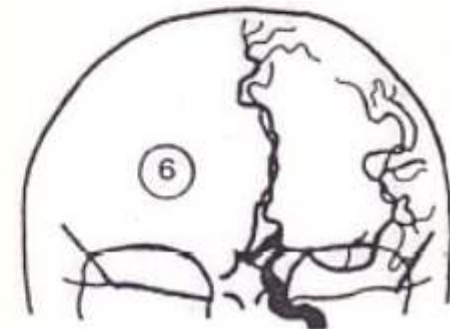
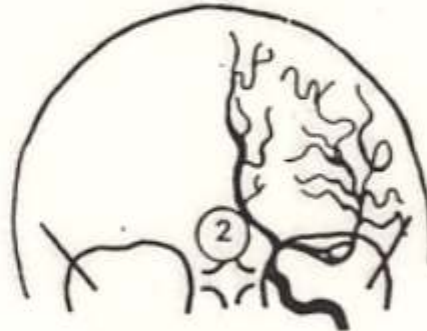
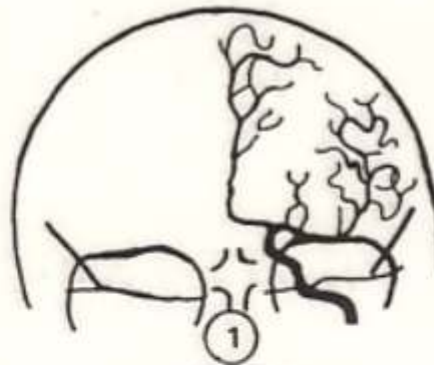
C. Effects of Increased Intracranial Pressure



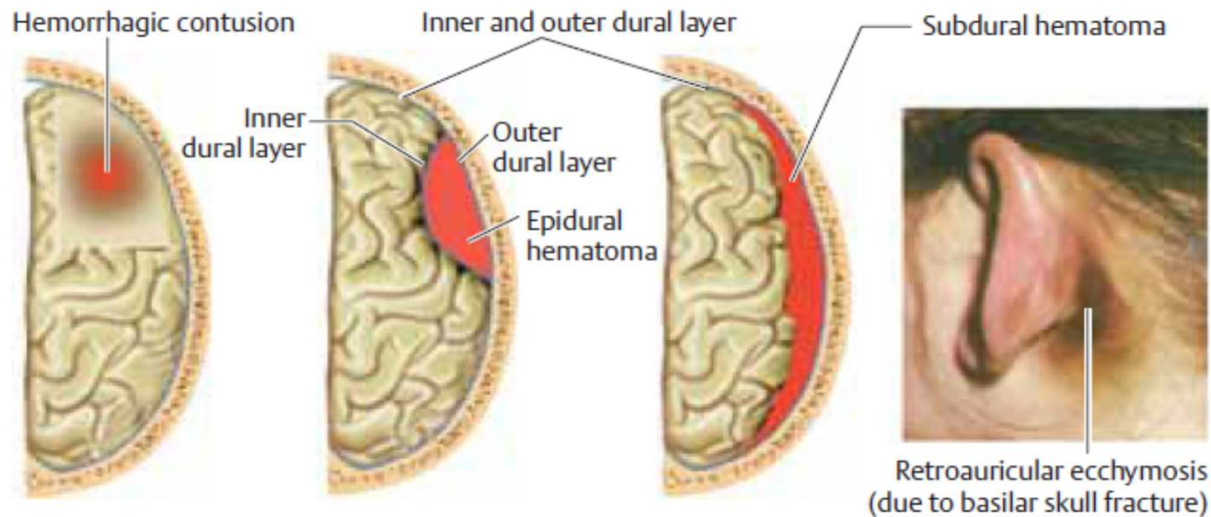
Angiographic findings in intra-cranial expansions (Bartko, 1985)

Obr. 55. Schéma angiografie a. carotis interna v predozadnej projekcii pri intrakraniálnych expanzívnych procesoch rozličnej lokalizácie

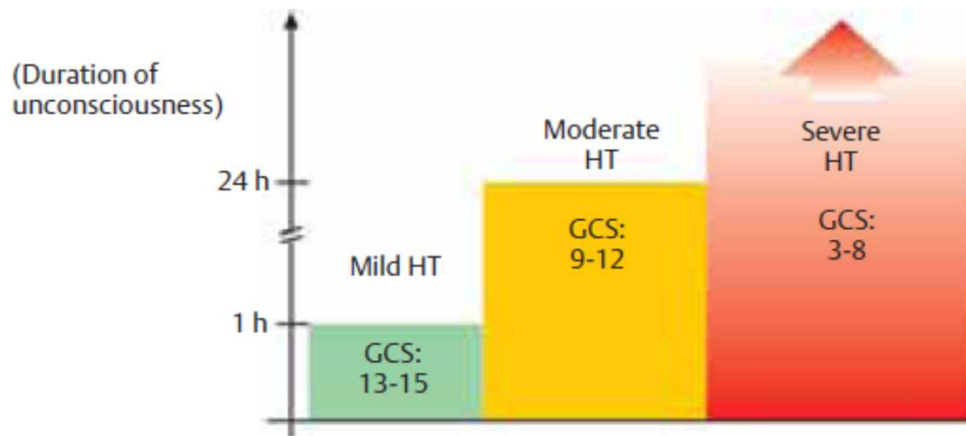
1 – normálny nálež, 2 – expanzívny proces v preselárnej oblasti, 3 – expanzívny proces v čelovom laloku, 4 – expanzívny proces v temporálnom laloku, 5 – angiografický nálež pri subdurálnom hematóme, 6 – angiografický nálež pri expanzívnom procese na strane protifahlej angiografii (pozri porovnanie s cerebri ant.)



6. Intracranial Hemorrhage



Traumatic intracranial hematoma



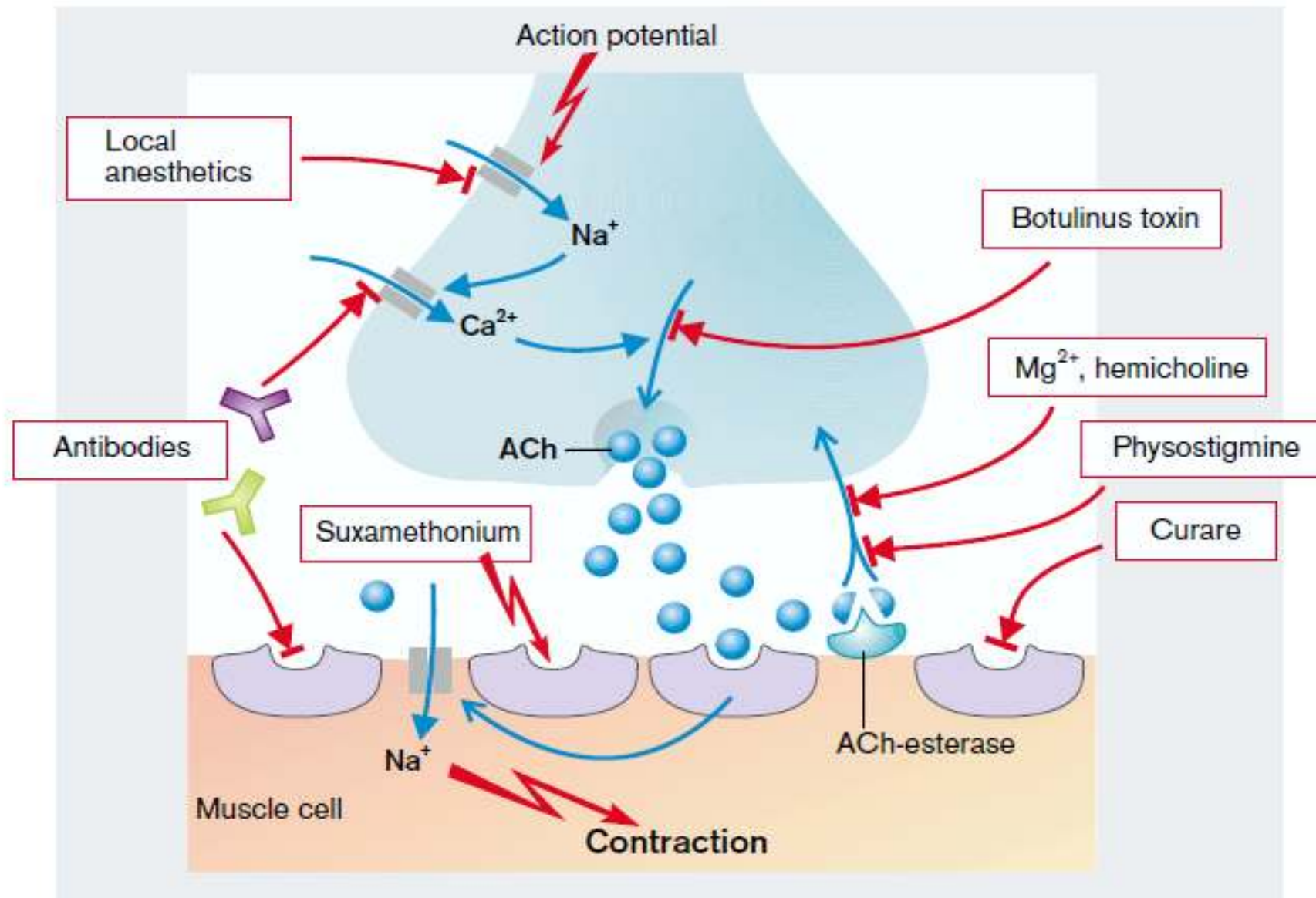
Classification of head trauma (HT) by Glasgow Coma Scale (GCS)

Glasgow coma scale

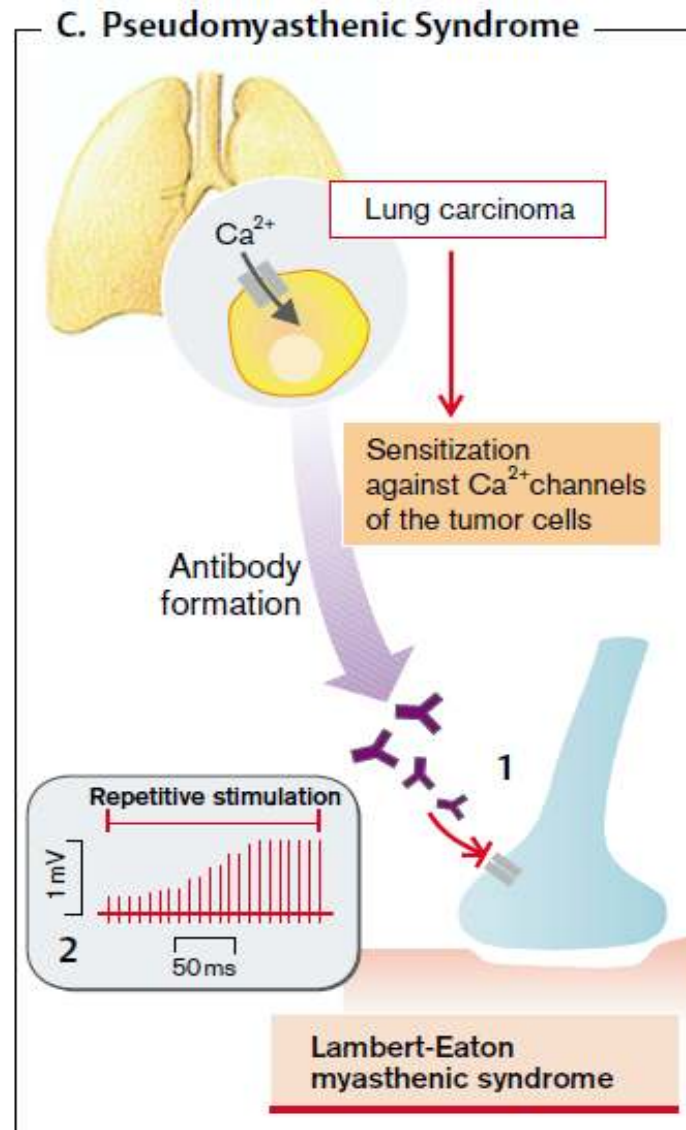
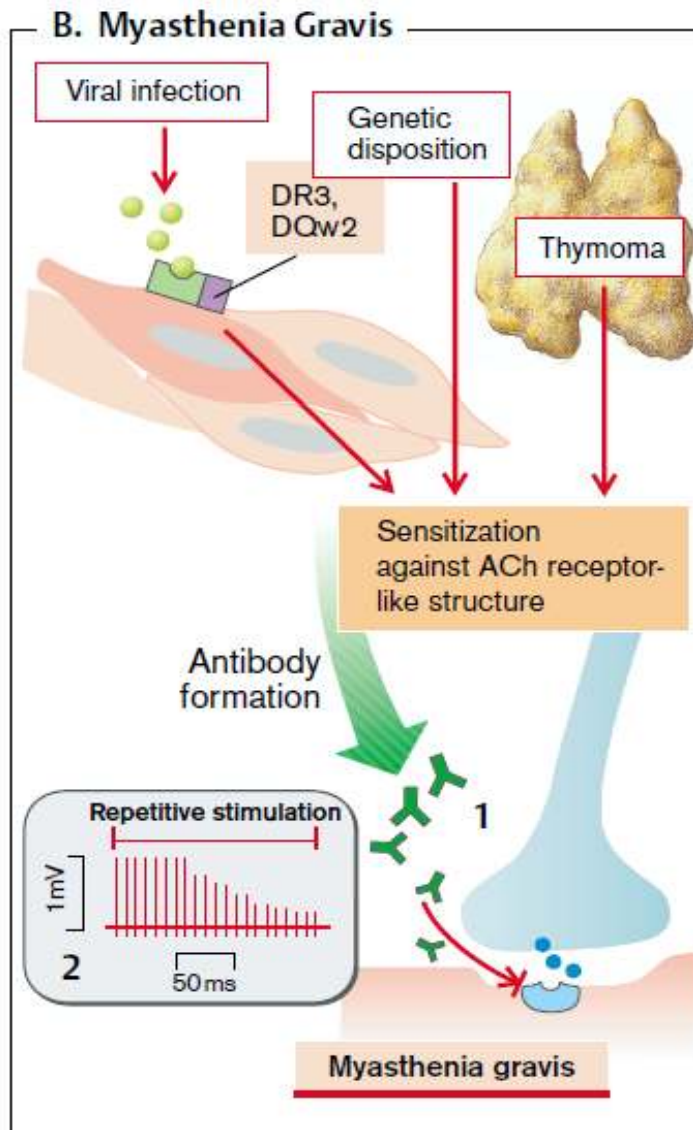
Glasgow Coma Scale						
	1	2	3	4	5	6
Eyes	Does not open eyes	Opens eyes in response to painful stimuli	Opens eyes in response to voice	Opens eyes spontaneously	N/A	N/A
Verbal	Makes no sounds	Incomprehensible sounds	Utters inappropriate words	Confused, disoriented	Oriented, converses normally	N/A
Motor	Makes no movements	Extension to painful stimuli (decerebrate response)	Abnormal flexion to painful stimuli (decorticate response)	Flexion / Withdrawal to painful stimuli	Localizes painful stimuli	Obeys commands

The scale comprises three tests: [eye](#), [verbal](#) and [motor](#) responses. The three values separately as well as their sum are considered. The lowest possible GCS (the sum) is 3 (deep [coma](#) or [death](#)), while the highest is 15 (fully awake person).

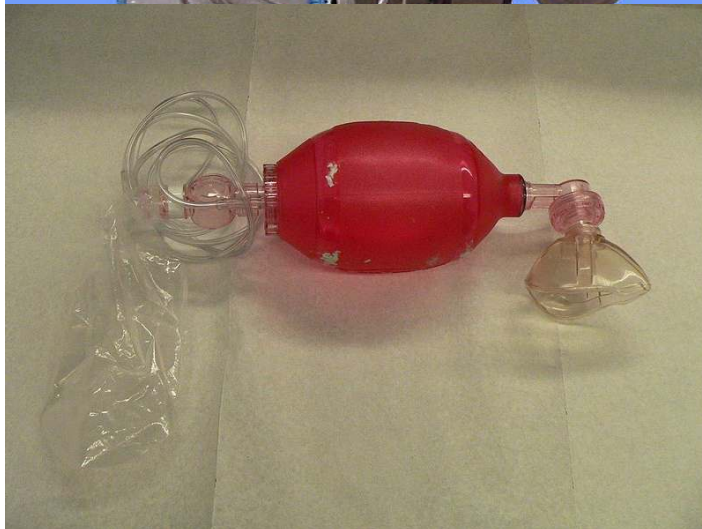
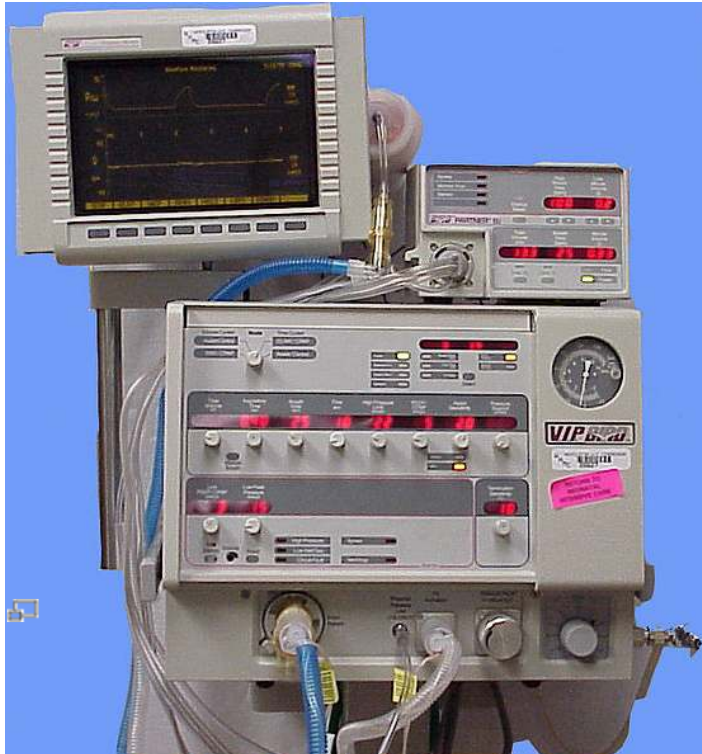
7. Disorders of Neuromuscular transmission



7. Disorders of Neuromuscular transmission



7B. Artificial ventilation/ Iron lung



In ventilatory muscle paralysis,
Ventilation can be delivered via:

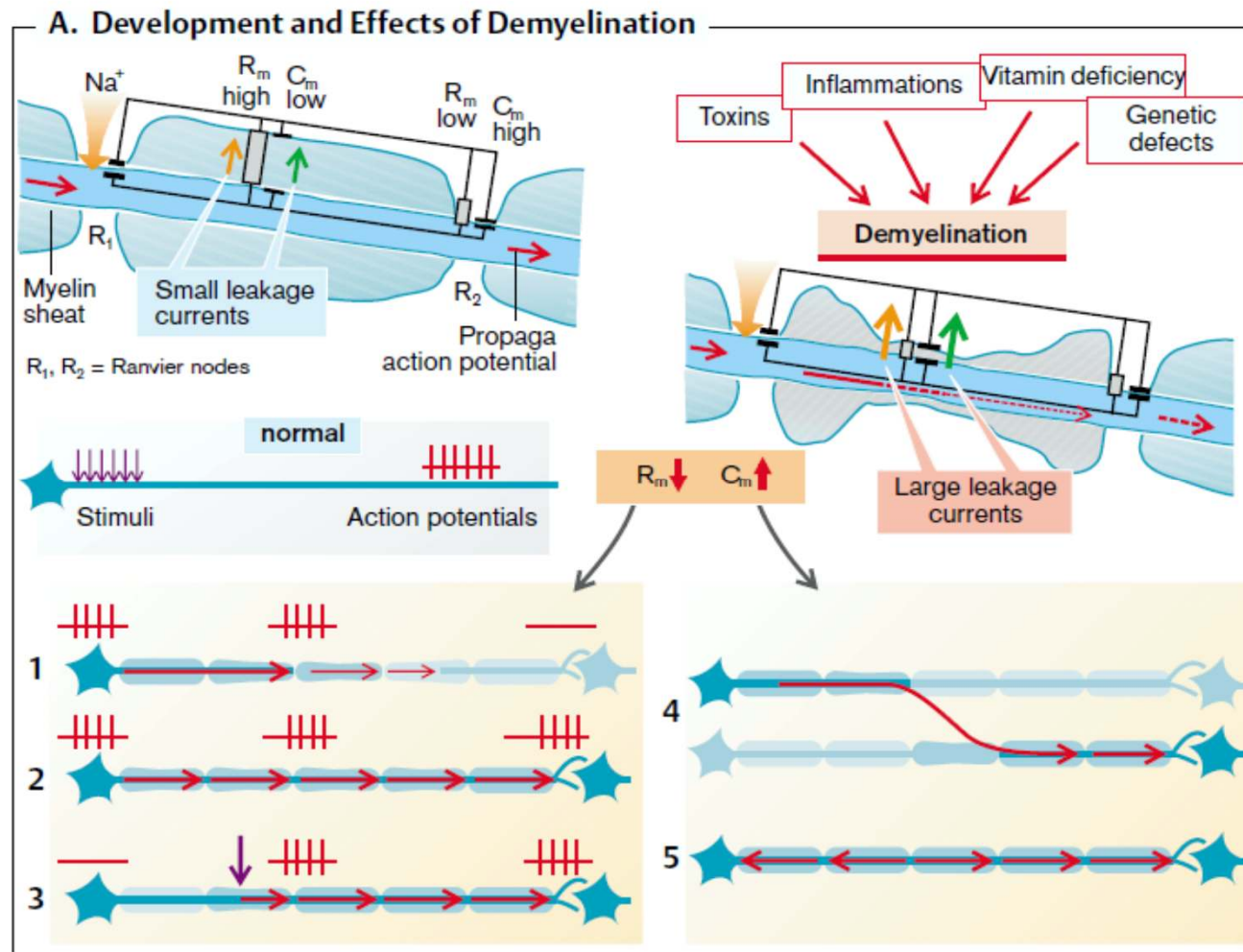
Hand-controlled ventilation such as:

Bag-Valve-Mask Resuscitator Continuous-flow or Anaesthesia (or T-piece) bag

- A mechanical ventilator.

- Iron lung is a historical type of mechanical ventilator

7C. Demyelination – sclerosis multiplex



B. Wave Frequency Pattern of EEG

α 8–13 Hz



β 14–30 Hz



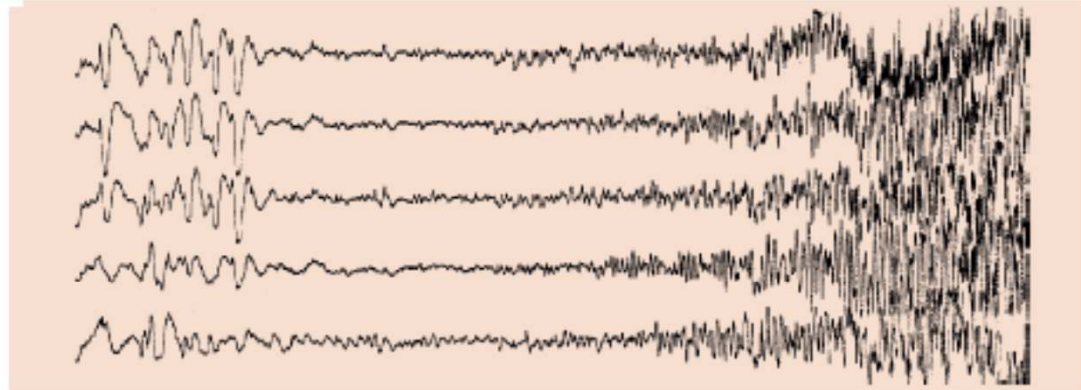
θ 4–7 Hz



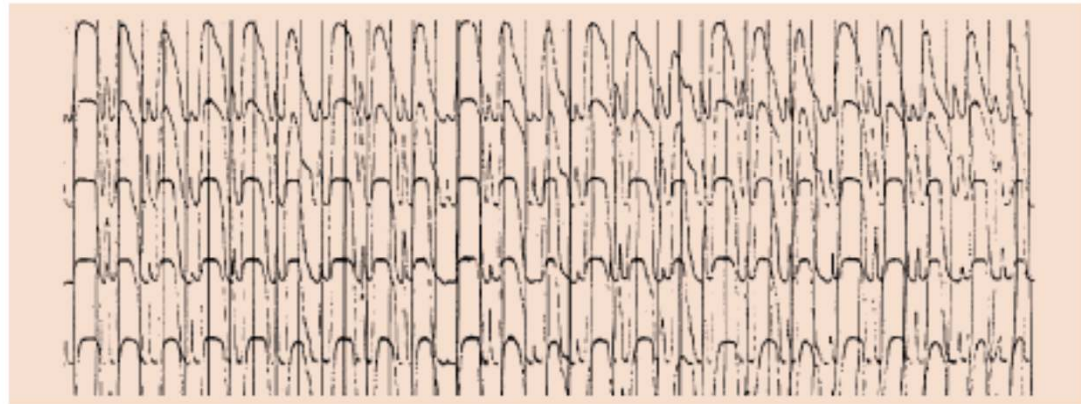
δ 0.5–3 Hz



1 Normal EEG frequencies



2 Onset of an epileptic attack



3 Rhythmic spike-wave complexes in absences

8A. Normal findings: EEG waves:

Alpha waves, 8-13 Hz, parieto-occipital region, marked in closed eyes

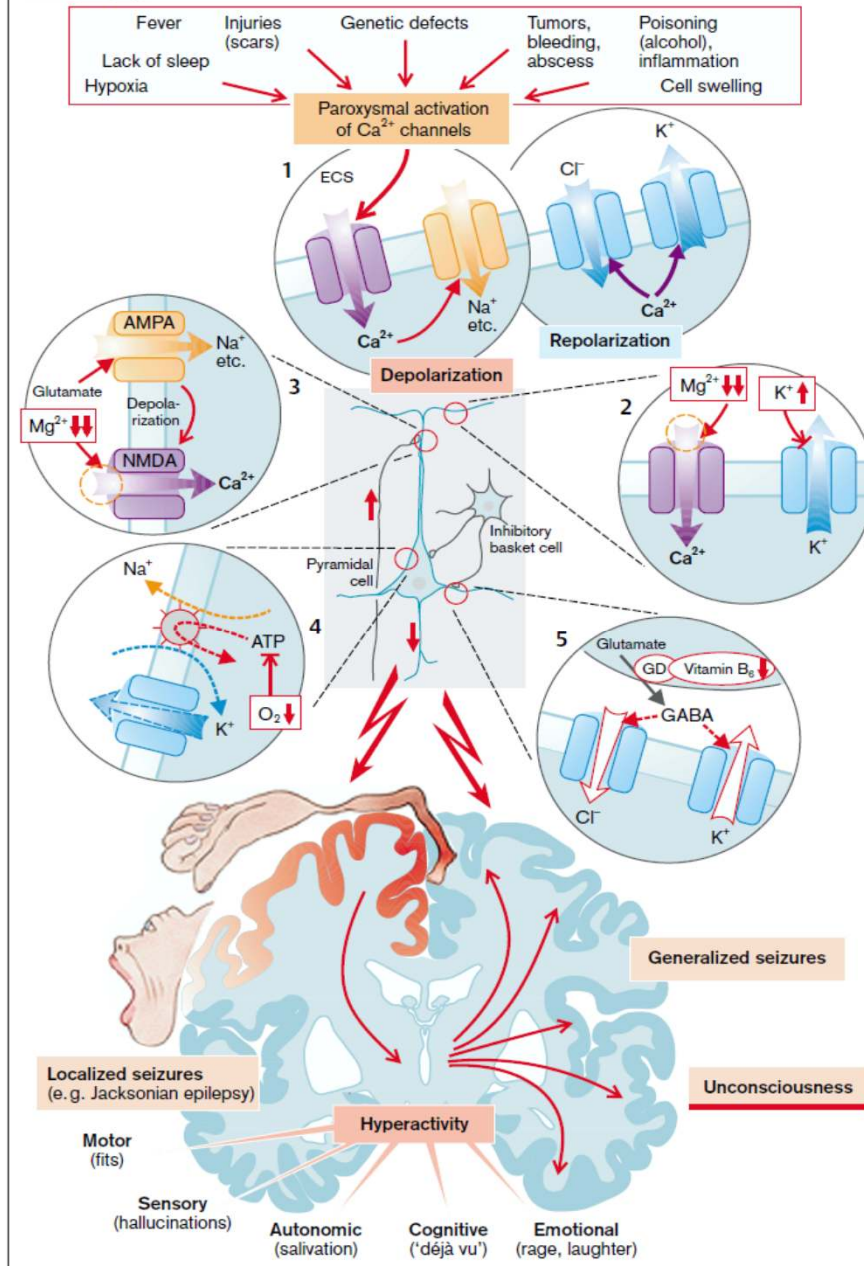
Beta waves, 14-30 Hz, frontal region

Gamma waves, 40-60 Hz, are not regularly used due to interference with electric power net.

Delta waves, < 4 Hz, e.g in synchronous phase of sleep.

Theta waves, 4-7 Hz, e.g in synchronous phase of sleep.

A. Epilepsy



8B. Epilepsy:

Cortico-Thalamic

and
Thalamo-cortical
feedback
system
modulating
sensory inputs

8C. Migraine – phosphenes

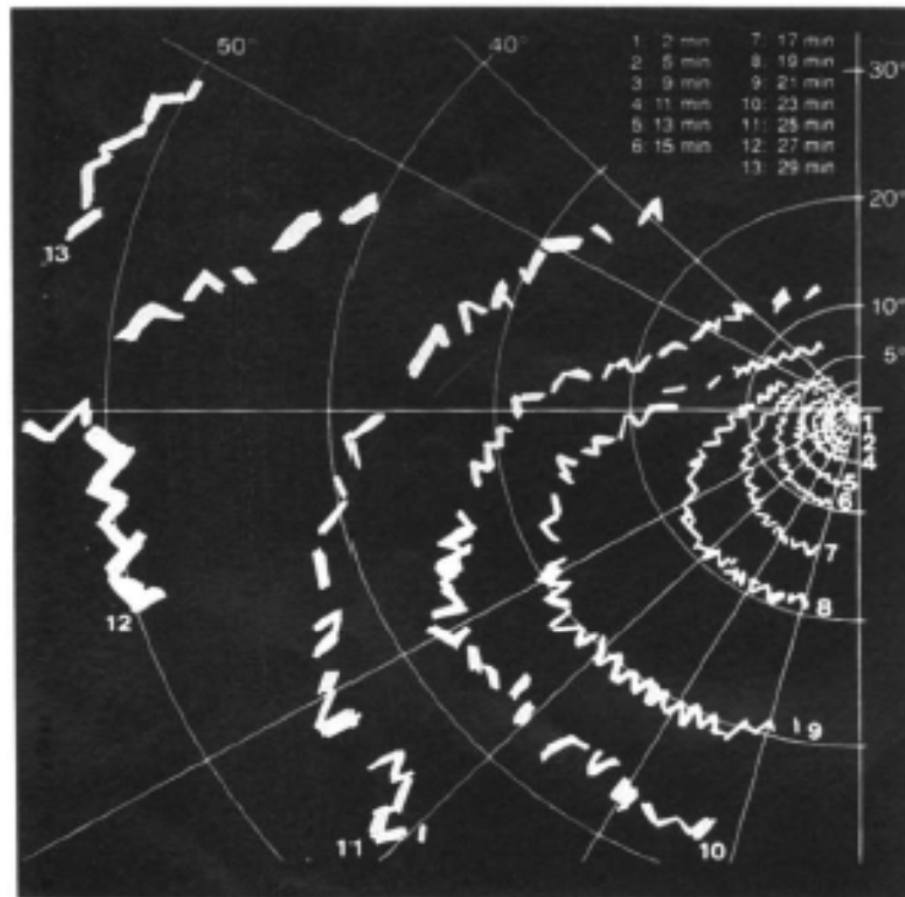
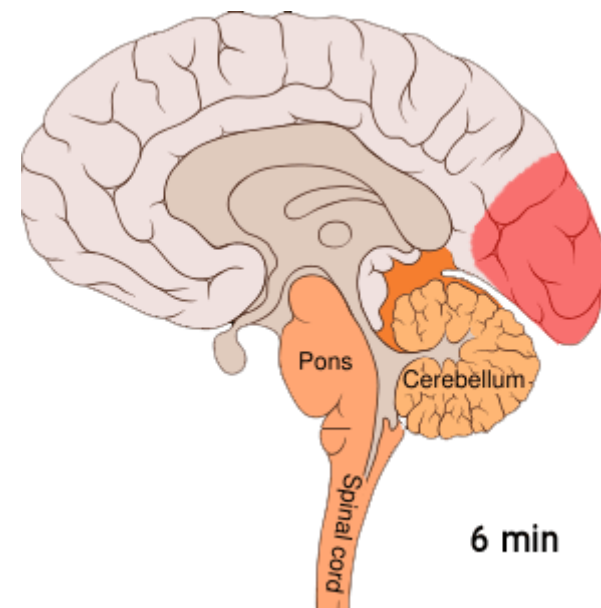


FIGURE 1. Photographic negative of a *migraine phosphene protocol*. The scintillating phosphene was progressing through the lower quadrant and part of the upper quadrant of the left visual hemifield. Thirteen drawings were made between 2 and 29 min after the phosphene appeared near the centre of the visual field. To evaluate the distance between the migraine phosphene and the centre of the visual field, several radii were drawn across the protocol. The angular distance from the fovea centre, computed in degrees of visual angle, is indicated by circles. Circles and radii were added to the protocol sheet after the observations were made. Observation distance, 34 cm.



8C. Migraine - scotomas

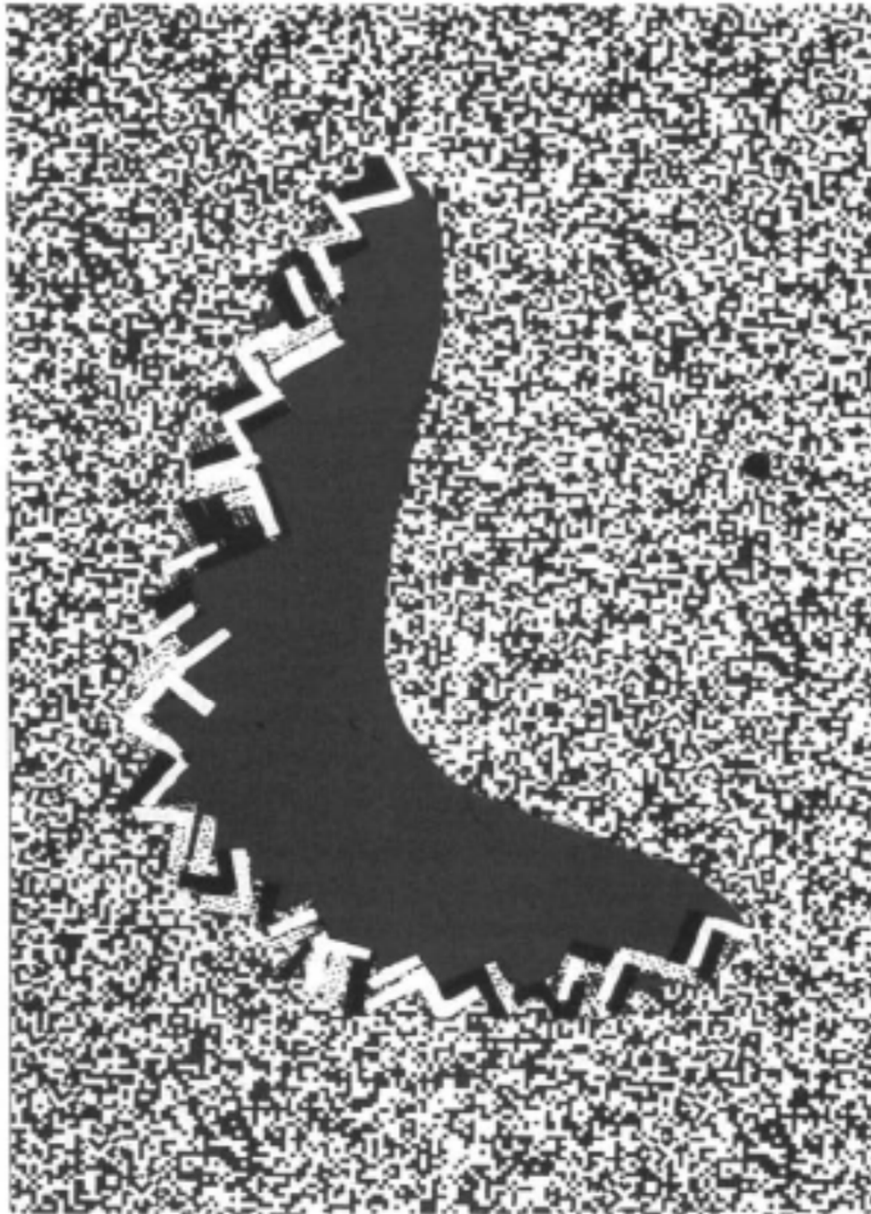
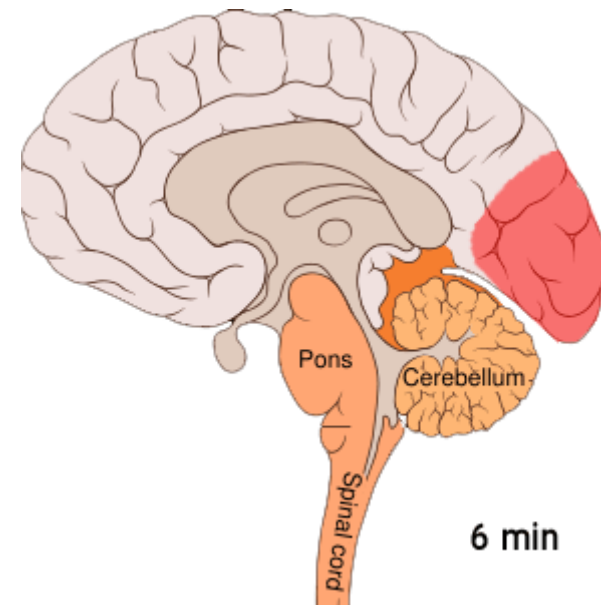
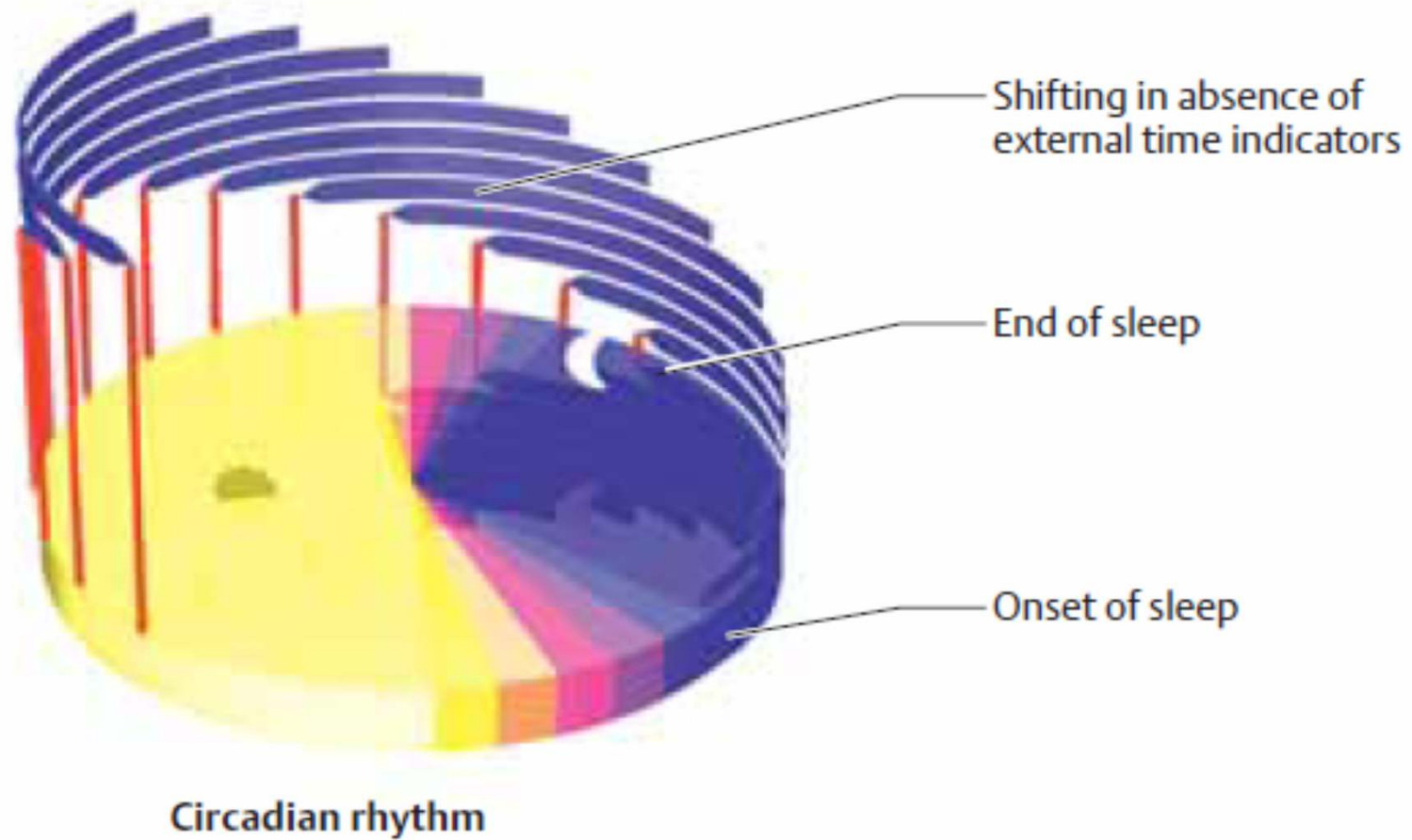


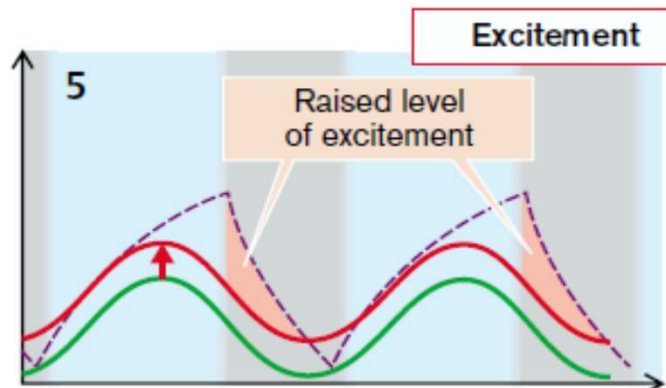
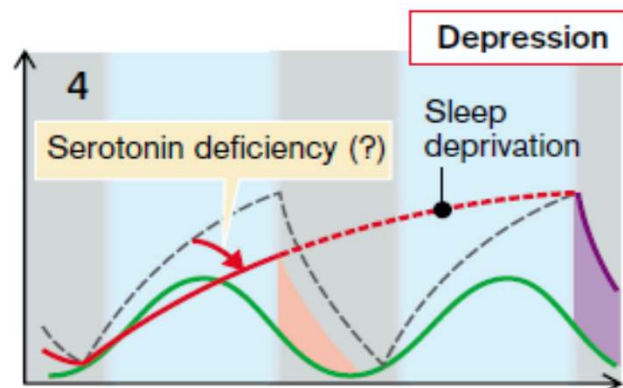
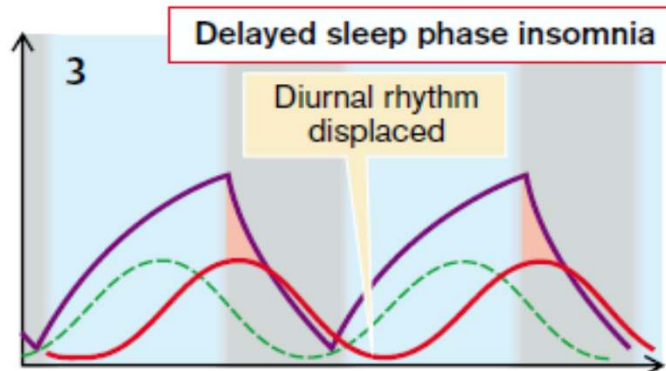
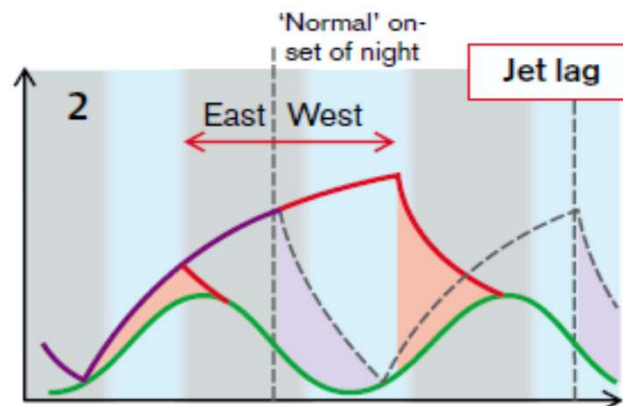
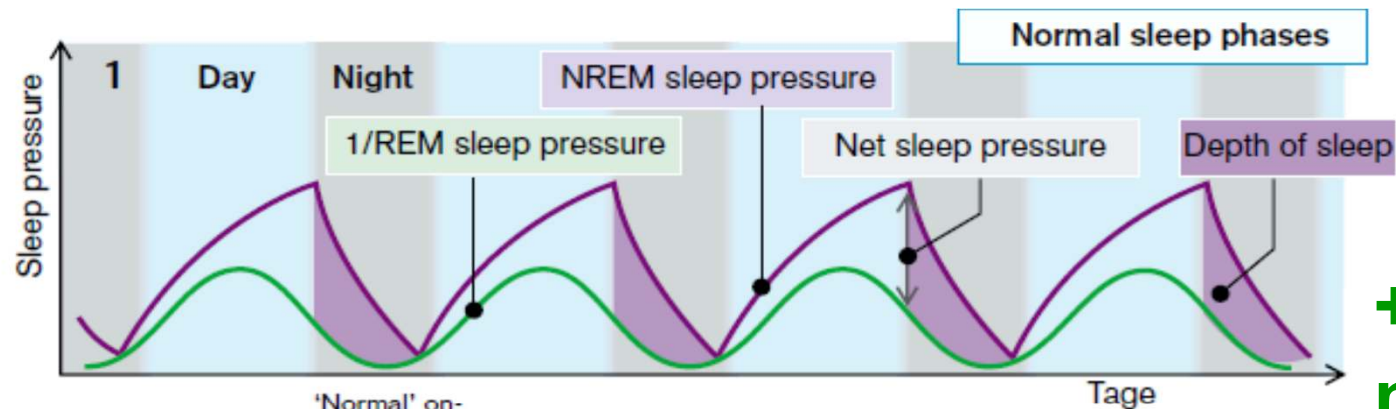
FIGURE 4. Illustration of a scintillating migraine phosphene and its trailing scotoma observed on a *dynamic random-dot noise pattern* (TV screen without program). The scotoma is perceived as a homogeneous neutral grey. Some of the phosphene particles (dotted) appeared in a pure red or green colour, some in deep black (Grüsser & Landis, 1991).



9. Sleep/ Wake Cycle

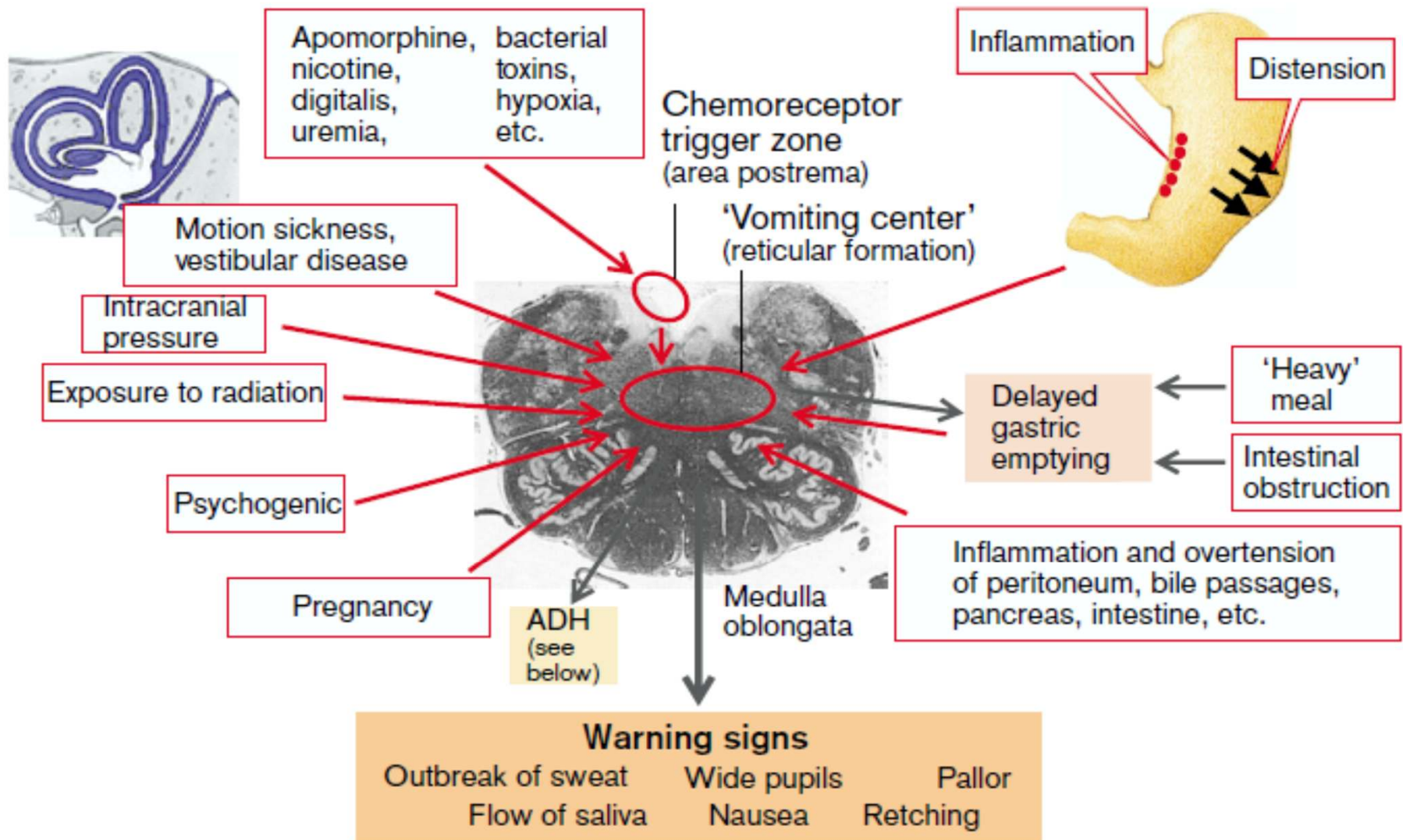


9. Sleep/ Wake Cycle



+
narcolepsy
and
reticular
formation
effects

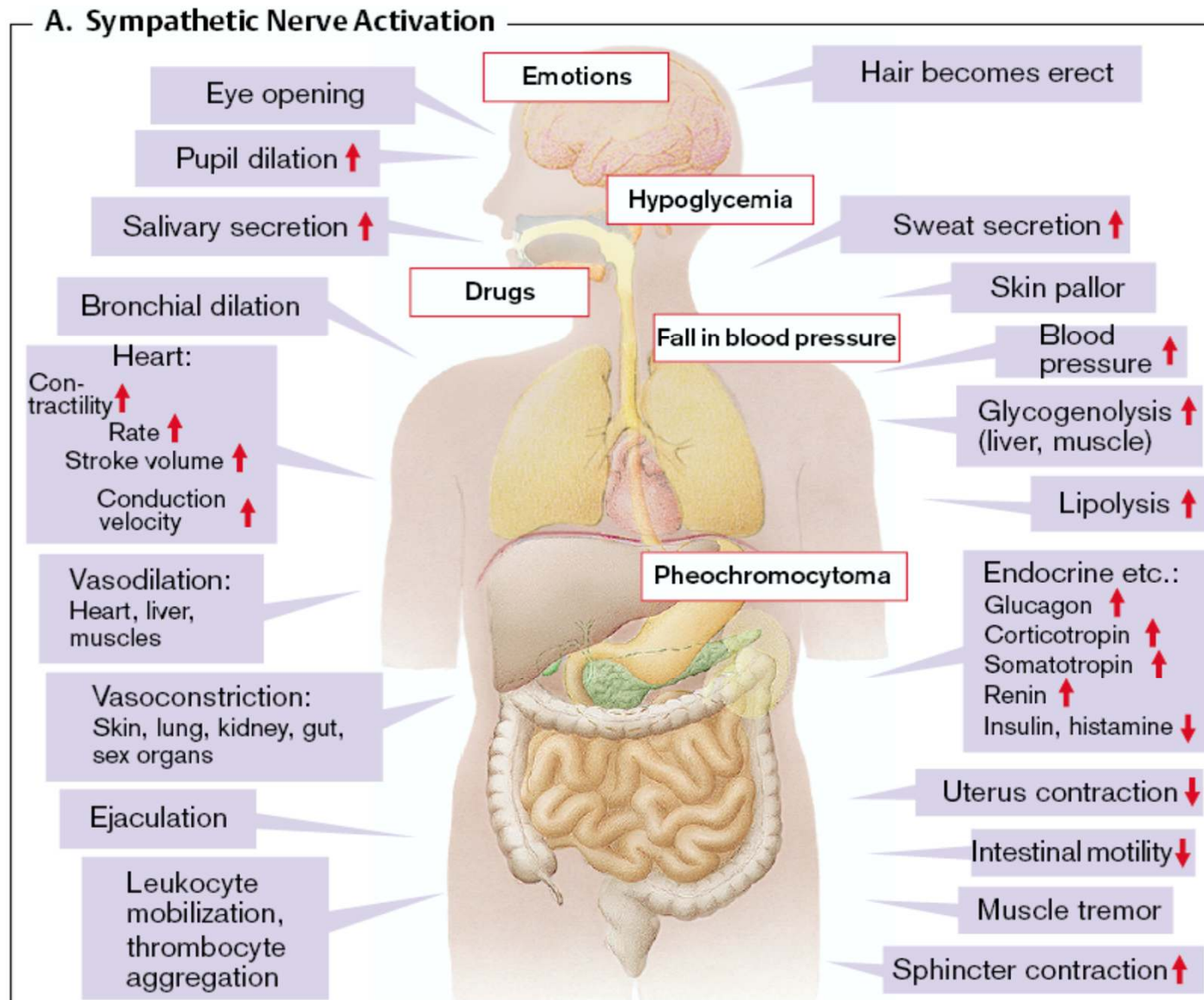
10. Vomiting Center/ Causes of Vomiting



10. Causes of vomiting

- 1 Intracranial hypertension - irritation
- 2 Drugs – nicotine, apomorphine, etc
- 3 Kinetosis
- 4 Radiation disease
- 5 Pregnancy
- 6 Psychogenic
- 7 Pharyngeal irritation
- 8 Local gastric irritation – food poisoning
- 9 Peritoneal irritation, ileus
- 10 Other internal organs – heart etc

11. Autonomus nervous system disorders.



B. Loss of Parasympathetic Stimulation

Anticholinergic drugs

Pupil dilation

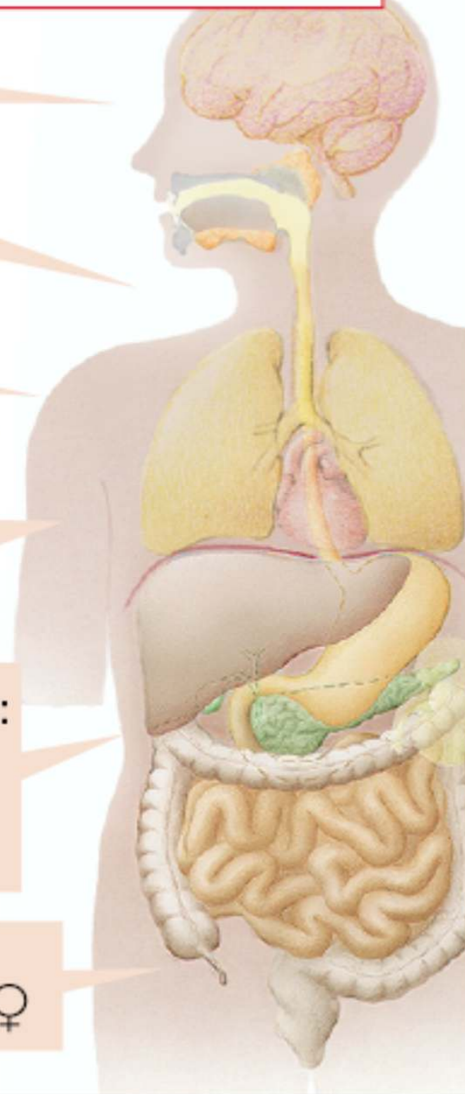
Inhibition
of sweating

Tachycardia

Decreased motility:
Bronchi,
gut, bladder
(but not sphincters)

Decreased secretion:
Tears, saliva,
bronchi,
gastrointestinal

No erection ♂
No vasocongestion ♀



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„Lecture NS X, etc“

Petr Marsalek, and others

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