Physiological functions

This article has been translated from WikiSkripta; ready for the **editor's review**.

Basic physiological functions include:

1. consciousness,
2. maintaining a relatively constant body temperature,
3. maintaining a constant blood pressure,
4. heartbeat and pulse,
5. respiration.

Consciousness

Consciousness is a state in which the organism fully perceives stimuli and responds appropriately to them.

It is evaluated according to the actual orientation of the patient in space, place and time.

Disorders of consciousness

1. **Quantitative** = Violation of alertness, range of consciousness.
   - *Drowsiness* – orientation is preserved, the patient only has delayed reactions, he is sleepy, but he can be awakened by verbal or tactile stimuli.
   - *Sopor* - the patient reacts only to painful stimuli, he can be discussed for a short time, speech contact is not possible.
   - *Coma* - the patient cannot be awakened, he reacts to nociception (painful stimulus) only with defensive movement mechanisms.
   - *Shallow coma* - defensive reflexes preserved (danger of aspiration of mucus, vomit...).
   - *Syncope* (or fainting) - temporary, brief loss of consciousness, caused by insufficient blood flow to the brain.
2. **Qualitative** = violation of the content and clarity of consciousness in a normal state of wakefulness.
   - Obnubilation – gloomy states, the patient can perform senseless actions that he does not remember after thinking about them.
   - Delirium – restlessness, hallucinations, excitement, illusions.
   - Hallucination,
   - Bludy,
   - Amence – anxiety, helplessness, forgetfulness; an acutely occurring condition (short-term and transient – e.g. after surgery, with high fever).

We assess consciousness using stimuli - verbal, tactile (touch, shake), central stimulus (pinch). The quantitative state of consciousness can be assessed, for example, using the so-called Glasgow scale (3 categories, 3–15 points). Ways of responding to stimuli are scored:

- Verbal answer:
  - oriented
  - confused,
  - inappropriate words,
  - incomprehensible,
  - none.
- Eye opening:
  - spontaneously,
  - to address,
  - for pain,
  - will not open.
- Motor response:
  - movement on command,
  - targeted defense,
  - dodge,
  - flexion to a painful stimulus,
  - extension to a painful stimulus,
  - none.

Result:

- 3-8 points: Severe impairment of consciousness,
- 9-12 points: Moderate impairment of consciousness,
- 13-15 points: Mild disturbance of consciousness.

Rating according to the "five-point scale":

- 0 – the person communicates without problems.

- 1 – the person communicates with pauses.
- 2 – a person communicates little, understands everything.
- 3 – a person does not speak, sometimes understands.
- 4 – a person speaks but does not understand.
- 5 – the person does not speak and does not understand.

Body temperature

'*Body temperature* is affected by:

- Basal metabolism.
- Increased muscle activity.
- Increased body cell temperature.
- Hormones thyroid glands, adrenal glands.
- Mental processes.
- Age.
- Day time.
- Physical activity.

Regulation

- Sensors on the surface of the body and in the body.
- Hypothalamus (regulator of internal body temperature).
- Effector system (vasodilatation, vasoconstriction, sweating, shivering).

Measurement methods

- Axillary - in the armpit,
- oral - in the mouth (+0.3 °C),
- rectal – in the anus (+0.5 °C),
- vaginal – in the vagina (so-called basal),
- in the ear,
- on the skin.

Types of thermometers:

- glass (maximum, high-speed),
- chemical - single use,
- digital,
- ear - use the principle of reflection of infrared light,
- esophageal thermometer,
- thermometer on urinary catheter.

Rating

- *Subfebrile* - increased temperature (37-38 °C).
- *Febris* - fever (38-40 °C).
- *Hyperpyrexia* - temperature above 40 °C.
- *Hypothermia* - temperature below 35.5 °C.

Types of Fevers':

- *Febris continua* – persistent fever.
- *Febris remittens* - subsiding fever.
- *Febris intermittents* - intermittent fever.
- *Febris septica* – septic fever.
- *Febris recurrens* - recurring fever.
- *Febris undulans* - rolling fever.
- *Febris bifasica* - biphasic fever.

Temperature drop can be:

- lytic – gradual, or
- critical – fierce.

Blood pressure

🔎 *For more information see Blood pressure.*

'*Blood pressure* ***is the force exerted by the blood on the artery wall. A common assessment of blood pressure has two components: the*** *systolic* ***pressure and the*** *diastolic* pressure. The difference in values between systolic and diastolic pressure is referred to as *pressure amplitude*.

Blood pressure '*depends on these parameters*:

- volume of blood in the bloodstream,
- elasticity of the vascular wall,
- capillary lumen,
- viscosity of blood.

These parameters and thus blood pressure can be affected by various factors:

- by age,
- physical exertion,
- emotions,
- gender,
- daytime,
- body weight (obesity as a risk factor hypertension),
- medication,
- diseases of the heart, blood vessels,
- injuries,
- diseases of the nervous system,
- endocrine diseases and
- the environment.

BP measurement methods

🔎 *For more information see Blood pressure measurement.*

Blood pressure can be measured

- directly (invasive method), using a central venous catheter, a
- indirectly (non-invasive method), auscultation, palpation.

Rating

- *Normotension*

– 120/80 mmHg.

- *Mild hypertension* – 140/90 mmHg.
- *Central hypertension* – 160/100 mmHg.
- *Severe hypertension* – 180/110mmHg.
- *Hypotension* – 85/60mmHg.

Pulse

Pulse wave (pulse) is the impact of blood flow on the artery wall during systole. We distinguish between **peripheral *and*** *central* (apical) pulses.

One heart contraction physiologically expels approx. 70% of the volume of the heart (ejection fraction) into the bloodstream at rest. The heart thus pumps out 4-6 liters of blood in one minute at rest (minute cardiac output).

Factors affecting the pulse:

- Age.
- Gender.
- Physical exertion.
- Increased body temperature.
- Bleeding.
- Stress, fear, anxiety, Medicines.

Measurement locations

- a. carotid,
- a. temporalis,
- a. brachialis,
- a. radialis,
- a. femoralis,
- a. poplitea, a. tibialis posterior, a. dorsalis pedis.

'*Evaluation of the pulse* - according to frequency, fullness, regularity

1. **frequency**,
   - *Tachycardia* - over 90/min,
   - *Bradycardia* - below 60/min,
   - *Asystole* - disappearance of the pulse,
2. **pulse fullness (quality)**,
   - *pulsus durus* - hard,
   - *Mr. tardus* - slow, lengthy,

    - *Mr. mollitis* - soft,
    - *Mr. filiformis* - filamentous,
    - *Mr. parvus* – if there is a small difference between TKs and TKd,
    - *Mr. alternans* - weaker and stronger pulse waves,
3. **regularity (rhythm)**,
    - regular – regularis,
    - irregular – irregularis.

Breathing

- External / internal.
- Thoracic (costal) + abdominal (diaphragmatic).
- inhalation (inspirium) + exhalation (expirium).

Factors Affecting Respiration

- Age.
- Physical activity.
- Stress, fear, anxiety.
- Altitude.
- Medicines.
- Lifestyle.

Evaluation of breathing - according to breathing frequency, depth of breathing, regularity, character

1. **frequency**,
    - *eupnoea* - resting breathing - 15-20/ min.
    - *tachypnoea* - rapid breathing - over 25/ min.
    - *bradypnoea* - slow breathing - below 12/ min.
    - *apnea* - stop breathing,
2. **breathing depth**,
    - measurement spirometer,
    - *static and dynamic lung volumes:*
    - **Respiratory volume (RV)** - volume of one breath - 500ml.
    - **Vital lung capacity (VK)** - maximum exhalation after maximum inhalation - men 2500ml, women 2000ml.
    - **Inspiratory Reserve Volume (IRV)** - the volume of air that can be forcefully inhaled after a normal breath.
    - **Expiratory reserve volume (ERV)** - the volume of air that can be forcefully exhaled after normal exhalation.
    - **Residual volume** - the air that remains in the lungs after maximum exhalation - approx. 1200 ml.
3. **character of breathing**.
    - sound phenomena (whistling, bubbling...),
    - dyspnea (*dyspnoea*),
4. **regularity (rhythm)**,
    - regular – *regularis*,
    - irregular – *irregularis*.

Links

Related Articles

- Blood pressure • Systolic pressure • Diastolic pressure • Mean arterial pressure •Pressure amplitude
- Blood pressure measurement
- Body temperature
- Temperature measurement
- Body temperature measurement and evaluation

References

Links

Related articles

- Blood Pressure • Systsolic pressure • Diastolic pressure • Mean arterial pressure•Pressure amplitude
- Mean arterial pressure
- Body temperature
- Temperature measurement
- Measurement and assessment of body temperature

- Lecture by PhDr. Šárka Tomová, assistant at the Institute of Nursing, 2nd Faculty of Medicine, UK