Head of the Department of Anesthesiology and Reanimatology No.1 named after Valeriu Ghereg

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**TESTS FOR Vth YEAR STUDENTS**  
**(Anesthesiology, Reanimatology and Toxicology)**   
**FOR THE 2021-2022 ACADEMIC YEAR**

**FACULTY OF MEDICINE No.2**

General and locoregional anesthesia

1. (SC) Choose the meaning of the term „Analgesia”:
2. Lack of pain sensation
3. Lack of tactile sensation
4. Lack of thermal sensation
5. Muscle relaxation
6. Supressed consiouness

**Answer: a**

1. **(MC) Choose the** **monitoring techniques used during anesthesia:**
2. Capnometry
3. Cardiac output measurement
4. Electroencephalography
5. Nuclear Magnetic Resonance
6. Pulse oxymetry

**Answers: a, b, c, e**

1. **(MC) Choose the** **components of common hemodynamic response to a nociceptive stimulus:**
2. Arterial hypertension
3. Cardiac arrest
4. Hypothermia
5. Tachycardia
6. Tahyphylaxis

**Answers: a, d**

1. **(SC) Specify the meaning of the term „Capnography”:**
2. A method of measuring body oxygen metabolism
3. Cardiac output measurement
4. Graphycal registration of CO2 concentration in the exhaled air
5. Measurement of the global lung ventilation
6. Registration of the O2 hemoglobin saturation

**Answer: c**

1. (MC) Choose the the effects of Ketamine:
2. Cardiovascular depression
3. Increase in blood pressure
4. Increase in intracranial pressure
5. Hallucinations
6. Muscle relaxation

Answers: b, c, d

1. (SC) Choose the correct ratio of Morphine/Fentanyl analgesic potency:
2. 1:10
3. 1:50
4. 1:100
5. 1:200
6. 1:400

**Answer: c**

1. (SC) Choose the most potent analgesic:
2. Codeine
3. Fentanyl
4. Morphine
5. Omnoponum
6. Promedolum

Answer: b

1. (SC) Which of the following statements concerning barbiturates is not correct?
2. They cause sedation
3. They decrease muscular tonus
4. High doses of barbiturates can lead to miocardium depression
5. Hypnotic doses cause a transitory pulmonary hypoventilation
6. They increases respiratory minute volume

**Answer: e**

1. **(MC) Choose the processes associated with skeletal muscle cell depolarization:**
2. Decrease in intracellular chlorine ion concentration
3. Decrease in intracellular potassium concentration
4. Decrease in intracellular sodium concentration
5. Increase in intracellular potassium concentration
6. Increase in intracellular sodium concentration

Answers: b, e

1. (MC) Choose the effects of intravenous Ketamine administration:
2. Analgesia
3. Bradycardia
4. General anesthesia
5. Hypotension
6. Moderate increase in blood pressure

Answers: a, c, e

1. (MC) Choose the parameters that influence tissue uptake (absorbtion) of a local anesthetic:
2. Anesthetic concentration
3. Heart rate
4. Tissue blood flow (vascularisation)
5. Tissue solubility
6. Respiratory rate

Answers: a, c, d

1. (MC) Choose the complications assosiated with Lidocaine overdosage:
2. Convulsion
3. Cough
4. Central nervous system excitation
5. Loss of consciousness
6. Sharp abdominal pain

Answers: a, c, d

1. (MC) Choose the effects of Midazolam:
2. Amnesia
3. Anticoagulant effect
4. Anticonvulsant effect
5. Hypercoagulation
6. Hypnosis

Answers: a, c, e

1. (SC) The correct amount of Lidocaine contained in 100 milliliters of 1% solution is:
2. 10 mg
3. 100 mg
4. 1 gr
5. 10 gr
6. 100 gr

Answer: c

1. (MC) Choose the correct statements concerning Nitrous Oxide properties:
2. It provides analgesia
3. It increases the amount of thrombocytes
4. It induces hypnosis
5. It produces arterial hypertension
6. It induces cardiac arrhythmia

# **Answers: a, c**

# **(MC) Choose the correct statements concerning Propofol:**

1. It depresses the cerebral cortex
2. It has a long duration of action
3. It is an intravenous general anesthetic
4. It is metabolized rapidly
5. It stimulates the limbic system

Answers: a, c, d

1. (SC) Select the most precise meaning of the term „Epidural anesthesia”:
2. Local anesthetic is administered in the cerebrospinal fluid
3. Local anesthetic is administered in the epidural space
4. Local anesthetic is administered in the paravertebral zone
5. Local anesthetic is administered intramuscularly
6. Local anesthetic is administered intravenously

**Answer: b**

1. **(MC) Choose the methods of Local/Regional anesthesia:**
2. Intravenous administration of morphine
3. Local/topic application of the local anesthetic
4. Brachial plexus block
5. Tissue infiltration with local anesthetic
6. Inhalation of halotane

**Answers: b, c, d**

1. **(MC) Choose the three most common complications of Epidural anesthesia :**
2. Arterial hypotension
3. Arterial hypertension
4. Hyperventilation
5. Accidental dural puncture
6. Headache

**Answers: a, d, e**

1. **(MC) Choose the effects of Sodium thiopental:**
2. Respiratory center activation
3. Direct myocardial depression
4. Respiratory center depression
5. Arterial hypertension
6. Arterial hypotension

**Answer: b, c, e**

1. **(MC) Choose the effects of Succinylcholine:**
2. The duration of action is approximately 5-10 minutes
3. The duration of action is approximately 30 min
4. It increases serum potassium level
5. It produces postsynaptic membrane depolarization
6. It produces postsynaptic membrane hyperpolarization

Answers:a, c, d

1. (SC) Choose the correct statement concerning Pipercuronium bromide (Arduan):
2. The duration of action is approximately 5 minutes
3. It is a depolarizing neuromuscular blocking agent
4. It is a non-depolarizing neuromuscular blocking agent
5. It produces muscle pains
6. It induces hyperpotassemia

Answer: c

1. (MC) Choose the correct statements concerning Fentanyl:
2. It is more potent than Morphine
3. It is less potent than Morphine
4. The duration of analgesia is approximately 20-30 minutes
5. The duration of analgesia is 60 minutes
6. It is used for weaning the patient from anesthesia

Answers: a, c

1. (MC) Choose the correct statements concerning Droperidol:
2. It shows analgesic effect
3. It produces antiemetic effect
4. It is an anxiolytic
5. It is a neuroleptic (antipsychotic)
6. It has extrapyramidal side-effects

Answers: b, d, e

1. (MC) Choose the effects of Sodium Thiopental:
2. Respiratory center depression
3. It can produce bronchospasm
4. Arterial hypertension
5. Arterial hypotension
6. Hypnosis

**Answers: a, b, d, e,**

1. **(MC) Choose the effects of Ketamine:**
2. Dissociative anesthesia
3. Moderate increase in blood pressure
4. Hallucinations during the weaning from anesthesia
5. Arterial hypotension
6. Bronchospasm

**Answers: a, b, c**

1. **(MC) Choose the correct statements concerning Nitrous oxide:**
2. It can irritate upper airways
3. It provides analgesia
4. It provides hypnosis
5. It induces arterial hypertension
6. It can induce dillutionalhypoxia

**Answers: b, c, e**

1. **(MC) Choose the main types of receptors to which general anesthetics bind:**
2. Alpha 1 – adrenoreceptors
3. Beta 1 and 2 - adrenorecptors
4. Dopminergic
5. GABA
6. NMDA

**Answers: d, e**

1. **(MC) Choose the inhalation anesthetics:**
2. Desflurane
3. Enflurane
4. Etomidate
5. Halothane
6. Nitrous oxide

**Answers: a, b, d, e**

1. **(MC) Choose the volatile anesthetics:**
2. Sevoflurane
3. Etomidate
4. Isoflurane
5. Nitrous oxide
6. Xenon

**Answers: a, c**

1. **(MC) Choose the inhalation anesthetics that are gases:**
2. Enflurane
3. Etomidate
4. Halothane
5. Nitrous oxide
6. Xenon

**Answers: d, e**

1. **(MC) Choose contraindications to anesthesia with Barbituarates:**
2. Allergy to barbiturates
3. Bronchial asthma
4. Seizures
5. Arterial hypotension
6. Liver failure

**Answers: a, b, d, e**

1. **(SC)** T**he onset of hypnosis after Thiopental intravenous injection occurs in:**
2. 30-60 s
3. 5-8 min
4. 20 min
5. 30 min
6. 1 hour

**Answer: a**

1. **(MC) Choose the common side effects of Sodium Thiopental:**
2. Seizures
3. Cardiovascular depression
4. Respiratory depression
5. Vein irritation
6. Laryngeal spasm

**Answers: b, c, d, e**

1. **(MC) Choose the common side effects of Diazepam used as a general anesthetic:**
2. Bronchial spasm
3. Cardiovascular depression
4. Hallucinations during induction
5. Respiratory depression
6. Seizures

**Answers: b, d**

1. **(MC) Choose the local anesthetics:**
2. Buprenorphine
3. Cocaine
4. Dopamine
5. Lidocaine
6. Procaine

**Answers: b, d, e**

1. **(SC) Choose the drug that was** **first usedas**alocal anesthetic**:**
2. Cocaine
3. Lidocaine
4. Mepivacaine
5. Prilocaine
6. Procaine

**Answer: a**

1. **(SC) Choose the inhalation agent which can cause dillutional hypoxia:**
2. Diethyl Ether
3. Halotane
4. Isoflurane
5. Nitrous Oxide
6. Sevoflurane

**Answer: d**

1. **(SC) Choose the drug of choice for the treatment of seizures after a local anesthetic overdose:**
2. Diazepam
3. Droperidol
4. Fentanyl
5. Ketamine
6. Sodium oxybutyrate

**Answer: a**

1. **(SC)** **The reason of why the II-nd lead for ECG monitoring during anesthesia is used:**
2. Shows better the T wave
3. Shows better the ventricular (QRS) complex
4. Does not require grounding
5. Technically is easier to be performed
6. Shows better the P wave

**Answer: e**

1. **(MC) Choose the tissue layers that the needle must pass through when performing epidural anesthesia:**
2. Skin
3. Supraspinous ligament
4. Interspinous ligament
5. Intervertebral disk
6. Ligamentum flavum

**Answers: a, b, c, e**

1. **(MC) Choose the tissue layers that the needle must pass through when performing spinal anesthesia:**
2. Skin
3. Supraspinous and interspinous ligaments
4. Intervertebral disk
5. Ligamentum flavum
6. Dura mater

**Answers: a, b, d, e**

1. **(SC) Choose the correct location of epidural space:**
2. Between the dura mater and spinal cord
3. Between the intervertebral disk and ligamentum flavum
4. Between the ligamentum flavum and dura mater
5. Between the supraspinous and interspinous ligaments
6. Between the supraspinous and flavum ligaments

**Answer: c**

1. **(MC) Choose the correct statements concerning the subarachnoid space:**
2. Contains cerebrospinal fluid
3. Is a space between the arachnoid mater and pia mater
4. Is a space between dura mater and arachnoid mater
5. Is a space between the ligamentum flavum and intervertebral disk
6. Is a space between the ligamentum flavum and dura mater

**Answers: a, b**

1. **(SC) .Choose the structures the local anesthetic acts on in case of epidural anesthesia:**
2. Anterior grey horn
3. Spinal cord
4. The roots of spinal nerves
5. The motor fibers exclusively
6. The sensory fibers exclusively

**Answer: c**

1. **(MC) Choose the contraindications to spinal anesthesia**:
2. Hypovolemia
3. Infections of the skin at the puncture site
4. Patient’s refusal
5. Severe pain
6. Coagulation abnormalities

**Answerss: a, b, c, e**

1. **(MC) Choose the components of general anesthesia:**
2. Analgesia
3. Hypnosis
4. Hyperthermia
5. Muscle relaxation
6. Autonomic nervous system stability (Homeostasis)

**Answerss: a, b, d, e**

1. **(MC) Choose systemic side-effects of local anesthetics:**
2. Psychomotor agitation
3. Amnesia
4. Seizures
5. Allergic reactions
6. Drowsiness

**Answerss: a, c, d**

1. **(MC)** **Choose techniques used for local/regional anesthesia:**
2. Brachial plexus anesthesia
3. Inhaled halothane anesthesia
4. Intravenous anesthesia with Propofol
5. Infiltration anesthesia
6. Topical anesthesia

**Answers: a, d, e**

1. **(MC) Choose the local anesthetics:**
2. Cocaine
3. Dopamine
4. Lidocaine
5. Morphine
6. Procaine

**Answerss: a, c, e**

1. **(MC) Choose the local anesthetics with an ‘‘ester type’’ intermediate chain:**
2. Benzocaine
3. Bupivacaine
4. Lidocaine
5. Procaine
6. Tetracaine

**Answers: a, d, e**

1. **(MC) Choose the local anesthetics with an ‘‘amide type’’ intermediate chain:**
2. Bupivacaine
3. Lidocaine
4. Prilocaine
5. Procaine
6. Tetracaine

**Answers: a, b, c**

1. **(SC) Choose the local infiltration anesthesia technique:**
2. Administration of local anesthetic in the metaphyseal or epiphyseal bone region
3. Lubrication of the mucosa with local anesthetic
4. Layered tissue infiltration with local anesthetic
5. Intravenous injection of local anesthetic after applying the tourniquet
6. Perineural local anesthetic injection

**Answer: c**

1. **(MC) Choose the correct statements concerning the Tuffier'sline:**
2. Is an important landmark for the performance of epidural anesthesia
3. Is an important landmark for the performance of spinal anesthesia
4. Is a line drawn between opposite iliac crests
5. Crosses the vertebral column at the L4 level
6. Points on sciatic nerve root

**Answers: a, b, c, d**

1. **(MC) Choose the methods used for performing peripheral nerve blocks:**
2. Intravenous administration of contrast agent
3. Seldinger technique
4. Anatomical landmarks technique
5. Use of peripheral nerve stimulator
6. Ultrasound

**Answers: c, d, e**

1. **(MC) Choose the local/regional anesthesia benefits:**
2. Important hemodynamic effects
3. Minimal depressive effects on the respiratory centers
4. Preserved contact with the patient
5. The possibility of postoperative analgesia
6. Decreased rate of thromboembolic complications

**Answers: b, c, d, e**

1. **(MC) Choose the disadvantages of local/regional anesthesia:**
2. Minimal interference with respiratory function
3. Time consuming
4. The possibility of ineffective analgesia
5. Increased thromboembolic complications
6. Systemic toxicity

**Answers: b, c, e**

1. **(MC) Choose the drugs which can be used for spinal anesthesia:**
2. Bupivacaine
3. Dopamine
4. Diclofenac
5. Lidocaine
6. Mepivacaine

**Answers: a, d, e**

1. **(SC) Choose the correct meaning of Minimal Alveolar Concentration:**
2. Concentration of CO2 in the airway
3. Concentration of CO2 in the alveoli
4. O2 concentration in the alveoli
5. Parameter of the patient respiratory function
6. Criterion for comparing potency of inhalation anesthetics

**Answer: e**

1. **(MC) Choose the drugs that can trigger Malignant Hyperthermia:**
2. Diazepam
3. Halothane
4. Ketamine
5. Propofol
6. Succinylcholine

**Answers: b, e**

1. **(SC) Choose the drug of choice for the treatment of seizures (convulsion) after a local anesthetic overdose:**
2. Droperidol
3. Diazepam
4. Fentanyl
5. Ketamine
6. Nitroglycerin

**Answer: b**

1. **(SC) Choose the false statement concerning Succinylcoline:**
2. Is a a muscle relaxant
3. Produces depolarisation of postsynaptic membrane
4. Increases K+  blood concentration
5. Decreases the blood level of Na+
6. Fasciculations are common

**Answer: d**

1. **(MC) Choose the true statements concerning monitoring during anesthesia:**
2. SpO2 monitoring is mandatory
3. The complexity of monitoring depends only on surgery duration
4. The 2nd ECG lead is the most recommended lead
5. Temperature monitoring in all patients given general anesthesia lasting more than 30 minutes
6. Is not mandatory during local/regional anesthesia

**Answers: a, c, d**

1. **(SC) Choose the scale used for the evaluation of anesthesia risk:**
2. APACHE
3. Glasgow
4. SOFA
5. ASA
6. Baltazar

**Answer: d**

1. **(MC) Choose the predictive signs of difficult airways:**
2. III-IV Mallampati score
3. Neck stiffness and limited range of motion
4. Gapped teeth
5. Limited mouth opening
6. The distance between the thyroid cartilage and floor of the mouth < 3 fingers

**Answers: a, b, d, e**

1. **(MC) Choose the confirmation criteria of endotraheal tube placement:**
2. The presence of capnometric wave during manual ventilation
3. Bilateral rising of the chest during ventilation
4. The length from the alveolar ridge to the tip of the tube is 22 cm
5. Airway pressure <30 cm H2O
6. Presence of breath sounds bilaterally

**Answers: a, b, e**

1. **(SC) Choose the false statement concerning Nitrous oxide:**
2. Is used for both induction and maintainance of anesthesia
3. Can be used as monocomponent anesthesia because of analgesic and muscular relaxant effects
4. Is contraindicated during on-pump cardiac surgery
5. Air embolism is a possible complication in neurosurgical patients in sitting position
6. Can produce dilutional hypoxia if used for induction as a sole anesthetic

**Answer: b**

1. **(SC) Choose the false statement concerning Propofol:**
2. Is used for both induction and maintenance of anesthesia
3. Is used for continous sedation in ICU
4. Rapid onset of hypnotic effect
5. Minimal mental confusion on awakening
6. Does not produce any allergic complications

**Answer: e**

1. **(SC) Choose the false statement concerning bensodiazepine drugs as anesthetics:**
2. The most used drugs from this group are Diazepam and Midazolam
3. Preoperative administration has anxiolytic effect
4. Have an anti-seizure effect
5. Have an analgesic effect
6. Possess central muscle relaxant properties

**Answer: d**

1. **(MC) Choose the Suxamethonium-related side effects:**
2. Muscle pain
3. Malignant Hyperthermia
4. Cardiac rhythm disorders
5. Hypernatremia
6. Hyperkalemia

**Answers: a, b, c, e**

1. **(MC) Choose the Propofol-related side effects:**
2. Hyperthermia
3. Hypotension
4. Thrombophlebitis
5. Pain on injection
6. Respiratory depression

**Answers: b, c, d, e**

1. **(SC) Choose the false answer concerning Ketamine:**
2. Has an analgesic effect
3. Produces increase in systemic BP as a result of sympathomimetic effect
4. Increases cerebral blood flow
5. Is the most recommended drug for head trauma patients
6. Has minimal depressive effect on the respiratory system

**Answer: d**

1. **(MC) Choose the drugs used as hypnotics during anesthesia:**
2. Sodium thiopental
3. Fentanyl
4. Ketamine
5. Suxamethonium
6. Propofol

**Answers:a, c, e**

1. **(SC) Choose the drug that is not a non-depolarizing muscular blocking agent:**
2. Rocuronium
3. Atracurium
4. Mivacurium
5. Pancuronium
6. Suxamethonium

**Answer: e**

1. **(SC) Choose the false statement concerning capnometry:**
2. Is a method of measuring CO2 concentration in exhaled air
3. Its use during low-flow anesthesia is optional
4. The use of capnometry is recommended during cardiopulmonary resuscitation
5. Offers the possibility of early detection of CO2 reinhalation
6. Is a method for confirmation of proper endotracheal tube placement

**Answer: b**

1. **(SC) Choose the opioid antagonist:**
2. Pentazocine
3. Morphine
4. Codeine
5. Tramadol
6. Naloxon

**Answer: e**

1. **(MC) Choose the side effects related to synthetic opioids:**
2. High blood pressure
3. Itching
4. Constipation
5. Tachycardia
6. Nausea and vomiting

**Answers: b, c, e**

1. **(MC) Choose the infraglottic devices used for airway management:**
2. I-gel
3. Laryngeal mask
4. Guedel airway
5. Orotrachel tube
6. Tracheostomic tube

**Answers: d, e**

1. **(SC) Choose the recommended pressure in the cuff of endotracheal tube:**
2. 10-15 cmH2O
3. 5-10 mmHg
4. 20-30 cmH2O
5. 30-40 mmHg
6. 35-40 cmH2O

**Answer: c**

1. **(SC) Choose the false answer concerning Fentanyl:**
2. Its analgesic effect exceeds 100 times the analgesic effect of Morphine
3. Is a natural opioid
4. Is used for postoperative analgesia
5. Depresses respiratory center
6. Produces chest rigidity

**Answer: b**

1. **(MC) Choose the true affirmations concerning Sevoflurane:**
2. Is a liquid anesthetic agent used by inhalation
3. Is used for induction
4. Is a bronchodilator
5. Its cardiovascular effects are insignificant
6. Produces airway irritation

**Answers: a, b, c, d**

1. **(SC) Choose the local anesthetic with the longest duration of action:**
2. Lidocaine
3. Mepivacaine
4. Prilocaine
5. Procaine
6. Ropivacaine

**Answer: e**

1. **(SC) Choose the local anesthetic with the highest potency:**
2. Bupivacaine
3. Lidocaine
4. Mepivacaine
5. Prilocaine
6. Procaine

**Answer: a**

1. **(SC) Choose the local anesthetic with the longest onset of action:**
2. Levobupivacaine
3. Lidocaine
4. Mepivacaine
5. Prilocaine
6. Procaine

**Answer: a**

1. **(MC) Choose the two inhalation anesthetics with the lowest MAC (i.e. highest potency):**
2. Desflurane
3. Enflurane
4. Halothane
5. Isoflurane
6. Nitrous oxide

**Answers: c, d**

1. **(MC) Choose the two inhalation anesthetics with the highest MAC (i.e. lowest potency):**
2. Desflurane
3. Sevoflurane
4. Halothane
5. Isoflurane
6. Nitrous oxide

**Answers: a, e**

1. **(MC) Choose the main components of anesthesia machine:**
2. Anesthesia circuit
3. Pulse oximeter
4. Gas source and flowmeters
5. Vaporizer
6. Ventilator

**Answers: a, c, d, e**

1. **(MC) Choose the advantages of a low-flow anesthesia circuit:**
2. Conserves heat
3. Conserves humidity of the inhaled gases
4. Minimal environment pollution
5. Increases the cost of anesthesia
6. Required volume of anesthetic gases is low

**Answers: a, b, c, e**

1. **(MC) Choose the correct statements concerning Nitrous oxide:**
2. Can be used as sole anesthetic (monoanesthesia)
3. Causes airways irritation
4. Provides analgesia
5. Provides hypnosys
6. Effect develops slowly

**Answers: c, d**

1. **(MC)** **Choose the anesthetics which can be used for anesthesia induction:**
2. Halotane
3. Isoflurane
4. Nitrous oxide
5. Propofol
6. Sevoflurane

**Answers: a, c, d, e**

1. (**MC) Choose the common findings in an Elderly patient:**
2. Decreased cardiac output
3. Increased cardiac output
4. Increased glomerular filtration rate
5. Increase in total lung capacity
6. Lower tolerance to anesthetic drugs

Answers: a, e

1. **(SC) Choose the incorrect term:**
2. Brainstem spinal anesthesia
3. Combined intravenous-inhalation anesthesia
4. Combined spinal-epidural anesthesia
5. General anesthesia with muscle relaxation and mechanical ventilation
6. Monocomponent Halotane anesthesia

**Answer: a**

1. **(MC) Choose the drugs that are not local anesthetics:**
2. Bubrenorphine
3. Bupivacaine
4. Butorphanol
5. Cocaine
6. Lidocaine

**Answers: a, c**

1. **(SC) The wideness of epidural space at the L3-L4 level is:**
2. 0.4 – 0.8 millimeter
3. Over 1 centimeter
4. 4-8 millimeters
5. 10-20 millimeters
6. 15-25 millimeters

**Answer: c**

1. **(SC) Choose the drug used to reverse the benzodiazepine effect:**
2. Fentanyl
3. Morphine
4. Clonidine
5. Flumazenil
6. Cocaine

**Answer: d**

1. **(SC) Choose the drug used to reverse non-depolarizing neuromuscular blocking agents:**
2. Fentanyl
3. Neostigmine
4. Succinylcholine
5. Flumazenil
6. Mivacurium

**Answer: b**

1. **(SC) Choose the short acting non-depolarizing neuromuscular blocking agent:**
   * 1. Succinylcholine
     2. Pipecuronium
     3. Mivacurium
     4. Tubocurarine
     5. Pancuronium

**Answer: c**

**98.(MC) Choose the supra-glottic devices used for airway management:**

1. I-gel
2. Laryngeal mask
3. Guedel airway
4. Orotrachel tube
5. Tracheostomic tube

**Answers: a, b, c**

**Acute respiratory failure**

**1. (SC) Choose the anatomical structure which binds to the anterior edge of Epiglottis:**

1. Arytenoid cartilage
2. Corniculate-cuneiphorme cartilages
3. Crycoid cartilage
4. Thyroid cartilage
5. Vocal cords

**Answer: d**

**2. (MC) Choose the non-respiratory functions of the lung:**

1. Blood filter
2. Conversion of the angiotensin I to angiotensin II
3. Gas exchange
4. Participation in the acid-base balance
5. Participation in the hydro-ionic balance

**Answers: a, b, d, e**

**3. (MC) Choose the values of the PaO2/FiO2 ratio characteristic of ARDS:**

1. <100
2. <200
3. <300
4. >300
5. ═400

**Answer: a, b, c**

**4. (MC) Tick the clinical signs of Hypercapnic Respiratory Failure:**

1. Abdominal pain
2. Agitation
3. Dyspnea
4. Somnolence
5. Sweating

**Answers: c, d, e**

**5. (SC) Choose the statement that defines PaO2:**

1. Fraction of inspired O2
2. Oxygen content in arterial blood
3. Oxygen saturation of arterial blood
4. Partial pressure of O2 in arterial blood
5. Partial pressure of O2 in venous blood

**Answer: d**

**6. (MC) Choose the triggering factors of ARDS:**

1. Pleuritis
2. Pneumonia
3. Pulmonary contusion
4. Sepsis
5. Shock states

**Answers: b, c, d, e**

**7. (SC) Choose the statement that defines FiO2:**

1. Fraction of inspired O2
2. Oxygen content in arterial blood
3. Oxygen saturation of the arterial blood
4. Partial pressure of O2 in arterial blood
5. Partial pressure of O2 in venous blood

**Answer: a**

**8. (SC)Select the pathognomonic radiographic sign in ARDS:**

1. Basal infiltrates
2. Bilateral diffuse fluffy infiltrates
3. Hypertransparency
4. Movement of mediastinal structures
5. Unilateral pulmonary infiltrate

**Answer: b**

**9. (MC) Choose the effects of hyperventilation:**

* 1. Hypercapnia
  2. Hypocapnia
  3. Hypoxemia
  4. Metabolic acidosis
  5. Respiratory alcalosis

**Answers: b, e**

**10.** **(MC) Tick the pathophysiological mechanisms that lead to Acute Respiratory failure:**

1. Altered ventilation/perfusion ratio
2. Alveolar hyperventilation
3. Alveolar hypoventilation
4. Disorder of the alveolar-capillary diffusion
5. Intrapulmonary right-left shunt

**Answers: a, c, d, e**

**11. (SC) Choose the normal range for PaO2**:

1. <60 mmHg
2. 65-70 mmHg
3. 75-80 mmHg
4. 85-90 mmHg
5. 95-100 mmHg

**Answer: e**

**12. (SC) Tick the Tidal volume recommended for mechanical ventilation in patients with ARDS:**

1. 3ml/kg
2. 6 ml/kg
3. 10 ml/kg
4. 15 ml/kg
5. >15 ml/kg

**Answer: b**

**13. (MC) Choose the correct statements characterizing the O2 cascade:**

1. Alveolar pressure of O2 is influenced by water vapor pressure in the airways
2. It describes the process of increasing the atmospheric O2 partial pressure to the alveoli
3. It describes the process of increasing the O2 partial pressure from the atmosphere to the mitochondria
4. It describes the process of reduction of the O2 partial pressure from the atmospheric air to the mitochondria
5. Water vapor partial pressure in the airways increases alveolar O2 pressure

**Answers: a, d**

**14. (SC) Tick the acid-base balance disturbance induced by hypoventilation:**

1. Metabolic acidosis
2. Metabolic alkalosis
3. Respiratory acidosis
4. Respiratory alkalosis
5. Metabolic and respiratory alkalosis

**Answer: c**

**15. (SC) Tick the threshold PaO2 value that defines hypoxemia:**

1. 30 mmHg
2. 40 mmHg
3. 50 mmHg
4. 60 mmHg
5. 80 mmHg

**Answer: d**

**16. (MC) Choose the indications for tracheostomy:**

1. Bradypnea with respiratory rate = 8/min
2. Laryngeal edema or fracture
3. Laryngeal tumors
4. Lesions of cervical spine segment
5. Severe facial trauma

**Answers: b, c, d, e**

**17. (MC) Tick** **the effects of the positive end expiratory pressure (PEEP):**

1. it decreases PaO2/FiO2 ratio
2. it decreases intrapulmonary shunt fraction
3. it decreases venous return
4. it prevents alveolar collapse
5. it recruits atelectatic alveoli

**Answers: b, c, d, e**

**18. (MC) Tick the systemic effects of acute respiratory acidosis:**

1. Activation of the sympathetic system
2. Hypertension
3. Laryngospasm
4. Tachycardia
5. Tachypnea

**Answers: a, b, d,** **e**

**19. (MC) Choose the mechanisms contributing to hypercapnia:**

1. Alveolar hyperventilation
2. Alveolar hypoventilation
3. Increased CO2 concentration in the inhaled blend (reinhalation)
4. Increased dead space
5. Increased O2 concentration in breating air

**Answers: b, c, d**

**20. (MC) Tick the advantages of mechanical ventilation:**

1. it decreases the systemic oxygen demand
2. it decreases venous return in pulmonary oedema
3. it decreases the work of breathing
4. it increases venous return
5. Keeping O2 and CO2 values in arterial blood in the normal range

**Answers:** **a, b, c, e**

**21. (MC) Choose the nasal cannula characteristics:**

1. it allows 0.4 FiO2
2. it allows 0.7 FiO2
3. it allows feeding and communication
4. it irritates the mucosa
5. It is easily tolerated by the patient

**Answers: a, c, d, e**

**22. (MC) Tick the objectives of tracheal intubation:**

1. Achieving an appropriate extracorporeal oxygenation
2. Providing mechanical ventilation
3. Treatment of airway obstruction
4. Facilitating the oxygen therapy
5. Protection of the airways

**Answers: b, c, d, e**

**23. (MC) Choose the statements that are valid for hypoxemia:**

1. PaO2<60 mmHg
2. PaO2=95 mmHg
3. PaO2>90 mmHg
4. SaO2< 90%
5. SaO2>96%

**Answers: a, d**

**24. (MC) Tick the causes of hypoxia:**

1. Cardiac output = 1.5 l/min
2. Low content of the O2 in the arterial blood
3. PaCO2 = 45-50mmHg
4. PaO2 = 50 mm Hg
5. Severe anemia

**Answers: a, b, d, e**

**25. (MC) Specify the causes that induce hypoxemia:**

1. Changes in the ventilation-perfusion ratio
2. Decreased release of O2 to the tissue
3. Diffusion disorders in the alveolo-capillary membrane
4. Reduced O2 concentration of inspired air
5. Right-left shunt

**Answers: a, c, d, e**

**26. (SC) Tick the parameter that characterizes the severity of ARDS:**

1. PaCO2
2. PaO2/FiO2
3. PAO2/FiO2
4. PaO2/PvO2
5. PAO2-PaO2

**Answer: b**

**27. (MC) Tick the factors that influence the release of O2 to the periphery:**

a. Amount of 2,3 Bisphosphoglycerate

b. Body temperature

c. Level of serum proteins

d. O2 tissue consumption

e. pH

**Answers: a, b, d, e**

**28. (MC) Tick the effects induced by hypoxia:**

1. Metabolic acidosis
2. Metabolic alkalosis
3. Reduction of the ATP
4. The accumulation of lactic acid
5. The installation of anaerobic metabolism

**Answers: a, c, d, e**

**29. (MC) Choose the signs and symptoms ARDS can start with:**

1. Bradycardia
2. Dyspnea
3. Psychomotor agitation
4. Tachycardia
5. Tachypnea

**Answers: b, c, d, e**

**30. (MC) Choose the features characteristic of bronchial spasms:**

1. Extended inspiration
2. Extended inspiration and expiration
3. Increased work of breathing
4. Short inspiration and expiration
5. Short inspiration and extended expiration

**Answers: c, e**

**31. (MC) Tick the complications of mechanical ventilation:**

1. Barotrauma
2. Hypoglycemia
3. Polyuria
4. Pulmonary volutrauma
5. Ventilator-associated pneumonia

**Answers: a, d, e**

**32. (MC) Choose the statements characteristic of hypoxia:**

1. It can be induced by hypoxemia
2. It can develop at high altitude
3. It can develop at normal PaO2 values
4. It is a deficiency of oxygen in the tissue
5. It is not dependent on cardiac output

**Answers: a, b, c, d**

**33. (MC) Tick the manifestations induced by hyperventilation:**

1. Hypocapnia
2. Hypoxemia
3. Metabolic acidosis
4. Respiratory acidosis
5. Respiratory alkalosis

**Answers: a, e**

**34. (MC) Tick the features of the facial simple mask:**

1. it allows phonation
2. it does not require sedation
3. it ensures administration of 100% O2 (FIO2=1,0)
4. It is easily accepted by the patient
5. It may cause epistaxis

**Answers: a, b, d**

**35. (MC) Choose the true statements for ARDS:**

1. it induces hypoxemic respiratory failure
2. It is a consequence of increased alveolar-capillary membrane permeability
3. It is cardiogenic pulmonary edema
4. Represents non-cardiogenic pulmonary edema
5. The severity is determined by the PaO2/FiO2 ratio

**Answers: a, b, d, e**

**36. (MC) Choose the indications for mechanical ventilation:**

1. Increased work of breathing
2. PaO2/FiO2<200 mmHg
3. PaO2<60 mmHg on FiO2≥0,5
4. SaO2<90% on FiO2≥0,5
5. Tachycardia

**Answers: a, b, c, d**

**37. (MC) Tick the oxygentherapy complications:**

1. Acute lung injury
2. Atelectasis
3. Hyperventilation
4. Hypotension
5. Hypoventilation

**Answers: a, b, e**

**38. (MC) Choose the common causes of ARDS:**

1. Burns
2. Chronic renal failure
3. Hemorrhagic necrotic pancreatitis
4. Massive transfusion
5. Septic shock

**Answers: a, c, d, e**

**39. (MC) Tick the weaning from ventilator criteria:**

1. PaCO2>60 mmHg
2. PaO2>70mmHg on FiO2<0,4
3. PaO2/FiO2<200
4. PaO2/FiO2>200
5. SaO2>95% on FiO2<0,4

**Answers: b, d, e**

**40. (MC) Tick the causes of hypoxia:**

1. Hyperventilation
2. Intoxication with carbon monoxide
3. Low cardiac output
4. Severe anemia
5. Shock

**Answers: b, c, d, e**

**41. (MC)Choose the medications used in the management of airway obstruction:**

* 1. Dexamethasone
  2. Dopamine
  3. Salbutamol
  4. Terbutaline

1. Theophylline

**Answers: a, c, d, e**

**42. (MC)Choose the treatment of status asthmaticus:**

1. Administration of adrenaline
2. Administration of albuterol
3. Administration of antibiotics
4. Application of the Safar's triple maneuver
5. Oxygen therapy

**Answers: a, b, e**

**43. (MC)Tick the effects of severe hypoxia:**

1. Cardiac arrhythmias
2. Coma
3. Metabolic acidosis
4. Metabolic alkalosis
5. Myocardial ischemia

**Answers: a, b, c, e**

**44. (MC)Tick the consequences of hyperventilation:**

1. Hypocapnia
2. Hypoxemia
3. Metabolic acidosis
4. Respiratory acidosis
5. Respiratory alkalosis

**Answers: a, e**

**45. (MC) Tick the options characteristic of the anatomical dead space:**

1. It is the volume of air contained in the airways (oropharynx, trachea, bronchi)
2. It is the volume of air contained in the alveoli
3. It is the volume of air contained in the machine ventilation circuit
4. The normal value is 10% of the Tidal volume
5. The normal value is 30% of the Tidal volume

**Answers: a, e**

**46. (MC) Choose the alveolo-capillary gradient characteristics:**

1. It is used to diagnose the source of hypoxemia
2. It represents the difference between the alveolar and arterial O2 concentration
3. The normal value is 0-5 mmHg
4. The normal value is 5-10 mmHg
5. There is a difference between the arterial and venous concentration of O2

**Answers: a, b, d**

**47. (MC) Tick the factors that modify O2 arterial content (according to the formula):**

1. Amount of hemoglobin
2. Blood pressure
3. Lactate
4. Arterial oxygen saturation (SaO2)
5. The partial pressure of the O2 in the arterial blood (PaO2)

**Answers: a, d, e**

**48. (MC) Choose the parameters on which the delivery of O**2 **(according to the formula) depends:**

1. Arterial oxygen saturation
2. Heart rate (through cardiac output)
3. Serum hemoglobin concentration
4. Stroke volume
5. The partial pressure of CO2 in arterial blood

**Answers: a, b, c, d**

### 49. (SC) Choose the parameter for the evaluation of the severity of respiratory distress syndrome:

### Blood pressure

### FCC

### PaO2/FiO2

### PO2

### SpO2

**Answer: c**

### 50. (SC) Which collaborative intervention will you anticipate to a increasingly lethargic patient with hypercapnic respiratory failure, respiratory rate of 8 and SpO2 of 89%:

### Administration of oxygen by facial simple mask

### Administration of oxygen by non-rebreather mask

### Administration of oxygen by nasal cannula

### Endotracheal intubation and positive pressure ventilation

### Insertion of a tracheostomy tube

**Answer: d**

### 51. (SC) Choose the assessment information which will be of most concern when admitting a patient in possible respiratory failure with a high PaCO2:

### Disorders of consciousness

### Fatigability

### Sweating

### The patient's blood pressure is 160/90 mmHg

### The patient's SpO2 is 90%

**Answer: a**

### 52. (SC) After aortocoronary bypass, a patient develops increasing shortness of breath and hypoxemia. To determine whether the patient has ARDS or pulmonary edema caused by left ventricular failure, choose the main method of assessment:

### Arterial blood gases every 2 hours

1. Cardiac ultrasound
2. Inserting a pulmonary artery catheter
3. Positioning the patient for a chest radiograph
4. Spirometry

**Answer: b**

**53. (MC) Choose the diagnostic methods of respiratory distress syndrome:**

1. Chest radiograph with bilateral opacities not explained by effusions, lobar or lung collapse, or nodules
2. Impaired oxygenation, defined as a PaO2/FiO2 ratio of 300 mmHg or less
3. Onset within one week after the effect of a known pathological factor or new or worsening respiratory symptoms
4. Pulmonary wedge pressure>18 mmHg
5. Respiratory failure not explained by cardiac failure or fluid overload

**Answers: a, b, c, e**

**54. (MC) Tick the "direct injury" risk factors for ARDS:**

1. Burns
2. Pneumonia
3. Pulmonary contusion
4. Sepsis
5. Toxic inhalation

**Answers: b, c, e**

**55. (MC) Tick the "indirect injury" risk factors for ARDS:**

1. Acute hemorrhagic necrotic pancreatitis
2. Community acquired pneumonia
3. Major trauma
4. Multiple blood transfusions
5. Sepsis

**Answers: a, c, d, e**

**56. (MC) Choose the ventilator-associated pneumonia characteristics:**

1. It is a community-acquired infection
2. It is a nosocomial infection
3. It is defined by the presence of new or progressive pulmonary infiltrates
4. It starts 48-72 hours after the intubation
5. Pre-existing pulmonary pathology is a risk factor

**Answers: b, c, d, e**

**57. (MC) Choose the strategies for the prevention of ventilator-associated pneumonia:**

1. Awaken daily and assess readiness to wean and extubate
2. Elevate head of bed 30-45 degrees
3. Oral care
4. Stress ulcer disease prophylaxis
5. Using closed tracheobronchial circuit

**Answers: a, b, c, e**

**58. (SC) Choose the true definition of dead space:**

1. The volume of air contained in the alveoli
2. The volume of air contained by the respiratory system, not participating in gas exchange
3. The volume of air contained by the respiratory system, participating in gas exchange
4. The volume of air entering the lungs during a normal breathing in
5. The volume of air exhaled from the lungs during a normal breathing out

**Answer: b**

**59.** **(SC) Tick the** **normal value of the anatomic dead space:**

1. 1 ml/kg body weight
2. 2 ml/kg body weight
3. 5 ml/kg body weight
4. 8 ml/kg body weight
5. 10 ml/kg body weight

**Answer: b**

**60. (SC) Choose the statement defining Tidal Volume:**

1. The amount of air left in the lungs following a maximal exhalation
2. The amount of air someone is able to take in with a deep inhalation
3. The amount of air which enters the lungs during normal inhalation at rest
4. The amount of extra air exhaled during a maximal breath out
5. The volume of air inhaled or exhaled by the lungs for a minute

**Answer: c**

**61. (SC) Choose the common clinical manifestation occuring in pulmonary embolism:**

1. Bradycardia
2. Bradypnea
3. Dyspnea
4. Dysuria
5. Hypertermia

**Answer: c**

**62.** **(SC) Which of the following is suggested by Biot’s respiration:**

1. Angina crisis
2. Brain damage
3. Diabetic coma
4. Hyperventilation
5. Pneumonia

**Answer: b**

**63. (MC) Specify the causes of exacerbation of chronic obstructive pulmonary disease:**

1. Bacterial infections
2. Cessation of smoking
3. Polluted environment
4. unjustified interruption of chronic medication
5. Viral infections

**Answer: a, c, d, e**

**64. (MC) Choose the physiological events in COPD:**

1. Anxiety
2. Dyspnea
3. Oliguria
4. Hemoptysis
5. Chronic cough

**Answers: b, e**

**65. (MC) Tick the goals of sedation for patients on ventilator:**

1. Muscle relaxation
2. Providing analgesia
3. Reducing the consumption of O2
4. Reduction of bronchial secretions
5. Synchronization with the ventilator

**Answers: c, e**

**66. (MC) Choose the characteristics of non - rebreathing mask:**

1. It provides a FiO2 higher than 0,6
2. It has a O2 reservoir
3. It has no O2 reservoir
4. It has one-way valve
5. It provides a FiO2 up to 0,6

**Answers: a, b, d**

**67. (MC) Choose the first line recommended clinical examinations of a patient complaining of dyspnea:**

1. Acid-base balance
2. Bronchoscopy
3. Chest X-ray
4. Pulmonary scintigraphy
5. electrocardiogram

**Answers: a, c, e**

**68. (MC) Tick the clinical situations that can cause acute cough:**

1. Cystic fibrosis
2. Foreign body in the airway
3. Pneumonia
4. Pulmonary edema
5. Pulmonary embolism

**Answers: b, c, d, e**

**69. (MC) Choose the treatment options in acute asthma:**

1. Beta-blockers
2. corticosteroids
3. Nebulization with an anticholinergic
4. Nebulization with beta-2-agonists
5. Oxygen therapy

**Answers: b, c, d, e**

**70. (MC) Choose the medication used in the treatment of exacerbation of chronic obstructive pulmonary disease:**

1. Antibacterial drugs
2. Bronchodilators
3. Diuretics
4. Hypnotics
5. Systemic corticosteroids

**Answers: a, b, e**

**71. (MC) Tick the medication used to treat chronic obstructive pulmonary disease:**

1. Bromides
2. Fenoterol
3. Inhaled corticosteroids
4. Salmeterol
5. Theophylline

**Answers: b, c, d, e**

**72. (MC) Choose the indications for starting mechanical ventilatory support with endotracheal intubation:**

1. Bradypnea with respiratory rate <5/min
2. Hypertensive crisis
3. Inefficient noninvasive ventilation
4. Loss of protective pharyngeal reflexes
5. Spinal cord cervical level trauma

**Answers: a, c, d, e**

**73. (MC) Choose the ventilator withdrawal criteria:**

1. PaO2/FiO2 <200
2. PaO2/FiO2 >200
3. Respiratory rate <35/min
4. SpO2 <90%
5. Tidal volume >5ml/kg

**Answers: b, c, e**

**74. (MC) Tick the clinical signs that suggest spontaneous pneumothorax:**

1. Dyspnea
2. Fever
3. Gaillard Classic triad: hypersonic percussion, absence of breath sounds and vocal vibrations
4. Tracheal deviation away from the side of the injury
5. Violent, lateral thoracic pain

**Answers: a, c, d, e**

**75. (MC) Tick the oxygen therapy complications:**

1. Absorption atelectasis
2. Anorexia, nausea
3. Hypoventilation and CO2 narcosis
4. Retrolental fibroplasia in premature infants
5. Seizures

**Answers: a, c, d**

**76.**  **(SC) Tick the sign that does not require mechanical ventilation for a chronic obstructive pulmonary disease patient:**

1. Disorders of consciousness
2. PaCO2 >70 mmHg
3. PaO2 =60 mmHg
4. Respiratory decompensation
5. The absence of rapid improvement despite oxygen therapy

**Answer: c**

**77. (SC) Choose** **the specific method of diagnosis of pulmonary embolism:**

1. Chest computed tomography angiography
2. Chest X-ray
3. Computed tomography of the thoracic cavity without contrast
4. Pulmonary scintigraphy
5. Venous ultrasonography of the lower extremities

**Answer: a**

**78. (MC) Tick the pathological conditions presenting expiratory dyspnea with wheezing and/or bronchial rales:**

1. Acute pneumonia
2. Acute pulmonary edema
3. Decompensation of chronic obstructive pulmonary disease
4. Pneumothorax
5. Pulmonary embolism

**Answers: b, c**

**79. (CS) Tick the clinical sign whicn is not characteristic of asthma crisis:**

1. anxiety
2. bradypneea with inspiratory dyspnea
3. cough
4. expiratory dyspnea
5. wheezing

**Answer: b**

**(SC) 80. Choose the false statement concerning pulmonary embolism:**

1. Deep vein thrombosis is the most frequent cause of pulmonary embolism
2. Hypercoagulability is a risk factor
3. It is a congenital disease
4. It is caused by the migration of an embolus in the pulmonary arterial circulation
5. Risk factors are long tubular bone fractures

**Answer: c**

**81. (MC) Tick the indications for ventilatory support initiation in acute respiratory failure:**

1. PaCO2 >70 mmHg
2. PaO2/FiO2 <100
3. Profuse sweating
4. Respiratory rate >25/min
5. Respiratory muscles fatigue

**Answers: a, b, d, e**

**82. (SC) Choose the pathology characterized by hypoxemia with hypercapnia:**

1. Acute pulmonary edema
2. Decompensation of chronic obstructive pulmonary disease
3. Lung cancer
4. Pulmonary embolism
5. Renal impairment

**Answer: b**

**83. (SC) Tick the clinical sign not suggestive of airway obstruction by an inhaled foreign body:**

1. Hyperresonance at the percussion
2. Inspiratory dyspnea
3. Intercostal recession
4. Stridor
5. Uncompromised phonation

**Answer: a**

**(SC) 84. Choose the term that defines the volume of air inspired/expired during respiration at rest:**

1. Tidal volume
2. Dead space volume
3. Residual capacity
4. Residual volume
5. Vital capacity

**Answer: a**

**85. (MC) Tick the signs and symptoms specific to status asthmaticus:**

1. Anxiety with air hunger
2. Chest hyperinflation
3. Jugular turgidity in expiration
4. Stridor
5. Wheezing

**Answers: a, b, c, e**

**86. (SC) What is the O2 concentration in inspired atmospheric air:**

1. 15-16%
2. 21%
3. 24%
4. 35%
5. 50%

**Answer: b**

**87. (SC) Tick the statement which does not characterize acute respiratory distress syndrome:**

1. Chronic respiratory impairment can be a complication of acute respiratory distress syndrome
2. It is a cardiogenic-type pulmonary edema
3. It is characterized by acute onset
4. The cause may be pulmonary and/or systemic
5. The death rate varies between 25-55%

**Answer: b**

**88. (SC) Tick the typical clinical sign for pneumothorax:**

1. Bradypnea
2. Headache
3. Hypersonic percussion
4. Thorax emphysematous
5. Wheezing

**Answer: c**

**89. (SC) Choose the parameter estimated by pulse oximetry:**

1. Arterial oxygen saturation
2. Cardiac output
3. O2 partial pressure in arterial blood
4. Pulmonary capillary occlusion pressure
5. Vascular resistance

**Answer: a**

**90. (MC) Choose the effects of hypercapnia:**

1. CNS depression at high PaCO2
2. Cerebral vasoconstriction due to cerebral hypoxia
3. Cerebral vasodilation and increase in intracranial pressure
4. Activation of sympathetic nervous system with tachycardia, vasoconstriction
5. Stimulation of ventilation via chemoreceptors

**Answers: a, c, d, e**

**Monitoring cardiovascular function. Acute heart failure.**

**1. (SC) The relation between an increase of the stroke volume of the heart in response to an increase in the volume of blood** **is called:**

a. "Frank-Starling" law

b. "Otto Frank" law

c. "Starling-Pappenheimer-Staverman" law

d. "Laplace" law

e. "Hilton's" law

**Answer: a**

**2. (SC) Cardiac output is:**

1. Blood volume ejected by heart during systole
2. Blood volume ejected by heart per 1 minute
3. Total circulating blood volume
4. Blood volume divided by the body surface area
5. Blood volume divided by the body weight

**Answer : b**

**3. (SC) Levosimendan is:**

a. a beta-blocker

b. a angiotensin converting enzyme inhibitor

c. an antiarrhythmic drug

d. dopamine receptor agonist

e. a positive inotrope

**Answer: e**

**4. (SC) Pulmonary capillary wedge pressure (PCWP) reflects indirectly:**

1. Left atrium pressure
2. Right atrium pressure
3. Right ventricle pressure
4. Left ventricle pressure
5. Pulmonary artery pressure

**Answer: a**

**5. (SC) In a patient with increased systemic vascular resistance and high blood pressure the drug of choice is:**

1. Vasodilator
2. Vasopressor
3. Diuretic
4. Beta-blocker
5. Fluids

**Answer: a**

**6. (SC) In a patient with hypotension and decreased systemic vascular resistance the drug of choice is:**

1. Norepinephrine
2. Epinephrine
3. Dopamine
4. Dobutamine
5. Nitroglycerin

**Answer: a**

**7. (MC) Systemic vascular resistance is increased in the following types of shock:**

1. Cardiogenic
2. Hypovolemic
3. Septic
4. Neurogenic
5. Anaphylactic

**Answers: a, b**

**8. (MC) Systemic vascular resistance is increased in:**

1. Hypovolemic shock
2. Adrenal insufficiency
3. Acute hemorrhagic pancreatitis
4. Anaphylactic shock
5. Pain, anxiety

**Answers: a,e**

**9. (MC) Systemic vascular resistance is decreased in:**

1. Septic shock
2. Acute pancreatitis
3. Liver cirrhosis
4. Neurogenic shock
5. Hypovolemic shock

**Answers: a, b, c, d**

**10. (MC) Cardiac failure with an elevated cardiac output can be seen in:**

1. Chronic anemia
2. Arteriovenous fistula
3. Acute myocardial infarction
4. Patients with sepsis after fluid resuscitation
5. Hyperthyroidism

**Answers: a, b, d, e**

**11. (MC) Choose common causes of left ventricle failure:**

1. Acute myocardial infarction
2. Aortic dissection
3. Air embolism
4. Mitral valve insufficiency
5. Aortic valve stenosis

**Answers: a, b, d, e**

**12. (MC) Choose causes of right ventricle failure:**

1. Aortic valve stenosis
2. Pulmonaryembolism with blood clots
3. Pulmonaryairembolism
4. Amniotic fluid embolism
5. Mechanical ventilation with excessive positive pressure

**Answers: b, c, d, e**

**13. (SC) Choose the cause of global (biventricular) cardiac failure:**

1. Myocarditis
2. Aortic valve stenosis
3. Pulmonary artery embolism
4. Mechanical ventilation
5. Massive pleural effusions

**Answer: a**

**15. (MC) Dyastolic cardiac failure caused by external compression can be produced by:**

1. Pericardial calcifications or effusions
2. Tension pneumothorax
3. Large amounts of fluid in the pleural space
4. Large acute myocardial infarction
5. Mechanical ventilation

**Answers: a, b, c**

**16. (MC) Choose components of cardiac output:**

1. Preload
2. Afterload
3. Heart rate
4. Contractility
5. Tidal volume

**Answers: a, b, c, d**

**17. (MC) What is preload:**

1. The length of myocardial fibers at the end of diastole
2. ventricular end- diastolic volume
3. ventricular end-diastolic pressure
4. Venous return to the heart
5. Resistance of the blood vessels to blood flow

**Answers: a, b, c**

**18.** **(SC) Choose the correct statement concerning central venous pressure:**

a. it is the pressure in the inferior vena cava

b. it is the pressure in the venous system, near to the heart

c. it is not influenced by intrathoracic pressure

d. it is determined by the left ventricle

e. it is an indicator of cardiac contractility

**Answer: b**

**19. (MC) What is afterload?**

1. Tension in the ventricular wall during ejection
2. End-diastolic sarcomere length
3. End-diastolic ventricular volume
4. The amount of resistance the heart must overcome to open the aortic valve
5. Resistance to the blood flow in the major vessels

**Answers: a, d**

**20. (MC) Afterload is influenced by:**

1. Pleural pressure
2. Vascular impedance and resistance
3. Preload
4. Degree of aortic valve stenosis
5. Contractility

**Answers: a, b, c, d**

**21. (MC) Choose the true statement concerning the relation between heart rate and cardiac output:**

1. In healthy individuals the maximal cardiac outputis achieved at a HR of 140 bpm
2. Cardiac outputgradually decreases from 140 to 180 bpm
3. Heart rate greater than 180 bpm can cause ventricular fibillation
4. In cardiac failure cardiac output decreases at a HR of 120 bpm
5. In healthy individuals the maximal cardiac output is achieved at a heart rate of less than 45 bpm

**Answers: a, b, c, d**

**22. (MC) A hypotensive patient (BP=100/40 mmHg, MAP= 60 mmHg), with a heart rate of 110 bpm, warm skin and a short capillary refill time has:**

1. Increased cardiac output
2. Low cardiac output
3. Decreased systemic vascular resistance
4. Increased systemic vascular resistance
5. Increased stroke volume

**Answers: a, c, e**

**23. (MC) A hypotensive patient (BP= 80/65 mmHg, MAP = 70 mmHg), with a heart rate of 110 bpm, cold skin and increased capillary refill time has:**

1. Increased cardiac output
2. Low cardiac output
3. Decreased systemic vascular resistance
4. Increased systemic vascular resistance
5. Increased stroke volume

**Answers: b, d**

**24. (MC) The management of a patient undergoing cardiac surgery in perioperative period includes :**

1. Hyperbaric oxygen therapy
2. Oxigenotherapy
3. Nutritional support
4. Analgesia and sedation
5. Prophylactic medication (antibiotics, anticoagulants, antiagregants)

**Answers: b, c, d, e**

**25. (MC) Bradycardia requires the treatment when:**

1. HR ≤35 bpm, irrespective to blood pressure
2. HR ≤35 bpm, with hypotension
3. HR ≤50 bpm, irrespective to blood pressure
4. HR ≤50 bpm, with hypotension
5. HR >50 bpm, with normal blood pressure

**Answers: a, d**

**26. (MC) Patients with bradycardia should be assesed for:**

1. Potassium blood level
2. Thyroid hormone (hyperthyroidism identification)
3. Thyroid hormone (hypothyroidism identification)
4. Chronic beta-mimetic therapy
5. Chronic beta blocker therapy

**Answers: a, c, e**

**27. (MC) A patient with cardiac failure and arterial hypotension or low systemic vascular resistance is treated with vasopressors. The target values for systolic blood pressure and systemic vascular resistance are:**

1. systolic blood pressure= 70 mmHg
2. systolic blood pressure = 100 mmHg
3. systemic vascular resistance >2400 dyne·s·cm-5/m2
4. systemic vascular resistance > 1600 dyne·s·cm-5/m2
5. systolic blood pressure > 140 mmHg

**Answers: b, d**

**28. (MC) Vasodilators are indicated in:**

1. High systemic vascular resistance
2. Low systemic vascular resistance
3. Patent with arterial hypertension (systolic blood pressure>140 mmHg or MAP>100 mmHg)
4. Systolic blood pressure = 100 mmHg
5. Mean arterial pressure = 55 mmHg

**Answers: a, c**

**29.** **(MC) Choose the drugs that could be administered to patients with high systemic vascular resistance (>2400 dyne·s·cm-5/m2) or arterial hypertension (systolic blood pressure >140 mmHg or PAM >100 mmHg):**

1. Norepinephrine
2. Nifedipine
3. Epinephrine
4. Sodium Nitroprusside
5. Efedrine

**Answers: b, d**

**30. (MC) The purposes of cardiovascular function monitoring in anesthesia and intensive care are:**

1. Monitoring all possible parameters
2. Ensuring that the tissue perfusion is enough in patient considered "relatively stable"
3. Early detection of inadequate tissue perfusion
4. Titrating therapy to specific hemodynamic target in unstable patients
5. Identification of hemodynamic patterns

**Answers: b, c, d, e**

**31. (SC) Choose the normal value of central venous pressure (CVP):**

1. <0 mmHg
2. ±5 mmHg
3. 0-8 mmHg
4. 18-20 mmHg
5. >20 mmHg

**Answer: c**

**32. (SC) Normal value of Pulmonary Capillary Wedge Pressure (PCWP) is:**

1. 0 mmHg
2. < 5 mmHg
3. 5-12 mmHg
4. 18-20 mmHg
5. >20 mmHg

**Answer: c**

**33. (MC) Choose the correct statements concerning intra-aortic balloon pump counterpulsation:**

1. the balloon is inserted through the femoral artery
2. the proximal part of the balloon is placed above the renal arteries
3. the distal part of the balloon is close to the left atrium
4. the balloon is inflated with helium during systole
5. the balloon is inflated during diastole

**Answers: a, b, e**

**34. (MC) Intraaortic balloon pump is used to increase :**

1. brain perfusion
2. cardiac perfusion
3. mesenteric perfusion
4. hepatic perfusion
5. renal perfusion

**Answers: a, b**

**35.** **(MC) Choose the typical suggestive clinical signs of acute coronary syndrome:**

1. Chest pain that lasts less than 20 min
2. Chest pain that lasts more than 20 min
3. Retrosternal pain that radiates to the left shoulder or arm
4. Dyspnea
5. wheezing

**Answers: b, c, d**

**36. (MC) Choose the drugs used in the treatment of acute coronary syndrome:**

1. Aspirin
2. Ketorolac
3. Morphine
4. Epinephrine
5. Propranolol

**Answers: a, c, e**

**37. (MC) Which findings are useful for the diagnosis of acute coronary syndrome:**

* + 1. ST elevation> 1 mm in 2 or more leads
    2. Positive T Troponin
    3. Retrosternal pain
    4. Positive D-dimer
    5. Elevated serum lactate dehydrogenase levels

**Answers: a, b, c**

**38. (MC) Choose complications of acute coronary syndrome:**

* + 1. Right bundle branch block of His
    2. Cardiogenic shock
    3. Ventricular fibrillation
    4. Pulmonary edema
    5. Sudden death

**Answers: b, c, d, e**

**39. (SC) Choose the first line pharmacologic agent for the** **treatment of pain in acute coronary syndrome:**

1. Nimesulid
2. Fentanyl
3. Tramadol
4. Paracetamol
5. Morphine

**Answer: e**

**40. (MC) Choose the correct statements regarding morphine:**

* + 1. it decreases left ventricular preload
    2. it decreases left ventricular afterload
    3. it is the first line pharmacologic agent for the treatment of pain in acute coronary syndrome
    4. it increases respiratory rate
    5. it dilates coronary arteries

**Answers: a, b, c, e**

**41. (MC) Choose the complications of acute myocardial infarction:**

* + 1. Cardiogenic shock
    2. Ventricular fibrillation
    3. Pulmonary edema
    4. Mesenteric thrombosis
    5. Pulmonary embolism

**Answers: a, b, c**

**42. (MC) In cardiogenic shock is characterized by:**

1. Peripheral vasoconstriction
2. Peripheral vasodilation
3. Sustained hypotension (systolic blood pressure < 90 mm Hg for at least 30 minutes)
4. Reduced cardiac index (<1.8 l/min/m2 without support)
5. Elevated Pulmonary Capillary Wedge Pressure (PCWP> 18 mm Hg)

**Answers: a, c, d, e**

**43.** **(MC) The causes of cardiogenic shock are:**

* + 1. Anterior wall myocardial infarction
    2. Left ventricular hypertrophy
    3. Acute mitral insufficiency
    4. Ventricular septal rupture
    5. Left bundle branch block

**Answers: a, c, d**

**44. (MC) The causes of acute atrial fibrillation may be:**

* + 1. Pulmonary embolism
    2. Valvular heart diseases
    3. Drug use
    4. Myocarditis
    5. Hypervolemia

**Answers: a, b, c, d**

**45. (MC) The first line treatment of atrial fibrillation are:**

* + 1. Immediate cardioversion
    2. Amiodarone
    3. Beta-blockers
    4. Procainamide
    5. Lidocaine

**Answers: b, d**

**46. (SC) Choose first line treatment for patients with regular narrow complex ventricular tachycardia and hemodynamic instability:**

* + 1. Immediate cardioversion
    2. Amiodarone
    3. Beta-blockers
    4. Procainamide
    5. Lidocaine

**Answer: a**

**47. (MC) The causes of acute diastolic heart failure are:**

* + 1. Open pneumothorax
    2. Aortic stenosis
    3. Tachycardia
    4. Cardiac ischemia
    5. Artificial ventilation with increased positive end-expiratory pressure

**Answers: b, c, d, e**

**48. (MC) Choose the components of oxygen delivery formula:**

* + 1. Hemoglobin (Hb)
    2. Oxygen consumption (VO2)
    3. Cardiac output (CO)
    4. The partial pressure of oxygen in arterial blood (PaO2)
    5. Systemic vascular resistance (SVR)

**Answers: a, c, d**

**49. (MC) Which statements regarding afterload are true?**

1. it is the myocardial parietal tension during diastole
2. it is the myocardial parietal tension during systole
3. it is determined by atrial blood volume
4. it is the amount of resistance the heart must overcome to open the aortic valve
5. it is equivalent to systemic vascular resistance

**Answers: b, d, e**

**50. (MC) The non-invasive or minimally invasive techniques for hemodynamic monitoring are:**

* + 1. Echocardiography
    2. Thoracic Electrical Bioimpedance
    3. Swan-Ganz catheter
    4. Transesophageal Doppler
    5. PiCCO (Pulse Contour Cardiac Output)

**Answers: a, b, d, e**

**51. (MC) Choose the short-acting beta-blockers:**

* + 1. Propranolol
    2. Atenolol
    3. Esmolol
    4. Labetolol
    5. Metoprolol

**Answers: c, d**

**52. (MC) High systemic vascular resistance is observed in:**

* + 1. Liver cirrhosis
    2. Hypovolemic shock
    3. Mechanical ventilation
    4. Pain
    5. Norepinephrine infusion

**Answers: b, d, e**

**53. (MC) Low systemic vascular resistance is observed in:**

* + 1. Severe traumatic brain injury
    2. Sepsis
    3. Cardiogenic shock
    4. Anaphylactic shock
    5. Neurogenic shock

**Answers: a, b, d, e**

**54. (MC) Low systemic vascular resistance is observed in:**

* + 1. Hypovolemic shock
    2. Acute pancreatitis
    3. Cardiogenic shock
    4. Cirrhosis
    5. Anxiety

**Answers: b, d**

**55. (MC) Which statements are correct concerning torsade de pointes ?**

* + 1. QT ≥500ms
    2. it can develop into ventricular fibrillation
    3. may degenerate into atrial fibrillation
    4. the treatment is cardioversion
    5. it can be treated with 1-2 g slow intravenous administration of MgSO4

**Answers: a, b, d, e**

**56. (MC) Choose life-threatening arrhythmia:**

* + 1. Second-degree atrioventricular block
    2. Supraventricular tachycardia
    3. Ventricular tachycardia
    4. Torsade de pointes
    5. Sinus bradycardia

**Answers: b, c, d**

**57.** (**SC) Choose the extracardiac factor which does not contribute to acute heart failure:**

* + 1. Hypervolemia
    2. Alcohol abuse
    3. Renal dysfunction
    4. Hyperkinetic syndrome (anemia, fever)
    5. Decreased lung compliance

**Answer: e**

**58. (SC) Choose the most probable diagnosis for a patient with systolic blood pressure = 70 mmHg, cardiac output=1,5 l/min, pulmonary capillary wedge pressure > 22 mmHg, urine output <0.5 ml/kg body:**

* + 1. Decompensated chronic heart failure
    2. severe hypovolemia
    3. Cardiogenic shock
    4. Heart failure
    5. Right- sided heart failure

**Answer: c**

**59. (MC) Negative prognostic factors associated with acute heart failure are:**

* + 1. Hypovolemic shock
    2. Myocardial infarction
    3. Hyponatremia
    4. Kidney failure
    5. Hypotension

**Answers: b, c, d, e**

**60. (MC) Choose the aggravating factors of heart failure:**

a. Myocardial ischemia

b. Infections

c. Superficial thrombophlebitis

d. Excess dietary sodium

e. Diuretic therapy

**Answers: a, b, d**

**61. (MC) Choose the indications for intra-aortic balloon pump:**

1. Aortic dissection
2. Cardiogenic shock
3. Cardiomyopathies
4. Refractory left ventricle failure
5. Abdominal aortic aneurysm

**Answers: b, c, d**

**62. (MC) Choose precipitating factors of heart failure:**

a. Myocarditis

b. Atrial fibrillation

c. Anemia

d. Diaphragmatic paralysis

e. Hyperthyroidism

**Answers: a, b, c, e**

**63. (MC) Choose the contraindications for intra-aortic balloon pump :**

1. Aortic dissection
2. Cardiogenic shock
3. Cardiomyopathies
4. Aortic regurgitation
5. Abdominal aortic aneurysm

**Answers: a, d, e**

**64. (MC) Precipitating factors leading to heart failure include:**

a. The altitude (> 3000 m)

b. Ventricular fibrillation

c. Anemia

d. Hypothyroidism

e. Corticosteroids

**Answers: a, c, d, e**

**65. (MC) What receptors does dobutamine act?**

a. Alpha 1

b. Alpha 2

c. Beta 1

d. Beta 2

e. Beta 3

**Answers: a, c, d**

**66. (MC) Choose the drugs that improve the survival in acute heart failure:**

a. angiotensin-converting-enzyme inhibitor

b. Beta-blockers

c. Angiotensin receptor blockers

d. Digoxin

e. Furosemide

**Answers: a, b, c**

**67. (MC) The treatment of acute heart failure includes:**

a. Cardioversion

b. Dobutamine

c. Levosimendan

d. intra-aortic balloon pump

e. Dopamine

**Answers: b, c, e**

**68. (SC) The most specific and sensitive biochemical marker for detecting acute ischemia/myocardial necrosis is:**

a. Atrial natriuretic peptide

b. Lactate dehydrogenase

c. D-dimers

d. Troponins T and I

e. C-reactive protein

**Answer: d**

**69. (SC) Wha is the biochemical marker of heart failure?**

a. Troponins T and I

b. D-dimers

c. B-type natriuretic peptide (BNP)

d. C-reactive protein

e. TNF-alpha

**Answer: c**

**70.  (MC) Noncoronary causes of increased serum troponins are:**

a. Contusion of the liver

b. Cardiac contusion

c. Myocarditis

d. Cardioversion

e. Chemotherapy-induced cardiotoxicity

**Answers: b, c, d, e**

**71. (SC) Troponins T and I are the parts of the following class of markers:**

a. Interstitial matrix remodeling

b. Neurohumoral

c. Oxidative stress

d. Inflammation

e. Myocyte injury

**Answer: e**

**72. (SC)The most sensitive** **early marker for** **myocardial infarction is:**

a. Myoglobin

b. Troponins

c. CK-MB

d. LDH

e. Myeloperoxidase

**Answer: a**

**73. (SC) The classes of biomarkers in patients with acute heart failure are:**

a. Myocyte injury markers

b. Interstitial matrix remodeling markers

c. Viral markers

d. Tumor markers

e. Hepatic markers

**Answer: a**

**74. (MC) To make diagnosis of acute heart failure the following diagnostic methods are used:**

a. Transesophageal echocardiography

b. Exercise Stress Echocardiography

c. Intra-aortic balloon pump

d. Coronarography

e. Electrocardiography

**Answers: a, d, e**

**75. (MC) Heart failure in sepsis is manifested by:**

a. Increased cardiac output

b. Increased heart rate

c. Decreased heart rate

d. Ejection fraction below 35%

e. Increased vascular resistance

**Answers: a, b**

**76. (MC) Choose ECG changes that suggest etiology of heart failure:**

a. Signs of ischemia/injury

b. Prolongation of QRS ≥ 130 ms

c. Wall motion abnormalities

d. Arrhythmias and conduction disorders

e. Low voltage

**Answers: a, b, d, e**

**77. (MC) In heart failure:**

a. chest x-ray identify size and shape of the cardiac silhouette

b. chest radiography may diagnose pulmonary edema

c. cardiothoracic ratio is a useful index of cardiac size evaluation

d. In mild heart failure pleural fluid can occur

e. In severe heart failure atelectasis occurs

**Answers: a, b, c**

**78. (SC) Choose factors that inluence calculation of the cardiac output:**

a. Systemic vascular resistance

b. The circulating blood volume

c. only heart rate

d. Heart rate and systolic volume

e. Systolic volume and systemic vascular resistance

**Answer: d**

**79. (MC) Factors that affect the end-diastolic volume are:**

a. Volume loss

b. High Tidal Volume during mechanical ventilation

c. Venous tone

d. Positive End Expiratory Pressure

e. Respiratory minute volume

**Answers: a, b, c, d**

**80. (SC) The most common symptom of congestive heart failure is:**

a. Tachycardia

b. Oliguria

c. Splenomegaly

d. Hepatomegaly

e. Dyspnea

**Answer: e**

**81. (MC) Choose the pathophysiological effects and clinical signs associated with cardiogenic pulmonary edema:**

a. Increased pulmonary capillary wedge pressure

b. alveolar edema

c. Crackles

d. expectoration of hemorrhagic sputum

e. leg swelling

**Answers: a, b, c, d**

**82. (SC) The most important factor that influence blood flow resistance is:**

a. Length of blood vessel

b. blood viscosity

c. vessel diameter

d. Blood pressure

e. rate of blood flow

**Answer: c**

**83. (MC) Which of the following can be used in the treatment of acute heart failure:**

a. Nonsteriodal anti-inflammatory drugs

b. [Angiotensin-](https://www.mayoclinic.org/diseases-conditions/high-blood-pressure/in-depth/ace-inhibitors/art-20047480)converting enzyme inhibitors

c. Beta blockers

d. Diuretics

e. Fresh frosen plasma

**Answers: b, c, d**

**84. (SC) What is the most common cause of sudden cardiac death:**

a. Cocaine abuse

b. Mitral valve prolapse

c. Cardiomyopathy

d. Ventricular arrhythmias

e. Atrial fibrillation

**Answer: d**

**85. (SC) Choose signs of cardiac tamponade:**

a. Hypotension, dull heart sounds, jugular distension

b. Tachycardia, dyspnea, fever

c. Bradycardia, diaphoresis, weakness in arms

d. Hypertension, palpitations, chest pain

e. Hypotension, bradycardia, paralysis

**Answer: a**

**86. (SC) The most common complication of myocardial infarction in the first 24 hours is:**

a. Fibrinous pericarditis

b. Coronary artery aneurysm

c. Arrhythmia

d. Mitral insufficiency

e. Papillary muscle rupture

**Answer: c**

# **87. (SC) Which of the following positions would best aid breathing for a patient with acute pulmonary edema?**

a. Left side-lying position

b. Lying flat in bed.  
c. High Fowler’s position

d. Trendelenburg position

e. Semi-Fowler’s position

**Answer: c**

**88. (SC) Choose monitored parameters of cardiovascular system?**

a. Tidal volume

b. Stroke volume

c. Infused volume

d. Transfused volume

e. Expiratory volume

**Answer: b**

# **89. (SC) ECG and chest X-ray confirmed biventricular (global) heart failure in a 75-year-old patient with the gradual onset of symptoms. What is the best initial step in the management of this patient?**

a. administration of diuretics and ACE inhibitors

b. administration of diuretics and digoxin

c. administration of diuretics, ACE inhibitors and anticoagulants

d. determination the cause of heart failure by echocardiography, cardiac catheterization or other diagnostic methods

e. administration of diuretics, vasodilators, ACE inhibitor

**Answer: d.**

**Shock. Transfusion and fluid therapy. Parenteral n**[**utrition in critically ill patients**](http://www.google.md/url?sa=t&rct=j&q=&esrc=s&source=web&cd=2&cad=rja&ved=0CDkQFjAB&url=http%3A%2F%2Fwww.uptodate.com%2Fcontents%2Fnutrition-support-in-critically-ill-patients-an-overview&ei=MgxKUYG7BYKCOInigdAE&usg=AFQjCNHFjKg61zz5353r3u7YcE9gpq30uw&sig2=jvZW8XmpQFA63WHywfZ1vQ&bvm=bv.44011176,d.ZWU).

1. **(SC) Sepsis is defined as:**
2. infection + acute change in qSOFA score 1 point
3. infection + acute change in qSOFA score ≥2 points
4. infection + arterial hypotension
5. infection + septicemia
6. antibiotic*-*resistant infections

**Answer:** **b**

1. **(MC) Septic shock is defined as :**
2. sepsis
3. persisting hypotension requiring vasopressors to maintain MAP≥65mmHg
4. persisting hypotension requiring vasopressors to maintain SAP≥120 mmHg
5. serum lactate level >2 mmol/L despite adequate volume resuscitation
6. heart rate >100/min

**Answers:** **a, b, d**

1. **(SC). Choose the first-choice vasopressor for the treatment of hypotension despite adequate volume resuscitation in septic shock:**
2. epinephrine
3. dobutamine
4. phenylephrine
5. norepinephrine
6. vasopresine

**Answer:** **d**

1. **(SC) Choose the first-choice fluid in the resuscitation of septic shock:**
2. hydroxyethyl starches
3. fresh frosen plasma
4. red blood cells
5. normal saline (0.9% NaCl Solution)
6. 5% dextrose in water

**Answer:** **d**

1. **(SC) Choose the drug of choice for the treatment of patients with septic schock** **and myocardial dysfunction:**
2. epinephrine
3. dobutamine
4. isoprenaline
5. phenylephrine
6. norepinephrine

**Answer:** **b**

1. **(MC)** **The treatment of patients with septic shock may include*:***
2. dobutamine
3. hydrocortisone
4. nitroglycerin
5. norepinephrine
6. normal saline (0.9% NaCl Solution)

**Answers:** **a, b, d, e**

1. **(SC) Sodium bicarbonate therapy is indicated for patients with septic shock if pH is:**
2. 7.10
3. 7.2
4. 7.3
5. 7.35
6. 7.4

**Answer:** **a**

1. **(MC) Choose the variables included in SOFA score:**
2. PaO2/FiO2<200
3. respiratory rate>22/min
4. systolic blood pressure<100 mmHg
5. heart rate>100 b/min
6. altered mentation

**Answers:** **b, c, e**

1. (**MC) Choose the variables that ARE NOT included in SOFA score:**
2. systolic blood pressure
3. bilirubin level
4. mentation
5. creatinine level
6. respiratory rate

**Answers:** **b, d**

1. (**MC) Choose the conditions that may cause cardiogenic shock:**
2. myocarditis
3. life-threatening arrhythmias
4. constrictive pericarditis
5. conduction abnormalities
6. valvulopathies

**Answers:** **a, b, d, e.**

1. **(MC) Which of the following statements concerning cardiogenic shock are correct:**
2. stroke volume is increased
3. end-diastolic pressure is increased
4. cardiac output is low
5. anaerobic metabolism is increased
6. delivery of oxygentotissues is increased

**Answers:** **b, c, d**

1. **(MC) Choose the compensatory mechanisms in cardiogenic shock:**

a*.* activation of the sympathetic nervous system

b. inhibition of the sympathetic nervous system

c. activation of the renin-angiotensin-aldosteron system

d. activation of the parasympathetic nervous system

e. inhibition of the parasympathetic nervous system

**Answers: a, c, e**

1. (**SC) Which of the following statement concerning cardiogenic shock is FALSE:**

a. afterload is increased   
b. left atrial pressure is elevated

c. delivery of oxygentotissues is decreased

d. cardiac output is increased

e. catecolamine secretion is increased

**Answer: d**

1. **(MC) In patients with cardiogenic shock is present:**
2. decreased cardiac output
3. arterial hypotension
4. increased peripheral vascular resistanse
5. decreased peripheral vascular resistanse
6. tachycardia

**Answers:** **a, b, c, e**

1. **(SC) Choose the drug of first choice for the treatment of arterial hypotension in patients with cardiogenic shock:**
2. epinephrine
3. dobutamine
4. dopamine
5. phenylephrine
6. norepinephrine

**Answer:** **e**

1. **(MC) Choose the drugs used for the treatment of cardiogenic shock (secondary to acute myocardial infarction):**
2. dobutamine
3. epinephrine
4. fentanyl
5. nitroglycerin
6. norepinephrine

**Answers: a, b, c, e**

1. **(SC) Choose the drug that IS NOT used for the treatment of cardiogenic shock** **(secondary to acute myocardial infarction)**:
2. dobutamine
3. epinephrine
4. fentanyl
5. nitroglycerin
6. norepinephrine

**Answer:** **d**

1. **(MC) Which of the following statements concerning** **the** **intraaortic baloon pump are true:**
2. it is a definitive therapy for patients with cardogenic shock
3. it is a temporary therapy for patients with cardogenic shock
4. the balloon is inserted into the ascending thoracic aorta

d. the balloon is inserted into the descending thoracic aorta

e. the baloon is inflated during the diastole

**Answers:** **b, d, e**

1. **(MC) Which drugs ARE NOT recommended to be used in order to increase cardiac contractility in patients with cardiogenic shock and synus rhythm:** 
   1. corglicon
   2. dobutamine
   3. epinephrine
   4. isoprenaline
   5. strophantine

**Answers:** **a, d, e**

1. **(MC) Choose the causes of extracardiac obstructive shock:**
2. massive pulmonary embolism
3. acute myocardial infarcion
4. constrictive pericarditis
5. pneumothorax
6. pericardial tamponade

**Answers: a, c, d, e**

1. **(SC) What is the imaging method ofchoice for pulmonary embolism?**
2. e[chocardiography](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwj8guL8ipbQAhULvhQKHbV9Ab0QFggdMAA&url=https%3A%2F%2Fen.wikipedia.org%2Fwiki%2FEchocardiography&usg=AFQjCNHRBk6E0DaDfM1MJDCG_44GUKFoiQ&bvm=bv.137904068,d.d24)
3. electrocardiography
4. arterial blood gases
5. chest x-ray
6. computed tomography pulmonary angiography

**Answer:** **e**

1. **(MC)** **Choose the electrocardiographic changes in pulmonary embolism:**
2. sinus tachycardia
3. inversion of T waves in leads V1 – V4
4. sinus bradycardia
5. S1Q3T3 pattern
6. **right axis deviation**

**Answers:** **a, b, d, e**

1. **(MC) Choose the agents that can be used in the treatment of hemodynamically unstable pulmonary embolism:**
2. droperidol
3. streptokinase
4. norepinephrine
5. unfractionated heparin
6. warfarin

**Answers:** **b, c, d, e**

1. **(MC) Choose the trombolytic drugs:**
2. enoxaparin
3. heparin
4. rtPA (recombinant tissue plasminogen activator)
5. streptokinase
6. warfarin

**Answers:** **c, d**

1. (**SC) Choose the correct anticoagulation therapy in hemodynamically unstable patients with pulmonary embolism**:
2. unfractionated heparin - bolus of 40 units/kg, followed by an infusion of 18 units/kg per hour
3. unfractionated heparin - bolus of 40 units/kg, followed by an infusion of 5 units/kg per hour
4. unfractionated heparin - bolus of 50 units/kg, followed by an infusion of 5 units/kg per hour
5. unfractionated heparin - bolus of 80 units/kg, followed by an infusion of 18 units/kg per hour
6. unfractionated heparin - bolus of 80 units/kg, followed by an infusion of 14 units/kg per hour

**Answer: d**

1. (**SC)**  **The target range of aPTT during heparization of patients with of hemodynamically unstable pulmonary embolism should be:**
2. 1.0 – 1.3 times control
3. 1.2 – 1.5 times control
4. 1.5 – 2.3 times control
5. 2.5 – 3.5 times control
6. 3.5 –4.5 times control

**Answer:** **с**

1. (**MC) Choose the correct statements concerning treatment with warfarin of hemodynamically unstable patients with pulmonary embolism**:
2. the treatment should be initiated on the same day as heparin
3. the treatment should be initiated on the fifth day after heparin administration
4. the treatment with warfarin should overlap with heparin treatment within five days and should start on the same day as heparin
5. the aim of the treatment is the INR level of 2.0 – 3.0.
6. the treatment should last at least 3 months

**Answers:** **a, c, d, e**

1. (**MC) Choose the triggers of anaphylaxis:**
2. antibiotics
3. hypovolemia
4. vaccines
5. local anesthetics
6. insect stings

**Answers:** **a, c, d, e**

1. (**MC) Choose the correct statements concerning anaphylaxis:**
2. stroke volume increases compensatory
3. vascular permeability is increased
4. stroke volume is decreased
5. blood volume decreases
6. mediators contribute to vasodilation

**Answers:** **b, c, d, e**

1. (**MC) Choose the correct statements regarding anaphylaxis:**
2. IgE is involved in pathophysiology
3. IgM is involved in pathophysiology
4. mediators contribute to vasodilation
5. mediators contribute to vasoconstriction
6. vascular permeability is decreased

**Answers:** a, c

1. (**MC) Choose the correct therapeutic options concerning anaphylaxis:**
2. intramuscular epinephrine in a dose of 0.5 mg in adults
3. intravenous epinephrine bolus of 50 mcg
4. intravenous infusion of epinephrine if the arterial hypotension persists despite the bolus administration
5. glucagon as an adjuvant to epinephrine in patients who are on beta-blocker therapy
6. 5% dextrose solution for fluid replacement

**Answers:** **a, b, c, d**

1. **(SC) Choose the drug of first choice for the treatment of arterial hypotension in patients with anaphylaxis:**
2. epinephrine
3. dobutamine
4. dopamine
5. norepinephrine
6. phenylephrine

**Answer:** **a**

1. **(MC) Which of the following can cause anaphylaxis:**
2. bronchospasm
3. increased cardiac output
4. increased vascular permeability
5. hypervolemia
6. generalized vasodilation

**Answers:** **a, c, e**

1. **(MC) Choose the agents commonly used in the treatment of anaphylaxis:**
2. epinephrine
3. diphenhydramine
4. hydrocortisone
5. nitroglycerin
6. normal saline (0.9% NaCl Solution)

**Answers:** **a, b, c, e**

1. **(MC) Choose the conditions that may cause neurogenic shock:**

a. severe bleeding

b. acute myocardial infarction

c. severe brain injury

d. severe intracerebral hemorrhage

e. spinal cord injury

**Answers:** **c, d, e**

1. **(MC) Choose the agents commonly used in treatment of neurogenic shock:**
2. epinephrine
3. nitroglycerin
4. norepinephrine
5. normal saline (0.9% NaCl Solution)
6. lactated Ringer,s solution

**Answers:** **a, c, d, e**

1. **(MC) Which of the following statements concerningneurogenic shock is true:**
2. cardiac output is increased
3. patients have relative hypovolemia
4. cardiac output is decreased
5. there is generalized vasodilation
6. there is generalized vasoconstriction

**Answers:** **b, c, d**

1. **(SC) Choose the drug that is NOT used in the treatment of neurogenic shock:**
2. epinephrine
3. nitroglycerin
4. norepinephrine
5. normal saline
6. lactated Ringer,s solution

**Answer:** b

1. **(MC) Choose the symptoms of neurogenic shock:**
2. abdominal pain
3. arterial hypotension
4. tachycardia
5. warm dry skin
6. bradycardia

**Answers:** **b, d, e**

1. **(SC) Choose the correct therapeutic option for the treatment of bradycardia in neurogenic shock:**
2. metoprolol
3. norepinephrine
4. atropine
5. hydrocortisone
6. spinal immobilization

**Answer:** **c**

1. **(MC) Choose the causes of hypovolemic shock:**
2. excessive vomiting
3. diabetic ketoacidosis
4. bleeding
5. bowel obstruction
6. sepsis

**Answers:** **a, b, c, d**

1. **(MC) Which of the following statements concerning hypovolemic shock are true:**
2. stroke volume is increased compensatory
3. vascular permeability is increased
4. stroke volume is decreased
5. blood volume is decreased
6. there is generalized vasodilation

**Answers:** **c, d**

1. **(SC) Choose the FALSE statement regarding hypovolemc shock:**
   1. central venous pressure is decreased
   2. patient has tachycardia
   3. cardiac output is decreased
   4. skin is warm
   5. urine output is decreased

**Answer:** **d**

1. **(MC) Which of the following statements concerning** **hypovolemic shock are true:**
2. the heart rate is increased
3. the heart rate is decreased
4. endogenous catecholamine levels are increased
5. cortisole levels are increased
6. water reabsorbtion in renal tubules is incresead

**Answers:** **a, c, d, e**

1. **(MC) Choose the common changes in hypovolemic shock:**

a. lactic acidosis

b. elevated serum renin levels

c. elevated serum norepinephrine levels

d. low serum angiotensin II levels

e. low serum aldosteron levels

**Answers:** **a, b, c**

1. **(MC) Compensatory mechanisms in hypovolemic shock are:**

a. sympathetic nervous system stimulation

b. decreased sympathetic nervous system activity

c. renin-angiotensin system stimulation

d. parasympathetic nervous system stimulation

e. increased secretion of aldosterone

**Answers: a, c, e**

1. **(MC) Choose the FALSE statements concernicing hypovolemic shock:**

a. cardiac output is increased

b. cardiac output is decreased

c. peripheral blood vessels are constricted

d. peripheral blood vessels are dilated

e. oxygen delivery to the periphery is increased

**Answers:** **a, d, e**

1. **(MC) Choose the true statements concernicing hypovolemic shock:**

a. preload is decreased

b. cardiac output is decreased

c. oxygen delivery to the periphery is increased

d. blood volume is decreased

e. afterload is increased

**Answers:** **a, b, d, e**

1. **(MC) Choose the symptoms of hypovolemic shock:**
2. decreased urinary output
3. confusion or lethargy
4. hypotension
5. bradycardia
6. tachycardia

**Answers:** **a, b, c, e**

1. **(SC) Which of the following would be the first fluid of choice for a patient in hypovolemic shock:**
2. Dextran 40
3. normal saline (0.9% NaCl Solution)
4. 0.45% normal saline
5. 5% Dextrose solution
6. 10% Dextrose solution

**Answer:** **b**

1. **(MC) Choose the types of shock in which glucocorticoids are used:**
2. hypovolemic shock
3. cadiogenic shock (after acute myocardial infarction)
4. septic shock if adequate fluid resuscitation and vasopressor therapy are not able to restore hemodynamic stability
5. anaphylactic shock
6. obstructive shock (massive pulmonary embolism)

**Answers:** **c, d**

1. **(MC) Choose the clinical indications for the use of washed red blood cells:**
2. history of hemolytic transfusion reactions
3. IgA-deficient patients
4. history of recurrent, severe allergic reactions to blood product transfusion
5. IgM-deficient patients
6. patients with antibodies to leucocytes

**Answers:** **b, c**

1. **(MC) Choose the clinical indications for the use of leukocyte depleted red blood cells:**
2. patients with antibodies to leucocytes
3. IgA-deficient patient
4. prevention of HLA-alloimmunization
5. patiens with history of hemolytic transfusion reactions
6. patients with leukocytosis

**Answers:** **a, c**

1. **(MC) Red blood cell transfusion is indicated for critically ill patients with the level of hemoglobin of:**
2. 48 g/L
3. 56 g/L
4. 65 g/L
5. 100 g/L
6. 112 g/L

**Answers:** **a, b, c**

1. **(MC) Choose the indications for the use of fresh frozen plasma:**
2. correction of  excessive microvascular bleeding in  the  presence of a PT greater than 1.5 times or an aPTT greater than 2 times normal
3. parenteral nutrition
4. augmentation of  plasma volume
5. augmentation of  albumin  concentration
6. urgent  reversal  of  warfarin therapy  when prothrombin complex concentrate isnot available

**Answers:** **a, e**

1. **(MC) Choose the indications for the use of human albumin solutions:**

a. hypovolemia

b. severe hypoproteinemia *(*serum protein level*<*50 g/l)

c. microvascular bleeding

d. hemophilia A

e. hypofibrinogenemia

**Answers:** **a, b**

1. **(MC) Cryoprecipitate contains:**
2. factor VIII
3. factor XII
4. factor XIII
5. vonWillebrand factor
6. fibrinogen

**Answers:** **a, c, d, e**

1. **Cryoprecipitate is indicated for the treatment of microvascular bleeding in patients with:**
2. hypofibrinogenemia
3. thrombocytopenia
4. Von Willebrand disease
5. hemophilia A
6. hemophilia B

**Answers:** **a, c, d**

1. **(MC) Choose the true statements concerning starches:**
2. they are used to expand patient's blood volume
3. they reduce patient's blood volume
4. they are used to correct coagulation factor deficiency
5. they are used for parenteral nutrition
6. they have little antigenic properties

**Answers:** **a, e**

1. **(MC) Choose the crystalloid solutions:**
2. Normal saline solution
3. 5% Dextrose solution
4. 6% hydroxyethyl starch solution
5. Ringer's solution
6. Lactated Ringer’s solution

**Answers:** **a, b, d, e**

1. **(MC) Choose the solutions that ARE NOT crystalloid:**
2. Aminoplasmal
3. Normal saline solution
4. Intralipid
5. Lactated Ringer’s solution
6. Gelatin solution

**Answers:** **a, c, e**

1. **(MC) Choose the colloid solutions:**
2. Lactated Ringer’s solution
3. Normal saline solution
4. Intralipid
5. 6% hydroxyethyl starch solution
6. Gelatin solution

**Answers:** **d, e**

1. **(MC) Which of the following statements concernicing 5% Dextrose solution is true:**
2. it is used for treatment of microvascular bleeding
3. it is used to expand patient's blood volume
4. it is used for parenteral nutrition
5. it can be administered byperipheral vein
6. it is used for treatment of dehydration

**Answers:** **d, e**

1. **(MC) Which of the following solutions are used for parenteral nutrition:**
2. Aminosteril
3. 5% Dextrose solution
4. 10% Dextrose solution
5. Infezol
6. fresh frozen plasma

**Answers:** **a, c, d**

1. **(SC) Which of the following solutions is NOT used for parenteral nutrition:**
2. Aminoplasmal
3. 20% Dextrose solution
4. Infezol
5. Intralipid
6. 6% hydroxyethyl starch solution

**Answer:** **e**

1. **(SC) Daily requirements of carbohydrates (adult patient) for total parenteral nutrition are:**
2. 10-20% of total calories
3. 20-30% of total calories
4. 30-40% of total calories
5. 50-60% of total calories
6. 70-80 of total calories

**Answer:d**

1. **(SC) Daily requirements of lipids (adult patient) for total parenteral nutrition are:**
2. 10-20% of total calories
3. 25-30% of total calories
4. 35-40% of total calories
5. 45-50% of total calories
6. 55-60% of total calories

**Answer: b**

1. **(MC) Choose the lipid emulsions used in total parenteral nutrition:**
2. Aminoplasmal
3. Aminosteril
4. Infezol
5. Intralipid
6. Lipofundin

**Answers:** **d, e**

1. **(MC) Choose the aminoacid solutions used in total parenteral nutrition:**
2. Intralipid
3. Aminosteril
4. Aminoplasmal
5. Lipofundin
6. Infezol

**Answers: b, c, e**

1. **(SC) The caloric value of dextrose is:**
2. 2.7 kcal/g
3. 3.7 kcal/g
4. 4.5 kcal/g
5. 5.5 kcal/g
6. 6.0 kcal/g

**Answer:** **b**

1. **(SC) The caloric value of lipids is:**
2. 3.7 kcal/g
3. 4.1 kcal/g
4. 5.5 kcal/g
5. 6.5 kcal/g
6. 9.3 kcal/g

**Answer:** **e**

1. (**SC) The caloric value of proteins is:**
2. 3.7 kcal/g
3. 4.1 kcal/g
4. 5.5 kcal/g
5. 6.5 kcal/g
6. 9.3 kcal/g

**Answer:** **b**

1. (**MC) The dextrose solutions used in total parenteral nutrition are:**
2. 5% Dextrose
3. 10% Dextrose
4. 20% Dextrose
5. 30% Dextrose
6. 40% Dextrose

**Answers:** **b, c, d, e**

1. (**SC) Which of the following statement concernicing gelatin solutions is true:**
2. they are used to expand patient's blood volume
3. they induce a greater plasma volume expansion than starches
4. they are used to correct clotting factors deficiencies
5. they are used for total parenteral nutrition
6. they have no sensitizing properties

**Answer:** **a**

1. (**SC) Choose the correct value of basic adult daily requirements of proteins:**
2. 0.8-1 g/kg body wt
3. 2-3 g/kg body wt
4. 3-4 g/kg body wt
5. 4-5 g/kg body wt
6. 5-6 g/kg body wt

**Answer:** **a**

1. (**SC**) **Choose the correct value of basic adult daily requirements of carbohydrates for total parenteral nutrition:**
2. 1-1.5 g/kg body wt
3. 2-3 g/kg body wt
4. 3-4 g/kg body wt
5. 4-5 g/kg body wt
6. 5-6 g/kg body wt

**Answer:** **c**

1. **(SC) Choose the indication for normal saline infusion:**
2. treatment of acidosis
3. parenteral nutrition
4. treatment of microvascular bleeding
5. expansion of patient's blood volume
6. treatment of alcalosis

**Answer:** **d**

1. **(SC) Choose the indication for hydroxyethyl starch solutions** **infusion**:
2. parenteral nutrition
3. correction of microvascular bleeding
4. expansion of patient's blood volume
5. treatment of acidosis
6. treatment of hypoalbuminemia

**Answer:** **c**

1. **(SC) Choose the indication for 20% Dextrose infusion**:
   1. parenteral nutrition
   2. correction of microvascular bleeding
   3. treatment of acidosis
   4. treatment of hypoalbuminemia
   5. expansion of patient's blood volume

**Answer:** **a**

1. **(SC) What is the primary treatment of** [**hypovolemic shock?**](http://www.proprofs.com/discuss/q/147093/what-is-the-treatment-of-choice-to-correct-hypovolemic-shock)
2. lactated Ringer’s solution
3. norepinephrine
4. hydrocortisone
5. 10% Dextrose solution
6. cryoprecipitate

**Answer:** **a**

1. **(MC) Choose the types of shock associated with peripheral vasodilation:**
2. septic
3. neurogenic
4. anaphylactic
5. hypovolemic
6. cardiogenic

**Answers:** **a, b, c**

1. **(SC) Choose the type of shock in which epinephrine is the drug of choice for the treatment of arterial hypotension:**
2. neurogenic
3. anaphylactic
4. septic
5. cardiogenic
6. hypovolemic

**Answer:** **b**

1. **(SC) Which of the following concerning cardiogenic shock is correct:**
2. pulmonary capillary wedge pressure (PCWP) < 18 mm Hg, cardiac index (CI) <2.0-2.2 l/min/m2 with support
3. PCWP > 18 mm Hg, CI >2.0-2.2 l/min/m2 with support
4. PCWP < 18 mm Hg, CI >2.0-2.2 l/min/m2 with support
5. PCWP > 18 mm Hg, CI <2.0-2.2 l/min/m2 with support
6. Values of PCWP and CI do not have any importance

**Answer:** **d**

1. (**MC) Choose the signs of hypovolemic shock:**
2. altered mental status
3. lactic acidosis
4. oliguria
5. poliuria
6. arterial hypotension

**Answers:** **a, b, c, e**

1. **(МC) Choose the types of shock in which norepinephrine is the drug of choice for the treatment of arterial hypotension:**
2. neurogenic
3. anaphylactic
4. septic
5. cardiogenic
6. hypovolemic

**Answers**: **a, c, d**

**Acute consciousness disorders. Brain death.**

1. **(SC)** **The respiratory center is localized in:**
   1. the medulla oblongata and pons
   2. only in the medulla oblongata
   3. the hypothalamus
   4. the cerebellum
   5. the cerebrum

**Answer: a**

1. **(SC)** **The** **total volume of cerebrospinal fluid in an adult is approximately**:
   1. 25-75 ml
   2. 75-100 ml
   3. 100-150 ml
   4. 200-250 ml
   5. 250-300 ml

**Answer: c**

1. **(MC) Choose the true statements concerning oxygen in the adult brain:**
   1. cerebral oxygen consumption is approximately 3.5 ml per 100 g per minute
   2. the human brain accounts for about 20*%* of the total oxygen consumption of the oxygen
   3. partial pressure of O2 less than 60 mmHg in the arterial blood causes cerebral vasoconstriction
   4. the brain cannot store oxygen
   5. acute reduction of blood flow for 10-15 seconds results in loss of consciousness

**Answers: a, b, d, e**

1. **(MC)** **Tick the causes of cerebral edema:**
2. cardiopulmonary resuscitation
3. cerebral contusion
4. postural hypotension
5. hemorrhagic stroke
6. cerebral tumors

**Answers: a, b, d, e**

1. **(SC)** **Which of the following is ineffective in cytotoxic brain edema:**
2. mannitol
3. hyperventilation
4. hypothermia
5. glucocorticosteroids
6. head of bed elevation to 30–45 degrees

**Answer: d**

1. **(MC)** **Brain herniation can produce:**
2. anisocoria
3. bilateral pupils dilatation
4. improvement in the level of consciousness
5. hemodynamic instability
6. heart rhythm disorders

**Answers: a, b, d, e**

1. **(MC) Choose the causes of increased intracranial pressure:**
   1. hyperventilation
   2. hypercapnia
   3. systemic hypotension
   4. hypoxia
   5. hyperoxia

**Answer: b, c, d**

1. (**MC) Choose the components of Cushing's triade:**
2. increase in blood pressure
3. bradycardia
4. tachycardia
5. bradypnea
6. raised intracranial pressure

**Answers: a, b, e**

1. **(MC)** **Choose the criteria** **of the Glasgow coma scale:**
2. pupil size
3. verbal response
4. eyes response
5. eyes position and movement
6. motor response

**Answers: b, c, e**

1. **(MC)** **Choose the components of the classic Monroe-Kellie doctrine:**
2. brain
3. CSF
4. extracelular fluid
5. tentorium
6. blood

**Answers: a, b, e**

1. **(SC)** **Choose the definition of cerebral perfusion pressure:**
2. the difference between systemic blood pressure and intracranial pressure
3. the difference between systolic and dyastolic blood pressure
4. the difference between mean arterial pressure and intracranial pressure
5. the difference between systolic blood pressure and intracranial pressure
6. the difference between dyastolic blood pressure and intracranial pressure

**Answer: c**

1. **(MC) Choose causes of coma:**
2. hyper- , hyponatremia
3. dyslipidemia
4. hyperglycemia
5. hypoxia
6. hypoglycemia

**Answers: a, c, d, e**

1. **(MC)** **The consequenses of hypercapnia are:**
2. cerebral vasodilatation
3. increased cerebral blood flow
4. decreased intracranial pressure
5. reduced cerebrospinal fluid production
6. increased intracranial pressure

**Answers: a, b, e**

1. **(MC)** **Choose the factors influencing cerebral blood flow:**
2. PaO2
3. body temperature
4. PaCO2
5. systemic blood pressure
6. blood glucose level of 6 mmol/l

**Answers: a, b, c, d**

1. **(MC) Choose the factors that increase cerebral blood flow and intracranial pressure**:
2. hyperventilation
3. hypoxemia
4. epileptic seizure
5. hypercapnia
6. hypothermia

**Answers: b, c, d**

**16. (MC) Choose the factors that decrease cerebral blood flow and intracranial pressure:**

1. sedation and analgesia
2. hyperthermia
3. head of bed elevation to 30-45 degrees
4. respiratory alkalosis
5. acidosis

**Answers: a, c, d**

**17. (MC)**  **Choose mechanisms of cytotoxic cerebral edema:**

1. Na+ enter into neurons and accumulate intracellularly
2. Cl-  leave the cell
3. there is a depletion of ATP
4. intracellular potassium ion (K+) concentration increases
5. extracellular water flows into the cell

**Answers: a, c, e**

**18. (MC) Choose the clinical signs of cerebellar tonsillar herniation:**

1. blood pressure instability
2. anisocoria
3. decerebrate posturing
4. apnea
5. impaired consciousness

**Answers: a, c, d, e**

**19. (MC**) **Choose the true statements concerning ventriculostomy:**

1. compressed lateral ventricles are not an impediment for ventriculostomy
2. ventriculostomy is a single method of intracranial pressure monitoring
3. ventriculostomy is the gold standard of intracranial pressure monitoring
4. ventriculostomy offers the possibility to reduce intracranial pressure by draining CSF
5. ventriculostomy is a safe method of intracranial pressure monitoring without side effects

**Answers: c, d**

**20. (MC)** **Bilateral fixed dilated pupils indicate:**

1. opioid overdose
2. anoxia
3. brain death
4. administration of mydriatic eye drops
5. systemic administration of adrenomimetic drugs

**Answers: b, c, d, e**

**21. (MC) Choose the diagnostic tests forcomatose patients:**

1. CT examination
2. MRI
3. C reactive protein level
4. electroencephalography
5. lumbar puncture

**Answers: a, b, d, e**

**22. (SC)** **Choose the test of first choice for** **comatose patients:**

1. MRI
2. lumbar puncture
3. CT examination
4. evoked potentials
5. electroencephalography

**Answer: c**

**23. (MC) Choose treatment options for intracranial hypertension:**

1. routine hyperventilation
2. mantaining PaO2>60 mmHg
3. treatment of hypertension
4. continous sedation
5. antiseizure therapy

**Answers: b, c, d, e**

**24. (MC)** **Choose the osmotic drugs:**

1. Dextran 70
2. Normal saline
3. Hypertonic Saline (3%)
4. Mannitol
5. Loop diuretics

**Answers: c, d**

**25. (MC) Furosemide exerts its effect (decreases intracranial pressure) through:**

1. reduction of cerebrospinal fluid production
2. improvement of cerebrospinal fluid circulation
3. an osmotic gradient caused by a mild diuresis
4. lowering serum potasium level
5. reduction of brain water

**Answers: a, c, e**

**26. (MC) Choose the side effects of glucocorticosteroids:**

1. hypoglicemia
2. immunosupression
3. upper gastrointestinal bleeding
4. arterial hypotension
5. hyponatremia

**Answers: b, c**

**27. (MC) Which of the following statements are true?**

1. administration of glucocorticosteroids improves the outcome of the patients with cytotoxic cerebral edema
2. administration of glucocorticosteroids in patients with cerebral edema increases the risk of upper gastrointestinal bleeding
3. loop diuretics increase the effect of osmothic drugs
4. glucocorticosteroids can induce hypoglycemia
5. glucocorticosteroids are used in the treatment of vasogenic cerebral edema

**Answers:b, c, e**

**28. (SC) Which of the following statements is FALSE?**

1. hypothermia reduces intracranial pressure
2. hypothermia is recommended for the treatment of patients with severe head trauma
3. hypothermia can induce coagulopathy
4. hypothermia increases cerebral metabolic rate
5. hypothermia can cause arrhythmias

**Answer: d**

**29. (MC) Choose the tests that are NOT used for the diagnosis brain death:**

1. assesment of brainstem reflexes
2. adrenaline test
3. doll’s eyes test
4. determining intracranial pressure
5. apnea test

**Answers: b, d**

**30. (MC) Choose the factors that affect cerebral blood flow:**

a. pH

b. PaO2

c. blood viscosity

d. INR

e. PaCO2

**Answers: a, b, c, e**

**31. (MC)** **Choose strategies aimed at reducing** c**erebral metabolic rate:**

a. systemic hypothermia

b. continous sedation

c. reducing cardiac output

d. administration of anticonvulsivant drugs

e. selective cerebral hypothermia

**Answers: a, b, d, e**

**32. (MC) Choose the metabolic disfunctions that can cause impaired consciousness**:

* 1. hypokalemia
  2. hypernatremia
  3. hypercholesterolemia
  4. hyperglycemia
  5. hyperazotemia

**Answers: b, d, e**

**33. (SC) Which Glasgow Coma Score (GCS) corresponds to comatose patient:**

a. GCS **=**15

b. GCS **=**13

c. GCS **=**12

d. GCS **=**10

e. GCS ≤ 8

**Answer: e**

**34.** **(SC)** **Choose the range of blood pressure in a healthy adult when the cerebral blood flow is constant:**

a. in the range of 80-180 mmHg systolic BP

b. in the range of 60-160 mmHg mean arterial pressure

c. in the range of 40-180 mmHg mean arterial pressure

d. in the range of 60-160 mmHg systolic BP

e. in the range of 90-180 mmHg mean arterial pressure

**Answers: b**

**35.** **(SC) Choose the level of cerebral perfusion pressure that is recommended to maintain in patient with traunatic brain injury:**

a. 50 mmHg

b. >70 mmHg

c. >80 mmHg

d. >90 mmHg

e. 50-70 mmHg

**Answer: e**

**36.** **(SC) Choose the normal value of intracranial pressure:**

a. 0 mmHg

b. 0-5 mmHg

c. 5-15 mmHg

d. 18 mmHg

e. >20 mmHg

**Answer: c**

**37**. **(MC) Choose the conditions when apnea test should be aborted in patents with brain death:**

a. SpO2<80%

b. cardiac rhythm disturbancess

c. systolic BP <90 mmHg

d. MAP>60 mmHg

e. resumption of spontaneous breathing

**Answers: a, b, c, e**

**38.** **(MC) Choose the conditions that a patient must meet before performing apnea test:**

a. core temperature > 36°

b. normal blood pH

c. normotension (systolic blood pressure ≥ 100 mm Hg)

d. sinus rhythm

e. PaCO2= 35-45 mmHg

**Answers: a, b, c, e**

**39**. **(MC) What causes decreased cerebral blood flow?**

a. Na serum level < 135 mmol/L

b. pH<7.3

c. PaO2 < 60 mmHg

d. PaCO2 < 32 mmHg

e. pH>7.5

**Answers: d, e**

**40. (MC) Choose the conditions that can induce impaired consciousness**:

a. serum potassium concentrations of 2.5 mmol/L

b. serum glucose level < 2.0 mmol/L

c. serum sodium concentration < 124 mmol/L

d. PaCO2 >70 mmHg

e. PaO2 >80 mmHg

**Answers: b, c, d**

**41. (MC) Choose the conditions that increase intracranial pressure:**

a. hypoventilation

b. hyperventilation

c. hypoxia

d. hyperoxia

e. arterial hypertension

**Answers: a, c, e**

**42**. **(MC) Choose the true statements concerning cerebral perfusion pressure (CPP):**

a. CPP of < 50 mmHg results in cerebral hypoperfusion

b. target values of optimal CPP are within the range of 50 – 70 mmHg

c. the CPP is determined exclusively by diastolic blood pressure

d. CPP is dependent on the mean arterial pressure and intracranial pressure

e. CPP of >90 mmHg improves the outcome of patients with traumatic brain injury

**Answers: a, b, d**

**43.(SC)** **What is the most appropriate choice of intravenous fluid therapy to restore**  **blood volume and blood pressure in patients with traumatic brain injury?**

a. 5% Dextrose in water

b. Normal saline (0.9%NaCl)

c. 3% sodium chloride

d. **Dextranes**

e. Hydroxyethyl starch

**Answer:** b

**44**. **(SC) Choose FALSE statement concerning Mannitol:**

a. mannitol is an osmotic diuretuc

b. it is recommended for the treatment of vasogen cerebral edema

c. it should not be used if the serum osmolality exceeds 320 mosm/l

d. it should be given rapidly as in IV bolus

e. in adult patients the dose is 0.5-1 g/kg body weigh

**Answer: b**

**45. (SC) Choose the most common cause of cytotoxic cerebral edema**:

a. increased cerebral blood flow

b. hypothermia

c. hyponatremia

d. cerebral ischemia

e. hypoglycemia

**Answer: d**

**46. (SC)** **Choose the most common cause of intracerebral bleeding in middle-age adults aged 50-70 years:**

a. cerebral venous infarction

b. disseminated intravascular coaglation

c. cerebral amyloid angiopathy

d. cerebral arteriovenous malformation

e. coagulation disturbances

**Answer: d**

**47. (SC)** **Choose the most common cause of subarachnoid hemorrhage:**

# saccular cerebral aneurism

# drug induced vasculitis

# intracranial artery dissection

# moyamoya disease

# arteriovenous malformation

**Answers: a**

### 48. (MC) Choose the most common causes of ischemic stroke:

1. valvular heart disease
2. atherosclerotic disease in the extracranial cervical carotid artery
3. saccular cerebral aneurism
4. atrial fibrillation
5. atherosclerotic disease in the vertebral artery

**Answers: a, b, d, e**

**49. (MC) Choose the drugs recommended in patients with coma of unknown origin:**

1. flumazenil
2. 40% glucose solution
3. thiamine
4. naloxon
5. dantrolen

**Answers: b, c, d**

**50. (SC) Choose the first-line treatment for** **opioid overdose:**

1. codeine
2. pentazocine
3. butorphanol
4. naloxon
5. methadone

**Answer: d**

**51. (MC) Which of the following can cause disorders of consciousness?**

1. uremia
2. diabetic ketoacidosis
3. serum iron of 20 µmol/L
4. blood glucose concntration of 2.0 mmol/L
5. hypothyroidism

**Answers: a, b, d, e**

**52. (MC) Which of the following can cause disorders of consciousness?**

1. serum sodium concentration of 118 mmol/L
2. serum potasium concentration of 2.5 mmol/L
3. blood glucose concentration of 28 mmol/L
4. blood total cholesterol level of 200 mg/dL
5. PaCO2 >70 mmHg

**Answers: a, c, e**

**53. (MC) Which of the following are** **true statements about vasogenic cerebral edema?**

1. is caused by disruption of blood-brain barier
2. white matter is affected selectively
3. is the most common type in brain tumors
4. responds very well to corticosteroid treatment
5. the main cause is hypoperfusion

**Answers: a, c, d**

**54. (SC) Choose FALSE statement concerning cytotoxic cerebral edema:**

1. it rezults from cerebral ischemia
2. it is caused by disruption of the blood-brain barrier
3. it is not caused by disruption of the blood-brain barrier
4. it is due to energy depletion
5. Na+/K+ pump is impaired

**Answer: b**

**55. (MC) Choose the true statements concerning apnea test:**

1. it is a mandatory examination for determining brain death
2. it is recommended for patients with a Glasgow coma scale >5 points
3. patient must be preoxygenated with 100% O2
4. if respiratory movements are observed, the apnea test result is negative (i.e., does not support the diagnosis of brain death).
5. it should be aborted if SpO2<80%

**Answers: a, c, d, e**

**56. (SC) Choose FALSE statement concerning caloric test:**

1. it is used for diagnosis of brain death
2. it helps to identify the reversibility of brain stem injury
3. it is recommended for the patients with fixed and non-reactive pupils
4. it is performed by instillation of ice-cold water into the external auditory meatus
5. patients with brain death have horizontal nistagmus

**Answer: e**

**57. (SC) Choose the cause of bilateral pinpoint pupils:**

1. brain hypoperfusion
2. opiate overdose
3. central transtentorial herniation
4. mezencephalic lesions
5. increased catecholamine blood levels

**Answer: b**

**58. (MC) Choose the cause of unilaterally nonreactive dilated pupil:**

1. systemic hypoperfusion
2. mesencephalic lesions
3. subfalcian herniation
4. metabolic disorders
5. transtentorial herniation

**Answer: e**

**59. (MC) Choose the correct statements concerning oculocephalic test:**

1. the head is briskly turned from side to side
2. it is recommended for all coma patients
3. it is used for diagnosis of brain death
4. it is not contraindicated in patients with cervical spinalcordinjury
5. if the eyes move conjugately in the opposite direction to that of head movement, it indicates an intact pons

**Answers: a, c, e**

**60. (MC) Choose the true statements concerning Cheyne-Stokes respiration:**

1. it is caused by bilateral cortical and forebrain lesions
2. it suggests ketoacidosis
3. it is an oscillation of ventilation between apnea and hyperpnea
4. it is characterized by frequent and deep breathing
5. it suggests midbrain-upper ponce lesions

**Answers: a, c**

**61. (MC) Choose the methods used to reduce the cerebral blood flow:**

1. blood pressure management
2. drainage of cerebrospinal fluid
3. sedation in order to avoid ”fighting of the patient with ventilator”
4. head of bed elevation to 30-45 degrees
5. administration of vasoconstrictors

**Answers: a, c, d**

**62. (MC) Choose the side effects of hypothermia:**

1. delayed wound healing
2. thrombotic complications
3. heart rhythm disorders
4. shivering
5. reduction in cerebral metabolic rate

**Answers: a, c, d**

**63**. **(MC) Choose the correct statements concerning external ventricular drain:**

1. it can be used to monitor intracranial pressure
2. ventriculitis is an unavoidable complication
3. it offers the possibility to drain cerebrospinal fluid if necessary
4. hemorrhagic complications are expected in patients with coagulation disturbances
5. the catheter is inserted into the 4th ventricle

**Answers: a, c, d**

**64. (MC) Choose the correct statements concerning sedation of comatose patients with sodium thiopental:**

1. it provides hemodynamic stability because of sympathomimetic effects
2. it reduces cerebral metabolic rate
3. it has immunosuppressive effect
4. when used in high doses it increases the duration of mechanical ventilation and length of stay in intensive care unit
5. its efficiency can be evaluated by continuous EEG monitoring

**Answers: b, c, d, e**

**Fluid and electrolyte** [**disturbances**](https://www.google.md/search?hl=en&biw=1280&bih=627&q=hydroelectrolytic+disturbances&spell=1&sa=X&ei=jA5KUe_cCIXJswbZn4HICA&ved=0CCcQvwUoAA).

**1. (SC) How many liters of total water does a 70 kg human body contain?**

1. 30 liters
2. 42 liters
3. 52 liters
4. 56 liters
5. 70 liters

**Answer: b**

**2. (SC) How many percent of intracellular water does the human body contain?**

1. 22%
2. 26%
3. 36%
4. 46%
5. 56%

**Answer: c**

**3. (SC) How many percent of interstitial water does the human body contain?**

1. 10.5%
2. 11.5%
3. 13.5%
4. 14.5%
5. 20.5%

**Answer : b**

**4. (SC) How many percent the human body weight does plasma constitute?**

1. 3.5%
2. 4.5%
3. 4.7%
4. 5.5%
5. 7.5%

**Answer: b**

**5. (SC) Osmotic pressure is determined by the balance of:**

1. Frank-Starling law
2. Van Hoff law
3. Saint-Giorgy law
4. Hagen-Poiseuille law
5. Stewart law

**Answer: b**

**6. (SC) Which is the normal value of plasma oncotic pressure?**

1. 23-25mmHg
2. 24-26 mmHg
3. 25-28 mmHg
4. 27-29 mmHg
5. 30-49 mmHg

**Answer: c**

**7. (SC) The exchange of water between the fluid compartments is determined by the:**

1. Nernst Balance law
2. Starling Balance law
3. Gibbs-Donan Balance law
4. Saint Giorgy Balance law
5. Hagen-Poiseuille law

**Answer: b**

**8. (SC) The resting membrane potential is expressed by the:**

1. Nernst equation
2. Steward equation
3. Gibbs-Donan equation
4. Starling equation
5. Hagen-Poiseuille equation

**Answer: a**

**9. (SC) Szent-Gyorgy balance expresses:**

1. The resting membrane potential
2. The types of fluid disorders
3. The types of electrolyte disorders
4. The neuromuscular excitability
5. The action membrane potential

**Answer: d**

**10. (SC) Fluid disturbance characterized by greater loss of sodium than water is called:**

1. Isoosmolar
2. Hypoosmolar
3. Hyperosmolar
4. Hypertonic
5. Hypotonic

**Answer: b**

**11. (SC) Fluid disturbance characterized by equivalent loss of sodium and water is called:**

1. Hypoosmolar
2. Isoosmolar
3. Hyperosmolar
4. Hypertonic
5. Hypotonic

**Answer: b**

**12. (SC) Fluid disturbance characterized by greater loss of water than sodium is called:**

1. Hypoosmolar
2. Isoosmolar
3. Hyperosmolar
4. Hypertonic
5. Hypotonic

**Answer: c**

**13. (SC) Serum sodium level ≤135 mEq/l means:**

1. Hyponatremia
2. excessive G5% infusion
3. Hypernatremia
4. Normal serum sodium level
5. Hypovolemia

**Answer: a**

**14. (SC) Decreasing serum potassium level below 3.5 mmol/l denotes:**

1. Hypokalemia
2. Excessive G5% infusion
3. Hyperkalemia
4. Normal cell potassium level
5. Normal plasma potassium level

**Answer: b**

**15. (SC) What notion does the relationship between vascular volume and circulating blood define?**

1. Venous return
2. Volemia
3. Circulating volume
4. Cardiac output
5. Stress volume

**Answer: b**

**16. (SC) The relationship between venous return and right atrial pressure can be presented by model:**

1. Gibbs-Donan
2. Guyton
3. Starling
4. Nernst
5. Saint-Giorgy

**Answer: b**

**17. (SC) Nictemeral physiological diuresis of a70 kg person under conditions of thermal comfort is:**

1. 0.5 L
2. 1 L
3. 1.5 L
4. 2 L
5. 2.5 L

**Answer: c**

**18. (SC) Which of the following parameters is most useful in monitoring patient’s volume replete?**

1. Ionogram
2. PaCO2
3. PaO2
4. CVP
5. Nictemeral diuresis

**Answer: d**

**19. (SC) What are normal values of blood calcium:**

* 1. 2.5-3.5 mEq/L
  2. 4.5-5.5 mEq/L
  3. 5.5-7.5 mEq/L
  4. 7.5-9.5 mEq/L
  5. 9.5-10.5 mEq/L

**Answer: b**

**20. (SC) Cerebrospinal fluid is a part of:**

* 1. intracellular fluid space
  2. extracellular fluid space
  3. transcellular fluid space
  4. extravascular fluid space
  5. interstitial fluid space

**Answer: c**

**21. (SC) Ascitic fluid of a patient with cirrhosis refers to the:**

* 1. transcellular fluid space
  2. extracellular fluid space
  3. intracellular fluid space
  4. extravascular fluid space
  5. interstitial fluid space

**Answer: a**

**22. (SC) The chemical equivalent is the amount of substance which binds or moves:**

1. A hydrogen atom
2. An oxygen molecule
3. A bicarbonate molecule
4. A chlorine molecule
5. A glucose molecule

**Answer: a**

**23. (SC) A solution is named hypertonic, when:**

1. Its osmolarity is higher than the plasmatic one, but it doesn’t produce water movement between the compartments;
2. Its osmolarity is higher than the plasmatic one, and it produces water movement between the compartments;
3. Its osmolarity is equal to the plasmatic one, but it produces water movement between the compartments;
4. Its osmolarity is lower than the that plasmatic one, and it produces water movement between the compartments;
5. Its osmolarity is lower than the plasmatic one, and it does not produce water movement between the compartments;

**Answer : b**

**24. (SC) Starling equation determines:**

1. the volume of water in fluid compartments
2. the fluid compartment osmolarity
3. the fluid compartment composition
4. the direction and water flow between the fluid compartments
5. the direction and water flow in the same fluid compartment

**Answer: d**

**25. (SC) During water filtration from microcirculatory bed in intersticial space:**

1. the hydrostatic pressure increases in the capillary and protein concentration increases
2. the hydrostatic pressure decreases in thecapillary and protein concentration decreases
3. the hydrostatic pressure decreases in the capillary and protein concentration increases
4. the hydrostatic pressure increases in the capillary, but protein concentration decreases
5. the hydrostatic pressure and protein concentration do not change

**Answer: c**

**26. (SC) Primary disorder of sodium ion has major consequence on the change of :**

1. extracellular volume
2. action potential
3. acid-base balance
4. cell membrane stability
5. cellular energetics

**Answer: a**

**27. (SC) Primary disorder of potassium ion has major consequence on the change of :**

1. extracellular volume
2. action potential
3. acid-base balance
4. cell membrane stability
5. cellular energetics

**Answer: b**

**28. (SC) Primary disorder of magnesium ion has major consequence on the change of :**

1. extracellular volume
2. action potential
3. acid-base balance
4. cell membrane stability
5. cellular energetics

**Answer: d**

**29. (SC) Nictemeral water physiological needs in thermal comfort conditions is:**

1. 10-20 mL/kg
2. 20-30 mL/kg
3. 30-40 mL/kg
4. 40-50 mL/kg
5. 50-60 mL/kg

**Answer: c**

**30. (MC) The major types of water imbalance are:**

1. Hypoosmolar
2. Hypovolemic
3. Isoosmolar
4. Hyperosmolar
5. Hypervolemic

**Answers: a, d**

**31. (MC) The major types of volume disorders are:**

1. Hypoosmolar
2. Hypovolemic
3. Isoosmolar
4. Hyperosmolar
5. Hypervolemic

**Answers: b, e**

**32. (MC) Insensible perspiration involves water loss by**:

1. Diuresis
2. Sweating
3. Water evaporation through the skin
4. Water evaporation through the mucosa
5. Loss of water with faeces

**Answer: c, d**

**33. (MC) The body loses in the normal conditions water through :**

1. Diuresis
2. Breath
3. Sweating
4. Insensible perspiration
5. Salivation

**Answers: a, b, c, d**

**34. (MC) The highest concentration of chlorine is contained in:**

1. Saliva
2. Gastric juice
3. Bile
4. Pancreatic juice
5. Intestinal juice

**Answers: b, e**

**35. (SC) The highest concentration of sodium is contained in:**

1. Saliva
2. Gastric juice
3. Bile
4. Pancreatic juice
5. Intestinal juice

**Answer: e**

**36. (MC) The following clinical parameters are essential in assessing hydration status:**

1. Hourly diuresis
2. Skin color
3. The mucous membrane humidification degree
4. The filling capillary time
5. Pulse in supine and standing positions

**Answers: a, c, d, e**

**37. (MC) The following laboratory parameters evoke a dehydration state:**

1. Hyperglycemia
2. Increased hematocrit
3. C-reactive protein
4. Hypernatremia
5. Hypophosphataemia

**Answers: a, b, d**

**38. (SC) The most accurate clinical sign of iatrogenic hyperhydration is:**

1. Peripheral edema appearance
2. Arterial hypertension
3. Unstimulated urine output over 1,5 ml/kg/hour
4. Tachycardia
5. Hypersalivation

**Answer: c**

**39. (MC) When setting up an infusion program, the following components are considered:**

1. Vascular volume
2. Hepatic function
3. Cardiac function
4. Volemia
5. The volemia composition

**Answers: a, c, d, e**

**40. (MC) To compensate the volume losses preoperatively, it is necessary to take into consideration:**

1. Required volume for prehydration
2. Maintaining volume
3. Current losses
4. Seized volume
5. Circulating volume

**Answers: a, b, c, d**

**41. (MC) To compensate the volume loss, the following solutions are used:**

1. Ringer solution
2. Bicarbonate solution
3. Mannitol solution
4. Fresh frozen plasma
5. Physiological saline

**Answers : a, e**

**42. (MC) The parameters characterizing macromolecular solution are:**

1. Osmolarity
2. Molecular weight
3. Substitution coefficient of the side chain
4. Volume
5. Packaging

**Answers: a, b, c**

**43. (MC) Macromolecular solutions compared with crystalloid solutions:**

1. Are more expensive
2. Have the same efficiency in volume compensation
3. Increase mortality
4. Reduce inflammatory response
5. Produce more frequently adverse effects

**Answers: a, b, c, e**

**44. (MC) Hyperkalemia is clinically characterized by:**

1. Loss of osteo-tendinous reflexes
2. Weakness
3. Exacerbations of osteotendinous reflexes
4. muscular hypertonus
5. dysrhythmia

**Answers: a, b, e**

**45. (MC) On ECG hyperkalemia is characterized by:**

1. high, sharp, symmetrical T wave
2. Depression of ST segment
3. deep Q waves
4. Expanding RR intervals
5. The disappearance of P wave

**Answers: a, d, e**

**46. (MC) Drug correction of hyperkalemia consists in the administration of:**

1. CaCl2 or Ca gluconate
2. glucose-insulin solution
3. ion exchange resin (Kayexalate)
4. mannitol
5. MgSO4

**Answers: a, b, c**

**47. (MC) Choose the true statements concerning treatment of hypokalemia:**

1. The treatment of hypokalemia lasts few days
2. In case of ketoacidosis is preferably potassium phosphate
3. the maximum dose is 100 mEq per hour
4. mild hypokalemia can be corrected orally
5. cardiac glycosides are administered concomitantly

**Answers: a, b, d**

**48. (MC) Severe hypercalcemia is treated by the administration of:**

1. Rapid saline infusion
2. Furosemide
3. Glucocorticoids
4. Calcitonin
5. Vitamin D

**Answers: a, b, c, d**

**49. (SC) A patient is hospitalized with a hematocrit of 58% and serum sodium level of 158 mmol / l. What is the cause of these lab results?**

1. Hyperhydration
2. Anemia
3. Dehydration
4. Renal failure
5. Heart failure

**Answer: c**

**50. (SC) The patient is hospitalized with serum sodium level of 110 mEq/L. Which therapeutic actions should be taken?**

* 1. Increasing oral intake of fluids
  2. Administration of 10% NaCl solution
  3. Intranasal administration of antidiuretic hormone
  4. Monitoring the eventuality of seizures. Fluid restriction.
  5. Monitoring diuresis

**Answer: d**

**51. (SC) The patient reported several episodes of diarrhea and vomiting. Which of the following parameters should be monitored?**

1. Serum calcium
2. Serum phosphate
3. Serum potassium
4. Serum sodium
5. Serum chlorine

**Answer: c**

[**Acid-base disturbances**](https://www.google.md/search?hl=en&biw=1280&bih=627&q=hydroelectrolytic+disturbances&spell=1&sa=X&ei=jA5KUe_cCIXJswbZn4HICA&ved=0CCcQvwUoAA).

1. **(SC) Choose the normal value of pH in arterial blood:** 
   1. 7.0
   2. 7.1
   3. 7.2
   4. 7.3
   5. 7.4

**Answer:** **e**

1. **(SC) Choose the normal value of serum bicarbonate levels in a healthy adult*:***
2. 14-18 mmol/L
3. 18-22 mmol/L
4. 22-26 mmol/L
5. 26-30 mmol/L
6. 30-34 mmol/L

**Answer:** **c**

1. **(SC) Choose the normal value of bases excess in arterial blood for healthy adult:**
2. 1 mmol/L
3. 2 mmol/L
4. 3 mmol/L
5. 4 mmol/L
6. 5 mmol/L

**Answer:** **b**

1. **(SC) Choose the normal value of pCO2 in arterial blood:**
2. 10 mmHg
3. 20 mmHg
4. 30 mmHg
5. 40 mmHg
6. 50 mmHg

**Answer:** **d**

1. **(MC) Which of the following statements concerning acid-base balance is true*:***
2. acidosis = pH < 7.35
3. alacalosis = pH >7.45
4. acidosios = pH > 7.45
5. deathwilloccurat pH<6.8
6. deathwilloccur at pH >7.8

**Answers:** **a, b, d, e**

1. **(MC) Which of the following statements concerning buffer system of the human blood are true:**
2. buffer is a solution containing substances which have the ability to minimise changes in pH when an acid or base is added to it
3. buffer typically consists of a solution which contains a weak acid mixed with the salt of that acid and a strong base
4. buffer typically consists of a solution which contains a weak base mixed with the salt of that base and a strong acid
5. buffer systems act withinseconds
6. the main intracellular buffer is phosphate buffer system

**Answers:** **a, b, c, d**

1. **(MC) Which of the following statements concerning regulation of acid-base balance is true*:***
2. buffer systems act withinseconds
3. respiratory mechanism responds within minutes, maximal in 12-24 hrs.
4. respiratory mechanism responds within 12-24 hrs, maximal in 3-5 days.
5. renal mechanism responds within seconds, maximal in few hours
6. renal mechanism responds slowly (effectively in 3-5 days)

**Answers:** **a, b, e**

1. **(MC) Which of the following can cause respiratory acidosis:**
2. drug depression of respiratory center (eg by opiates, sedatives, anaesthetics)
3. cervical cord trauma
4. Guillain-Barre syndrome
5. diabetic ketoacidosis
6. salicylate poisoning

**Answers:** **a, b, c**

1. **(MC) Which of the following CAN NOT cause respiratory acidosis:**
2. muscle relaxants
3. pneumothorax
4. 'supra-tentorial' causes (pain, fear, stress, voluntary)
5. cytokines in sepsis
6. salicylate poisoning

**Answers:** **c, d, e**

1. **(MC) Choose the diagnostic criteria for respiratory acidosis:**
2. pH >7.45
3. pH<7.35
4. pCO2 = 40 mm Hg
5. pCO2 >44 mm Hg
6. pCO2 <36 mm Hg

**Answers:** **b, d**

1. **(MC) Choose the treatment options for respiratory acidosis:**
2. treatment of the primary cause of the disorder
3. sodium bicarbonate therapy for patients with decreased pH
4. sodium bicarbonate therapy only for patients with pH <7.15
5. mechanical ventilation in severe cases
6. surgical removal of mineralocorticoid producing tumor

**Answers: a, d**

1. **(MC) Choose the correct statements concerning the effects of hypercapnia:**
2. cerebral vasodilation
3. cerebral vasoconstriction
4. stimulation of the sympathetic nervous system
5. stimulation of the parasympathetic nervous system
6. increase in intracranial pressure

**Answers:** **a, c, e**

1. **(MC) Which of the following can cause metabolic acidosis:**
2. myasthenia gravis
3. pulmonary edema
4. diabetic ketoacidosis
5. hypovolemic shock
6. severe diarrhea

**Answers:** **c, d, e**

1. **(SC) Which of the following CAN NOT cause metabolic acidosis:**
2. acute kidney injury
3. hipokalemia
4. cardiogenic shock
5. pancreatic fistula
6. methanol poisoning

**Answer:** **b**

1. **(MC) Choose the diagnostic criteria for metabolic acidosis:**
2. pH=7.30
3. pH>7.45
4. HCO3 = 24 mmol/l
5. HCO3 > 26 mmol/l
6. HCO3 <22 mmol/l  
   **Answers:**  **a, e**
7. **(MC) Choose the correct statements concerning the effects of metabolic acidosis:**
8. hyperventilation (Kussmaul breathing)
9. hypoventilation
10. shift of oxygen dissociation curve to left
11. shift of oxygen dissociation curve to right
12. hyperkalemia

**Answers:** **a, d, e**

1. **(MC) Choose the correct treatment options of respiratory acidosis:**
2. treatment of the primary cause of the disorder
3. sodium bicarbonate therapy for patients with decreased pH
4. sodium bicarbonate therapy only for patients with pH <7.15
5. mechanical ventilation
6. surgical removal of mineralocorticoid producing tumor

**Answers:** **a, c**

1. **(MC) Which of the following can cause respiratory alcalosis:**

a. bronchospasm

b. tetanus

c. anxiety-hyperventilation syndrome (psychogenic)

d. analeptics

e.pulmonary embolism

**Answers:** **c, d, e**

1. **(MC) Choose the diagnostic criteria for respiratory alcalosis:**
2. pH=7.30
3. pH>7.45
4. pH<7.45
5. pCO2 <36 mmHg
6. pCO2 >44 mmHg

**Answers:** **b, d**

1. **(MC) Choose the effects of metabolic alcalosis:**
2. cerebral vasodilation
3. cerebral vasoconstriction
4. shift of oxygen dissociation curve to the right
5. increase in intracranial pressure
6. arrhythmias

**Answers: b, e**

1. **(MC) Which of the following can cause metabolic alcalosis:**
2. pulmonary embolism
3. loss of acidic gastric juice
4. hypovolemic shock
5. Cushing’s syndrome
6. loop diuretics

**Answers:** **b, d, e**

1. **(MC) Choose the effects of metabolic alkalosis:**
2. hyperventilation (Kussmaul breathing)
3. psychomotor agitation
4. mental obtundation
5. decreased myocardial contractility
6. arterial hypertension

**Answers:** **c, d**

1. **(MC) Choose the effects of metabolic alkalosis:**
2. shift of oxygen dissociation curve to right
3. shift of oxygen dissociation curve to left
4. inreased cerebral blood flow
5. decreased myocardial contractility
6. fever

**Answers:** **b, d**

1. **(MC) Choose the diagnostic criteria for metabolic alcalosis:**
2. pH=7.30
3. pH>7.45
4. HCO3- <22 mmol/l
5. pCO2 <36 mm Hg
6. HCO3- >26 mmol/l  
   **Answers: b, e**
7. **(MC) Choose the treatment options for metabolic alkalosis:**
8. reexpansion of extracelular fluid
9. surgical removal of mineralocorticoid producing tumor
10. discontinuation of glucocorticoid therapy
11. HCl infusion or Acetazolamide
12. oxygen therapy

**Answers:** **a, b, c, d**

1. **(SC) A patient was admitted to the hospital for inguinal hernia repair. pH=7.42; PCO2 =42 mm Hg; HCO3- = 24 mmol/l. How do you interpret his acid-base values?**
2. normal values
3. respiratory acidosis
4. metabolic acidosis
5. respiratory alcalosis
6. metabolic alcalosis

**Answer:** **a**

1. **(SC) A patient underwent surgery** **and in the postoperative period it was necessary to aspirate his stomach content. The analysis of arterial blood showed the following values: pH=7.75; PCO2 =44 mm Hg; HCO3- = 44 mmol/l. How do you interpret his acid-base values?**
2. normal values
3. respiratory acidosis
4. metabolic acidosis
5. respiratory alkalosis
6. metabolic alcalosis

**Answer:** **e**

1. **(SC) A patient was admitted to the hospital in a coma. The analysis of arterial blood showed the following values: pH= 7.2; PCO2 =18 mm Hg; HCO3- = 18 mmol/l.** **How do you interpret his acid-base values*?***
2. normal values
3. respiratory acidosis
4. metabolic acidosis
5. respiratory alkalosis
6. metabolic alcalosis

**Answer:** **c**

1. **(SC) A patient is mechanically ventilated. The analysis of arterial blood showed the following values: pH= 7.2, PCO2 = 60 mm Hg; HCO3- = 24 mmol/l. How do you interpret his acid-base values?**
2. normal values
3. respiratory acidosis
4. metabolic acidosis
5. respiratory alkalosis
6. metabolic alcalosis

**Answer:** **b**

1. **(SC) A patient is mechanically ventilated. The analysis of arterial blood showed the following values:** **pH= 7.5; PCO2 = 30 mm Hg; HCO3- = 22 mmol/l. How do you interpret his acid-base values*?***
2. normal values
3. respiratory acidosis
4. metabolic acidosis
5. respiratory alkalosis
6. metabolic alcalosis

**Answer:** **d**

1. **(SC) Choose the formula for calculation of anionic gap:**
2. Na+ – (Cl- + HCO3-)
3. Na+ + (Cl- - HCO3-)
4. Na+ + HCO3-– Cl-
5. Na+ + (Na+ – (Cl- + K+)
6. Cl- + HCO3-)

**Answer:** **a**

1. **(MC) Choose the causes of metabolic acidosis with high anion gap:**
2. salicylate poisoning
3. drug depression of respiratory center (eg by opiates)
4. renal failure
5. lactic acidosis
6. diabetic ketoacidosis

**Answers:** **a, d, e**

1. **(MC) Choose the causes of metabolic acidosis with normal anion gap:**
2. severe diarrhea
3. renal failure
4. small bowel fistula
5. pancreatic fistula
6. methanol poisoning

**Answers:** **a, c, d**

1. **(MC) Which of the following statements concerning anion gap are true?**
2. it can be used to identify the cause of metabolic alacalosis
3. the anion gap is high in patients with pancreatic fistula
4. it can be used to identify the cause of metabolic acidosis
5. the anion gap is normal in patients with diabetic ketoacidosis
6. the formula for calculation of anionic gap is: : Na+ – (Cl- + HCO3-)

**Answers:** **c, e**

1. **(MC) Choose the correct statements about the anion gap:**
2. in ketoacidosis acidosis the anion gap is increased
3. the anion gap is decreased in renal failure
4. the anion gap is decreased in methanol poisoning
5. in lactic acidosis the anion gap is increased
6. the anion gap is increased in severe diarrhoea

**Answers:** **a, d**

1. **(SC) Choose the values of pH and pCO2  in the arterial blood of a tourist who climbed the mountain Mont Blank (altitude of 4800 meters above the sea level):**
2. pH ↑, pCO2 ↑
3. pH ↓, pCO2 ↓
4. pH ↑ , pCO2 ↓
5. pH ↓, pCO2 ↑
6. both pH and pCO2  will not change

**Answer:** **c**

1. **(SC) Before licensure exams a student is very anxious and has tachypnea. What acid-base disorder do you suggest?**
2. respiratory acidosis
3. metabolic acidosis
4. respiratory alcalosis
5. metabolic alcalosis
6. there will be no acid-base disorders

**Answer:** **c**

1. **(SC) A 55-year-old patient with renal failure missed his dyalisis. What acid-base disorder do you suggest?**
   1. respiratory acidosis
   2. metabolic acidosis
   3. respiratory alcalosis
   4. metabolic alkalosis
   5. there will not be any acid-base disorders

**Answer:** **b**

1. **(MC) A 20-year-old patient is admitted to the hospital after a suicide attempt by aspirin overdose. What acid-base disorder do you expect?**
2. metabolic acidosis with high anionic gap
3. metabolic acidosis with normal anion gap
4. respiratory alcalosis
5. respiratory acidosis
6. metabolic alcalosis

**Answers:** **a, c**

1. **(SC) A 32-year-old patient is admitted to the hospital with hypovolemic shock.**  **What acid-base disorder do you suggest?**
2. pH = 7.1, PaCO2 = 60 mm Hg, HCO3- = 24 mmol/l
3. pH = 7.35, PaCO2 = 40 mm Hg, HCO3- = 24 mmol/l
4. pH = 7.45, PaCO2 = 35 mm Hg, HCO3- = 26 mmol/l
5. pH = 7.24, PaCO2 = 32 mm Hg, HCO3- = 14 mmol/l
6. pH = 7.55, PaCO2 = 40 mm Hg, HCO3- = 30 mmol/l

**Answer:** **d**

**Acute liver failure.**

1. **(MC) Choose the diagnostic criteria of acute liver failure:**
2. Coagulopathy (INR>1.5)
3. Coagulopathy (INR>3.0)
4. Encephalopathy
5. Pre-existing liver disease of <6 months duration
6. pre-existing liver disease of >6 months duration

**Answers: a, c, d**

1. **(SC) Choose the true statement concerning acute liver failure:**
2. Diagnostic criteria are coagulopathy, encephalopathy and pre-existing liver desease of <6 months duration
3. Diagnostic criteria are coagulopathy, encephalopathy and pre-existing liver desease of >6 months duration
4. Signs of cirrhosis of the liver must be present
5. Albumin is a marker of acute liver failure
6. The criterion of coagulopathy is INR>5

**Answer: a**

1. **(MC) Choose the causes of acute liver failure:**
2. Viral hepatitis B and C
3. Acetaminophen overdose
4. Flu virus
5. Malignant infiltration of the liver
6. Mushroom poisoning

**Answers: a, b, d, e**

1. **(SC) Choose the antidote for acetaminophen overdose in patients with acute liver failure:**
2. Sodium thiosulphate
3. Methylene blue
4. N-acetylcysteine
5. Physostigmine
6. Flumazenil

**Answer: c**

1. **(SC) Choose the etiological treatment for hepatitis B-associated acute liver failure:**
2. N-acetylcysteine
3. Lamivudine
4. Penicillin G
5. Corticosteroids
6. acyclovir

**Answer: b**

1. **(SC) Choose the etiological treatment for patients with acute liver failure due to mushroom poisoning:**
2. protamine sulfate
3. methylene blue
4. Neostigmine
5. Penicillin G
6. Corticosteroids

**Answer: d**

1. **(SC) Choose the etiological treatment for patients with acute liver failure due to autoimmune hepatitis:**
2. N-acetylcysteine
3. Corticosteroids
4. Penicillin G
5. Activated charcoal
6. Sodium thiosulphate

**Answer: b**

1. **(MC) Choose the haemodynamic changes in patients with acute liver failure:**
2. Decrease in venous return
3. Peripheral vasoconstriction
4. Peripheral vasodilation
5. Arterial hypotension
6. Arterial hypertension

**Answers: a, c, d**

1. **(MC) Choose the true statements concerning haemodinamical changes in patients with acute liver failure:**
2. The cardiac output is increased
3. The cardiac output is decreased
4. Pressure in the portal venous system is elevated
5. Pressure in the portal venous system is decreased
6. The systemic vascular resistance is low

**Answers: a, c, e**

1. **(SC) Choose the first choice agent for the treatment of arterial hypotension in patients with acute liver failure:**
2. Normal saline solution
3. Dextrose 20%
4. Norepinephrine
5. Aminosteril
6. Epinephrine

**Answer: a**

1. **(MC) Choose the therapeutic options for the treatment of cerebral oedema in patients with acute liver failure:**
2. Lactulose
3. Mannitol
4. Hyperventilation
5. Barbiturates
6. Corticosteroids

**Answers: b, c, d**

1. **(MC) Choose the true statements concerning transfusion of blood components in patients with acute liver failure:**
2. Fresh frozen plasma is indicated only for the treatment of active bleeding due to coagulation factors deficiency
3. Fresh frozen plasma is indicated in all cases of coagulation factors deficiency (even in the absence of active bleeding)
4. When invasive procedures must be performed, platelet counts of 50000/mm3 are considered adequate
5. Albumin may be considered for patients with active bleeding when plasma infusion does not correct severely elevated INR
6. Recombinant activated factor VII may be considered for patients with active bleeding when plasma infusion does not correct severely elevated INR

**Answers: a, c, e**

1. **(MC) Choose the true statements concerning neurological complications in patients with acute liver failure:**
2. Cerebral edema is frequently observed in patients with grade I-II encephalopathy
3. Patients with grade IV encephalopathy are comatose
4. Hyperventilation can be used for rapidly lowering intracranial pressure
5. Diazepam is the drug of first choice for sedation
6. Patients with grade 3 or 4 encephalopathy need intubation and ventilation

**Answers: b, c, e**

1. **(MC) Choose the causes of acute kidney injury in patients with acute liver failure:**
2. nephrotoxic effects of drugs
3. hypovolaemia
4. sepsis
5. urinary tract obstruction
6. raised intracranial pressure

**Answers: a, b, c**

1. **(MC) Choose the metabolic derangements that are common in acute liver failure:**
2. hypoglycemia
3. hypokalemia
4. hyperkalemia
5. acidosis
6. alkalosis

**Answers: a, b, d, e**

1. **(MC) Choose the indicators of poor prognosis for patients with acetaminophen-induced acute liver failure:**
2. pH<7.3
3. prothrombin time >100 seconds
4. elevated creatinine level
5. presence of grade 3 or 4 hepatic encephalopathy
6. PaO2/FiO2<200

**Answers: a, b, c, d**

1. **(MC) Choose the features of mechanical ventilation of patients with acute liver failure:**
2. low-tidal-volume ventilation is used
3. high-tidal-volume ventilation is used
4. hypercapnia is accepted
5. normocapnia is mandatory
6. positive end-expiratory pressure is used during mechanical ventilation

**Answers: a, c, e**

1. **(MC) Choose the complications of** **acute liver failure:**
2. acute respiratory distress syndrome
3. cerebral edema
4. hypothermia
5. acute kidney injury
6. hypoglycemia

**Answers: a, b, d, e**

1. **(MC) Choose the true statements concerning liver transplantation for patients with acute liver failure:**
2. it is the only main definitive therapy for patients who are unable to achieve regeneration
3. the 1-year survival following liver transplant is >90%
4. patients must take immunosuppressant medications
5. it is contraindicated in patients with acetaminophen overdose
6. the survival rates of patients with acute liver failure are higher in comparison with the survival rates of patients with cronic liver failure

**Answers: a, c**

**Acute kidney injury.**

1. **(SC) Choose the risk factors of acute kidney injury :**
2. diabetes mellitus
3. arterial hypertension with end-organ lesions
4. young age
5. chronic renal failure
6. emergency surgery

**Answers: a, b, d**

1. **(MC) Which of the following statements concerning acute kidney injury are true:**
2. acute kidney injurymay bereversible
3. sepsis is the most common cause of acute kidney injury
4. intrinsic renal lesion is the most common form of acute kidney injury in ICU
5. acute kidney injuryusually has three stages according to severity
6. continuous venovenous hemofiltration is an absolute indication in acute kidney injury irrespective of evolutionary stage

**Answers: a, b, d**

1. **(SC) Which of the following tests is useful for diagnosis of acute kidney injury:**
2. Serum albumin
3. Alaninaminotranspheraze
4. Serum amylase level
5. Bicarbonates level
6. Creatinine blood test

**Answer: e**

1. **(MC) Which of the following conditions could cause prerenal form of acute kidney injury:**
2. Massive bleeding
3. Acute methanol intoxication
4. Low cardiac output syndrome
5. Hypovolemia
6. Acute interstitial nephritis

**Answers: a, c, d**

1. **(MC) Management of acute kidney injury includes:**
2. Blood volume restoring
3. NSAID administration
4. Use of diuretic drugs
5. Maintenance of MAP ≥65 mmHg
6. Optimization of cardiac function

**Answers: a, c, d, e**

1. **(SC) Which of the following electrolyte disturbances is the most common and life threatening for the patient with acute kidney injury:**
2. Hypokalemia
3. Hypernatremia
4. Hyperphosphatemia
5. Hyperkalemia
6. Hypermagnesemia

**Answer: d**

1. **(MC) Acute kidney injury is defined as:**
2. Urine output <0.5 ml/kg/h for 6 hours
3. Decrease of blood creatinine level by 50%
4. Increase in serum creatinine by ≥0.3 mg/dl (≥ 26.5 μmol/l) within 48 hours
5. Increase in serum creatinine to ≥1.5 times baseline, which is known or presumed to have occurred within the prior 7 days
6. Serum blood urea nitrogen >30 mg/dl

**Answer: a, c, d**

1. **(MC) Evolution scenarios of acute kidney injury may be:**
2. Chronic renal failure
3. Death
4. Chronic dialysis
5. Reversal of renal function
6. Chronic hypokalemia

**Answers: a, b, c, d**

1. **(MC) The treatment of acute kidney injury include:**
2. Volume replacement
3. Prophylaxis of deep venous thrombosis by administration of LMWH
4. Maintenance of MAP ≥65 mmHg
5. Correction of electrolyte disorders
6. Use of low renal doses of Dopamine in order to increase urine output

**Answers: a, c, d**

1. **(MC) Which of the following ECG changes is suggestive for hyperkalemia:**
2. Flattening of P wave
3. PQ segment lengthens
4. Narrowing of QRS complex
5. T wave flattens
6. Wide QRS complex

**Answers: a, b, e**

1. **(MC) Which of the following ECG changes are the most specific for hyperkalemia:**
2. Peaked T wave
3. Shortening of PR segment
4. Widening of QRS complex
5. “Ghotic” P wave
6. Sine waves

**Answers: a, c, e**

1. **(MC) Treatment of hyperkalemia includes:**
2. Bicarbonate administration
3. Diuresis stimulation
4. Administration of calcium gluconate or CaCl2
5. Administration of KCl with concentrate Glucose
6. Continuous venovenous hemofiltration

**Answers: b, c, e**

1. **(MC) Which of the following drugs can induce acute kidney injury:**
2. Aminoglicozide
3. NSAID
4. Contrast agents
5. Unfractionated heparin
6. ACE inhibitors

**Answers: a, b, c, e**

1. **(MC) Which of the following conditions can cause acute kidney injury:**
2. Acute cardiac failure
3. Elective cardiac surgery with cardiopulmonary bypass
4. The intake of 4 conventional units of alcohol
5. Severe trauma
6. Sepsis

**Answers: a, b, d, e**

1. **(MC) Choose criteria for continuous venovenous hemofiltration in acute kidney injury:**
2. pH<7.1
3. refractory hypervolemia
4. hemodynamic instability
5. persistent serum potassium level >6.5 mmol/l
6. serum creatinine >150 µmol/L

**Answers: a, b, d**

1. **(MC) Which of the medications used for treatment of hyperkalemia reduces serum level of potassium by redistribution:**
2. CaCl2
3. Calcium gluconate
4. Insulin
5. β2 adrenergic agonists
6. Kayexalat

**Answers: c, d**

1. **(MC) Which of the following medications are used for the treatment of hyperkalemia:**
2. β1 adrenergic agonists
3. Sodium bicarbonate
4. Calcium gluconate
5. Verospiron
6. Furosemide

**Answers: c, e**

1. **(MC) Which of the following statements concerning acute kidney injury are false:**
2. the incidence of acute kidney injury in the ICU is approximately 20% -50%
3. Intrinsic renal injury is the most common type of AKI
4. Diabetes mellitus is a risk factor of AKI
5. Diagnostic criteria of AKI are dynamic changes of blood urea nitrogen and serum creatinine
6. Reduction of urine output per hour is one of the first suggestive signs of acute kidney injury

**Answers: b, d**

1. **(SC) Choose normal urine output:**
2. 0.3 ml/kg/h
3. 0.5 ml/kg/h
4. 0.8 ml/kg/h
5. 1 ml/kg/h
6. 1.5 ml/kg/h

**Answer: d**

1. **(SC) Choose** **the first-line solutions for volume replacement in patients with onset of acute kidney injury:**
2. Saline solution
3. 5% Dextrose
4. Ringer solution
5. Gelofuzin
6. 6% HES

**Answer: c**

1. **(MC) Choose risk factors of acute kidney injury:**
2. Age > 80 ani
3. Plasma level of HbA1c > 9%
4. Serum creatinine 68 µmol/L
5. BP>180/120 mmHg
6. Serum K 3.8 mmol/L

**Answers: a, b, d**

1. **(SC) Treatment of hyperkalemia does not include the administration of:**
2. Calcium gluconate
3. Sodium bicarbonate
4. Glucose with insulin
5. Dialysis
6. Potassium-sparing diuretics

**Answer: e**

1. **(SC) Choose** **from the following the alternative method of dialysis in the treatment of acute kidney injury:**
2. Plasmapheresis
3. Portosystemic transjugular shunt
4. Renal transplant
5. continuous veno-venous hemofiltration
6. Cardio-pulmonary by-pass

**Answer: d**

1. **(MC) Which of the following factors can lead to prerenal acute kidney injury:**
2. Hypovolemia
3. Sequestration of the fluid in the third space (extravascular)
4. Tuberous sclerosis
5. Glomerulosclerosis
6. Kidney endothelial cells proliferation

**Answers: a, b**

1. **(MC) Which of the following are recommended for the patients with acute kidney injury whith oliguria and signs of hypervolemia:**
2. Water and salt restriction
3. Sugar restriction
4. Protein restriction
5. Dialysis with ultrafiltration
6. Loop diuretics

**Answers: a, d, e**

1. **(MC) Subvesical obstruction of urinary tract can be produced by:**
2. Prostate adenoma
3. Prostate carcinoma
4. Neurogenic bladder
5. Inadvertent ligation of the ureter
6. Hypovolemia

**Answers: a, b**

1. **(MC) Metabolic acidosis in acute kidney injury is treated with:**
2. Lithium carbonate
3. Sodium bicarbonate
4. Calcium gluconate
5. Restriction of the protein in the diet
6. Dialysis   
   **Answers: b, d, e**
7. **(MC) Hyperkalemia related to acute kidney injury is treated with:**
8. Aluminium hydroxide
9. Glucose with insulin
10. Sodium bicarbonate
11. Water restriction
12. Ion-exchanges resins

**Answers: b, c, e**

1. **(MC) Choose drugs that can induce prerenal azotemia:**
2. Cyclooxygenase inhibitors
3. Beta-lactam antibiotics
4. Rifampicin
5. ACE inhibitors
6. Cyclosporine

**Answers: a, d, e**

1. **(MC) Which of the following are the absolute indication for renal replacement therapy in acute kidney injury:**
2. Hypocalcaemia
3. Hyponatremia
4. Signs of uremic syndrome
5. Untreatable hypervolemia
6. Hyperkalemia resistant to conservative treatments

**Answers: c**, **d, e**

1. **(MC) Which of the following are recommended in acute kidney injury related hypervolemia:**
2. Hypotonic saline solution
3. Sodium bicarbonate
4. Thiazide diuretics
5. Loop diuretics
6. Restriction of water and salt

**Answers: c, d, e**