Unconsciousness, head and spine injury
Central nervous system anatomy
CNS

- Brain + spinal cord
- Cerebrospinal fluid – bath for CNS, shock absorber, nutrient transporter

Brain:
- Cerebrum – thought, sensation, voluntary movement
- Cerebellum – balance, movement coordinate
- Brain stem – basic function (BP regul., breathing)
- Spinal cord
Fig. 2. The human central nervous system, exposed by dissection from the dorsal aspect. Shows the brain, spinal cord and the proximal parts of the spinal nerves.
Impaired consciousness

- No absolute criteria conscious x unconscious
- Alert – eye open, response
- Voice – response to voice
- Pain – eye opened at painful stimuli
- Unresponsive
Unconsciousness - evaluation

- **Shallow disorder** - can be awakened, performs simple tasks, difficult/no verbal contact, discoordination of motion.

- **Deep disorder** - no/weak reaction to pain stimuli.

- **Scales** - Glasgow Coma Scale (GCS).
Glasgow coma scale

1. Best motor response
   - None
   - Decerebrate
   - Decorticate
   - Withdraws
   - Localizes
   - Obey

2. Best verbal response
   - None
   - Incomprehensible
   - Inappropriate
   - Confused
   - Appropriate

3. Eye opening
   - None
   - To pain
   - To verbal command
   - Spontaneous

Remember, even a toaster has a GCS of 3!
Coma
(loss of consciousness)

Severe cerebral disfunction,
severe life threatening condition – development of

airway obstruction,
circulatory disorders
Coma, loss of consciousness
Causes

- **Damage of brain** – trauma, tumor, infection, abscesses ...
- **Lack of O2** – shock, bleeding, stroke, heart attack, poisoning, hypoxia ...
- **Lack of glucose** – diabetes
- **Epilepsy**
First Aid

- Check for **bleeding, chest trauma**, stop major blood loss
- Check for adequate **breathing, head tilt, freeing airway**
- If no breathing – **Airway Breathing Circulation - CPR**
- If adequate breathing – **maintain open airway**
- **Do not move the victim if not necessary**
Head injuries

**Due to:**
- violent forces to head
- acceleration, deceleration
- rapid head movement
- Large blood loss – intra, extracranially
- Bone fractures (skull, facial skeleton, bones, impressions)
- Damage of brain tissue
Head injury

- **Brain damage** – result in impaired consciousness
  - concussion of the brain /commotion/
  - brain contusion
  - brain laceration

**Problems:**
intracranial bleeding, brain swelling
Signs of serious damage

- Increasing drowsiness
- Worsening headache
- Confusion, strange behaviour, loss of memory
- Weak arms, legs
- Visual sensations, visual problems
- Blood or watery substance leakage from ears, nose
- Unusual breathing pattern
- Nausea, vomiting
Concussion = brain shake

- Temporal disturbance of brain activity
- No structural damage
- Signs – temporal confusion, loss of memory, occ. Vomitting, dizziness
- Full recovery
First aid concussion

- Check for vital signs, assess breathing
- Apply jaw thrust if necessary
- **Consider cervical spine injury**
- If loss of consciousness, call AMB.
- After recovery **watch for subsequent deterioration**
Contussion

- Brain tissue \textit{damage at the site of trauma + the opposite site}
- impaired consciousness, abnormal breathing pattern
- \textit{different pupil size (anisocory)}
The head strikes a hard object creating a concussion-type injury.
Rotational Forces
- Shearing
- Twisting

Coup ("blow")

Contrecoup ("counter-blow")
- Contusion
- Swelling
- Blood clots
Brain compression

- **Due to**
  - accumulation of blood (trauma, stroke)
  - accumulation of water - *Brain swelling*

- Symptoms can develop hours after injury
Intracranial bleeding

**Causes:**
- Hypertension
- Rupture of brain vessels aneurysm
- Trauma
- Tumours

**Consequences** – brain damage - loss of consciousness - inadequate breathing - hypoxia - brain swelling - intracranial pressure increase - decreased blood flow - brain hypoxia - damage to neurons - loss of functions - increase of oedema etc...

**Severe brain damage can lead to death**
Signs of brain compression

- Inadequate response
- Intense headache
- Slow breathing
- Slow pulse
- Unequal pupil size
- Half body weakness/paralysis
To do ...

- Do not allow eating, drinking
- Call for help
- Monitor vital signs
- **Maintain patent airway**
- **Stop major bleeding, treat big chest traumatism...**
- Don’t move with patient if it is not necessary!
skull base fractures
First AID – unconscious patient

- Check reactivity
- Check airway / adequate breathing
- Check for bleeding, chest trauma, stop massive bleeding
- No vital signs - CPR
- If breathing - recovery position (according to other trauma)
- Call for help
- Stay with the patient; control of vital functions!
First Aid  head injury

- **Stop external bleeding** by direct/ indirect
- **Unconscious** – adequate breathing – *stabilised position* - prevention of aspiration
- **Conscious** – elevated head, back
- **No oral intake**
- Regular *vital signs assessment*
- If possible – immobilisation of the head
- Always assume that there can be neck spine injury!
The brain has millions of nerve cells which control the way we think, move and feel.

The nerve cells do this by passing electrical signals to each other.

If these signals are disrupted, or too many signals are sent at once, this causes a seizure (sometimes called a ‘fit’ or ‘attack’).
Epilepsy

- a tendency to have seizures that start in the brain
- different types of epileptic seizures
Seizure triggers

- lack of sleep, stress, alcohol and flickering lights (called photosensitive epilepsy)
- can differ from person to person
First AID

- **Prevent further injury** (e.g. fall, head hitting etc.)

- During attack **monitor vital functions, eliminate seizure triggers**

- **Call AMB when:**
  - First seizure
  - Breathing disorder
  - Impaired consciousness more than 15min
  - High temp., small child,
  - Pregnancy
Spinal injury

- Life threatening if **cervical spine affected**, muscle paralysis
- **Bad manipulation can worsen the injury**
- Adequate FA is essential for good outcome
Damage of spinal cord causes loss of muscle strength and sensation below the injured area.
Causes of spinal injury

- Falling from a height
- Diving into shallow pool
- Falling from horse, motorbike
- Sudden deceleration
- Unusual movement
Causes of spinal cord injury

- Fragments of fractured vertebra cut spinal cord
- Intervertebral disc displacement – damage to cord by pressure
Lumbo-sacral Spinal Injury Following Spinal Manipulation

**Mechanism of Injury**

Manipulation of spine extrudes disc material into spinal canal

**Subsequent Condition**

- Lumbar vertebral body
- Intervertebral disc
- Cauda equina of spinal cord
- Extruded disc hemorrhage filling the entire spinal canal at L5-S1 level and compressing the cauda equina
- Sacrum

**Cauda Equina Syndrome**

Point of injury (L5-S1 level)

Symptoms including progressive loss of sensation in penis, rectum and down legs

**Cut-away view of lumbosacral spine**
Signs of spinal injury

- Pain
- Disorders of sensation, motoric disorders
- Incontinence or urine retention, priapism
- If unconscious - behave as if spinal injury present
First AID

- **No manipulation if not needed!**
  - If needed do it really carefully, no rotation of spine!

- **If awake** - try spontaneous movement, sensation.
- If unconscious - turn to back with no spine rotation
- Adequate transport
Thoracic, lumbar spine:
- no sitting!
- transfer at hard stretcher
- wait for and prefer professional transport using vacuum mat

Cervical spine:
- patient can have respiratory disorder!
- don‘t do rotation of cervical spine !!!! Hold the head in narrow position!
Positioning, transport

- **On the place of trauma:**
  1. check and secure vital functions
  2. stop major blood loss
  3. choose the right position for
     - first aid
     - transport
Getting out of a vehicle
One Man Transport
Two Men Transport
NOTE

By altering the carry so that both bearers face the casualty, it is also useful for placing him on a litter.

*Figure B-12. Continued.*
More aiders
POSITIONING
Recovery position
Thank you for your attention 😊