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TESTS FOR Vth YEAR STUDENTS
(Anesthesiology and Reanimatology. Toxicology)
FOR THE 2023-2024 ACADEMIC YEAR
FACULTY OF MEDICINE No.2

General and locoregional anesthesia

1. **(SC) Choose the meaning of the term „Analgesia":**
   a. Lack of pain sensation
   b. Lack of tactile sensation
   c. Lack of thermal sensation
   d. Muscle relaxation
   e. Supressed consiouness
   Answer: a

2. **(MC) Choose the monitoring techniques used during anesthesia:**
   a. Capnometry
   b. Cardiac output measurement
   c. Electroencephalography
   d. Nuclear Magnetic Resonance
   e. Pulse oxymetry
   Answers: a, b, c, e

3. **(MC) Choose the components of common hemodynamic response to a nociceptive stimulus:**
   a. Arterial hypertension
   b. Cardiac arrest
   c. Hypothermia
   d. Tachycardia
   e. Tahyphylaxis
   Answers: a, d

4. **(SC) Specify the meaning of the term „Capnography":**
   a. A method of measuring body oxygen metabolism
   b. Cardiac output measurement
   c. Graphycal registration of CO_2 concentration in the exhaled air
   d. Measurement of the global lung ventilation
   e. Registration of the O_2 hemoglobin saturation
   Answer: c

5. **(MC) Choose the the effects of Ketamine:**
   a. Cardiovascular depression
   b. Increase in blood pressure
   c. Increase in intracranial pressure
   d. Hallucinations
   e. Muscle relaxation
   Answers: b, c, d

6. **(SC) Choose the correct ratio of Morphine/Fentanyl analgesic potency:**
   a. 1:10
   b. 1:50
   c. 1:100

a. 1:200
b. 1:400

Answer: c

1. (SC) Choose the most potent analgesic:

a. Codeine
b. Fentanyl
c. Morphine
d. Omnoponum
e. Promedolum

Answer: b

2. (SC) Which of the following statements concerning barbiturates <u>is not</u> correct?

a. They cause sedation
b. They decrease muscular tonus
c. High doses of barbiturates can lead to miocardium depression
d. Hypnotic doses cause a transitory pulmonary hypoventilation
e. They increases respiratory minute volume

Answer: e

3. (MC) Choose the processes associated with skeletal muscle cell depolarization:

a. Decrease in intracellular chlorine ion concentration
b. Decrease in intracellular potassium concentration
c. Decrease in intracellular sodium concentration
d. Increase in intracellular potassium concentration
e. Increase in intracellular sodium concentration

Answers: **b, e**

4. (MC) Choose the effects of intravenous Ketamine administration:

a. Analgesia
b. Bradycardia
c. General anesthesia
d. Hypotension
e. Moderate increase in blood pressure

Answers: **a, c, e**

5. (MC) Choose the parameters that influence tissue uptake (absorbtion) of a local anesthetic:

a. Anesthetic concentration
b. Heart rate
c. Tissue blood flow (vascularisation)
d. Tissue solubility
e. Respiratory rate

Answers: **a, c, d**

6. (MC) Choose the complications assosiated with Lidocaine overdosage:

a. Convulsion
b. Cough
c. Central nervous system excitation
d. Loss of consciousness
e. Sharp abdominal pain

Answers: **a, c, d**

7. (MC) Choose the effects of Midazolam:

a. Amnesia
b. Anticoagulant effect
c. Anticonvulsant effect
d. Hypercoagulation
e. Hypnosis

Answers: **a, c, e**

8. (SC) The correct amount of Lidocaine contained in 100 milliliters of 1% solution is:

a. 10 mg
b. 100 mg
c. 1 gr
d. 10 gr
e. 100 gr

Answer: **c**

9. (MC) Choose the correct statements concerning Nitrous Oxide properties:

a. It provides analgesia
b. It increases the amount of thrombocytes
c. It induces hypnosis
d. It produces arterial hypertension
e. It induces cardiac arrhythmia

Answers: a, c

10. (MC) Choose the correct statements concerning Propofol:

a. It depresses the cerebral cortex
b. It has a long duration of action
c. It is an intravenous general anesthetic
d. It is metabolized rapidly
e. It stimulates the limbic system

Answers: **a, c, d**

11. (SC) Select the most precise meaning of the term „Epidural anesthesia":

a. Local anesthetic is administered in the cerebrospinal fluid
b. Local anesthetic is administered in the epidural space
c. Local anesthetic is administered in the paravertebral zone
d. Local anesthetic is administered intramuscularly
e. Local anesthetic is administered intravenously

Answer: b

12. (MC) Choose the methods of Local/Regional anesthesia:

a. Intravenous administration of morphine
b. Local/topic application of the local anesthetic
c. Brachial plexus block
d. Tissue infiltration with local anesthetic
e. Inhalation of halotane

Answers: b, c, d

13. (MC) Choose the three most common complications of Epidural anesthesia :

a. Arterial hypotension
b. Arterial hypertension

c. Hyperventilation
d. Accidental dural puncture
e. Headache

Answers: a, d, e

14. (MC) Choose the effects of Sodium thiopental:

a. Respiratory center activation
b. Direct myocardial depression
c. Respiratory center depression
d. Arterial hypertension
e. Arterial hypotension

Answer: b, c, e

15. (MC) Choose the effects of Succinylcholine:

a. The duration of action is approximately 5-10 minutes
b. The duration of action is approximately 30 min
c. It increases serum potassium level
d. It produces postsynaptic membrane depolarization
e. It produces postsynaptic membrane hyperpolarization

Answers:**a, c, d**

16. (SC) Choose the correct statement concerning Pipercuronium bromide (Arduan):

a. The duration of action is approximately 5 minutes
b. It is a depolarizing neuromuscular blocking agent
c. It is a non-depolarizing neuromuscular blocking agent
d. It produces muscle pains
e. It induces hyperpotassemia

Answer: c

17. (MC) Choose the correct statements concerning Fentanyl:

a. It is more potent than Morphine
b. It is less potent than Morphine
c. The duration of analgesia is approximately 20-30 minutes
d. The duration of analgesia is 60 minutes
e. It is used for weaning the patient from anesthesia

Answers: a, c

18. (MC) Choose the correct statements concerning Droperidol:

a. It shows analgesic effect
b. It produces antiemetic effect
c. It is an anxiolytic
d. It is a neuroleptic (antipsychotic)
e. It has extrapyramidal side-effects

Answers: **b, d, e**

19. (MC) Choose the effects of Sodium Thiopental:

a. Respiratory center depression
b. It can produce bronchospasm
c. Arterial hypertension
d. Arterial hypotension
e. Hypnosis

Answers: a, b, d, e,

20. (MC) Choose the effects of Ketamine:
a. Dissociative anesthesia
b. Moderate increase in blood pressure
c. Hallucinations during the weaning from anesthesia
d. Arterial hypotension
e. Bronchospasm
Answers: a, b, c

21. (MC) Choose the correct statements concerning Nitrous oxide:
a. It can irritate upper airways
b. It provides analgesia
c. It provides hypnosis
d. It induces arterial hypertension
e. It can induce dillutional hypoxia
Answers: b, c, e

22. (MC) Choose the main types of receptors to which general anesthetics bind:
a. Alpha 1 – adrenoreceptors
b. Beta 1 and 2 - adrenorecptors
c. Dopminergic
d. GABA
e. NMDA
Answers: d, e

23. (MC) Choose the inhalation anesthetics:
a. Desflurane
b. Enflurane
c. Etomidate
d. Halothane
e. Nitrous oxide
Answers: a, b, d, e

24. (MC) Choose the volatile anesthetics:
a. Sevoflurane
b. Etomidate
c. Isoflurane
d. Nitrous oxide
e. Xenon
Answers: a, c

25. (MC) Choose the inhalation anesthetics that are gases:
a. Enflurane
b. Etomidate
c. Halothane
d. Nitrous oxide
e. Xenon
Answers: d, e

26. (MC) Choose contraindications to anesthesia with Barbituarates:
a. Allergy to barbiturates
b. Bronchial asthma

c. Seizures
d. Arterial hypotension
e. Liver failure

Answers: a, b, d, e

27. (SC) The onset of hypnosis after Thiopental intravenous injection occurs in:

a. 30-60 s
b. 5-8 min
c. 20 min
d. 30 min
e. 1 hour

Answer: a

28. (MC) Choose the common side effects of Sodium Thiopental:

a. Seizures
b. Cardiovascular depression
c. Respiratory depression
d. Vein irritation
e. Laryngeal spasm

Answers: b, c, d, e

29. (MC) Choose the common side effects of Diazepam used as a general anesthetic:

a. Bronchial spasm
b. Cardiovascular depression
c. Hallucinations during induction
d. Respiratory depression
e. Seizures

Answers: b, d

30. (MC) Choose the local anesthetics:

a. Buprenorphine
b. Cocaine
c. Dopamine
d. Lidocaine
e. Procaine

Answers: b, d, e

31. (SC) Choose the drug that was first used as a local anesthetic**:**

a. Cocaine
b. Lidocaine
c. Mepivacaine
d. Prilocaine
e. Procaine

Answer: a

32. (SC) Choose the inhalation agent which can cause dillutional hypoxia:

a. Diethyl Ether
b. Halotane
c. Isoflurane
d. Nitrous Oxide
e. Sevoflurane

Answer: d

33. (SC) Choose the drug of choice for the treatment of seizures after a local anesthetic overdose:

a. Diazepam
b. Droperidol
c. Fentanyl
d. Ketamine
e. Sodium oxybutyrate

Answer: a

34. (SC) The reason of why the II-nd lead for ECG monitoring during anesthesia is used:

a. Shows better the T wave
b. Shows better the ventricular (QRS) complex
c. Does not require grounding
d. Technically is easier to be performed
e. Shows better the P wave

Answer: e

35. (MC) Choose the tissue layers that the needle must pass through when performing epidural anesthesia:

a. Skin
b. Supraspinous ligament
c. Interspinous ligament
d. Intervertebral disk
a) Ligamentum flavum

Answers: a, b, c, e

36. (MC) Choose the tissue layers that the needle must pass through when performing spinal anesthesia:

a. Skin
b. Supraspinous and interspinous ligaments
c. Intervertebral disk
d. Ligamentum flavum
e. Dura mater

Answers: a, b, d, e

37. (SC) Choose the correct location of epidural space:

a. Between the dura mater and spinal cord
b. Between the intervertebral disk and ligamentum flavum
c. Between the ligamentum flavum and dura mater
d. Between the supraspinous and interspinous ligaments
e. Between the supraspinous and flavum ligaments

Answer: c

38. (MC) Choose the correct statements concerning the subarachnoid space:

a. Contains cerebrospinal fluid
b. Is a space between the arachnoid mater and pia mater
c. Is a space between dura mater and arachnoid mater
d. Is a space between the ligamentum flavum and intervertebral disk
e. Is a space between the ligamentum flavum and dura mater

Answers: a, b

39. (SC) .Choose the structures the local anesthetic acts on in case of epidural anesthesia:

a. Anterior grey horn
b. Spinal cord
c. The roots of spinal nerves
d. The motor fibers exclusively
e. The sensory fibers exclusively

Answer: c

40. (MC) Choose the contraindications to spinal anesthesia:

a. Hypovolemia

b. Infections of the skin at the puncture site
c. Patient's refusal
d. Severe pain
e. Coagulation abnormalities

Answerss: a, b, c, e

41. (MC) Choose the components of general anesthesia:

a. Analgesia
b. Hypnosis
c. Hyperthermia
d. Muscle relaxation
e. Autonomic nervous system stability (Homeostasis)

Answerss: a, b, d, e

42. (MC) Choose systemic side-effects of local anesthetics:

a. Psychomotor agitation
b. Amnesia
c. Seizures
d. Allergic reactions
e. Drowsiness

Answerss: a, c, d

43. (MC) Choose techniques used for local/regional anesthesia:

a. Brachial plexus anesthesia
b. Inhaled halothane anesthesia
c. Intravenous anesthesia with Propofol
d. Infiltration anesthesia
e. Topical anesthesia

Answers: a, d, e

44. (MC) Choose the local anesthetics:

a. Cocaine
b. Dopamine
c. Lidocaine
d. Morphine
e. Procaine

Answerss: a, c, e

45. (MC) Choose the local anesthetics with an ‘‘ester type’’ intermediate chain:

a. Benzocaine
b. Bupivacaine

c. Lidocaine
d. Procaine
e. Tetracaine

Answers: a, d, e

46. (MC) Choose the local anesthetics with an ‘‘amide type’’ intermediate chain:

a. Bupivacaine
b. Lidocaine
c. Prilocaine
d. Procaine
e. Tetracaine

Answers: a, b, c

47. (SC) Choose the local infiltration anesthesia technique:

a. Administration of local anesthetic in the metaphyseal or epiphyseal bone region
b. Lubrication of the mucosa with local anesthetic
c. Layered tissue infiltration with local anesthetic
d. Intravenous injection of local anesthetic after applying the tourniquet
e. Perineural local anesthetic injection

Answer: c

48. (MC) Choose the correct statements concerning the Tuffier's line:

a. Is an important landmark for the performance of epidural anesthesia
b. Is an important landmark for the performance of spinal anesthesia
c. Is a line drawn between opposite iliac crests
d. Crosses the vertebral column at the L4 level
e. Points on sciatic nerve root

Answers: a, b, c, d

49. (MC) Choose the methods used for performing peripheral nerve blocks:

a. Intravenous administration of contrast agent
b. Seldinger technique
c. Anatomical landmarks technique
d. Use of peripheral nerve stimulator
e. Ultrasound

Answers: c, d, e

50. (MC) Choose the local/regional anesthesia benefits:

a. Important hemodynamic effects
b. Minimal depressive effects on the respiratory centers
c. Preserved contact with the patient
d. The possibility of postoperative analgesia
e. Decreased rate of thromboembolic complications

Answers: b, c, d, e

51. (MC) Choose the disadvantages of local/regional anesthesia:

a. Minimal interference with respiratory function
b. Time consuming
c. The possibility of ineffective analgesia
d. Increased thromboembolic complications
e. Systemic toxicity

Answers: b, c, e

52. (MC) Choose the drugs which can be used for spinal anesthesia:

a. Bupivacaine
b. Dopamine
c. Diclofenac
d. Lidocaine
e. Mepivacaine

Answers: a, d, e

53. (SC) Choose the correct meaning of Minimal Alveolar Concentration:

a. Concentration of CO_2 in the airway
b. Concentration of CO_2 in the alveoli
c. O_2 concentration in the alveoli
d. Parameter of the patient respiratory function
e. Criterion for comparing potency of inhalation anesthetics

Answer: e

54. (MC) Choose the drugs that can trigger Malignant Hyperthermia:

a. Diazepam
b. Halothane
c. Ketamine
d. Propofol
e. Succinylcholine

Answers: b, e

55. (SC) Choose the drug of choice for the treatment of seizures (convulsion) after a local anesthetic overdose:

a. Droperidol
b. Diazepam
c. Fentanyl
d. Ketamine
e. Nitroglycerin

Answer: b

56. (SC) Choose the false statement concerning Succinylcoline:

a. Is a a muscle relaxant
b. Produces depolarisation of postsynaptic membrane
c. Increases K^+ blood concentration
d. Decreases the blood level of Na^+
e. Fasciculations are common

Answer: d

57. (MC) Choose the true statements concerning monitoring during anesthesia:

a. SpO_2 monitoring is mandatory
b. The complexity of monitoring depends only on surgery duration
c. The 2^{nd} ECG lead is the most recommended lead
d. Temperature monitoring in all patients given general anesthesia lasting more than 30 minutes
e. Is not mandatory during local/regional anesthesia

Answers: a, c, d

58. (SC) Choose the scale used for the evaluation of anesthesia risk:

a. APACHE
b. Glasgow

c. SOFA
d.
e. ASA
f. Baltazar

Answer: d

59. (MC) Choose the predictive signs of difficult airways:

a. III-IV Mallampati score
b. Neck stiffness and limited range of motion
c. Gapped teeth
d. Limited mouth opening
e. The distance between the thyroid cartilage and floor of the mouth < 3 fingers

Answers: a, b, d, e

60. (MC) Choose the confirmation criteria of endotraheal tube placement:

a. The presence of capnometric wave during manual ventilation
b. Bilateral rising of the chest during ventilation
c. The length from the alveolar ridge to the tip of the tube is 22 cm
d. Airway pressure <30 cm H_2O
e. Presence of breath sounds bilaterally

Answers: a, b, e

61. (SC) Choose the false statement concerning Nitrous oxide:

a. Is used for both induction and maintainance of anesthesia
b. Can be used as monocomponent anesthesia because of analgesic and muscular relaxant effects
c. Is contraindicated during on-pump cardiac surgery
d. Air embolism is a possible complication in neurosurgical patients in sitting position
e. Can produce dilutional hypoxia if used for induction as a sole anesthetic

Answer: b

62. (SC) Choose the false statement concerning Propofol:

a. Is used for both induction and maintenance of anesthesia
b. Is used for continous sedation in ICU
c. Rapid onset of hypnotic effect
d. Minimal mental confusion on awakening
e. Does not produce any allergic complications

Answer: e

63. (SC) Choose the false statement concerning bensodiazepine drugs as anesthetics:

a. The most used drugs from this group are Diazepam and Midazolam
b. Preoperative administration has anxiolytic effect
c. Have an anti-seizure effect
d. Have an analgesic effect
e. Possess central muscle relaxant properties

Answer: d

64. (MC) Choose the Suxamethonium-related side effects:

a. Muscle pain
b. Malignant Hyperthermia
c. Cardiac rhythm disorders
d. Hypernatremia
e. Hyperkalemia

Answers: a, b, c, e

65. (MC) Choose the Propofol-related side effects:
a. Hyperthermia
b. Hypotension
c. Thrombophlebitis
d. Pain on injection
e. Respiratory depression
Answers: b, c, d, e

66. (SC) Choose the false answer concerning Ketamine:
a. Has an analgesic effect
b. Produces increase in systemic BP as a result of sympathomimetic effect
c. Increases cerebral blood flow
d. Is the most recommended drug for head trauma patients
e. Has minimal depressive effect on the respiratory system
Answer: d

67. (MC) Choose the drugs used as hypnotics during anesthesia:
a. Sodium thiopental
b. Fentanyl
c. Ketamine
d. Suxamethonium
e. Propofol
Answers:a, c, e

68. (SC) Choose the drug that <u>is not</u> a non-depolarizing muscular blocking agent:
a. Rocuronium
b. Atracurium
c. Mivacurium
d. Pancuronium
e. Suxamethonium
Answer: e

69. (SC) Choose the <u>false</u> statement concerning capnometry:
a. Is a method of measuring CO_2 concentration in exhaled air
b. Its use during low-flow anesthesia is optional
c. The use of capnometry is recommended during cardiopulmonary resuscitation
d. Offers the possibility of early detection of CO_2 reinhalation
e. Is a method for confirmation of proper endotracheal tube placement
Answer: b

70. (SC) Choose the opioid antagonist:
a. Pentazocine
b. Morphine
c. Codeine
d. Tramadol
e. Naloxon
Answer: e

71. (MC) Choose the side effects related to synthetic opioids:
a. High blood pressure
b. Itching

c. Constipation
d. Tachycardia
e. Nausea and vomiting

Answers: b, c, e

72. (MC) Choose the infraglottic devices used for airway management:

a. I-gel
b. Laryngeal mask
c. Guedel airway
d. Orotrachel tube
e. Tracheostomic tube

Answers: d, e

73. (SC) Choose the recommended pressure in the cuff of endotracheal tube:

a. 10-15 cmH_2O
b. 5-10 mmHg
c. 20-30 cmH_2O
d. 30-40 mmHg
e. 35-40 cmH_2O

Answer: c

74. (SC) Choose the false answer concerning Fentanyl:

a. Its analgesic effect exceeds 100 times the analgesic effect of Morphine
b. Is a natural opioid
c. Is used for postoperative analgesia
d. Depresses respiratory center
e. Produces chest rigidity

Answer: b

75. (MC) Choose the true affirmations concerning Sevoflurane:

a. Is a liquid anesthetic agent used by inhalation
b. Is used for induction
c. Is a bronchodilator
d. Its cardiovascular effects are insignificant
e. Produces airway irritation

Answers: a, b, c, d

76. (SC) Choose the local anesthetic with the longest duration of action:

a. Lidocaine
b. Mepivacaine
c. Prilocaine
d. Procaine
e. Ropivacaine

Answer: e

77. (SC) Choose the local anesthetic with the highest potency:

a. Bupivacaine
b. Lidocaine
c. Mepivacaine
d. Prilocaine
e. Procaine

Answer: a

78. (SC) Choose the local anesthetic with the longest onset of action:

a. Levobupivacaine
b. Lidocaine
c. Mepivacaine
d. Prilocaine
e. Procaine

Answer: a

79. (MC) Choose the two inhalation anesthetics with the lowest MAC (i.e. highest potency):

a. Desflurane
b. Enflurane
c. Halothane
d. Isoflurane
e. Nitrous oxide

Answers: c, d

80. (MC) Choose the two inhalation anesthetics with the highest MAC (i.e. lowest potency):

a. Desflurane
b. Sevoflurane
c. Halothane
d. Isoflurane
e. Nitrous oxide

Answers: a, e

81. (MC) Choose the main components of anesthesia machine:

a. Anesthesia circuit
b. Pulse oximeter
c. Gas source and flowmeters
d. Vaporizer
e. Ventilator

Answers: a, c, d, e

82. (MC) Choose the advantages of a low-flow anesthesia circuit:

a. Conserves heat
b. Conserves humidity of the inhaled gases
c. Minimal environment pollution
d. Increases the cost of anesthesia
e. Required volume of anesthetic gases is low

Answers: a, b, c, e

83. (MC) Choose the correct statements concerning Nitrous oxide:

a. Can be used as sole anesthetic (monoanesthesia)
b. Causes airways irritation
c. Provides analgesia
d. Provides hypnosys
e. Effect develops slowly

Answers: c, d

84. (MC) Choose the anesthetics which can be used for anesthesia induction:

a. Halotane
b. Isoflurane

c. Nitrous oxide
d. Propofol
e. Sevoflurane

Answers: a, c, d, e

85. (MC) Choose the common findings in an Elderly patient:

a. Decreased cardiac output
b. Increased cardiac output
c. Increased glomerular filtration rate
d. Increase in total lung capacity
e. Lower tolerance to anesthetic drugs

Answers: **a, e**

86. (SC) Choose the incorrect term:

a. Brainstem spinal anesthesia
b. Combined intravenous-inhalation anesthesia
c. Combined spinal-epidural anesthesia
d. General anesthesia with muscle relaxation and mechanical ventilation
e. Monocomponent Halotane anesthesia

Answer: a

87. (MC) Choose the drugs that <u>are not</u> local anesthetics:

a. Bubrenorphine
b. Bupivacaine
c. Butorphanol
d. Cocaine
e. Lidocaine

Answers: a, c

88. (SC) The wideness of epidural space at the L3-L4 level is:

a. 0.4 – 0.8 millimeter
b. Over 1 centimeter
c. 4-8 millimeters
d. 10-20 millimeters
e. 15-25 millimeters

Answer: c

89. (SC) Choose the drug used to reverse the benzodiazepine effect:

a. Fentanyl
b. Morphine
c. Clonidine
d. Flumazenil
e. Cocaine

Answer: d

90. (SC) Choose the drug used to reverse non-depolarizing neuromuscular blocking agents:

a. Fentanyl
b. Neostigmine
c. Succinylcholine
d. Flumazenil
e. Mivacurium

Answer: b

91. (SC) Choose the short acting non-depolarizing neuromuscular blocking agent:
a. Succinylcholine
b. Pipecuronium
c. Mivacurium
d. Tubocurarine
e. Pancuronium
Answer: c

98.(MC) Choose the supra-glottic devices used for airway management:
a. I-gel
b. Laryngeal mask
c. Guedel airway
d. Orotrachel tube
e. Tracheostomic tube
Answers: a, b, c

Acute respiratory failure

1. (SC) Choose the anatomical structure which binds to the anterior edge of Epiglottis:
a. Arytenoid cartilage
b. Corniculate-cuneiphorme cartilages
c. Crycoid cartilage
d. Thyroid cartilage
e. Vocal cords
Answer: d

2. (MC) Choose the non-respiratory functions of the lung:
a. Blood filter
b. Conversion of the angiotensin I to angiotensin II
c. Gas exchange
d. Participation in the acid-base balance
e. Participation in the hydro-ionic balance
Answers: a, b, d, e

3. (MC) Choose the values of the PaO_2/FiO_2 ratio characteristic of ARDS:
a. <100
b. <200
c. <300
d. >300
e. ═400
Answer: a, b, c

4. (MC) Tick the clinical signs of Hypercapnic Respiratory Failure:
a. Abdominal pain
b. Agitation
c. Dyspnea
d. Somnolence
e. Sweating
Answers: c, d, e

5. (SC) Choose the statement that defines PaO_2:
a. Fraction of inspired O_2

b. Oxygen content in arterial blood
c. Oxygen saturation of arterial blood
d. Partial pressure of O_2 in arterial blood
e. Partial pressure of O_2 in venous blood
Answer: d

6. (MC) Choose the triggering factors of ARDS:
a. Pleuritis
b. Pneumonia
c. Pulmonary contusion
d. Sepsis
e. Shock states
Answers: b, c, d, e

7. (SC) Choose the statement that defines FiO_2:
a. Fraction of inspired O_2
b. Oxygen content in arterial blood
c. Oxygen saturation of the arterial blood
d. Partial pressure of O_2 in arterial blood
e. Partial pressure of O_2 in venous blood
Answer: a

8. (SC)Select the pathognomonic radiographic sign in ARDS:
a. Basal infiltrates
b. Bilateral diffuse fluffy infiltrates
c. Hypertransparency
d. Movement of mediastinal structures
e. Unilateral pulmonary infiltrate
Answer: b

9. (MC) Choose the effects of hyperventilation:
a. Hypercapnia
b. Hypocapnia
c. Hypoxemia
d. Metabolic acidosis
e. Respiratory alcalosis
Answers: b, e

10. (MC) Tick the pathophysiological mechanisms that lead to Acute Respiratory failure:
a. Altered ventilation/perfusion ratio
b. Alveolar hyperventilation
c. Alveolar hypoventilation
d. Disorder of the alveolar-capillary diffusion
e. Intrapulmonary right-left shunt
Answers: a, c, d, e

11. (SC) Choose the normal range for PaO_2:
a. <60 mmHg
b. 65-70 mmHg
c. 75-80 mmHg
d. 85-90 mmHg
e. 95-100 mmHg

Answer: e

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

a. 3ml/kg
b. 6 ml/kg
c. 10 ml/kg
d. 15 ml/kg
e. >15 ml/kg

Answer: b

13. (MC) Choose the correct statements characterizing the O_2 cascade:

a. Alveolar pressure of O_2 is influenced by water vapor pressure in the airways
b. It describes the process of increasing the atmospheric O_2 partial pressure to the alveoli
c. It describes the process of increasing the O_2 partial pressure from the atmosphere to the mitochondria
d. It describes the process of reduction of the O_2 partial pressure from the atmospheric air to the mitochondria
e. Water vapor partial pressure in the airways increases alveolar O_2 pressure

Answers: a, d

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

a. Metabolic acidosis
b. Metabolic alkalosis
c. Respiratory acidosis
d. Respiratory alkalosis
e. Metabolic and respiratory alkalosis

Answer: c

15. (SC) Tick the threshold PaO_2 value that defines hypoxemia:

a. 30 mmHg
b. 40 mmHg
c. 50 mmHg
d. 60 mmHg
e. 80 mmHg

Answer: d

16. (MC) Choose the indications for tracheostomy:

a. Bradypnea with respiratory rate = 8/min
b. Laryngeal edema or fracture
c. Laryngeal tumors
d. Lesions of cervical spine segment
e. Severe facial trauma

Answers: b, c, d, e

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

a. it decreases PaO_2/FiO_2 ratio
b. it decreases intrapulmonary shunt fraction
c. it decreases venous return
d. it prevents alveolar collapse
e. it recruits atelectatic alveoli

Answers: b, c, d, e

18. (MC) Tick the systemic effects of acute respiratory acidosis:
a. Activation of the sympathetic system
b. Hypertension
c. Laryngospasm
d. Tachycardia
e. Tachypnea
Answers: a, b, d, e

19. (MC) Choose the mechanisms contributing to hypercapnia:
a. Alveolar hyperventilation
b. Alveolar hypoventilation
c. Increased CO_2 concentration in the inhaled blend (reinhalation)
d. Increased dead space
e. Increased O_2 concentration in breating air
Answers: b, c, d

20. (MC) Tick the advantages of mechanical ventilation:
a. it decreases the systemic oxygen demand
b. it decreases venous return in pulmonary oedema
c. it decreases the work of breathing
d. it increases venous return
e. Keeping O_2 and CO_2 values in arterial blood in the normal range
Answers: a, b, c, e

21. (MC) Choose the nasal cannula characteristics:
a. it allows 0.4 FiO_2
b. it allows 0.7 FiO_2
c. it allows feeding and communication
d. it irritates the mucosa
e. It is easily tolerated by the patient
Answers: a, c, d, e

22. (MC) Tick the objectives of tracheal intubation:
a. Achieving an appropriate extracorporeal oxygenation
b. Providing mechanical ventilation
c. Treatment of airway obstruction
d. Facilitating the oxygen therapy
e. Protection of the airways
Answers: b, c, d, e

23. (MC) Choose the statements that are valid for hypoxemia:
a. PaO2<60 mmHg
b. PaO2=95 mmHg
c. PaO2>90 mmHg
d. SaO2< 90%
e. SaO2>96%
Answers: a, d

24. (MC) Tick the causes of hypoxia:
a. Cardiac output = 1.5 l/min
b. Low content of the O_2 in the arterial blood

c. $PaCO_2$ = 45-50mmHg
d. PaO_2 = 50 mm Hg
e. Severe anemia

Answers: a, b, d, e

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

a. Changes in the ventilation-perfusion ratio
b. Decreased release of O_2 to the tissue
c. Diffusion disorders in the alveolo-capillary membrane
d. Reduced O_2 concentration of inspired air
e. Right-left shunt

Answers: a, c, d, e

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

a. $PaCO_2$
b. PaO_2/FiO_2
c. PAO_2/FiO_2
d. PaO_2/PvO_2
e. PAO_2-PaO_2

Answer: b

27. (MC) Tick the factors that influence the release of O_2 to the periphery:

a. Amount of 2,3 Bisphosphoglycerate
b. Body temperature
c. Level of serum proteins
d. O_2 tissue consumption
e. pH

Answers: a, b, d, e

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

a. Metabolic acidosis
b. Metabolic alkalosis
c. Reduction of the ATP
d. The accumulation of lactic acid
e. The installation of anaerobic metabolism

Answers: a, c, d, e

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

a. Bradycardia
b. Dyspnea
c. Psychomotor agitation
d. Tachycardia
e. Tachypnea

Answers: b, c, d, e

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

a. Extended inspiration
b. Extended inspiration and expiration
c. Increased work of breathing
d. Short inspiration and expiration
e. Short inspiration and extended expiration

Answers: c, e

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

a. Barotrauma
b. Hypoglycemia
c. Polyuria
d. Pulmonary volutrauma
e. Ventilator-associated pneumonia

Answers: a, d, e

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

a. It can be induced by hypoxemia
b. It can develop at high altitude
c. It can develop at normal PaO_2 values
d. It is a deficiency of oxygen in the tissue
e. It is not dependent on cardiac output

Answers: a, b, c, d

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

a. Hypocapnia
b. Hypoxemia
c. Metabolic acidosis
d. Respiratory acidosis
e. Respiratory alkalosis

Answers: a, e

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

a. it allows phonation
b. it does not require sedation
c. it ensures administration of 100% O2 (FIO_2=1,0)
d. It is easily accepted by the patient
e. It may cause epistaxis

Answers: a, b, d

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

a. it induces hypoxemic respiratory failure
b. It is a consequence of increased alveolar-capillary membrane permeability
c. It is cardiogenic pulmonary edema
d. Represents non-cardiogenic pulmonary edema
e. The severity is determined by the PaO_2/FiO_2 ratio

Answers: a, b, d, e

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

a. Increased work of breathing
b. PaO_2/FiO_2<200 mmHg
c. PaO_2<60 mmHg on $FiO_2 \geq 0,5$
d. SaO_2<90% on $FiO_2 \geq 0,5$
e. Tachycardia

Answers: a, b, c, d

37. (MC) Tick the oxygentherapy complications:

a. Acute lung injury
b. Atelectasis
c. Hyperventilation
d. Hypotension
e. Hypoventilation

Answers: a, b, e

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

a. Burns
b. Chronic renal failure
c. Hemorrhagic necrotic pancreatitis
d. Massive transfusion
e. Septic shock

Answers: a, c, d, e

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

a. $PaCO_2$>60 mmHg
b. PaO_2>70mmHg on FiO_2<0,4
c. PaO_2/FiO_2<200
d. PaO_2/FiO_2>200
e. SaO_2>95% on FiO_2<0,4

Answers: b, d, e

40. (MC) Tick the causes of hypoxia:

a. Hyperventilation
b. Intoxication with carbon monoxide
c. Low cardiac output
d. Severe anemia
e. Shock

Answers: b, c, d, e

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

a. Dexamethasone
b. Dopamine
c. Salbutamol
d. Terbutaline
b. Theophylline

Answers: a, c, d, e

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

a. Administration of adrenaline
b. Administration of albuterol
c. Administration of antibiotics
d. Application of the Safar's triple maneuver
e. Oxygen therapy

Answers: a, b, e

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

a. Cardiac arrhythmias
b. Coma
c. Metabolic acidosis
d. Metabolic alkalosis
e. Myocardial ischemia

Answers: a, b, c, e

44. (MC)Tick the consequences of hyperventilation:

a. Hypocapnia

b. Hypoxemia
c. Metabolic acidosis
d. Respiratory acidosis
e. Respiratory alkalosis

Answers: a, e

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

a. It is the volume of air contained in the airways (oropharynx, trachea, bronchi)
b. It is the volume of air contained in the alveoli
c. It is the volume of air contained in the machine ventilation circuit
d. The normal value is 10% of the Tidal volume
e. The normal value is 30% of the Tidal volume

Answers: a, e

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

a. It is used to diagnose the source of hypoxemia
b. It represents the difference between the alveolar and arterial O_2 concentration
c. The normal value is 0-5 mmHg
d. The normal value is 5-10 mmHg
e. There is a difference between the arterial and venous concentration of O_2

Answers: a, b, d

47. (MC) Tick the factors that modify O_2 arterial content (according to the formula):

a. Amount of hemoglobin
b. Blood pressure
c. Lactate
d. Arterial oxygen saturation (SaO2)
e. 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:

a. Arterial oxygen saturation
b. Heart rate (through cardiac output)
c. Serum hemoglobin concentration
d. Stroke volume
e. The partial pressure of CO_2 in arterial blood

Answers: a, b, c, d

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

a. Blood pressure
b. FCC
c. PaO_2/FiO_2
d. PO_2
e. SpO_2

Answer: c

50. (SC) Which collaborative intervention will you anticipate to a increasingly lethargic patient with hypercapnic respiratory failure, respiratory rate of 8 and SpO_2 of 89%:

a. Administration of oxygen by facial simple mask
b. Administration of oxygen by non-rebreather mask
c. Administration of oxygen by nasal cannula
d. Endotracheal intubation and positive pressure ventilation
e. 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 $PaCO_2$:

a. Disorders of consciousness
b. Fatigability
c. Sweating
d. The patient's blood pressure is 160/90 mmHg
e. The patient's SpO_2 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:

a. Arterial blood gases every 2 hours
b. Cardiac ultrasound
c. Inserting a pulmonary artery catheter
d. Positioning the patient for a chest radiograph
e. Spirometry

Answer: b

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

a. Chest radiograph with bilateral opacities not explained by effusions, lobar or lung collapse, or nodules
b. Impaired oxygenation, defined as a PaO_2/FiO_2 ratio of 300 mmHg or less
c. Onset within one week after the effect of a known pathological factor or new or worsening respiratory symptoms
d. Pulmonary wedge pressure>18 mmHg
e. 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:

a. Burns
b. Pneumonia
c. Pulmonary contusion
d. Sepsis
e. Toxic inhalation

Answers: b, c, e

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

a. Acute hemorrhagic necrotic pancreatitis
b. Community acquired pneumonia
c. Major trauma
d. Multiple blood transfusions
e. Sepsis

Answers: a, c, d, e

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

a. It is a community-acquired infection
b. It is a nosocomial infection
c. It is defined by the presence of new or progressive pulmonary infiltrates
d. It starts 48-72 hours after the intubation
e. 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:

a. Awaken daily and assess readiness to wean and extubate
b. Elevate head of bed 30-45 degrees
c. Oral care
d. Stress ulcer disease prophylaxis
e. Using closed tracheobronchial circuit

Answers: a, b, c, e

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

a. The volume of air contained in the alveoli
b. The volume of air contained by the respiratory system, not participating in gas exchange
c. The volume of air contained by the respiratory system, participating in gas exchange
d. The volume of air entering the lungs during a normal breathing in
e. 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:

a. 1 ml/kg body weight
b. 2 ml/kg body weight
c. 5 ml/kg body weight
d. 8 ml/kg body weight
e. 10 ml/kg body weight

Answer: b

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

a. The amount of air left in the lungs following a maximal exhalation
b. The amount of air someone is able to take in with a deep inhalation
c. The amount of air which enters the lungs during normal inhalation at rest
d. The amount of extra air exhaled during a maximal breath out
e. 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:

a. Bradycardia
b. Bradypnea
c. Dyspnea
d. Dysuria
e. Hypertermia

Answer: c

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

a. Angina crisis
b. Brain damage
c. Diabetic coma

d. Hyperventilation
e. Pneumonia

Answer: b

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

a. Bacterial infections
b. Cessation of smoking
c. Polluted environment
d. unjustified interruption of chronic medication
e. Viral infections

Answer: a, c, d, e

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

a. Anxiety
b. Dyspnea
c. Oliguria
d. Hemoptysis
e. Chronic cough

Answers: b, e

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

a. Muscle relaxation
b. Providing analgesia
c. Reducing the consumption of O_2
d. Reduction of bronchial secretions
e. Synchronization with the ventilator

Answers: c, e

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

a. It provides a FiO_2 higher than 0,6
b. It has a O_2 reservoir
c. It has no O_2 reservoir
d. It has one-way valve
e. It provides a FiO_2 up to 0,6

Answers: a, b, d

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

a. Acid-base balance
b. Bronchoscopy
c. Chest X-ray
d. Pulmonary scintigraphy
e. electrocardiogram

Answers: a, c, e

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

a. Cystic fibrosis
b. Foreign body in the airway
c. Pneumonia
d. Pulmonary edema
e. Pulmonary embolism

Answers: b, c, d, e

69. (MC) Choose the treatment options in acute asthma:
a. Beta-blockers
b. corticosteroids
c. Nebulization with an anticholinergic
d. Nebulization with beta-2-agonists
e. Oxygen therapy
Answers: b, c, d, e

70. (MC) Choose the medication used in the treatment of exacerbation of chronic obstructive pulmonary disease:
a. Antibacterial drugs
b. Bronchodilators
c. Diuretics
d. Hypnotics
e. Systemic corticosteroids
Answers: a, b, e

71. (MC) Tick the medication used to treat chronic obstructive pulmonary disease:
a. Bromides
b. Fenoterol
c. Inhaled corticosteroids
d. Salmeterol
e. Theophylline
Answers: b, c, d, e

72. (MC) Choose the indications for starting mechanical ventilatory support with endotracheal intubation:
a. Bradypnea with respiratory rate <5/min
b. Hypertensive crisis
c. Inefficient noninvasive ventilation
d. Loss of protective pharyngeal reflexes
e. Spinal cord cervical level trauma
Answers: a, c, d, e

73. (MC) Choose the ventilator withdrawal criteria:
a. PaO_2/FiO_2 <200
b. PaO_2/FiO_2 >200
c. Respiratory rate <35/min
d. SpO_2 <90%
e. Tidal volume >5ml/kg
Answers: b, c, e

74. (MC) Tick the clinical signs that suggest spontaneous pneumothorax:
a. Dyspnea
b. Fever
c. Gaillard Classic triad: hypersonic percussion, absence of breath sounds and vocal vibrations
d. Tracheal deviation away from the side of the injury
e. Violent, lateral thoracic pain
Answers: a, c, d, e

75. (MC) Tick the oxygen therapy complications:
a. Absorption atelectasis

b. Anorexia, nausea
c. Hypoventilation and CO_2 narcosis
d. Retrolental fibroplasia in premature infants
e. Seizures

Answers: a, c, d

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

a. Disorders of consciousness
b. $PaCO_2$ >70 mmHg
c. PaO_2 =60 mmHg
d. Respiratory decompensation
e. The absence of rapid improvement despite oxygen therapy

Answer: c

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

a. Chest computed tomography angiography
b. Chest X-ray
c. Computed tomography of the thoracic cavity without contrast
d. Pulmonary scintigraphy
e. Venous ultrasonography of the lower extremities

Answer: a

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

a. Acute pneumonia
b. Acute pulmonary edema
c. Decompensation of chronic obstructive pulmonary disease
d. Pneumothorax
e. Pulmonary embolism

Answers: b, c

79. (CS) Tick the clinical sign whicn <u>is not</u> characteristic of asthma crisis:

a. anxiety
b. bradypneea with inspiratory dyspnea
c. cough
d. expiratory dyspnea
e. wheezing

Answer: b

(SC) 80. Choose the <u>false</u> statement concerning pulmonary embolism:

a. Deep vein thrombosis is the most frequent cause of pulmonary embolism
b. Hypercoagulability is a risk factor
c. It is a congenital disease
d. It is caused by the migration of an embolus in the pulmonary arterial circulation
e. Risk factors are long tubular bone fractures

Answer: c

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

a. $PaCO_2$ >70 mmHg
b. PaO_2/FiO_2 <100
c. Profuse sweating

d. Respiratory rate >25/min
e. Respiratory muscles fatigue

Answers: a, b, d, e

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

a. Acute pulmonary edema
b. Decompensation of chronic obstructive pulmonary disease
c. Lung cancer
d. Pulmonary embolism
e. Renal impairment

Answer: b

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

a. Hyperresonance at the percussion
b. Inspiratory dyspnea
c. Intercostal recession
d. Stridor
e. Uncompromised phonation

Answer: a

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

a. Tidal volume
b. Dead space volume
c. Residual capacity
d. Residual volume
e. Vital capacity

Answer: a

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

a. Anxiety with air hunger
b. Chest hyperinflation
c. Jugular turgidity in expiration
d. Stridor
e. Wheezing

Answers: a, b, c, e

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

a. 15-16%
b. 21%
c. 24%
d. 35%
e. 50%

Answer: b

87. (SC) Tick the statement which <u>does not characterize</u> acute respiratory distress syndrome:

a. Chronic respiratory impairment can be a complication of acute respiratory distress syndrome
b. It is a cardiogenic-type pulmonary edema
c. It is characterized by acute onset
d. The cause may be pulmonary and/or systemic

e. The death rate varies between 25-55%

Answer: b

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

a. Bradypnea
b. Headache
c. Hypersonic percussion
d. Thorax emphysematous
e. Wheezing

Answer: c

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

a. Arterial oxygen saturation
b. Cardiac output
c. O_2 partial pressure in arterial blood
d. Pulmonary capillary occlusion pressure
e. Vascular resistance

Answer: a

90. (MC) Choose the effects of hypercapnia:

a. CNS depression at high $PaCO_2$
b. Cerebral vasoconstriction due to cerebral hypoxia
c. Cerebral vasodilation and increase in intracranial pressure
d. Activation of sympathetic nervous system with tachycardia, vasoconstriction
e. 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:

a. Blood volume ejected by heart during systole
b. Blood volume ejected by heart per 1 minute
c. Total circulating blood volume
d. Blood volume divided by the body surface area
e. 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:

a. Left atrium pressure
b. Right atrium pressure
c. Right ventricle pressure
d. Left ventricle pressure
e. Pulmonary artery pressure

Answer: a

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

a. Vasodilator
b. Vasopressor
c. Diuretic
d. Beta-blocker
e. Fluids

Answer: a

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

a. Norepinephrine
b. Epinephrine
c. Dopamine
d. Dobutamine
e. Nitroglycerin

Answer: a

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

a. Cardiogenic
b. Hypovolemic
c. Septic
d. Neurogenic
e. Anaphylactic

Answers: a, b

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

a. Hypovolemic shock
b. Adrenal insufficiency
c. Acute hemorrhagic pancreatitis
d. Anaphylactic shock
e. Pain, anxiety

Answers: a,e

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

a. Septic shock
b. Acute pancreatitis
c. Liver cirrhosis
d. Neurogenic shock
e. Hypovolemic shock

Answers: a, b, c, d

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

a. Chronic anemia

b. Arteriovenous fistula
c. Acute myocardial infarction
d. Patients with sepsis after fluid resuscitation
e. Hyperthyroidism
Answers: a, b, d, e

11. (MC) Choose common causes of left ventricle failure:
a. Acute myocardial infarction
b. Aortic dissection
c. Air embolism
d. Mitral valve insufficiency
e. Aortic valve stenosis
Answers: a, b, d, e

12. (MC) Choose causes of right ventricle failure:
a. Aortic valve stenosis
b. Pulmonary embolism with blood clots
c. Pulmonary air embolism
d. Amniotic fluid embolism
e. Mechanical ventilation with excessive positive pressure
Answers: b, c, d, e

13. (SC) Choose the cause of global (biventricular) cardiac failure:
a. Myocarditis
b. Aortic valve stenosis
c. Pulmonary artery embolism
d. Mechanical ventilation
e. Massive pleural effusions
Answer: a

14. (MC) Dyastolic cardiac failure caused by external compression can be produced by:
a. Pericardial calcifications or effusions
b. Tension pneumothorax
c. Large amounts of fluid in the pleural space
d. Large acute myocardial infarction
e. Mechanical ventilation
Answers: a, b, c

15. (MC) Choose components of cardiac output:
a. Preload
b. Afterload
c. Heart rate
d. Contractility
e. Tidal volume
Answers: a, b, c, d

16. (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

17. (MC) What is afterload?

a. Tension in the ventricular wall during ejection
b. End-diastolic sarcomere length
c. End-diastolic ventricular volume
d. The amount of resistance the heart must overcome to open the aortic valve
e. Resistance to the blood flow in the major vessels

Answers: a, d

18. (MC) Afterload is influenced by:

a. Pleural pressure
b. Vascular impedance and resistance
c. Preload
d. Degree of aortic valve stenosis
e. Contractility

Answers: a, b, c, d

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

a. In healthy individuals the maximal cardiac output is achieved at a HR of 140 bpm
b. Cardiac output gradually decreases from 140 to 180 bpm
c. Heart rate greater than 180 bpm can cause ventricular fibillation
d. In cardiac failure cardiac output decreases at a HR of 120 bpm
e. In healthy individuals the maximal cardiac output is achieved at a heart rate of less than 45 bpm

Answers: a, b, c, d

20. (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:

a. Increased cardiac output
b. Low cardiac output
c. Decreased systemic vascular resistance
d. Increased systemic vascular resistance
e. Increased stroke volume

Answers: a, c, e

21. (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:

a. Increased cardiac output
b. Low cardiac output
c. Decreased systemic vascular resistance
d. Increased systemic vascular resistance
e. Increased stroke volume

Answers: b, d

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

a. Hyperbaric oxygen therapy
b. Oxigenotherapy
c. Nutritional support
d. Analgesia and sedation
e. Prophylactic medication (antibiotics, anticoagulants, antiagregants)

Answers: b, c, d, e

23. (MC) Bradycardia requires the treatment when:
a. HR ≤35 bpm, irrespective to blood pressure
b. HR ≤35 bpm, with hypotension
c. HR ≤50 bpm, irrespective to blood pressure
d. HR ≤50 bpm, with hypotension
e. HR >50 bpm, with normal blood pressure
Answers: a, d

24. (MC) Patients with bradycardia should be assesed for:
a. Potassium blood level
b. Thyroid hormone (hyperthyroidism identification)
c. Thyroid hormone (hypothyroidism identification)
d. Chronic beta-mimetic therapy
e. Chronic beta blocker therapy
Answers: a, c, e

25. (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:
a. systolic blood pressure = 70 mmHg
b. systolic blood pressure = 100 mmHg
c. systemic vascular resistance >2400 dyne·s·cm-5/m2
d. systemic vascular resistance > 1600 dyne·s·cm-5/m2
e. systolic blood pressure > 140 mmHg
Answers: b, d

26. (MC) Vasodilators are indicated in:
a. High systemic vascular resistance
b. Low systemic vascular resistance
c. Patent with arterial hypertension (systolic blood pressure >140 mmHg or MAP>100 mmHg)
d. Systolic blood pressure = 100 mmHg
e. Mean arterial pressure = 55 mmHg
Answers: a, c

27. (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):
a. Norepinephrine
b. Nifedipine
c. Epinephrine
d. Sodium Nitroprusside
e. Efedrine
Answers: b, d

28. (MC) The purposes of cardiovascular function monitoring in anesthesia and intensive care are:
a. Monitoring all possible parameters
b. Ensuring that the tissue perfusion is enough in patient considered "relatively stable"
c. Early detection of inadequate tissue perfusion
d. Titrating therapy to specific hemodynamic target in unstable patients
e. Identification of hemodynamic patterns

Answers: b, c, d, e

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

a. <0 mmHg
b. ±5 mmHg
c. 0-8 mmHg
d. 18-20 mmHg
e. >20 mmHg

Answer: c

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

a. 0 mmHg
b. < 5 mmHg
c. 5-12 mmHg
d. 18-20 mmHg
e. >20 mmHg

Answer: c

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

a. the balloon is inserted through the femoral artery
b. the proximal part of the balloon is placed above the renal arteries
c. the distal part of the balloon is close to the left atrium
d. the balloon is inflated with helium during systole
e. the balloon is inflated during diastole

Answers: a, b, e

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

a. brain perfusion
b. cardiac perfusion
c. mesenteric perfusion
d. hepatic perfusion
e. renal perfusion

Answers: a, b

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

a. Chest pain that lasts less than 20 min
b. Chest pain that lasts more than 20 min
c. Retrosternal pain that radiates to the left shoulder or arm
d. Dyspnea
e. wheezing

Answers: b, c, d

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

a. Aspirin
b. Ketorolac
c. Morphine
d. Epinephrine
e. Propranolol

Answers: a, c, e

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

a. ST elevation> 1 mm in 2 or more leads

b. Positive T Troponin
c. Retrosternal pain
d. Positive D-dimer
e. Elevated serum lactate dehydrogenase levels

Answers: a, b, c

36. (MC) Choose complications of acute coronary syndrome:

a. Right bundle branch block of His
b. Cardiogenic shock
c. Ventricular fibrillation
d. Pulmonary edema
e. Sudden death

Answers: b, c, d, e

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

a. Nimesulid
b. Fentanyl
c. Tramadol
d. Paracetamol
e. Morphine

Answer: e

38. (MC) Choose the correct statements regarding morphine:

a. it decreases left ventricular preload
b. it decreases left ventricular afterload
c. it is the first line pharmacologic agent for the treatment of pain in acute coronary syndrome
d. it increases respiratory rate
e. it dilates coronary arteries

Answers: a, b, c, e

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

a. Cardiogenic shock
b. Ventricular fibrillation
c. Pulmonary edema
d. Mesenteric thrombosis
e. Pulmonary embolism

Answers: a, b, c

40. (MC) In cardiogenic shock is characterized by:

a. Peripheral vasoconstriction
b. Peripheral vasodilation
c. Sustained hypotension (systolic blood pressure < 90 mm Hg for at least 30 minutes)
d. Reduced cardiac index (<1.8 l/min/m^2 without support)
e. Elevated Pulmonary Capillary Wedge Pressure (PCWP> 18 mm Hg)

Answers: a, c, d, e

41. (MC) The causes of cardiogenic shock are:

a. Anterior wall myocardial infarction
b. Left ventricular hypertrophy
c. Acute mitral insufficiency
d. Ventricular septal rupture

e. Left bundle branch block

Answers: a, c, d

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

a. Pulmonary embolism
b. Valvular heart diseases
c. Drug use
d. Myocarditis
e. Hypervolemia

Answers: a, b, c, d

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

a. Immediate cardioversion
b. Amiodarone
c. Beta-blockers
d. Procainamide
e. Lidocaine

Answers: b, d

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

a. Immediate cardioversion
b. Amiodarone
c. Beta-blockers
d. Procainamide
e. Lidocaine

Answer: a

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

a. Open pneumothorax
b. Aortic stenosis
c. Tachycardia
d. Cardiac ischemia
e. Artificial ventilation with increased positive end-expiratory pressure

Answers: b, c, d, e

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

a. Hemoglobin (Hb)
b. Oxygen consumption (VO_2)
c. Cardiac output (CO)
d. The partial pressure of oxygen in arterial blood (PaO2)
e. Systemic vascular resistance (SVR)

Answers: a, c, d

47. (MC) Which statements regarding afterload are true?

a. it is the myocardial parietal tension during diastole
b. it is the myocardial parietal tension during systole
c. it is determined by atrial blood volume
d. it is the amount of resistance the heart must overcome to open the aortic valve
e. it is equivalent to systemic vascular resistance

Answers: b, d, e

48. (MC) The non-invasive or minimally invasive techniques for hemodynamic monitoring are:
a. Echocardiography
b. Thoracic Electrical Bioimpedance
c. Swan-Ganz catheter
d. Transesophageal Doppler
e. PiCCO (Pulse Contour Cardiac Output)
Answers: a, b, d, e

49. (MC) Choose the short-acting beta-blockers:
a. Propranolol
b. Atenolol
c. Esmolol
d. Labetolol
e. Metoprolol
Answers: c, d

50. (MC) High systemic vascular resistance is observed in:
a. Liver cirrhosis
b. Hypovolemic shock
c. Mechanical ventilation
d. Pain
e. Norepinephrine infusion
Answers: b, d, e

51. (MC) Low systemic vascular resistance is observed in:
a. Severe traumatic brain injury
b. Sepsis
c. Cardiogenic shock
d. Anaphylactic shock
e. Neurogenic shock
Answers: a, b, d, e

52. (MC) Low systemic vascular resistance is observed in:
a. Hypovolemic shock
b. Acute pancreatitis
c. Cardiogenic shock
d. Cirrhosis
e. Anxiety
Answers: b, d

53. (MC) Which statements are correct concerning torsade de pointes ?
a. QT ≥500ms
b. it can develop into ventricular fibrillation
c. may degenerate into atrial fibrillation
d. the treatment is cardioversion
e. it can be treated with 1-2 g slow intravenous administration of $MgSO_4$
Answers: a, b, d, e

54. (MC) Choose life-threatening arrhythmia:
a. Second-degree atrioventricular block
b. Supraventricular tachycardia
c. Ventricular tachycardia

d. Torsade de pointes
e. Sinus bradycardia
Answers: b, c, d

55. (SC) Choose the extracardiac factor which <u>does not</u> contribute to acute heart failure:
a. Hypervolemia
b. Alcohol abuse
c. Renal dysfunction
d. Hyperkinetic syndrome (anemia, fever)
e. Decreased lung compliance
Answer: e

56. (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:
a. Decompensated chronic heart failure
b. severe hypovolemia
c. Cardiogenic shock
d. Heart failure
e. Right- sided heart failure
Answer: c

57. (MC) Negative prognostic factors associated with acute heart failure are:
a. Hypovolemic shock
b. Myocardial infarction
c. Hyponatremia
d. Kidney failure
e. Hypotension
Answers: b, c, d, e

58. (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

59. (MC) Choose the indications for intra-aortic balloon pump:
a. Aortic dissection
b. Cardiogenic shock
c. Cardiomyopathies
d. Refractory left ventricle failure
e. Abdominal aortic aneurysm
Answers: b, c, d

60. (MC) Choose precipitating factors of heart failure:
a. Myocarditis
b. Atrial fibrillation
c. Anemia
d. Diaphragmatic paralysis
e. Hyperthyroidism

Answers: a, b, c, e

61. (MC) Choose the contraindications for intra-aortic balloon pump :
a. Aortic dissection
b. Cardiogenic shock
c. Cardiomyopathies
d. Aortic regurgitation
e. Abdominal aortic aneurysm
Answers: a, d, e

62. (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

63. (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

64. (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

65. (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

66. (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

67. (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

68. (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

69. (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

70. (SC)The most sensitive early marker for myocardial infarction is:
a. Myoglobin
b. Troponins
c. CK-MB
d. LDH
e. Myeloperoxidase
Answer: a

71. (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

72. (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

73. (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

74. (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

75. (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

76. (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

77. (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

77. (SC) The most common symptom of congestive heart failure is:
a. Tachycardia
b. Oliguria
c. Splenomegaly
d. Hepatomegaly
e. Dyspnea
Answer: e

78. (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

79. (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

80. (MC) Which of the following can be used in the treatment of acute heart failure:
a. Nonsteriodal anti-inflammatory drugs
b. Angiotensin-converting enzyme inhibitors
c. Beta blockers
d. Diuretics
e. Fresh frosen plasma
Answers: b, c, d

81. (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

82. (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

83. (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

84. (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

85. (SC) Choose monitored parameters of cardiovascular system?
a. Tidal volume
b. Stroke volume
c. Infused volume
d. Transfused volume

e. Expiratory volume
Answer: b

86. (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 nutrition in critically ill patients.

1. (SC). Choose the first-choice vasopressor for the treatment of hypotension despite adequate volume resuscitation in septic shock:
a. epinephrine
b. dobutamine
c. phenylephrine
d. norepinephrine
e. vasopresine
Answer: d

2. (SC) Choose the first-choice fluid in the resuscitation of septic shock:
a. hydroxyethyl starches
b. fresh frosen plasma
c. red blood cells
d. normal saline (0.9% NaCl Solution)
e. 5% dextrose in water
Answer: d

3. (SC) Choose the drug of choice for the treatment of patients with septic schock and myocardial dysfunction:
a. epinephrine
b. dobutamine
c. isoprenaline
d. phenylephrine
e. norepinephrine
Answer: b

4. (MC) The treatment of patients with septic shock may include*:*
a. dobutamine
b. hydrocortisone
c. nitroglycerin
d. norepinephrine
e. normal saline (0.9% NaCl Solution)
Answers: a, b, d, e

5. (MC) Choose the conditions that may cause cardiogenic shock:

a. myocarditis
b. life-threatening arrhythmias
c. constrictive pericarditis
d. conduction abnormalities
e. valvulopathies

Answers: a, b, d, e.

6. (MC) Which of the following statements concerning cardiogenic shock are correct:

a. stroke volume is increased
b. end-diastolic pressure is increased
c. cardiac output is low
d. anaerobic metabolism is increased
e. delivery of oxygen to tissues is increased

Answers: b, c, d

7. (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

8. (SC) Which of the following statement concerning cardiogenic shock is <u>FALSE:</u>

a. afterload is increased
b. left atrial pressure is elevated
c. delivery of oxygen to tissues is decreased
d. cardiac output is increased
e. catecolamine secretion is increased

Answer: d

9. (MC) In patients with cardiogenic shock is present:

a. decreased cardiac output
b. arterial hypotension
c. increased peripheral vascular resistanse
d. decreased peripheral vascular resistanse
e. tachycardia

Answers: a, b, c, e

10. (SC) Choose the drug of first choice for the treatment of arterial hypotension in patients with cardiogenic shock:

a. epinephrine
b. dobutamine
c. dopamine
d. phenylephrine
e. norepinephrine

Answer: e

11. (MC) Choose the drugs used for the treatment of cardiogenic shock (secondary to acute myocardial infarction):

a. dobutamine
b. epinephrine

c. fentanyl
d. nitroglycerin
e. norepinephrine

Answers: a, b, c, e

12. (SC) Choose the drug that <u>IS NOT</u> used for the treatment of cardiogenic shock (secondary to acute myocardial infarction):

a. dobutamine
b. epinephrine
c. fentanyl
d. nitroglycerin
e. norepinephrine

Answer: d

13. (MC) Which of the following statements concerning the intraaortic baloon pump are true:

a. it is a definitive therapy for patients with cardogenic shock
b. it is a temporary therapy for patients with cardogenic shock
c. 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

14. (MC) Which drugs <u>ARE NOT</u> recommended to be used in order to increase cardiac contractility in patients with cardiogenic shock and synus rhythm:

a. corglicon
b. dobutamine
c. epinephrine
d. isoprenaline
e. strophantine

Answers: a, d, e

15. (MC) Choose the causes of extracardiac obstructive shock:

a. massive pulmonary embolism
b. acute myocardial infarcion
c. constrictive pericarditis
d. pneumothorax
e. pericardial tamponade

Answers: a, c, d, e

16. (SC) What is the imaging method of choice for pulmonary embolism?

a. echocardiography
b. electrocardiography
c. arterial blood gases
d. chest x-ray
e. computed tomography pulmonary angiography

Answer: e

17. (MC) Choose the electrocardiographic changes in pulmonary embolism:

a. sinus tachycardia
b. inversion of T waves in leads $V_1 – V_4$
c. sinus bradycardia
d. $S_1Q_3T_3$ pattern

e. right axis deviation

Answers: a, b, d, e

18. (MC) Choose the agents that can be used in the treatment of hemodynamically unstable pulmonary embolism:

a. droperidol
b. streptokinase
c. norepinephrine
d. unfractionated heparin
e. warfarin

Answers: b, c, d, e

19. (MC) Choose the trombolytic drugs:

a. enoxaparin
b. heparin
c. rtPA (recombinant tissue plasminogen activator)
d. streptokinase
e. warfarin

Answers: c, d

20.(SC) Choose the correct anticoagulation therapy in hemodynamically unstable patients with pulmonary embolism:

a. unfractionated heparin - bolus of 40 units/kg, followed by an infusion of 18 units/kg per hour
b. unfractionated heparin - bolus of 40 units/kg, followed by an infusion of 5 units/kg per hour
c. unfractionated heparin - bolus of 50 units/kg, followed by an infusion of 5 units/kg per hour
d. unfractionated heparin - bolus of 80 units/kg, followed by an infusion of 18 units/kg per hour
e. unfractionated heparin - bolus of 80 units/kg, followed by an infusion of 14 units/kg per hour

Answer: d

21. (SC) The target range of aPTT during heparization of patients with of hemodynamically unstable pulmonary embolism should be:

a. 1.0 – 1.3 times control
b. 1.2 – 1.5 times control
c. 1.5 – 2.3 times control
d. 2.5 – 3.5 times control
e. 3.5 –4.5 times control

Answer: c

22. (MC) Choose the correct statements concerning treatment with warfarin of hemodynamically unstable patients with pulmonary embolism:

a. the treatment should be initiated on the same day as heparin
b. the treatment should be initiated on the fifth day after heparin administration
c. the treatment with warfarin should overlap with heparin treatment within five days and should start on the same day as heparin
d. the aim of the treatment is the INR level of 2.0 – 3.0.
e. the treatment should last at least 3 months

Answers: a, c, d, e

23. (MC) Choose the triggers of anaphylaxis:
a. antibiotics
b. hypovolemia
c. vaccines
d. local anesthetics
e. insect stings
Answers: a, c, d, e

24. (MC) Choose the correct statements concerning anaphylaxis:
a. stroke volume increases compensatory
b. vascular permeability is increased
c. stroke volume is decreased
d. blood volume decreases
e. mediators contribute to vasodilation
Answers: b, c, d, e

25. (MC) Choose the correct statements regarding anaphylaxis:
a. IgE is involved in pathophysiology
b. IgM is involved in pathophysiology
c. mediators contribute to vasodilation
d. mediators contribute to vasoconstriction
e. vascular permeability is decreased
Answers: a, c

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

27. (SC) Choose the drug of first choice for the treatment of arterial hypotension in patients with anaphylaxis:
a. epinephrine
b. dobutamine
c. dopamine
d. norepinephrine
e. phenylephrine
Answer: a

28. (MC) Which of the following can cause anaphylaxis:
a. bronchospasm
b. increased cardiac output
c. increased vascular permeability
d. hypervolemia
e. generalized vasodilation
Answers: a, c, e

29. (MC) Choose the agents commonly used in the treatment of anaphylaxis:
a. epinephrine
b. diphenhydramine

c. hydrocortisone
d. nitroglycerin
e. normal saline (0.9% NaCl Solution)
Answers: a, b, c, e

30. (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

31. (MC) Choose the agents commonly used in treatment of neurogenic shock:
a. epinephrine
b. nitroglycerin
c. norepinephrine
d. normal saline (0.9% NaCl Solution)
e. lactated Ringer's solution
Answers: a, c, d, e

32. (MC) Which of the following statements concerning neurogenic shock true:
a. cardiac output is increased
b. patients have relative hypovolemia
c. cardiac output is decreased
d. there is generalized vasodilation
e. there is generalized vasoconstriction
Answers: b, c, d

33. (SC) Choose the drug that is <u>NOT</u> used in the treatment of neurogenic shock:
a. epinephrine
b. nitroglycerin
c. norepinephrine
d. normal saline
e. lactated Ringer's solution
Answer: b

34. (MC) Choose the symptoms of neurogenic shock:
a. abdominal pain
b. arterial hypotension
c. tachycardia
d. warm dry skin
e. bradycardia
Answers: b, d, e

35. (SC) Choose the correct therapeutic option for the treatment of bradycardia in neurogenic shock:
a. metoprolol
b. norepinephrine
c. atropine
d. hydrocortisone
e. spinal immobilization
Answer: c

36. (MC) Choose the causes of hypovolemic shock:
a. excessive vomiting
b. diabetic ketoacidosis
c. bleeding
d. bowel obstruction
e. sepsis
Answers: a, b, c, d

37. (MC) Which of the following statements concerning hypovolemic shock are true:
a. stroke volume is increased compensatory
b. vascular permeability is increased
c. stroke volume is decreased
d. blood volume is decreased
e. there is generalized vasodilation
Answers: c, d

38. (SC) Choose the <u>FALSE</u> statement regarding hypovolemc shock:
a. central venous pressure is decreased
b. patient has tachycardia
c. cardiac output is decreased
d. skin is warm
e. urine output is decreased
Answer: d

39. (MC) Which of the following statements concerning hypovolemic shock are true:
a. the heart rate is increased
b. the heart rate is decreased
c. endogenous catecholamine levels are increased
d. cortisole levels are increased
e. water reabsorbtion in renal tubules is incresead
Answers: a, c, d, e

40. (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

41. (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

42. (MC) Choose the <u>FALSE</u> 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

43. (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

44. (MC) Choose the symptoms of hypovolemic shock:
a. decreased urinary output
b. confusion or lethargy
c. hypotension
d. bradycardia
e. tachycardia
Answers: a, b, c, e

45. (SC) Which of the following would be the first fluid of choice for a patient in hypovolemic shock:
a. Gelatin solution
b. normal saline (0.9% NaCl Solution)
c. 0.45% normal saline
d. 5% Dextrose solution
e. 10% Dextrose solution
Answer: b

46. (MC) Choose the types of shock in which glucocorticoids are used:
a. hypovolemic shock
b. cadiogenic shock (after acute myocardial infarction)
c. septic shock if adequate fluid resuscitation and vasopressor therapy are not able to restore hemodynamic stability
d. anaphylactic shock
e. obstructive shock (massive pulmonary embolism)
Answers: c, d

47. (MC) Choose the clinical indications for the use of washed red blood cells:
a. history of hemolytic transfusion reactions
b. IgA-deficient patients
c. history of recurrent, severe allergic reactions to blood product transfusion
d. IgM-deficient patients
e. patients with antibodies to leucocytes
Answers: b, c

48. (MC) Choose the clinical indications for the use of leukocyte depleted red blood cells:
a. patients with antibodies to leucocytes
b. IgA-deficient patient
c. prevention of HLA-alloimmunization
d. patiens with history of hemolytic transfusion reactions
e. patients with leukocytosis

Answers: a, c

49. (MC) Red blood cell transfusion is indicated for critically ill patients with the level of hemoglobin of:
a. 48 g/L
b. 56 g/L
c. 65 g/L
d. 100 g/L
e. 112 g/L
Answers: a, b, c

50. (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

51. (MC) Cryoprecipitate contains:
a. factor VIII
b. factor XII
c. factor XIII
d. vonWillebrand factor
e. fibrinogen
Answers: a, c, d, e

52. Cryoprecipitate is indicated for the treatment of microvascular bleeding in patients with:
a. hypofibrinogenemia
b. thrombocytopenia
c. Von Willebrand disease
d. hemophilia A
e. hemophilia B
Answers: a, c, d

53. (MC) Choose the crystalloid solutions:
a. Normal saline solution
b. 5% Dextrose solution
c. Gelatin solution
d. Ringer's solution
e. Lactated Ringer's solution
Answers: a, b, d, e

54. (MC) Choose the solutions that <u>ARE NOT</u> crystalloid:
a. Aminoplasmal
b. Normal saline solution
c. Intralipid
d. Lactated Ringer's solution
e. Gelatin solution
Answers: a, c, e

55. (MC) Choose the colloid solutions:

a. Lactated Ringer's solution
b. Normal saline solution
c. Intralipid
d. Albumin solution
e. Gelatin solution

Answers: d, e

56. (MC) Which of the following statements concernicing 5% Dextrose solution is true:

a. it is used for treatment of microvascular bleeding
b. it is used to expand patient's blood volume
c. it is used for parenteral nutrition
d. it can be administered by peripheral vein
e. it is used for treatment of dehydration

Answers: d, e

57. (MC) Which of the following solutions are used for parenteral nutrition:

a. Aminosteril
b. 5% Dextrose solution
c. 10% Dextrose solution
d. Infezol
e. fresh frozen plasma

Answers: a, c, d

58. (SC) Which of the following solutions is <u>NOT</u> used for parenteral nutrition:

a. Aminoplasmal
b. 20% Dextrose solution
c. Infezol
d. Intralipid
e. Gelatin solution

Answer: e

59. (SC) Daily requirements of carbohydrates (adult patient) for total parenteral nutrition are:

a. 10-20% of total calories
b. 20-30% of total calories
c. 30-40% of total calories
d. 50-60% of total calories
e. 70-80 of total calories

Answer:d

60. (SC) Daily requirements of lipids (adult patient) for total parenteral nutrition are:

a. 10-20% of total calories
b. 25-30% of total calories
c. 35-40% of total calories
d. 45-50% of total calories
e. 55-60% of total calories

Answer: b

61. (MC) Choose the lipid emulsions used in total parenteral nutrition:

a. Aminoplasmal
b. Aminosteril
c. Infezol
d. Intralipid

e. Lipofundin

Answers: d, e

62. (MC) Choose the aminoacid solutions used in total parenteral nutrition:

a. Intralipid
b. Aminosteril
c. Aminoplasmal
d. Lipofundin
e. Infezol

Answers: b, c, e

63. (SC) The caloric value of dextrose is:

a. 2.7 kcal/g
b. 3.7 kcal/g
c. 4.5 kcal/g
d. 5.5 kcal/g
e. 6.0 kcal/g

Answer: b

64. (SC) The caloric value of lipids is:

a. 3.7 kcal/g
b. 4.1 kcal/g
c. 5.5 kcal/g
d. 6.5 kcal/g
e. 9.3 kcal/g

Answer: e

65. (SC) The caloric value of proteins is:

a. 3.7 kcal/g
b. 4.1 kcal/g
c. 5.5 kcal/g
d. 6.5 kcal/g
e. 9.3 kcal/g

Answer: b

66. (MC) The dextrose solutions used in total parenteral nutrition are:

a. 5% Dextrose
b. 10% Dextrose
c. 20% Dextrose
d. 30% Dextrose
e. 40% Dextrose

Answers: b, c, d, e

67. (SC) Which of the following statement concernicing gelatin solutions is true:

a. they are used to expand patient's blood volume
b. they induce a greater plasma volume expansion than starches
c. they are used to correct clotting factors deficiencies
d. they are used for total parenteral nutrition
e. they have no sensitizing properties

Answer: a

68. (SC) Choose the correct value of basic adult daily requirements of proteins:

a. 0.8-1 g/kg body wt

b. 2-3 g/kg body wt
c. 3-4 g/kg body wt
d. 4-5 g/kg body wt
e. 5-6 g/kg body wt
Answer: a

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

70. (SC) Choose the indication for normal saline infusion:
a. treatment of acidosis
b. parenteral nutrition
c. treatment of microvascular bleeding
d. expansion of patient's blood volume
e. treatment of alcalosis
Answer: d

71. (SC) Choose the indication for 20% Dextrose infusion:
a. parenteral nutrition
b. correction of microvascular bleeding
c. treatment of acidosis
d. treatment of hypoalbuminemia
e. expansion of patient's blood volume
Answer: a

72. (SC) What is the primary treatment of hypovolemic shock?
a. lactated Ringer's solution
b. norepinephrine
c. hydrocortisone
d. 10% Dextrose solution
e. cryoprecipitate
Answer: a

73. (MC) Choose the types of shock associated with peripheral vasodilation:
a. septic
b. neurogenic
c. anaphylactic
d. hypovolemic
e. cardiogenic
Answers: a, b, c

74. (SC) Choose the type of shock in which epinephrine is the drug of choice for the treatment of arterial hypotension:
a. neurogenic
b. anaphylactic
c. septic
d. cardiogenic

e. hypovolemic
Answer: b

75. (SC) Which of the following concerning cardiogenic shock is correct:
a. pulmonary capillary wedge pressure (PCWP) < 18 mm Hg, cardiac index (CI) <2.0-2.2 l/min/m^2 with support
b. PCWP > 18 mm Hg, CI >2.0-2.2 l/min/m^2 with support
c. PCWP < 18 mm Hg, CI >2.0-2.2 l/min/m^2 with support
d. PCWP > 18 mm Hg, CI <2.0-2.2 l/min/m^2 with support
e. Values of PCWP and CI do not have any importance
Answer: d

76. (MC) Choose the signs of hypovolemic shock:
a. altered mental status
b. lactic acidosis
c. oliguria
d. poliuria
e. arterial hypotension
Answers: a, b, c, e

77. (MC) Choose the types of shock in which norepinephrine is the drug of choice for the treatment of arterial hypotension:
a. neurogenic
b. anaphylactic
c. septic
d. cardiogenic
e. hypovolemic
Answers: **a, c, d**

Acute consciousness disorders. Brain death.

1. (SC) The respiratory center is localized in:
a. the medulla oblongata and pons
b. only in the medulla oblongata
c. the hypothalamus
d. the cerebellum
e. the cerebrum
Answer: a

2. (SC) The total volume of cerebrospinal fluid in an adult is approximately:
a. 25-75 ml
b. 75-100 ml
c. 100-150 ml
d. 200-250 ml
e. 250-300 ml
Answer: c

3. (MC) Choose the true statements concerning oxygen in the adult brain:
a. cerebral oxygen consumption is approximately 3.5 ml per 100 g per minute
b. the human brain accounts for about 20% of the total oxygen consumption of the oxygen
c. partial pressure of O_2 less than 60 mmHg in the arterial blood causes cerebral vasoconstriction

d. the brain cannot store oxygen
e. acute reduction of blood flow for 10-15 seconds results in loss of consciousness

Answers: a, b, d, e

4. (MC) Tick the causes of cerebral edema:

a. cardiopulmonary resuscitation
b. cerebral contusion
c. postural hypotension
d. hemorrhagic stroke
e. cerebral tumors

Answers: a, b, d, e

5. (SC) Which of the following is ineffective in cytotoxic brain edema:

a. mannitol
b. hyperventilation
c. hypothermia
d. glucocorticosteroids
e. head of bed elevation to 30–45 degrees

Answer: d

6. (MC) Brain herniation can produce:

a. anisocoria
b. bilateral pupils dilatation
c. improvement in the level of consciousness
d. hemodynamic instability
e. heart rhythm disorders

Answers: a, b, d, e

7. (MC) Choose the causes of increased intracranial pressure:

a. hyperventilation
b. hypercapnia
c. systemic hypotension
d. hypoxia
e. hyperoxia

Answer: b, c, d

8. (MC) Choose the components of Cushing's triade:

a. increase in blood pressure
b. bradycardia
c. tachycardia
d. bradypnea
e. raised intracranial pressure

Answers: a, b, e

9. (MC) Choose the criteria of the Glasgow coma scale:

a. pupil size
b. verbal response
c. eyes response
d. eyes position and movement
e. motor response

Answers: b, c, e

10. (MC) Choose the components of the classic Monroe-Kellie doctrine:

a. brain
b. CSF
c. extracelular fluid
d. tentorium
e. blood

Answers: a, b, e

11. (SC) Choose the definition of cerebral perfusion pressure:

a. the difference between systemic blood pressure and intracranial pressure
b. the difference between systolic and dyastolic blood pressure
c. the difference between mean arterial pressure and intracranial pressure
d. the difference between systolic blood pressure and intracranial pressure
e. the difference between dyastolic blood pressure and intracranial pressure

Answer: c

12. (MC) Choose causes of coma:

a. hyper- , hyponatremia
b. dyslipidemia
c. hyperglycemia
d. hypoxia
e. hypoglycemia

Answers: a, c, d, e

13. (MC) The consequenses of hypercapnia are:

a. cerebral vasodilatation
b. increased cerebral blood flow
c. decreased intracranial pressure
d. reduced cerebrospinal fluid production
e. increased intracranial pressure

Answers: a, b, e

14. (MC) Choose the factors influencing cerebral blood flow:

a. PaO_2
b. body temperature
c. $PaCO_2$
d. systemic blood pressure
e. blood glucose level of 6 mmol/l

Answers: a, b, c, d

15. (MC) Choose the factors that increase cerebral blood flow and intracranial pressure:

a. hyperventilation
b. hypoxemia
c. epileptic seizure
d. hypercapnia
e. hypothermia

Answers: b, c, d

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

a. sedation and analgesia
b. hyperthermia
c. head of bed elevation to 30-45 degrees

d. respiratory alkalosis
e. acidosis

Answers: a, c, d

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

a. Na^+ enter into neurons and accumulate intracellularly
b. Cl^- leave the cell
c. there is a depletion of ATP
d. intracellular potassium ion (K^+) concentration increases
e. extracellular water flows into the cell

Answers: a, c, e

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

a. blood pressure instability
b. anisocoria
c. decerebrate posturing
d. apnea
e. impaired consciousness

Answers: a, c, d, e

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

a. compressed lateral ventricles are not an impediment for ventriculostomy
b. ventriculostomy is a single method of intracranial pressure monitoring
c. ventriculostomy is the gold standard of intracranial pressure monitoring
d. ventriculostomy offers the possibility to reduce intracranial pressure by draining CSF
e. ventriculostomy is a safe method of intracranial pressure monitoring without side effects

Answers: c, d

20. (MC) Bilateral fixed dilated pupils indicate:

a. opioid overdose
b. anoxia
c. brain death
d. administration of mydriatic eye drops
e. systemic administration of adrenomimetic drugs

Answers: b, c, d, e

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

a. CT examination
b. MRI
c. C reactive protein level
d. electroencephalography
e. lumbar puncture

Answers: a, b, d, e

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

a. MRI
b. lumbar puncture
c. CT examination
d. evoked potentials
e. electroencephalography

Answer: c

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

a. routine hyperventilation
b. mantaining PaO_2>60 mmHg
c. treatment of hypertension
d. continous sedation
e. antiseizure therapy

Answers: b, c, d, e

24. (MC) Choose the osmotic drugs:
a. Dextran 70
b. Normal saline
c. Hypertonic Saline (3%)
d. Mannitol
e. Loop diuretics

Answers: c, d

25. (MC) Furosemide exerts its effect (decreases intracranial pressure) through:
a. reduction of cerebrospinal fluid production
b. improvement of cerebrospinal fluid circulation
c. an osmotic gradient caused by a mild diuresis
d. lowering serum potasium level
e. reduction of brain water

Answers: a, c, e

26. (MC) Choose the side effects of glucocorticosteroids:
a. hypoglicemia
b. immunosupression
c. upper gastrointestinal bleeding
d. arterial hypotension
e. hyponatremia

Answers: b, c

27. (MC) Which of the following statements are true?
a. administration of glucocorticosteroids improves the outcome of the patients with cytotoxic cerebral edema
b. administration of glucocorticosteroids in patients with cerebral edema increases the risk of upper gastrointestinal bleeding
c. loop diuretics increase the effect of osmothic drugs
d. glucocorticosteroids can induce hypoglycemia
e. glucocorticosteroids are used in the treatment of vasogenic cerebral edema

Answers:b, c, e

28. (SC) Which of the following statements is FALSE?
a. hypothermia reduces intracranial pressure
b. hypothermia is recommended for the treatment of patients with severe head trauma
c. hypothermia can induce coagulopathy
d. hypothermia increases cerebral metabolic rate
e. hypothermia can cause arrhythmias

Answer: d

29. (MC) Choose the tests that are NOT used for the diagnosis brain death:
a. assesment of brainstem reflexes
b. adrenaline test
c. doll's eyes test

d. determining intracranial pressure
e. apnea test
Answers: b, d

30. (MC) Choose the factors that affect cerebral blood flow:
a. pH
b. PaO_2
c. blood viscosity
d. INR
e. $PaCO_2$
Answers: a, b, c, e

31. (MC) Choose strategies aimed at reducing cerebral 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:
a. hypokalemia
b. hypernatremia
c. hypercholesterolemia
d. hyperglycemia
e. 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. $PaCO_2$= 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. PaO_2 < 60 mmHg
d. $PaCO_2$ < 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. $PaCO_2$ >70 mmHg
e. PaO_2 >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:
a. saccular cerebral aneurism
b. drug induced vasculitis
c. intracranial artery dissection
d. moyamoya disease
e. arteriovenous malformation
Answers: a

48. (MC) Choose the most common causes of ischemic stroke:
a. valvular heart disease
b. atherosclerotic disease in the extracranial cervical carotid artery
c. saccular cerebral aneurism
d. atrial fibrillation
e. atherosclerotic disease in the vertebral artery

Answers: a, b, d, e

49. (MC) Choose the drugs recommended in patients with coma of unknown origin:
a. flumazenil
b. 40% glucose solution
c. thiamine
d. naloxon
e. dantrolen
Answers: b, c, d

50. (SC) Choose the first-line treatment for opioid overdose:
a. codeine
b. pentazocine
c. butorphanol
d. naloxon
e. methadone
Answer: d

51. (MC) Which of the following can cause disorders of consciousness?
a. uremia
b. diabetic ketoacidosis
c. serum iron of 20 μmol/L
d. blood glucose concntration of 2.0 mmol/L
e. hypothyroidism
Answers: a, b, d, e

52. (MC) Which of the following can cause disorders of consciousness?
a. serum sodium concentration of 118 mmol/L
b. serum potasium concentration of 2.5 mmol/L
c. blood glucose concentration of 28 mmol/L
d. blood total cholesterol level of 200 mg/dL
e. $PaCO_2$ >70 mmHg
Answers: a, c, e

53. (MC) Which of the following are true statements about vasogenic cerebral edema?
a. is caused by disruption of blood-brain barier
b. white matter is affected selectively
c. is the most common type in brain tumors
d. responds very well to corticosteroid treatment
e. the main cause is hypoperfusion
Answers: a, c, d

54. (SC) Choose FALSE statement concerning cytotoxic cerebral edema:
a. it rezults from cerebral ischemia
b. it is caused by disruption of the blood-brain barrier
c. it is not caused by disruption of the blood-brain barrier
d. it is due to energy depletion
e. Na^+/K^+ pump is impaired
Answer: b

55. (MC) Choose the true statements concerning apnea test:
a. it is a mandatory examination for determining brain death
b. it is recommended for patients with a Glasgow coma scale >5 points

c. patient must be preoxygenated with 100% O_2
d. if respiratory movements are observed, the apnea test result is negative (i.e., does not support the diagnosis of brain death).
e. it should be aborted if SpO_2<80%
Answers: a, c, d, e

56. (SC) Choose FALSE statement concerning caloric test:
a. it is used for diagnosis of brain death
b. it helps to identify the reversibility of brain stem injury
c. it is recommended for the patients with fixed and non-reactive pupils
d. it is performed by instillation of ice-cold water into the external auditory meatus
e. patients with brain death have horizontal nistagmus
Answer: e

57. (SC) Choose the cause of bilateral pinpoint pupils:
a. brain hypoperfusion
b. opiate overdose
c. central transtentorial herniation
d. mezencephalic lesions
e. increased catecholamine blood levels
Answer: b

58. (SC) Choose the cause of unilaterally nonreactive dilated pupil:
a. systemic hypoperfusion
b. mesencephalic lesions
c. subfalcian herniation
d. metabolic disorders
e. transtentorial herniation
Answer: e

59. (MC) Choose the correct statements concerning oculocephalic test:
a. the head is briskly turned from side to side
b. it is recommended for all coma patients
c. it is used for diagnosis of brain death
d. it is not contraindicated in patients with cervical spinal cord injury
e. 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:
a. it is caused by bilateral cortical and forebrain lesions
b. it suggests ketoacidosis
c. it is an oscillation of ventilation between apnea and hyperpnea
d. it is characterized by frequent and deep breathing
e. it suggests midbrain-upper ponce lesions
Answers: a, c

61. (MC) Choose the methods used to reduce the cerebral blood flow:
a. blood pressure management
b. drainage of cerebrospinal fluid
c. sedation in order to avoid ”fighting of the patient with ventilator”
d. head of bed elevation to 30-45 degrees
e. administration of vasoconstrictors

Answers: a, c, d

62. (MC) Choose the side effects of hypothermia:
a. delayed wound healing
b. thrombotic complications
c. heart rhythm disorders
d. shivering
e. reduction in cerebral metabolic rate
Answers: a, c, d

63. (MC) Choose the correct statements concerning external ventricular drain:
a. it can be used to monitor intracranial pressure
b. ventriculitis is an unavoidable complication
c. it offers the possibility to drain cerebrospinal fluid if necessary
d. hemorrhagic complications are expected in patients with coagulation disturbances
e. 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:
a. it provides hemodynamic stability because of sympathomimetic effects
b. it reduces cerebral metabolic rate
c. it has immunosuppressive effect
d. when used in high doses it increases the duration of mechanical ventilation and length of stay in intensive care unit
e. its efficiency can be evaluated by continuous EEG monitoring
Answers: b, c, d, e

Fluid and electrolyte disturbances.

1. (SC) How many liters of total water does a 70 kg human body contain?
a. 30 liters
b. 42 liters
c. 52 liters
d. 56 liters
e. 70 liters
Answer: b

2. (SC) How many percent of intracellular water does the human body contain?
a. 22%
b. 26%
c. 36%
d. 46%
e. 56%
Answer: c

3. (SC) How many percent of interstitial water does the human body contain?
a. 10.5%
b. 11.5%
c. 13.5%
d. 14.5%
e. 20.5%

Answer : b

4. (SC) How many percent the human body weight does plasma constitute?
a. 3.5%
b. 4.5%
c. 4.7%
d. 5.5%
e. 7.5%
Answer: b

5. (SC) Osmotic pressure is determined by the balance of:
a. Frank-Starling law
b. Van Hoff law
c. Saint-Giorgy law
d. Hagen-Poiseuille law
e. Stewart law
Answer: b

6. (SC) Which is the normal value of plasma oncotic pressure?
a. 23-25mmHg
b. 24-26 mmHg
c. 25-28 mmHg
d. 27-29 mmHg
e. 30-49 mmHg
Answer: c

7. (SC) The exchange of water between the fluid compartments is determined by the:
a. Nernst Balance law
b. Starling Balance law
c. Gibbs-Donan Balance law
d. Saint Giorgy Balance law
e. Hagen-Poiseuille law
Answer: b

8. (SC) The resting membrane potential is expressed by the:
a. Nernst equation
b. Steward equation
c. Gibbs-Donan equation
d. Starling equation
e. Hagen-Poiseuille equation
Answer: a

9. (SC) Szent-Gyorgy balance expresses:
a. The resting membrane potential
b. The types of fluid disorders
c. The types of electrolyte disorders
d. The neuromuscular excitability
e. The action membrane potential
Answer: d

10. (SC) Fluid disturbance characterized by greater loss of sodium than water is called:
a. Isoosmolar
b. Hypoosmolar

c. Hyperosmolar
d. Hypertonic
e. Hypotonic
Answer: b

11. (SC) Fluid disturbance characterized by equivalent loss of sodium and water is called:
a. Hypoosmolar
b. Isoosmolar
c. Hyperosmolar
d. Hypertonic
e. Hypotonic
Answer: b

12. (SC) Fluid disturbance characterized by greater loss of water than sodium is called:
a. Hypoosmolar
b. Isoosmolar
c. Hyperosmolar
d. Hypertonic
e. Hypotonic
Answer: c

13. (SC) Serum sodium level ≤135 mEq/l means:
a. Hyponatremia
b. excessive G5% infusion
c. Hypernatremia
d. Normal serum sodium level
e. Hypovolemia
Answer: a

14. (SC) Decreasing serum potassium level below 3.5 mmol/l denotes:
a. Hypokalemia
b. Excessive G5% infusion
c. Hyperkalemia
d. Normal cell potassium level
e. Normal plasma potassium level
Answer: b

15. (SC) What notion does the relationship between vascular volume and circulating blood define?
a. Venous return
b. Volemia
c. Circulating volume
d. Cardiac output
e. Stress volume
Answer: b

16. (SC) The relationship between venous return and right atrial pressure can be presented by model:
a. Gibbs-Donan
b. Guyton
c. Starling
d. Nernst

e. Saint-Giorgy

Answer: b

17. (SC) Nictemeral physiological diuresis of a70 kg person under conditions of thermal comfort is:

a. 0.5 L
b. 1 L
c. 1.5 L
d. 2 L
e. 2.5 L

Answer: c

18. (SC) Which of the following parameters is most useful in monitoring patient's volume replete?

a. Ionogram
b. $PaCO_2$
c. PaO_2
d. CVP
e. Nictemeral diuresis

Answer: d

19. (SC) What are normal values of blood calcium:

a. 2.5-3.5 mEq/L
b. 4.5-5.5 mEq/L
c. 5.5-7.5 mEq/L
d. 7.5-9.5 mEq/L
e. 9.5-10.5 mEq/L

Answer: b

20. (SC) Cerebrospinal fluid is a part of:

a. intracellular fluid space
b. extracellular fluid space
c. transcellular fluid space
d. extravascular fluid space
e. interstitial fluid space

Answer: c

21. (SC) Ascitic fluid of a patient with cirrhosis refers to the:

a. transcellular fluid space
b. extracellular fluid space
c. intracellular fluid space
d. extravascular fluid space
e. interstitial fluid space

Answer: a

22. (SC) The chemical equivalent is the amount of substance which binds or moves:

a. A hydrogen atom
b. An oxygen molecule
c. A bicarbonate molecule
d. A chlorine molecule
e. A glucose molecule

Answer: a

23. (SC) A solution is named hypertonic, when:
a. Its osmolarity is higher than the plasmatic one, but it doesn't produce water movement between the compartments;
b. Its osmolarity is higher than the plasmatic one, and it produces water movement between the compartments;
c. Its osmolarity is equal to the plasmatic one, but it produces water movement between the compartments;
d. Its osmolarity is lower than the that plasmatic one, and it produces water movement between the compartments;
e. 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:
a. the volume of water in fluid compartments
b. the fluid compartment osmolarity
c. the fluid compartment composition
d. the direction and water flow between the fluid compartments
e. the direction and water flow in the same fluid compartment
Answer: d

25. (SC) During water filtration from microcirculatory bed in intersticial space:
a. the hydrostatic pressure increases in the capillary and protein concentration increases
b. the hydrostatic pressure decreases in thecapillary and protein concentration decreases
c. the hydrostatic pressure decreases in the capillary and protein concentration increases
d. the hydrostatic pressure increases in the capillary, but protein concentration decreases
e. 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 :
a) extracellular volume
b) action potential
c) acid-base balance
d) cell membrane stability
e) cellular energetics
Answer: a

27. (SC) Primary disorder of potassium ion has major consequence on the change of :
a) extracellular volume
b) action potential
c) acid-base balance
d) cell membrane stability
e) cellular energetics
Answer: b

28. (SC) Primary disorder of magnesium ion has major consequence on the change of :
a) extracellular volume
b) action potential
c) acid-base balance
d) cell membrane stability
e) cellular energetics
Answer: d

29. (SC) Nictemeral water physiological needs in thermal comfort conditions is:
a. 10-20 mL/kg
b. 20-30 mL/kg
c. 30-40 mL/kg
d. 40-50 mL/kg
e. 50-60 mL/kg
Answer: c

30. (MC) The major types of water imbalance are:
a. Hypoosmolar
b. Hypovolemic
c. Isoosmolar
d. Hyperosmolar
e. Hypervolemic
Answers: a, d

31. (MC) The major types of volume disorders are:
a. Hypoosmolar
b. Hypovolemic
c. Isoosmolar
d. Hyperosmolar
e. Hypervolemic
Answers: b, e

32. (MC) Insensible perspiration involves water loss by:
a. Diuresis
b. Sweating
c. Water evaporation through the skin
d. Water evaporation through the mucosa
e. Loss of water with faeces
Answer: c, d

33. (MC) The body loses in the normal conditions water through :
a. Diuresis
b. Breath
c. Sweating
d. Insensible perspiration
e. Salivation
Answers: a, b, c, d

34. (MC) The highest concentration of chlorine is contained in:
a. Saliva
b. Gastric juice
c. Bile
d. Pancreatic juice
e. Intestinal juice
Answers: b, e

35. (SC) The highest concentration of sodium is contained in:
a. Saliva
b. Gastric juice
c. Bile
d. Pancreatic juice

e. Intestinal juice

Answer: e

36. (MC) The following clinical parameters are essential in assessing hydration status:

a. Hourly diuresis
b. Skin color
c. The mucous membrane humidification degree
d. The filling capillary time
e. Pulse in supine and standing positions

Answers: a, c, d, e

37. (MC) The following laboratory parameters evoke a dehydration state:

a. Hyperglycemia
b. Increased hematocrit
c. C-reactive protein
d. Hypernatremia
e. Hypophosphataemia

Answers: a, b, d

38. (SC) The most accurate clinical sign of iatrogenic hyperhydration is:

a. Peripheral edema appearance
b. Arterial hypertension
c. Unstimulated urine output over 1,5 ml/kg/hour
d. Tachycardia
e. Hypersalivation

Answer: c

39. (MC) When setting up an infusion program, the following components are considered:

a. Vascular volume
b. Hepatic function
c. Cardiac function
d. Volemia
e. The volemia composition

Answers: a, c, d, e

40. (MC) To compensate the volume losses preoperatively, it is necessary to take into consideration:

a. Required volume for prehydration
b. Maintaining volume
c. Current losses
d. Seized volume
e. Circulating volume

Answers: a, b, c, d

41. (MC) To compensate the volume loss, the following solutions are used:

a. Ringer solution
b. Bicarbonate solution
c. Mannitol solution
d. Fresh frozen plasma
e. Physiological saline

Answers : a, e

42. (MC) The parameters characterizing macromolecular solution are:
a. Osmolarity
b. Molecular weight
c. Substitution coefficient of the side chain
d. Volume
e. Packaging
Answers: a, b, c

43. (MC) Macromolecular solutions compared with crystalloid solutions:
a. Are more expensive
b. Have the same efficiency in volume compensation
c. Increase mortality
d. Reduce inflammatory response
e. Produce more frequently adverse effects
Answers: a, b, c, e

44. (MC) Hyperkalemia is clinically characterized by:
a. Loss of osteo-tendinous reflexes
b. Weakness
c. Exacerbations of osteotendinous reflexes
d. muscular hypertonus
e. dysrhythmia
Answers: a, b, e

45. (MC) On ECG hyperkalemia is characterized by:
a. high, sharp, symmetrical T wave
b. Depression of ST segment
c. deep Q waves
d. Expanding RR intervals
e. The disappearance of P wave
Answers: a, d, e

46. (MC) Drug correction of hyperkalemia consists in the administration of:
a. $CaCl_2$ or Ca gluconate
b. glucose-insulin solution
c. ion exchange resin (Kayexalate)
d. mannitol
e. $MgSO_4$
Answers: a, b, c

47. (MC) Choose the true statements concerning treatment of hypokalemia:
a. The treatment of hypokalemia lasts few days
b. In case of ketoacidosis is preferably potassium phosphate
c. the maximum dose is 100 mEq per hour
d. mild hypokalemia can be corrected orally
e. cardiac glycosides are administered concomitantly
Answers: a, b, d

48. (MC) Severe hypercalcemia is treated by the administration of:
a. Rapid saline infusion
b. Furosemide
c. Glucocorticoids
d. Calcitonin

e. 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?

a. Hyperhydration
b. Anemia
c. Dehydration
d. Renal failure
e. Heart failure

Answer: c

50. (SC) The patient is hospitalized with serum sodium level of 110 mEq/L. Which therapeutic actions should be taken?

a. Increasing oral intake of fluids
b. Administration of 10% NaCl solution
c. Intranasal administration of antidiuretic hormone
d. Monitoring the eventuality of seizures. Fluid restriction.
e. Monitoring diuresis

Answer: d

51. (SC) The patient reported several episodes of diarrhea and vomiting. Which of the following parameters should be monitored?

a. Serum calcium
b. Serum phosphate
c. Serum potassium
d. Serum sodium
e. Serum chlorine

Answer: c

Acid-base disturbances.

1. (SC) Choose the normal value of pH in arterial blood:

a. 7.0
b. 7.1
c. 7.2
d. 7.3
e. 7.4

Answer: e

2. (SC) Choose the normal value of serum bicarbonate levels in a healthy adult*:*

a. 14-18 mmol/L
b. 18-22 mmol/L
c. 22-26 mmol/L
d. 26-30 mmol/L
e. 30-34 mmol/L

Answer: c

3. (SC) Choose the normal value of bases excess in arterial blood for healthy adult:

a. 1 mmol/L
b. 2 mmol/L
c. 3 mmol/L
d. 4 mmol/L

e. 5 mmol/L

Answer: b

4. (SC) Choose the normal value of pCO_2 in arterial blood:

a. 10 mmHg
b. 20 mmHg
c. 30 mmHg
d. 40 mmHg
e. 50 mmHg

Answer: d

5. (MC) Which of the following statements concerning acid-base balance is true*:*

a. acidosis = pH < 7.35
b. alacalosis = pH >7.45
c. acidosios = pH > 7.45
d. death will occur at pH<6.8
e. death will occur at pH >7.8

Answers: a, b, d, e

6. (MC) Which of the following statements concerning buffer system of the human blood are true:

a. buffer is a solution containing substances which have the ability to minimise changes in pH when an acid or base is added to it
b. buffer typically consists of a solution which contains a weak acid mixed with the salt of that acid and a strong base
c. buffer typically consists of a solution which contains a weak base mixed with the salt of that base and a strong acid
d. buffer systems act within seconds
e. the main intracellular buffer is phosphate buffer system

Answers: a, b, c, d

7. (MC) Which of the following statements concerning regulation of acid-base balance is true*:*

a. buffer systems act within seconds
b. respiratory mechanism responds within minutes, maximal in 12-24 hrs.
c. respiratory mechanism responds within 12-24 hrs, maximal in 3-5 days.
d. renal mechanism responds within seconds, maximal in few hours
e. renal mechanism responds slowly (effectively in 3-5 days)

Answers: a, b, e

8. (MC) Which of the following can cause respiratory acidosis:

a. drug depression of respiratory center (eg by opiates, sedatives, anaesthetics)
b. cervical cord trauma
c. Guillain-Barre syndrome
d. diabetic ketoacidosis
e. salicylate poisoning

Answers: a, b, c

9. (MC) Which of the following CAN NOT cause respiratory acidosis:

a. muscle relaxants
b. pneumothorax
c. 'supra-tentorial' causes (pain, fear, stress, voluntary)
d. cytokines in sepsis

e. salicylate poisoning

Answers: c, d, e

10. (MC) Choose the diagnostic criteria for respiratory acidosis:

a. pH >7.45
b. pH<7.35
c. pCO_2 = 40 mm Hg
d. pCO_2 >44 mm Hg
e. pCO_2 <36 mm Hg

Answers: b, d

11. (MC) Choose the treatment options for respiratory acidosis:

a. treatment of the primary cause of the disorder
b. sodium bicarbonate therapy for patients with decreased pH
c. sodium bicarbonate therapy only for patients with pH <7.15
d. mechanical ventilation in severe cases
e. surgical removal of mineralocorticoid producing tumor

Answers: a, d

12. (MC) Choose the correct statements concerning the effects of hypercapnia:

a. cerebral vasodilation
b. cerebral vasoconstriction
c. stimulation of the sympathetic nervous system
d. stimulation of the parasympathetic nervous system
e. increase in intracranial pressure

Answers: a, c, e

13. (MC) Which of the following can cause metabolic acidosis:

a. myasthenia gravis
b. pulmonary edema
c. diabetic ketoacidosis
d. hypovolemic shock
e. severe diarrhea

Answers: c, d, e

14. (SC) Which of the following CAN NOT cause metabolic acidosis:

a. acute kidney injury
b. hipokalemia
c. cardiogenic shock
d. pancreatic fistula
e. methanol poisoning

Answer: b

15. (MC) Choose the diagnostic criteria for metabolic acidosis:

a. pH=7.30
b. pH>7.45
c. HCO_3 = 24 mmol/l
d. HCO_3 > 26 mmol/l
e. HCO_3 <22 mmol/l

Answers: a, e

16. (MC) Choose the correct statements concerning the effects of metabolic acidosis:

a. hyperventilation (Kussmaul breathing)

b. hypoventilation
c. shift of oxygen dissociation curve to left
d. shift of oxygen dissociation curve to right
e. hyperkalemia
Answers: a, d, e

17. (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

18. (MC) Choose the diagnostic criteria for respiratory alcalosis:
a. pH=7.30
b. pH>7.45
c. pH<7.45
d. pCO_2 <36 mmHg
e. pCO_2 >44 mmHg
Answers: b, d

19. (MC) Choose the effects of metabolic alcalosis:
a. cerebral vasodilation
b. cerebral vasoconstriction
c. shift of oxygen dissociation curve to the right
d. increase in intracranial pressure
e. arrhythmias
Answers: b, e

20. (MC) Which of the following can cause metabolic alcalosis:
a. pulmonary embolism
b. loss of acidic gastric juice
c. hypovolemic shock
d. Cushing's syndrome
e. loop diuretics
Answers: b, d, e

21. (MC) Choose the effects of metabolic alkalosis:
a. hyperventilation (Kussmaul breathing)
b. psychomotor agitation
c. mental obtundation
d. decreased myocardial contractility
e. arterial hypertension
Answers: c, d

22. (MC) Choose the effects of metabolic alkalosis:
a. shift of oxygen dissociation curve to right
b. shift of oxygen dissociation curve to left
c. inreased cerebral blood flow
d. decreased myocardial contractility
e. fever
Answers: b, d

23. (MC) Choose the diagnostic criteria for metabolic alcalosis:

a. pH=7.30
b. pH>7.45
c. HCO_3^- <22 mmol/l
d. pCO_2 <36 mm Hg
e. HCO_3^- >26 mmol/l

Answers: b, e

24. (MC) Choose the treatment options for metabolic alkalosis:

a. reexpansion of extracelular fluid
b. surgical removal of mineralocorticoid producing tumor
c. discontinuation of glucocorticoid therapy
d. HCl infusion or Acetazolamide
e. oxygen therapy

Answers: a, b, c, d

25. (SC) A patient was admitted to the hospital for inguinal hernia repair. pH=7.42; PCO_2 =42 mm Hg; HCO_3^- = 24 mmol/l. How do you interpret his acid-base values?

a. normal values
b. respiratory acidosis
c. metabolic acidosis
d. respiratory alcalosis
e. metabolic alcalosis

Answer: a

26. (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; PCO_2 =44 mm Hg; HCO_3^- = 44 mmol/l. How do you interpret his acid-base values?

a. normal values
b. respiratory acidosis
c. metabolic acidosis
d. respiratory alkalosis
e. metabolic alcalosis

Answer: e

27. (SC) A patient was admitted to the hospital in a coma. The analysis of arterial blood showed the following values: pH= 7.2; PCO_2 =18 mm Hg; HCO_3^- = 18 mmol/l. How do you interpret his acid-base values?

a. normal values
b. respiratory acidosis
c. metabolic acidosis
d. respiratory alkalosis
e. metabolic alcalosis

Answer: c

28. (SC) A patient is mechanically ventilated. The analysis of arterial blood showed the following values: pH= 7.2, PCO_2 = 60 mm Hg; HCO_3^- = 24 mmol/l. How do you interpret his acid-base values?

a. normal values

b. respiratory acidosis
c. metabolic acidosis
d. respiratory alkalosis
e. metabolic alcalosis

Answer: b

29. (SC) A patient is mechanically ventilated. The analysis of arterial blood showed the following values: pH= 7.5; PCO_2 = 30 mm Hg; HCO_3^- = 22 mmol/l. How do you interpret his acid-base values?

a. normal values
b. respiratory acidosis
c. metabolic acidosis
d. respiratory alkalosis
e. metabolic alcalosis

Answer: d

30. (SC) Choose the formula for calculation of anionic gap:

a. $Na^+ – (Cl^- + HCO_3^-)$
b. $Na^+ + (Cl^- - HCO_3^-)$
c. $Na^+ + HCO_3^- – Cl^-$
d. $Na^+ + (Na^+ – (Cl^- + K^+)$
e. $Cl^- + HCO_3^-$)

Answer: a

31. (MC) Choose the causes of metabolic acidosis with high anion gap:

a. salicylate poisoning
b. drug depression of respiratory center (eg by opiates)
c. renal failure
d. lactic acidosis
e. diabetic ketoacidosis

Answers: a, c, d, e

32. (MC) Choose the causes of metabolic acidosis with normal anion gap:

a. severe diarrhea
b. renal failure
c. small bowel fistula
d. pancreatic fistula
e. methanol poisoning

Answers: a, c, d

33. (MC) Which of the following statements concerning anion gap are true?

a. it can be used to identify the cause of metabolic alacalosis
b. the anion gap is high in patients with pancreatic fistula
c. it can be used to identify the cause of metabolic acidosis
d. the anion gap is normal in patients with diabetic ketoacidosis
e. the formula for calculation of anionic gap is: : $Na^+ – (Cl^- + HCO_3^-)$

Answers: c, e

34. (MC) Choose the correct statements about the anion gap:

a. in ketoacidosis acidosis the anion gap is increased
b. the anion gap is decreased in renal failure
c. the anion gap is decreased in methanol poisoning
d. in lactic acidosis the anion gap is increased

e. the anion gap is increased in severe diarrhoea

Answers: a, d

35. (SC) Choose the values of pH and pCO_2 in the arterial blood of a tourist who climbed the mountain Mont Blank (altitude of 4800 meters above the sea level):

a. pH ↑, pCO_2 ↑
b. pH ↓, pCO_2 ↓
c. pH ↑ , pCO_2 ↓
d. pH ↓, pCO_2 ↑
e. both pH and pCO_2 will not change

Answer: c

36. (SC) Before licensure exams a student is very anxious and has tachypnea. What acid-base disorder do you suggest?

a. respiratory acidosis
b. metabolic acidosis
c. respiratory alcalosis
d. metabolic alcalosis
e. there will be no acid-base disorders

Answer: c

37. (SC) A 55-year-old patient with renal failure missed his dyalisis. What acid-base disorder do you suggest?

a. respiratory acidosis
b. metabolic acidosis
c. respiratory alcalosis
d. metabolic alkalosis
e. there will not be any acid-base disorders

Answer: b

38. (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?

a. metabolic acidosis with high anionic gap
b. metabolic acidosis with normal anion gap
c. respiratory alcalosis
d. respiratory acidosis
e. metabolic alcalosis

Answers: a, c

39. (SC) A 32-year-old patient is admitted to the hospital with hypovolemic shock. What acid-base disorder do you suggest?

a. pH = 7.1, $PaCO_2$ = 60 mm Hg, HCO_3^- = 24 mmol/l
b. pH = 7.35, $PaCO_2$ = 40 mm Hg, HCO_3^- = 24 mmol/l
c. pH = 7.45, $PaCO_2$ = 35 mm Hg, HCO_3^- = 26 mmol/l
d. pH = 7.24, $PaCO_2$ = 32 mm Hg, HCO_3^- = 14 mmol/l
e. pH = 7.55, $PaCO_2$ = 40 mm Hg, HCO_3^- = 30 mmol/l

Answer: d

Acute liver failure.

1. (MC) Choose the diagnostic criteria of acute liver failure:

a. Coagulopathy (INR>1.5)
b. Coagulopathy (INR>3.0)
c. Encephalopathy
d. Pre-existing liver disease of <6 months duration
e. pre-existing liver disease of >6 months duration

Answers: a, c, d

2. (SC) Choose the true statement concerning acute liver failure:

a. Diagnostic criteria are coagulopathy, encephalopathy and pre-existing liver desease of <6 months duration
b. Diagnostic criteria are coagulopathy, encephalopathy and pre-existing liver desease of >6 months duration
c. Signs of cirrhosis of the liver must be present
d. Albumin is a marker of acute liver failure
e. The criterion of coagulopathy is INR>5

Answer: a

3. (MC) Choose the causes of acute liver failure:

a. Viral hepatitis B and C
b. Acetaminophen overdose
c. Flu virus
d. Malignant infiltration of the liver
e. Mushroom poisoning

Answers: a, b, d, e

4. (SC) Choose the antidote for acetaminophen overdose in patients with acute liver failure:

a. Sodium thiosulphate
b. Methylene blue
c. N-acetylcysteine
d. Physostigmine
e. Flumazenil

Answer: c

5. (SC) Choose the etiological treatment for hepatitis B-associated acute liver failure:

a. N-acetylcysteine
b. Lamivudine
c. Penicillin G
d. Corticosteroids
e. acyclovir

Answer: b

6. (SC) Choose the etiological treatment for patients with acute liver failure due to mushroom poisoning:

a. protamine sulfate
b. methylene blue
c. Neostigmine
d. Penicillin G
e. Corticosteroids

Answer: d

7. (SC) Choose the etiological treatment for patients with acute liver failure due to autoimmune hepatitis:

a. N-acetylcysteine
b. Corticosteroids
c. Penicillin G
d. Activated charcoal
e. Sodium thiosulphate

Answer: b

8. (MC) Choose the haemodynamic changes in patients with acute liver failure:

a. Decrease in venous return
b. Peripheral vasoconstriction
c. Peripheral vasodilation
d. Arterial hypotension
e. Arterial hypertension

Answers: a, c, d

9. (MC) Choose the true statements concerning haemodinamical changes in patients with acute liver failure:

a. The cardiac output is increased
b. The cardiac output is decreased
c. Pressure in the portal venous system is elevated
d. Pressure in the portal venous system is decreased
e. The systemic vascular resistance is low

Answers: a, c, e

10. (SC) Choose the first choice agent for the treatment of arterial hypotension in patients with acute liver failure:

a. Normal saline solution
b. Dextrose 20%
c. Norepinephrine
d. Aminosteril
e. Epinephrine

Answer: a

11. (MC) Choose the therapeutic options for the treatment of cerebral oedema in patients with acute liver failure:

a. Lactulose
b. Mannitol
c. Hyperventilation
d. Barbiturates
e. Corticosteroids

Answers: b, c, d

12. (MC) Choose the true statements concerning transfusion of blood components in patients with acute liver failure:

a. Fresh frozen plasma is indicated only for the treatment of active bleeding due to coagulation factors deficiency
b. Fresh frozen plasma is indicated in all cases of coagulation factors deficiency (even in the absence of active bleeding)
c. When invasive procedures must be performed, platelet counts of 50000/mm^3 are considered adequate
d. Albumin may be considered for patients with active bleeding when plasma infusion does not correct severely elevated INR

e. 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

13. (MC) Choose the true statements concerning neurological complications in patients with acute liver failure:

a. Cerebral edema is frequently observed in patients with grade I-II encephalopathy
b. Patients with grade IV encephalopathy are comatose
c. Hyperventilation can be used for rapidly lowering intracranial pressure
d. Diazepam is the drug of first choice for sedation
e. Patients with grade 3 or 4 encephalopathy need intubation and ventilation

Answers: b, c, e

14. (MC) Choose the causes of acute kidney injury in patients with acute liver failure:

a. nephrotoxic effects of drugs
b. hypovolaemia
c. sepsis
d. urinary tract obstruction
e. raised intracranial pressure

Answers: a, b, c

15. (MC) Choose the metabolic derangements that are common in acute liver failure:

a. hypoglycemia
b. hypokalemia
c. hyperkalemia
d. acidosis
e. alkalosis

Answers: a, b, d, e

16. (MC) Choose the indicators of poor prognosis for patients with acetaminophen-induced acute liver failure:

a. pH<7.3
b. prothrombin time >100 seconds
c. elevated creatinine level
d. presence of grade 3 or 4 hepatic encephalopathy
e. $PaO_2/FiO_2<200$

Answers: a, b, c, d

17. (MC) Choose the features of mechanical ventilation of patients with acute liver failure:

a. low-tidal-volume ventilation is used
b. high-tidal-volume ventilation is used
c. hypercapnia is accepted
d. normocapnia is mandatory
e. positive end-expiratory pressure is used during mechanical ventilation

Answers: a, c, e

18. (MC) Choose the complications of acute liver failure:

a. acute respiratory distress syndrome
b. cerebral edema
c. hypothermia
d. acute kidney injury
e. hypoglycemia

Answers: a, b, d, e

19. (MC) Choose the true statements concerning liver transplantation for patients with acute liver failure:

a. it is the only main definitive therapy for patients who are unable to achieve regeneration
b. the 1-year survival following liver transplant is >90%
c. patients must take immunosuppressant medications
d. it is contraindicated in patients with acetaminophen overdose
e. 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 :

a. diabetes mellitus
b. arterial hypertension with end-organ lesions
c. young age
d. chronic renal failure
e. emergency surgery

Answers: a, b, d

2. (MC) Which of the following statements concerning acute kidney injury are true:

a. acute kidney injury may be reversible
b. sepsis is the most common cause of acute kidney injury
c. intrinsic renal lesion is the most common form of acute kidney injury in ICU
d. acute kidney injury usually has three stages according to severity
e. continuous venovenous hemofiltration is an absolute indication in acute kidney injury irrespective of evolutionary stage

Answers: a, b, d

3. (SC) Which of the following tests is useful for diagnosis of acute kidney injury:

a. Serum albumin
b. Alaninaminotranspheraze
c. Serum amylase level
d. Bicarbonates level
e. Creatinine blood test

Answer: e

4. (MC) Which of the following conditions could cause prerenal form of acute kidney injury:

a. Massive bleeding
b. Acute methanol intoxication
c. Low cardiac output syndrome
d. Hypovolemia
e. Acute interstitial nephritis

Answers: a, c, d

5. (MC) Management of acute kidney injury includes:

a. Blood volume restoring
b. NSAID administration
c. Use of diuretic drugs
d. Maintenance of MAP ≥65 mmHg

e. Optimization of cardiac function

Answers: a, c, d, e

6. (SC) Which of the following electrolyte disturbances is the most common and life threatening for the patient with acute kidney injury:

a. Hypokalemia
b. Hypernatremia
c. Hyperphosphatemia
d. Hyperkalemia
e. Hypermagnesemia

Answer: d

7. (MC) Acute kidney injury is defined as:

a. Urine output <0.5 ml/kg/h for 6 hours
b. Decrease of blood creatinine level by 50%
c. Increase in serum creatinine by ≥0.3 mg/dl (≥ 26.5 μmol/l) within 48 hours
d. Increase in serum creatinine to ≥1.5 times baseline, which is known or presumed to have occurred within the prior 7 days
e. Serum blood urea nitrogen >30 mg/dl

Answer: a, c, d

8. (MC) Evolution scenarios of acute kidney injury may be:

a. Chronic renal failure
b. Death
c. Chronic dialysis
d. Reversal of renal function
e. Chronic hypokalemia

Answers: a, b, c, d

9. (MC) The treatment of acute kidney injury include:

a. Volume replacement
b. Prophylaxis of deep venous thrombosis by administration of LMWH
c. Maintenance of MAP ≥65 mmHg
d. Correction of electrolyte disorders
e. Use of low renal doses of Dopamine in order to increase urine output

Answers: a, c, d

10. (MC) Which of the following ECG changes is suggestive for hyperkalemia:

a. Flattening of P wave
b. PQ segment lengthens
c. Narrowing of QRS complex
d. T wave flattens
e. Wide QRS complex

Answers: a, b, e

11. (MC) Which of the following ECG changes are the most specific for hyperkalemia:

a. Peaked T wave
b. Shortening of PR segment
c. Widening of QRS complex
d. "Ghotic" P wave
e. Sine waves

Answers: a, c, e

12. (MC) Treatment of hyperkalemia includes:
a. Bicarbonate administration
b. Diuresis stimulation
c. Administration of calcium gluconate or $CaCl_2$
d. Administration of KCl with concentrate Glucose
e. Continuous venovenous hemofiltration
Answers: b, c, e

13. (MC) Which of the following drugs can induce acute kidney injury:
a. Aminoglicozide
b. NSAID
c. Contrast agents
d. Unfractionated heparin
e. ACE inhibitors
Answers: a, b, c, e

14. (MC) Which of the following conditions can cause acute kidney injury:
a. Acute cardiac failure
b. Elective cardiac surgery with cardiopulmonary bypass
c. The intake of 4 conventional units of alcohol
d. Severe trauma
e. Sepsis
Answers: a, b, d, e

15. (MC) Choose criteria for continuous venovenous hemofiltration in acute kidney injury:
a. pH<7.1
b. refractory hypervolemia
c. hemodynamic instability
d. persistent serum potassium level >6.5 mmol/l
e. serum creatinine >150 µmol/L
Answers: a, b, d

16. (MC) Which of the medications used for treatment of hyperkalemia reduces serum level of potassium by redistribution:
a. $CaCl_2$
b. Calcium gluconate
c. Insulin
d. β_2 adrenergic agonists
e. Kayexalat
Answers: c, d

17. (MC) Which of the following medications are used for the treatment of hyperkalemia:
a. β_1 adrenergic agonists
b. Sodium bicarbonate
c. Calcium gluconate
d. Verospiron
e. Furosemide
Answers: c, e

18. (MC) Which of the following statements concerning acute kidney injury are <u>false</u>:
a. the incidence of acute kidney injury in the ICU is approximately 20% -50%

b. Intrinsic renal injury is the most common type of AKI
c. Diabetes mellitus is a risk factor of AKI
d. Diagnostic criteria of AKI are dynamic changes of blood urea nitrogen and serum creatinine
e. Reduction of urine output per hour is one of the first suggestive signs of acute kidney injury
Answers: b, d

19. (SC) Choose normal urine output:
a. 0.3 ml/kg/h
b. 0.5 ml/kg/h
c. 0.8 ml/kg/h
d. 1 ml/kg/h
e. 1.5 ml/kg/h
Answer: d

20. (SC) Choose the first-line solutions for volume replacement in patients with onset of acute kidney injury:
a. Saline solution
b. 5% Dextrose
c. Ringer solution
d. Gelofuzin
e. 6% HES
Answer: c

21. (MC) Choose risk factors of acute kidney injury:
a. Age > 80 ani
b. Plasma level of HbA1c > 9%
c. Serum creatinine 68 µmol/L
d. BP>180/120 mmHg
e. Serum K 3.8 mmol/L
Answers: a, b, d

22. (SC) Treatment of hyperkalemia does not include the administration of:
a. Calcium gluconate
b. Sodium bicarbonate
c. Glucose with insulin
d. Dialysis
e. Potassium-sparing diuretics
Answer: e

23. (SC) Choose from the following the alternative method of dialysis in the treatment of acute kidney injury:
a. Plasmapheresis
b. Portosystemic transjugular shunt
c. Renal transplant
d. continuous veno-venous hemofiltration
e. Cardio-pulmonary by-pass
Answer: d

24. (MC) Which of the following factors can lead to prerenal acute kidney injury:
a. Hypovolemia
b. Sequestration of the fluid in the third space (extravascular)

c. Tuberous sclerosis
d. Glomerulosclerosis
e. Kidney endothelial cells proliferation

Answers: a, b

25. (MC) Which of the following are recommended for the patients with acute kidney injury whith oliguria and signs of hypervolemia:

a. Water and salt restriction
b. Sugar restriction
c. Protein restriction
d. Dialysis with ultrafiltration
e. Loop diuretics

Answers: a, d, e

26. (MC) Subvesical obstruction of urinary tract can be produced by:

a. Prostate adenoma
b. Prostate carcinoma
c. Neurogenic bladder
d. Inadvertent ligation of the ureter
e. Hypovolemia

Answers: a, b

27. (MC) Metabolic acidosis in acute kidney injury is treated with:

a. Lithium carbonate
b. Sodium bicarbonate
c. Calcium gluconate
d. Restriction of the protein in the diet
e. Dialysis

Answers: b, d, e

28. (MC) Hyperkalemia related to acute kidney injury is treated with:

a. Aluminium hydroxide
b. Glucose with insulin
c. Sodium bicarbonate
d. Water restriction
e. Ion-exchanges resins

Answers: b, c, e

29. (MC) Choose drugs that can induce prerenal azotemia:

a. Cyclooxygenase inhibitors
b. Beta-lactam antibiotics
c. Rifampicin
d. ACE inhibitors
e. Cyclosporine

Answers: a, d, e

30. (MC) Which of the following are the absolute indication for renal replacement therapy in acute kidney injury:

a. Hypocalcaemia
b. Hyponatremia
c. Signs of uremic syndrome
d. Untreatable hypervolemia
e. Hyperkalemia resistant to conservative treatments

Answers: c, **d, e**

31. (MC) Which of the following are recommended in acute kidney injury related hypervolemia:

a. Hypotonic saline solution
b. Sodium bicarbonate
c. Thiazide diuretics
d. Loop diuretics
e. Restriction of water and salt

Answers: c, d, e