CLINICAL CHEMISTRY

MTLE BOARD EXAM RECALLS

MTLE *MARCH* *2023* RECALLS

MTLE *MARCH* *2024* RECALLS

MTLE *AUGUST* *2023* RECALLS

MTLE *AUGUST* *2024* RECALLS

STUDY QUESTIONS

500 ITEMS

2022 - 2024

MTLE 2022 RECALLS

God bless, future RMT!

1. What kind of quality control is important in maintaining long term accuracy of the analytical methods?
A. internal quality control
b. external quality control
c. sensitivity
d. specificity

2. In statistics, this is used to determine whether there is statistically significant difference between the standard deviations of two groups of data.
a. Mean
b. Median
c. F-test
d. T-test

3. It is a sample of known quantity with several analytes present.
a. Calibrator
b. Reagent
c. standard
d. control

4. This is the most widely used quality control chart in the clinical laboratory.
a. Gaussian curve
b. Cumulative Sum Graph
c. Youden/ Twin plot
d. Levey- Jennings chart

5. This type of error which can be observed on a Levey- Jennings chart is formed by control values that distribute themselves on one side or either side of the mean for six consecutive days.
a. Trend
b. Shift
c. Outliers
d. None of the above

6. The independent variable is plotted along the:
a. Horizontal axis
b. Vertical axis
c. Y- axis
d. Ordinate

7. A value of 11.2 ug/dL thyroxine is equivalent to _____ in SI units
a. 135 nmol/L
b. 135 umol/L
c. 145 nmol/L
d. 145 umol/L

8. The glycated hemoglobin value represents the blood glucose value during the preceding:
a. one to three weeks
b. two to three weeks
c. three to six weeks
d. eighth to twelve weeks

MTLE 2022 RECALLS

God bless, future RMT!

9. Apolipoprotein B-100 is the primary component of:
a. VLDL
b. LDL
c. IDL
d. HDL

10. This is considered as a one step method for cholesterol determination:
a. Liebermann- Burchdardt
b. Abell- Kendall
c. Schoenheimer Sperry
d. Bloors

11. Cholesterol esterase is used in which method/s for cholesterol determination?
a. chemical methods
b. enzymatic methods

12. LDL can be calculated from measurements of the following except _____ by the friedwald formula:
a. total cholesterol
b. VLDL
c. HDL
d. triglyceride

13. Which method for the assay of uric acid is simple and nonspecific?
a. colorimetric: kinetic
b. colorimetric: end point
c. enzymatic: UV
d. enzymatic: H2O2

14. This condition shows a beta- gamma bridging effect as the serum protein electrophoretic pattern
a. multiple myeloma
b. nephrotic syndrome
c. hepatic cirrhosis
d. pulmonary emphysema

15. In hemolytic disease of the newborn, which form of bilirubin is elevated in plasma?
a. conjugated bilirubin
b. unconjugated bilirubin
c. delta bilirubin
d. B and C

16. Creatinine kinase is under what enzyme category?
a. Oxidoreductases
b. hydrolases
c. lyases
d. transferase

17. For each degree of fever in the patient, pO2 will fall ___ & pCO2 will rise _____ %
a. 7, 3
b. 3, 7
c. 2, 3
d. 5, 2

MTLE 2022 RECALLS

God bless, future RMT!

18. Confirmatory test for acromegaly:
a. Physical activity test
b. Insulin tolerance test
c. somatomedin C
d. glucose suppression test

19. An individual with hyperthyroidism will manifest ____ triglyceride levels.
a. increased
b. decreased

20. The primary product of hepatic metabolism of cocaine is:
a. morphine
b. NAPA
c. benzoylecgonine
d. primidone

21. Which of the following drugs is a barbiturate?
a. cyclosporine
b. methotrexate
c. phenobarbital
d. acetaminophen

22. The signs and symptoms of this blood alcohol level in % w/v are mental confusion, dizziness and strongly impaired motor skills (staggering, slurred speech)
a. 0.09- 0.25
b. 0.18- 0.30
c. 0.27- 0.040
d. 0.35- 0.050

MTLE MARCH 2023 RECALLS

God bless, future RMT!

1. Chief plasma cation whose main function is maintaining osmotic pressure:
a) Chloride
b) Calcium
c) Sodium
d) Potassium

2. ClCr is used to estimate the:
a) Tubular secretion of creatinine
b) Glomerular secretion of creatinine
c) Renal glomerular and tubular mass
d) Glomerular filtration rate

3. Review: Thyroid Anatomy and Development
Thyroid gland
- positioned in the lower anterior neck and is shaped like a butterfly - made up of two lobes that rest on each side of the trachea, with a band of thyroid tissue—called the isthmus—running anterior to the trachea and bridging the lobes - Thyroid cells are organized into follicles. Follicles are spheres of thyroid cells surrounding a core of a viscous substance termed colloid, the center of thyroid hormone production.

4. Sample of choice for electrolyte testing:
a) Whole blood
b) Urine
c) Plasma

5. Lead toxicity is acquired through the following EXCEPT:
a) skin contact
b) animal bite
c) inhalation
d) ingestion

6. First step in preanalytical phase?
a) Test order
b) Patient preparation

7. Review: Conversion

TABLE 1-2 PREFIXES USED WITH SI UNITS

FACTOR	PREFIX	SYMBOL	SELECT DECIMALS
10^{-18}	atto	a	—
10^{-15}	femto	f	—
10^{-12}	pico	p	—
10^{-9}	nano	n	—
10^{-6}	micro	μ	0.000001
10^{-3}	milli	m	0.001
10^{-2}	centi	c	0.01
10^{-1}	deci	d	0.1
10^{0}	Liter, meter, gram	Basic unit	1.0
10^{1}	deka	da	10.0
10^{2}	hecto	h	100.0
10^{3}	kilo	k	1,000.0
10^{4}	mega	M	—
10^{9}	giga	G	—
10^{12}	tera	T	—
10^{15}	peta	P	—
10^{18}	exa	E	—

Prefixes are used to indicate a subunit or multiple of a basic SI unit.

MTLE MARCH 2023 RECALLS

God bless, future RMT!

8. Review:

REAGENT BLANK

- used with techniques such as spectrophotometry to ZERO THE INSTRUMENT **BEFORE** measuring test samples and other blanks

SAMPLE BLANK

- refers to using the sample for zeroing an instrument **DURING** a test procedure

9. Produced from deamination of amino acids:

a) Ammonia

b) Urea - major excretory product of protein metabolism

c) Uric acid - product of catabolism of the purine nucleic acids

d) Creatinine - is formed from creatine and creatine phosphate in muscle and is excreted into the plasma at a constant rate related to muscle mass

10. Review:

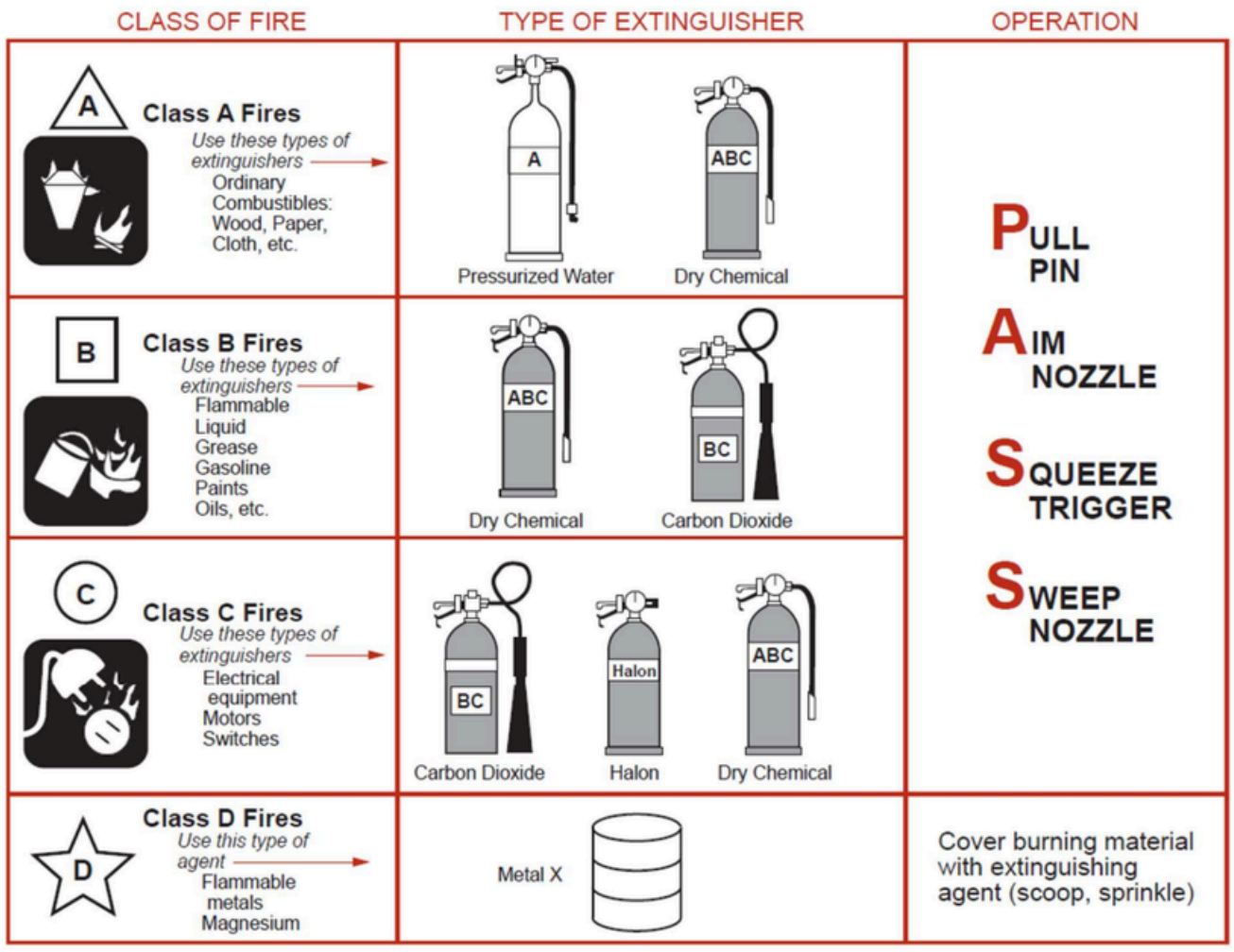


FIGURE 2-5 Proper use of fire extinguishers. (Adapted from the Clinical and Laboratory Safety Department, The University of Texas Health Science Center at Houston.)

11. Data Analysis to **Verify** a Reference Interval (Transference) The CLSI allows less vigorous studies to verify a reference interval with as few as **20** subject specimens.

Data Analysis to **Establish** a Reference Interval To establish a reference interval, it is recommended that the study includes at least **120** individuals.

12. A Gaussian distribution is usually

a) Bell-shaped

b) Rectangular

c) Uniform

d) Skewed

13. At what serum concentration would glucose begin to appear in the urine? Elsevier

a) 50 mg/dL

b) 75 mg/dL

c) 100 mg/

d) 170 mg/dL

MTLE MARCH 2023 RECALLS

God bless, future RMT!

14. Which of the following would be most adversely affected by a nonfasting sample? Elsevier
a) HDL
b) LDL
c) Cholesterol
d) Triglycerides

15. Which of the following apoproteins is inversely related to risk for coronary heart disease and is a surrogate marker for HDL? Elsevier
a) Apo A-I
b) Apo B
c) Apo B100
d) APO E

16. Which of the following enzymes catalyzes the conversion of starch to glucose and maltose? Elsevier
a) Lipase
b) Amylase
c) ALT
d) GGT

17. Where do steroids derived from? Elsevier
a) Glyceride
b) Non glyceride
c) Fatty acid
d) Complex

18. Which of the following sets of values for repeat analyses of a QC sample (target value of 50) reflects the best precision?
a) 50, 51, 52
b) 50, 52, 56
c) 48, 50, 52
d) 44, 50, 53

19. Which of the following would NOT be a typical methodology for a clinical chemistry test?
a) Immunoturbidimetry
b) Microscopy
c) EMIT®
d) ISE

20. How should a laboratory verify the reference range it uses for a particular test?
a) Call another laboratory
b) Use the numbers from a textbook
c) Test samples from healthy people
d) Look on a medical internet site

21. Which test is the most specific for myocardial infarction?
a) LDH
b) CK
c) Troponin
d) Myoglobin

MTLE MARCH 2023 RECALLS

God bless, future RMT!

22. If a screening TSH is high, which test is likely to be ordered next?
a) Cholesterol
b) Free T4
c) Ferritin
d) Glucose

23. The sample of choice for measuring blood osmolality:
a) Serum
b) Plasma
c) Whole blood
d) Urine

24. A hormone that is also an enzyme
a) Renin
b) Vasopressin
c) TSH
d) Cortisol

25. Buffer used in ALP analysis:
Alkaline phosphatase in **Tris buffer** at pH 9.1 was found to have the highest activity. Michaelis-Menten enzyme kinetic analysis revealed that the presence of Tris produced the highest Vmax and Km values for alkaline phosphatase at each pH tested, while the presence of Glycine produced the lowest.

26. Used to calibrate pH meter:
a) Distilled water
b) Tap water
c) Buffers

Calibration The steps necessary to standardize a pH meter are fairly straightforward. First, balance the system with the electrodes in a buffer with a 7.0 pH. The balance or intercept control shifts the entire slope. Next, replace the buffer with one of a different pH. If the meter does not register the correct pH, amplification of the response changes the slope to match that predicted by Nernst equation. If the instrument does not have a slope control, the temperature compensator performs the same function.

27. NOT true of CRP: a CHRONIC inflammatory marker
CRP is synthesized in the liver and is one of the acute phase proteins. High or increasing amount of CRP suggests an ACUTE infection or inflammation.

28. Review:

Measure	Unit
Meter (m)	Length
Kilogram (kg)	Mass
Second (s)	Time
Mole (Mol)	Quantity of substance
Ampere (A)	Electric current
Kelvin (K)	Thermodynamic temperature
Candela (cd)	Luminous intensity

MTLE MARCH 2023 RECALLS

God bless, future RMT!

29. Unit for urine creatinine: mg/dL

30. ADH is secreted by the? Pituitary gland

Antidiuretic hormone is made by the hypothalamus and is secreted into the blood by the pituitary gland.

Posterior pituitary is an extension of the forebrain and represents the storage region for vasopressin (also called ADH) and oxytocin.

TABLE 20-1 HYPOPHYSIOTROPIC HORMONES

HORMONE	STRUCTURE	ACTION
TRH	3 amino acids	Releases TSH and prolactin
GnRH	10 amino acids	Releases LH and FSH
CRH	41 amino acids	Releases ACTH
GHRH	44 amino acids	Releases GH
Somatostatin	14 and 28 amino acids	Inhibits GH and TSH release (additional effects on gut and pancreatic function)
Dopamine (prolactin inhibitory factor)	1 amino acid	Inhibits prolactin release

TRH, thyrotropin-releasing hormone; TSH, thyroid-stimulating hormone; GnRH, gonadotropin-releasing hormone; LH, luteinizing hormone; FSH, follicle-stimulating hormone; CRH, corticotropin-releasing hormone; ACTH, adrenocorticotropin hormone; GHRH, growth hormone–releasing hormone.

TABLE 20-2 ANTERIOR PITUITARY HORMONES

PITUITARY HORMONE	TARGET GLAND	STRUCTURE	FEEDBACK HORMONE
LH	Gonad (tropic)	Dimeric glycoprotein	Sex steroids (E_2/T)
FSH	Gonad (tropic)	Dimeric glycoprotein	Inhibin
TSH	Thyroid (tropic)	Dimeric glycoprotein	Thyroid hormones (T_4/T_3)
ACTH	Adrenal (tropic)	Single peptide derived from POMC	Cortisol
Growth hormone	Multiple (direct effector)	Single peptide	IGF-I
Prolactin	Breast (direct effector)	Single peptide	Unknown

LH, luteinizing hormone; FSH, follicle-stimulating hormone; TSH, thyroid-stimulating hormone; ACTH, adrenocorticotropin hormone; T_4, thyroxine; T_3, triiodothyronine; E_2, estradiol; T, testosterone; POMC, pro-opiomelanocortin; IGF-I, insulin-like growth factor.

31. Review: Chemical Fume Hoods and Biosafety Cabinets Fume Hoods

- required to contain and expel noxious and hazardous fumes from chemical reagents Biological safety cabinets (BSCs)
- remove particles that may be harmful to the employee who is working with potentially infectious biologic specimens

TABLE 2-1 COMPARISON OF BIOSAFETY CABINET CHARACTERISTICS

			APPLICATIONS	
BSC CLASS	FACE VELOCITY	AIRFLOW PATTERN	NONVOLATILE TOXIC CHEMICALS AND RADIONUCLIDES	VOLATILE TOXIC CHEMICALS AND RADIONUCLIDES
I	75	In at front through HEPA to the outside or into the room through HEPA	Yes	When exhausted outdoors
II, A1	75	70% recirculated to the cabinet work area through HEPA; 30% balance can be exhausted through HEPA back into the room or to outside through a canopy unit	Yes (minute amounts)	No
II, B1	100	30% recirculated, 70% exhausted. Exhaust cabinet air must pass through a dedicated duct to the outside through a HEPA filter	Yes	Yes (minute amounts)
I, B2	100	No recirculation; total exhaust to the outside through a HEPA filter	Yes	Yes (small amounts)
II, A2	100	Similar to II, A1, but has 100 lfm intake air velocity and plenums are under negative pressure to room; exhaust air can be ducted to the outside through a canopy unit	Yes	When exhausted outdoors (*formally* "B3") (minute amounts)

BSC, biological safety cabinet; HEPA, high-efficiency particulate air; lfm, linear feet per minute.
Adapted from *Biosafety in Microbiological and Biomedical Laboratories*. 5th ed. Revised December 2009.

MTLE MARCH 2023 RECALLS

God bless, future RMT!

32. Drug misuse and Drug abuse

Drug abuse is intentionally using drugs in a way that is unhealthy or illegal, while **misuse of drugs** is taking or using medicine in a way that is not intended.

33. Of the following, which will MOST likely interfere with quantitation of thyroglobulin?

a) Antithyroglobulin autoantibodies

b) Thyroid-stimulating antibodies

c) TSH receptor antibodies

d) Thyroid peroxidase antibodies

34. Hypernatremia:

a) 140 mmol/L

b) 135 mmol/L

c) Vomiting

35. Pseudo hyperkalemia is a result of: in vitro hemolysis

36. Thyroxine- present in largest amount

a. free

b. ionized

c. bound to albumin

d. bound to globulin

MTLE AUGUST 2023 RECALLS

God bless, future RMT!

1. Purest type of reagent water is:
a. Type I
b. Type II
c. Type III
d. Type IV

2. Which of the following is NOT an alcoholic drink?
a. Soju
b. Wine
c. Fruity brandy
d. Root beer

3. Which of the following is considered a lipid?
a. Chylomicrons
b. LDL
c. Cholesterol
d. HDL

4. Which of the following lipoproteins is the smallest of all the lipoproteins and it is composed of 50% proteins?
a. HDL
b. Chylomicrons
c. Triglycerides
d. LDL

5. Which of the following would be most adversely affected by a nonfasting sample?
a. HDL
b. Cholesterol
c. Triglycerides
d. LDL

6. Which of the following apoproteins is responsible for receptor binding for IDL and the chylomicron remnant produces in fat transport?
a. Apo A1
b. Apo C
c. Apo E
d. Apo B

7. Which of the following blood samples would serve best to assay lipoproteins because this anticoagulant acts to preserve lipoproteins?
a. EDTA plasma sample
b. Heparin plasma sample
c. Citrate plasma sample
d. Fluoride plasma sample

8. Degree of syringe when performing phlebotomy
Answer: 15-30 degrees

9. Which of the following tumor markers is used to monitor persons with breast cancer for reaccurance of disease?
Answer: CA-15-3

MTLE AUGUST 2023 RECALLS

God bless, future RMT!

10. Solve for Fahrenheit to Celsius
Given: 99.2 F

Formulas:

C= (F – 32) x 0.556

F = (C x 1.8) + 32

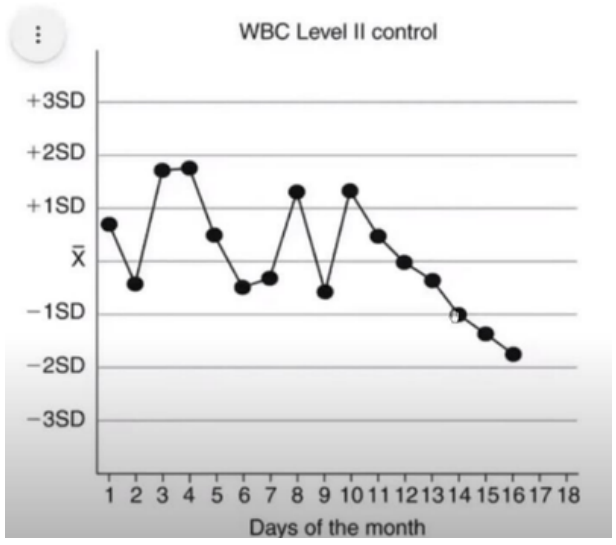
Solution: C = (99.2 – 32) x 0.556 **= 37.36**

11. Which westgard rule is considered only as a "warning rule", and would not result in the rejection of a run?
Answer: 1(2s)

12. A patient sample is assayed for fasting triglyceride and a triglyceride value of 1036 mg/dL. This value is of immediate concern because of its association with which of the following conditions?
Answer: Pancreatitis

13. Which lipoprotein migrants farthest from the anode during electrophoresis?
Answer: Chylomicron

14. What type of error is observed from days 10-16 in this control chart?
Answer: Trend



MTLE MARCH 2024 RECALLS

God bless, future RMT!

1. Female born with XX chromosomes develops ambiguous genitalia or genitals that appear male. What is this condition?
A. Klinefelter syndrome
B. Turner syndrome
C. Congenital adrenal hyperplasia
D. Down syndrome

2. All conditions may be associated with type 3c diabetes mellitus, except
A. Pancreatitis
B. Pancreatic Cancer
C. Cystic fibrosis
D. Autoimmune disease

3. The following amino acids are composition of creatine EXCEPT:
A. glycine
B. methionine
C. arginine
D. cysteine

4. Relating a measurement result to a stated reference through an unbroken chain of calibrations:
TRACEABILITY

5. How to report liver enzymes in SI unit?
a. IU/L
b. g/Dl
c. mmol/L
d. mmol/L

6. Which is not a function of the thyroid gland?
a. Protein Synthesis
b. Development of fetal tx
c. Waste excretion
d. Regulation of Metabolism

7. Which is not true about unconjugated bilirubin.
a. Also known as direct bilirubin
b. Water insoluble
c. Indirect bilirubin

8. Specimen for drug analysis EXCEPT:
a. Blood
b. Urine
c. Semen
d. Oral Secretions

9. Which is preferred for Blood Glucose Determination.
a. Serum
b. Plasma
c. EDTA
d. Whole Blood

MTLE MARCH 2024 RECALLS

God bless, future RMT!

10. Glycogenolysis happens in these following organs EXCEPT:
a. Liver
b. Bone
c. Kidney
d. Stomach

11. How many minutes does a sample needs to stand before centrifugation?
a. 60 minutes
b. 30 minutes
c. 20 minutes
d. 45 minutes

12. What is the most common substance abused?
a. Cannabinoids
b. Ecstasy
c. Shabu
d. Alcohol

13. Goal of POCT, EXCEPT:
a. Monitor drug effectiveness
b. Reduce adherent to treatment
c. Modify lifestyle
d. Screen

14. Scientist has a test with consistent results while using the same methods/ sample/environment/etc. This is an example of:
a. Sensitivity
b. Specificity
c. Replicability
d. Reproducibility

15. What will you use to neutralize alkaline spill?
a. Ethanol
b. Methanol
c. KOH
d. NAOH

16. Which strategy is performed when POCT-QA issues arises.
a. Refrain from using POCT Device
b. Allow only the doctor to perform POC Testing
c. Non-laboratory personnel are not allowed to perform POCT
d. Train non-laboratory personnel

17. What hormone is secreted when there is an increase level of glucose.
a. Glucose
b. Catecholamine
c. Insulin

18. Considered as a liver function test, EXCEPT:
a. AST
b. ALT
c. Amylase
d. Alkaline Phosphate

MTLE MARCH 2024 RECALLS

God bless, future RMT!

19. 4dl to Liter
a. 4
b. 0.04
c. 0.4
d. 40

20. What formula is this. $Na^+ + K^+ – (Cl^- + HCO_3^-)$
a. Anion Gap
b. Osmolal Gap
c. CO2
d. O2

21. which of the following is INCORRECT regarding steam sterilization?
a. Dry heat
b. 15 psi
c. Wet heat
d. 121 degC

22. What organ produces vasopressin?
A. Posterior pituitary gland
B. Anterior pituitary gland
C. Hypothalamus
D. Adrenal cortex

23. Which of the following is the best marker for risk in diabetic nephropathy?
A. Glucose
B. Creatinine
C. Microalbuminuria
D. BUN

24. Which lipoprotein migrates farthest from the anode during electrophoresis?
A. Chylomicron
B. VLDL
C. LDL
D. HDL 25.

25. What is the purpose of caffeine in the Jendrassik-Grof Method?
A. Wetting agent
B. Accelerator
C. Mordant

26. One or two values exceeding the qc parameters not included in counting:
A. Trend
B. Shift
C. Outlier
D. Drift

27. Duration of the disease
A. Mild and Severe
B. Benign and Malignant
C. Acute and Chronic
D. Contagious and non-contagious

MTLE MARCH 2024 RECALLS

God bless, future RMT!

28. Laboratory equipment hazard, except?
A. Mechanical
B. Chemical vapors
C. Sharp
D. Electric

29. Gastric enzymes proteolysis:
A. Gastrin
B. Amylase
C. Lipase
D. Trypsin

30. Functional plasma enzyme:
A. LD
B. ALP
C. Clotting factors
D. CK

31. Causes of excess cortisol?
A. Cushing syndrome
B. Addisons disease
C. Cohns syndrome
D. Acromegaly

32. How would 15.57 be rounded off to one less decimal place?
A. 15.0
B. 15.5
C. 15.6
D. 16.0

33. In a person with normal glucose metabolism, the blood glucose level usually increases rapidly after carbohydrates are ingested but returns to normal after?
A. 30 mins
B. 60 mins
C. 120 mins

34. The chylomicrons must be transported through the ____ to the blood
A. Blood
B. Circulation
C. Lymphatic system
D. Liver

35. Mandatory westgard rule
A. 1(2)s
B. 1(3)s
C. R 4)s
D. 10x

36. Hormones produced by gonads?
A. Vasopressin
B. Steroids
C. Dopamine

MTLE MARCH 2024 RECALLS

God bless, future RMT!

37. Outer region of an organ
A. Cortex
B. Capsule
C. Serosa

38. All the analytes below are associated with having diurnal variation, except:
a. GH
b. LH
c. ACTH
d. Prolactin

39. What is the order of the lipoproteins with increasing speed using the electrophoresis?
a. Chylomicrons - VLDL- LDL- HDL
b. Chylomicrons - LDL- VLDL- HDL
c. HDL- VLDL- LDL- Chylomicrons
d. HDL- LDL- VLDL- Chylomicrons

40. In the GOD-POD method, what color is the chromogen produced from the reaction
a. Red
b. Green
c. Yellow
d. Orange

41. Purpose of caffeine in the Jendrassik- Grof method
a. Precipitate B1
b. Precipitate B2
c. Solubilize B1
d. Solubilize B2

42. How should a laboratory verify the reference range it uses for a particular test?
a. call another laboratory
b. use the numbers from a textbook
c. test samples from healthy people
d. look on a medical internet site

43. What method is used to indirectly measure urea?
a. fehling's
b. szasz
c. berthelot
d. Jaffe

44. Used to contain and expel noxious and hazardous fumes from chemical reagents
a. fume hood
b. BSC
c. BSL
d. explosion- proof cabinet

45. Gastric enzyme of proteolysis
a. amylase
b. lipase
c. pepsin
d. aldolase

MTLE MARCH 2024 RECALLS

God bless, future RMT!

46. Carbon monoxide poisoning is measured using the following unit
a. ng/mL
b. ppm
c. ppb
d. mg/dL

47. Which of the following contribute most to dioxins in the environment?
a. buring of leaves
b. grilling
c. cigarette smoking
d. industrial pollution

48. Product of amino acid deamination
a. carbon dioxide
b. ammonia
c. lead
d. cadmium

49. Type 3c Diabetes involved in the following except:
a. pancreatitis
b. pancreatic cancer
c. autoimmune disease
d. cystic fibrosis

50. BUN is formed from
a. heart
b. kidney
c. liver
d. stomach

51. H2CO3: HCO3 ratio
a. 20:1
b. 1: 20
c. 20: 3
d. 3: 20

52. Highest elevation of CK
a. Duchenne's muscular dystrophy
b. pernicious anemia
c. acute hepatitis
d. rheumatoid arthritis

53. An example of functional plasma enzyme
a. ALT
b. LDH
c. CK
d. Coagulation factors

MTLE MARCH 2024 RECALLS

God bless, future RMT!

54. REVIEW: Types of Biological Safety Cabinet (BSC)

TABLE 5. Types of Biological Safety Cabinet (BSC)

Type of BSC	Description/Purpose	Air Flow
Class I Cabinet	Open-fronted type of cabinet Protects the laboratory worker and environment but no provision for samples Mostly used for BSL 1 agents though it can also process BSL 2 organisms	Allows room (unsterilized) air into the cabinet, to circulate around the workspace, and expose the material within, hence samples are exposed to contamination Only air to be exhausted is sterilized using a HEPA filter.
Class II, Type A1	Open-fronted cabinet Only utilized for biological samples	70% recirculated and 30% exhausted
Class II, Type A2	Open-fronted cabinet Most commonly used type of BSC in the clinical and microbiology laboratory For biological and clinical (infectious) samples and specimens treated with minimal concentration of volatile chemicals Mostly utilized for BSL 1 and 2 agents, with provisions also for BSL 3 organisms.	70% recirculated and 30% exhausted
Class II, Type B1	For biological samples and minimal concentration of volatile or toxic chemicals	30% recirculated and 70% exhausted
Class II, Type B2	For processing chemicals, radioisotopes, and carcinogens aside from biological samples treated with toxic or hazardous chemicals	0% recirculated and 100% exhausted
Class III Cabinet	Close-fronted BSC with an airtight system Also known as the glove-box cabinet – the infectious sample/material is handled with rubber gloves that are attached and sealed onto the cabinet Provides the highest level of safety to the laboratory worker Preferred for BSL 4 agents	Air coming into and going out of the cabinet is sterilized using HEPA filter.

BSL – Biosafety level agent

Source: Rodriguez, 2022

55. REVIEW: HIERARCHY OF CONTROLS

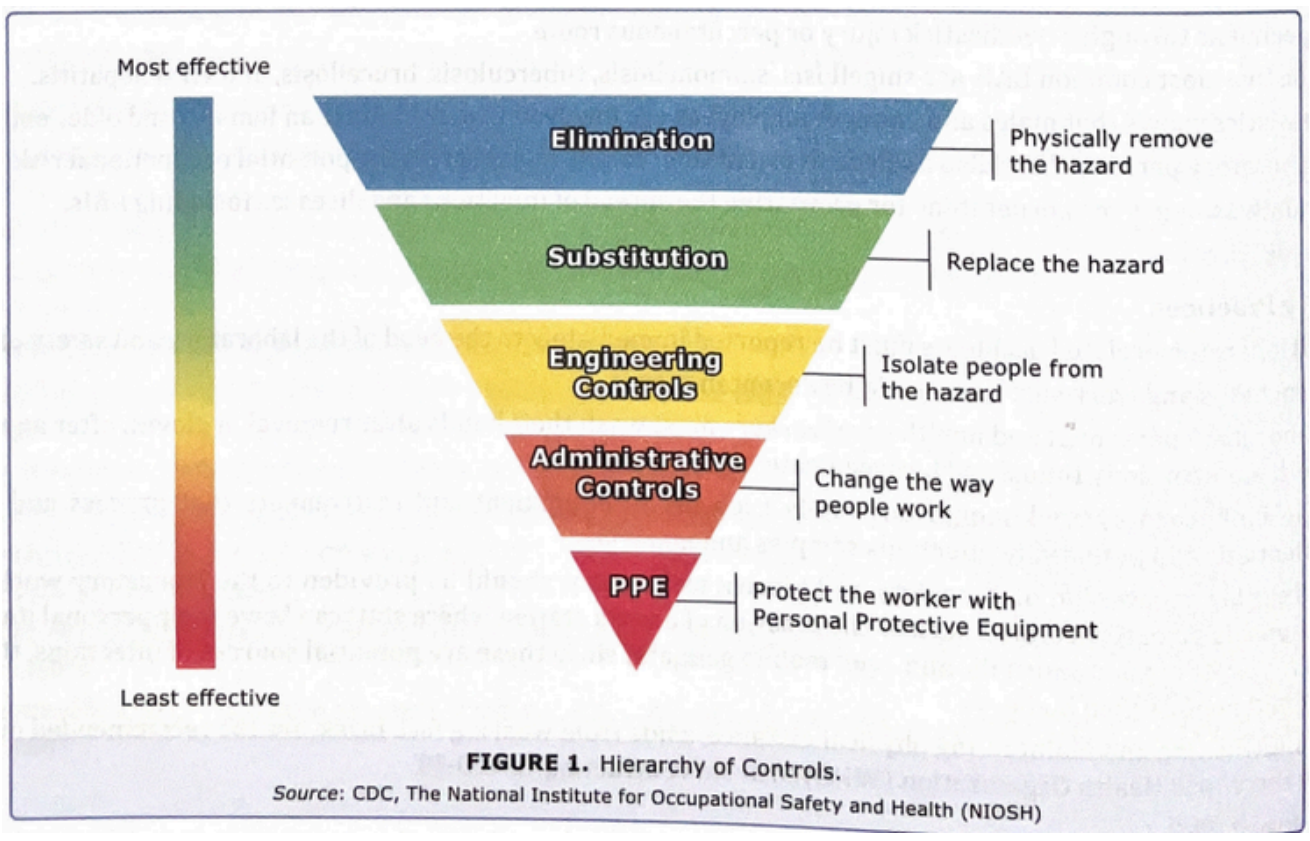
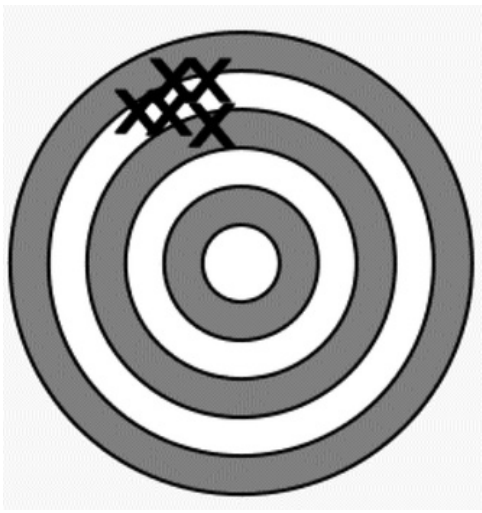


FIGURE 1. Hierarchy of Controls.

Source: CDC, The National Institute for Occupational Safety and Health (NIOSH)

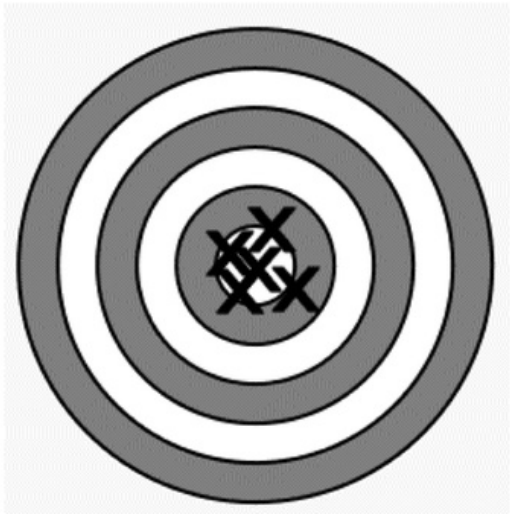
56. Low accuracy and high precision



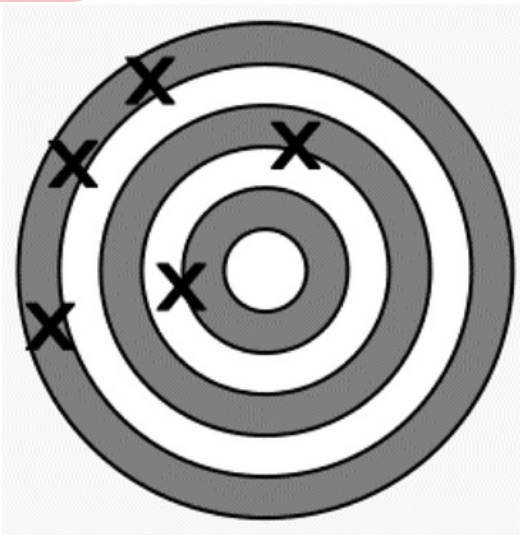
MTLE MARCH 2024 RECALLS

God bless, future RMT!

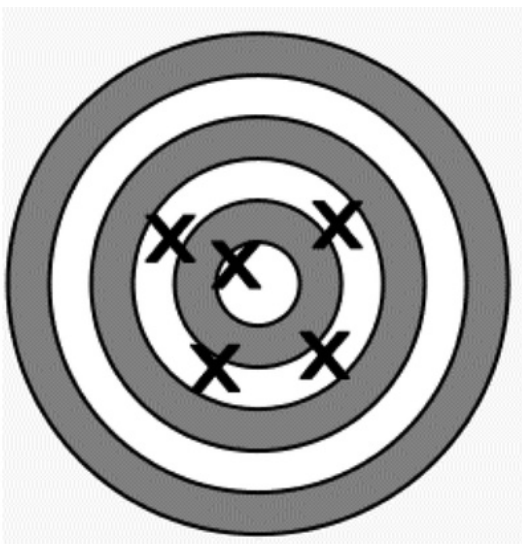
57. High accuracy and High precision



58. Low accuracy and low precision

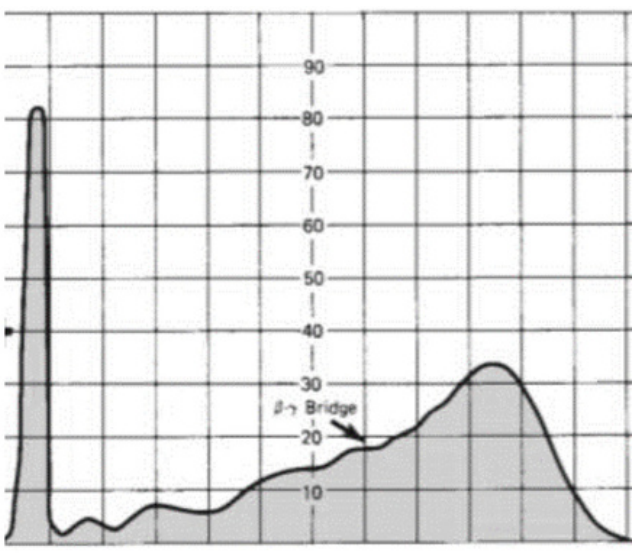


59. High accuracy and low precision



60. Which of the following disorders is the most probable reason for the serum protein electrophoresis pattern below?

a. Cirrhosis
b. Nephrotic syndrome
c. Inflammation
d. A1- Antitrypsin Deficiency

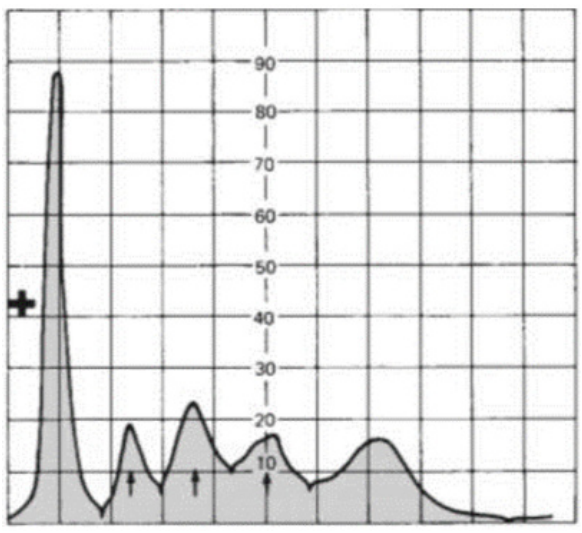


MTLE MARCH 2024 RECALLS

God bless, future RMT!

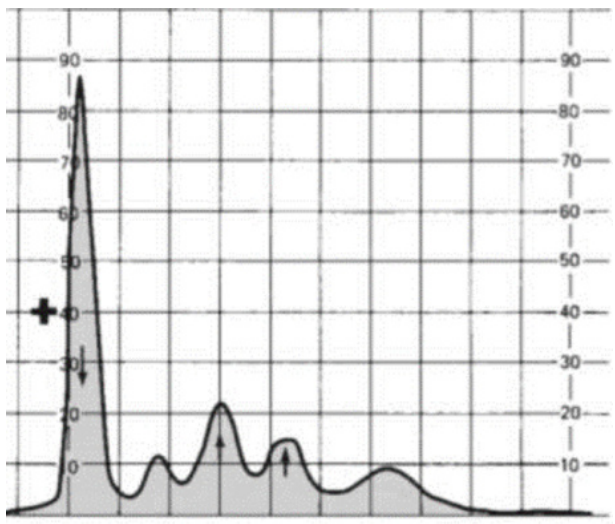
61. Which of the following disorders is the most probable reason for the serum protein electrophoresis pattern below?

a. Cirrhosis
b. Nephrotic syndrome
c. Inflammation
d. A1- Antitrypsin Deficiency



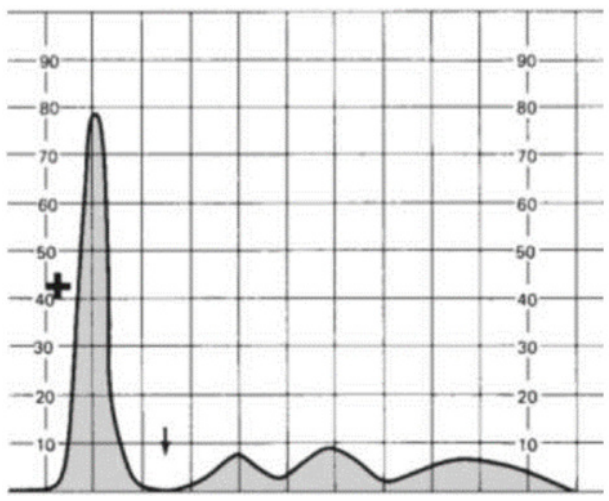
62. Which of the following disorders is the most probable reason for the serum protein electrophoresis pattern below?

a. Cirrhosis
b. Nephrotic syndrome
c. Inflammation
d. A1- Antitrypsin Deficiency



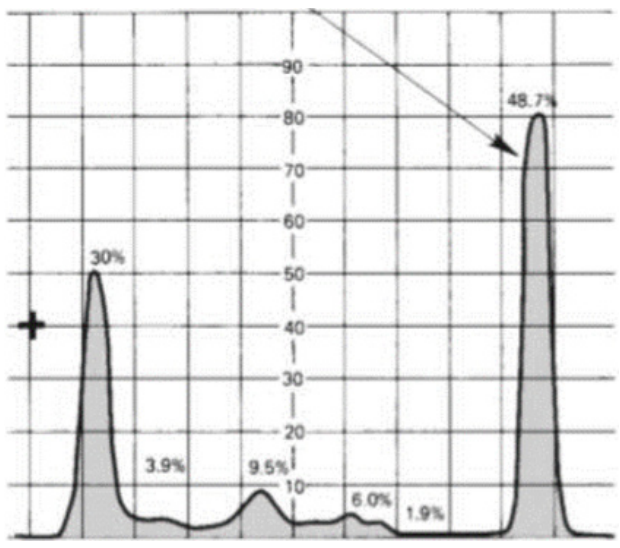
63. Which of the following disorders is the most probable reason for the serum protein electrophoresis pattern below?

a. Cirrhosis
b. Nephrotic syndrome
c. Inflammation
d. A1- Antitrypsin Deficiency



64. Which of the following disorders is the most probable reason for the serum protein electrophoresis pattern below?

a. monoclonal gammopathy
b. Nephrotic syndrome
c. Inflammation
d. A1- Antitrypsin Deficiency

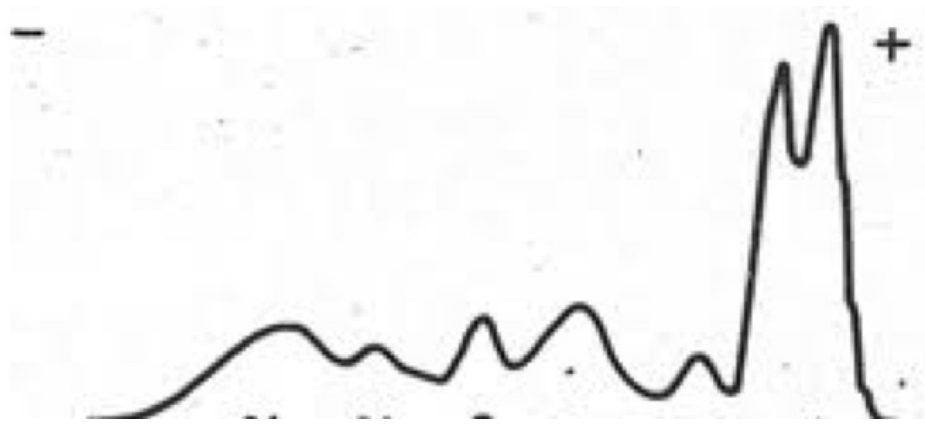


MTLE MARCH 2024 RECALLS

God bless, future RMT!

65. Which of the following disorders is the most probable reason for the serum protein electrophoresis pattern below?

a. chronic inflammation
b. nephrotic syndrome
c. bisalbuminemia
d. Analbuminemia



MTLE AUGUST 2024 RECALLS

God bless, future RMT!

1. With a blood pH of 7.40 and a bicarbonate-to-carbonic acid ratio of 20:1, the condition is most likely:
A. Metabolic acidosis
B. Normal
C. Respiratory alkalosis
D. Respiratory acidosis

2. Which of the following would be elevated in the blood in medullary carcinoma of the thyroid?
A. Calcitonin
B. Thyroxine
C. Catecholamines
D. Secretin

3. Which of the following is now used as a popular marker for heart failure?
a) Fibronectin
b) Troponin
c) Brain Natriuretic Peptide
d) Myoglobin

4. Which of the following is NOT a post-analytical error?
a) Unavailability of previous results for comparison
b) Transcription error
c) Delayed report
d) Illegible report

5. Which of the following is an indirect measurement of alcohol?
a) LD
b) GGT
c) AST
d) Alcohol metabolites

6. Which is a diagnostic possibility if upon cytogenetic investigation, an individual has peripheral karyotype 46, XX?
A. Congenital Adrenal Hyperplasia
B. Androgen Insensitivity Syndrome
C. Gonadal Dysgenesis
D. Gonadotropin Deficiency

7. Which of the following mechanisms best explains how mercury becomes toxic in the environment?
A. Reduction
B. Oxidation
C. Microbial actions in aquatic systems
D. Exposure to the atmosphere

8. Which of the following as described is not a colligative property?
A Boiling point elevation
B. Freezing point depression
C. Osmotic pressure depression
D. Vapor pressure depression

MTLE AUGUST 2024 RECALLS

God bless, future RMT!

9. Which form transports large quantities of free glycerol into the body?
A. TAG
B. Chylomicrons
C. LDL
D. VLDL

10. What organ produces TROPONIN?
A. Liver
B. Heart
C. Pancreas
D. Lungs

11. What hormone is not associated with calcium?
A. Calcitriol
B. PTH
C. Calcitonin
D. Vitamin E

12. What causes hypernatremia:
a) Diabetes insipidus
b) Dehydration
c) Vomiting

13. What is a common unit for measuring creatinine levels?
A. mmol/L
B. µmol/L

14. To evaluate increased or decreased levels of globulin, which test should be used?
A. Chromatography
B. Albumin-to-globulin (A/G) ratio
C. Serum electrophoresis

15. The following are the sources of gluconeogenesis, except?
A. Pyruvate
B. Lactate
C. Glycerol
D. Tryptophan

16. The following are signs of COVID-19, except?
A. Loss of taste
B. Cough
C. Fever
D. Positive in antibody test

17. The following are increased prolactin levels, except?
a) Pregnancy
b) Stress
c) Sexual intercourse
d) Breast stimulation

MTLE AUGUST 2024 RECALLS

God bless, future RMT!

18. Non-Protein Nitrogen (NPN) is commonly expressed as which of the following?
A. Sodium
B. Potassium
C. Blood Urea
D. Ammonia

19. In what condition does creatinine react with picrate?
a) acid
b) alkaline

20. How many times does a cortisol is tested
a) once
b) twice
c) 3x
d) 4x

21. Grave's disease autoantibody thyroid stimulating hormone receptor:
a) Increased T3 & T4
b) Decreased TSH
c) Increased T3 & T4 and TSH
d) Normal T3 & T4 decreased TSH

22. Diabetes insipidus gold standard:
a) Plasma test
b) Water deprivation test

23. CK seen in skeletal muscle: CK-MM

24. Anticoagulant used for lipoproteins: EDTA plasma

25. All of the following drugs are addictive, EXCEPT:
a) ketamines
b) amphetamines
c) benzodiazepines
d) alcohol

26. All are implicated with impaired glucose tolerance, EXCEPT:
a) Elderly
b) Obese
c) Patient with Sepsis
d) hypotension

27. Accumulation of nitrogen in the blood is in the form of:
A. BUN
B. Ammonia
C. Uric acid
D. Creatinine

28. What reagent is used in the Jaffe method for measuring creatinine?
A. Saturated picric acid
B. Concentrated picric acid

MTLE OTHER RECALLS

God bless, future RMT!

1. How many Liters is a 4dL solution?	a. 40L b. 0.04L c. 0.4L d. 4L
2. Which of the following is a systematic error?	a. Photometer variation b. Fibrin clot in sample c. Within run bias d. Electrical interference
3. Middle line	Mean
4. Most widely used, identifies both systematic and random errors	Shewhart Levey- Jennings
5. Control values that are too high or too low should be investigated/ removed because?	a. They are outliers b. They represent a trend c. They represent a shift d. None of the above
6. Al of the following exhibit diurnal variation EXCEPT:	a. Prolactin b. LH c. Growth hormone d. Cortisol
7. Select the enzyme that is most specific for b-d- glucose	a. glucose oxidase b. glucose 6-phosphate dehydrogenase c. hexokinase d. phosphohexose isomerase
8. What is the positive color for GOD-POD method of glucose determination?	a. red b. blue c. purple d. black
9. Select the correct of order of lipoprotein migration during electrophoresis.	a. (+) LDL-VLDL-HDL-Chylomicrons (-) b. (+) HDL- VLDL- LDL- Chylomicrons (-) c. (+) HDL-LDL-VLDL- Chylomicrons (-) d. (+) Chylomicron- LDL-VLDL-HDL (-)
10. Abetalipoproteinemia is	a. an acquired lipid disorder b. a congenital lipid disorder c. not a lipid disorder d. an excess of LDL

MTLE OTHER RECALLS

God bless, future RMT!

11. All of the following are associated with hyperthyroidism except:	**a. sweating** **b. diarrhea** **c. depression** **d. infertility**
12. All of the following can be used as specimen for toxicology and drug analysis except:	**a. hair** **b. blood** **c. nails** **d. sperm**
13. Carbon monoxide is measured with a unit of?	**a. mmol/L** **b. ppm** **c. mmHg** **d. mg/ dL**

CLINICAL CHEMISTRY EXAMINATION AND RATIO

1. All of the following statements about absorbance spectrophotometry is false, except?
A. Absorbance is directly proportional to transmittance
B. Percent transmittance is directly proportional to concentration
C. Percent transmittance is direct1u ro1;.;2,rtional to light path length
D. Absorbance is directly proportional to concentration

Beer's Law states that the concentration of a substance is directly proportional to the amount of light absorbed or inversely proportional to the logarithm of the transmitted light.

Beer's Law may be written simply as:
A = εbc
where
A is absorbance
ε is the molar absorptivity
b is the path length of the sample

Thus, the given statements should be:
Absorbance is indirectly proportional to transmittance
Percent transmittance is indirectly proportional to concentration
Percent transmittance is indirectly proportional to light path length

2. Fasting requirement for glycosylated hemoglobin
A. 6-8 hours
B. 8- 10 hours
C. 10-12 hours
D. No fasting required

3. All of the following requires fasting except for:
a. glucose
b. insulin
c. Cholesterol
d. Triglycerides

FBS- 8 to 10 hrs fasting
Lipid Profile– 12 to 14 hrs fasting
Lipid Profile with FBS– 10 hrs fasting

4. The following are requirements for quality control samples: (I) Convenient packaging; (II) Stable; (Ill) Resembles human sample; (IV) Expensive to ensure quality
A. 1, 11, III
B. I, II, IV
C. 1, 111, IV
D. II, Ill, IV
E. All of the above

Characteristics of an ideal QC material:
Resembles human sample
Inexpensive and stable for long periods
No communicable diseases
No matrix effects
With known analyte concentrations
Convenient packaging for easy dispensing and storage

5. Which of the following is the correct order of draw for patients with the following laboratory requests: glucose, glycated hemoglobin, sodium, potassium
A. red, lavender, gray
B. lavender, gray, red
C. yellow, red, lavender, gray
D. yellow, lavender, red, gray

Order of Draw: Yellow > red > lavender > gray BCNHES

6. Imprecision is determined by repeated analysis study. Meanwhile, inaccuracy is determined by three different types of study (recovery, interference and COM study).

A. Only the first statement is correct.
B. Only the second statement is correct.
C. Both statements are true.
D. Both statements are false.

Imprecision is estimated from studies in which multiple aliquots of the same specimen (with a constant concentration) are analyzed repetitively. Meanwhile, inaccuracy is determined by
(1) recovery study,
(2) interference study, and
(3) comparison of methods study.

7. How would gas parameters change if a sealed specimen is left at room temperature for more than 2 hours?
A. PO2 increases; PCO2 decreases; pH increases
B. PO2decreases; PCO2 increases; pH decreases
C. PO2 decreases; PCO2 decreases; pH decreases
D. PO2 increases; PCO2 increases; pH decreases

Sealed- There will be RBC consumption and metabolic reduction

Open air- **Air exchange** = pO2 increase, pCO2 decrease, and pH increase

8. An automated analyzer employing multi– layer thin film slides as its reaction vessel:
a. Continuous flow analyzer
b. Centrifugal analyzer
c. Random access analyzer
d. Dryslide analyzer

Continuous s Flow Analyzer
Uses continuous tubings for pumping reagents, dilution of reagents and mixing the samples and reagents Not really used anymore

Centrifugal Analyzer
Uses the force generated by centrifugation
You mix the sample and the reagent by centrifugation
Analysis is done in PARALLEL, meaning one test = multiple samples

Random Access Analyzers
You can do any test anytime at any given patient all at the same time

Dry Slide Analyzer
Multilayer thin film
Dry reagents
Quantitative

9. In infants younger than 1 year of age, this site is recommended for blood collection through skin puncture:
A. Plantar surface of the big toe
B. Ear lobe
C. Third or fourth finger
D. Lateral plantar surface of the foot
E. All of the above

In an infant younger than 1 year of age, the lateral or medial plantar surface of the foot should be used for skin puncture. In older children, the plantar surface of the big toe may also be used, although blood collection should be avoided on ambulatory patients from anywhere on the foot.

10. Why is it important to fill in the yellow top tube with sodium polyanethol sulfonate before the other tubes?
a. to allow immediate processing of the specimen b. to prevent clotting of blood
c. to prevent anticoagulants from other tubes from contaminating blue top tube
d. to prevent bacterial contamination due to prolonged exposure of blood in the environment

Yellow top tube with SPS- for microbiology studies, to prevent bacterial contamination due to prolonged exposure of the blood in the external environment

11. Stained zones after electrophoresis are quantified using:
A. Electropherogram
B. Densitometer
C. Analyzer
D. All of the above

Once separated, proteins may be detected either by staining followed by quantification using densitometer or by direct measurement using an optical detection system. A densitometer measures the absorbance of each fraction as the gel is moved past a photometric optical system and displays an electropherogram on a recorder chart or computer display.

CLINICAL CHEMISTRY EXAMINATION AND RATIO

12. Nephelometry is based on the measurement of light that is:
a. Absorbed by the particles in suspension
b. Scattered by fluorescence in suspension
c. Produced by fluorescence
d. Produced by excitation of ground state atoms

Turbidimetry- Amount of light absorbed or blocked by particles in solution
Absorption Spectroscopy- Produced by excitation of ground state atoms

13. The following terms are associated to the tertiary structure of proteins, except:
A. Three-dimensional structure with specific shape
B. Hydrophobic interactions
C. Intramolecular folding of polypeptide chains
D. Oligomeric aggregate unit

Tertiary structure involves intramolecular folding of polypeptide chain into a compact three-dimensional structure to a specific shape. This structure is maintained by electrovalent linkages, hydrogen bonds, disulfide bridges, van der Waals forces, and hydrophobic interactions. Hydrophobic interactions are considered to be a major force in maintaining the unique tertiary structure of proteins. Quaternary structure refers to the association of several polypeptide chains or subunits into a larger "oligomeric" aggregate unit.

14. In a spectrophotometer, light of a specific wavelength can be isolated from white light with a/ an:
a. Double beam
b. Diffraction grating
c. Aperture
d. Slit

Diffraction Grating- a type of monochromator; The one that isolates the specific wavelength

15. Deficiency of this protein is significant in patients with pulmonary emphysema:
A. Albumin
B. Alpha1-antrypsin
C. Orosomucoid
D. Alpha2-macroglobulin

AAT inhibits most serine proteases, especially those structurally related to trypsin. It is physiologically the most important as an inhibitor of leukocyte elastase, which is released in the process of phagocytosis by polymorphonuclear leukocytes. This enzyme reacts with elastin in the vascular endothelium and the tracheobronchial tree, in particular. AAT is thus important in the prevention of the loss of elastic lung recoil; uninhibited elastase in the bronchial tree can result in emphysema.

16. The measurement of the amount of electricity passing between 2 electrodes in an electrochemical cell is the principle of:
a. Electrophoresis
b. Amperometry
c. Coulometry
d. Potentiometry

Electrophoresis: Migration of particles according to charges
Amperometry: Detection of ions in solution based on electric current
Coulometry: Determination of the amount of matter transformed during an electrolyte reaction

17. In electrophoresis, particles migrate to the ___ at pH 8.6.
A. Anode
B. Cathode
C. Either
D. Neither

In electrophoresis, sample is injected near the cathode (negatively charged electrode) and is made to migrate to the anode (positively charged electrode).

18. The most widely used support medium for electrophoretic separation is:
a. Polyacrylamide gel
b. Starch gel
c. Paper
d. Agarose gel

Polyacrylamide Gel- also being used, but more expensive than agarose gel

19. The electrode for measuring pCO2:
A. Nernst
B. Severinghaus
C. Clark
D. Calomel

pCO2 is determined with a modified pH electrode, called a Severinghaus electrode. An outer semipermeable membrane that allows CO2 to diffuse into a layer of electrolyte buffer, usually bicarbonate, covers the glass pH electrode.

20. Determines the statistical difference between the standard deviation of two groups
a. accuracy
b. precision
c. F test
d. T test

FPS– F test, Precision, Standard deviation
TAM–Ttest, Accuracy, Mean

21. This disinfectant is used as a substitute for alcohol when the blood to be collected is for ethanol testing:
A. Benzalkonium chloride
B. Isopropyl alcohol
C. Normal saline
D. None of the above

For ethanol testing, benzalkonium chloride solution (Zephiran chloride) should be used for skin cleansing to avoid falsely increased results.

22. A negative acute phase reactant:
A. Ceruloplasmin
B. Transferrin
C. Serum amyloid A
D. CRP

Transferrin is a negative acute phase reactant; the most common cause of low levels is inflammation and malignancy.

23. Which of the following is the correct way of diluting acid?
A. Slowly adding water to acid
B. Slowly adding acid to water
C. Drop by drop adding water to acid
D. Drop by drop adding acid to water

* An important chemical safety rule to remember when dealing with acids and other liquids is never add water or other liquids to an acid, as it can cause an explosive type reaction. If a mixture containing both is to be made, always add the acid to the other liquid.

Remember "AW" = Acid →Water
Think of the letters "AAA" to remember the safety rule "always add acid".

24. The following inhibitors are correctly matched to the disease they may cause if deficient:
(I) Alpha1 anticyhmotrypsin: hepatic cirrhosis; (II) Alpha2 antiplasmin: hemorrhage;
(III) C1 inhibitor: hereditary angioedema;
(IV) Ceruloplasmin: Menkes' disease

A. I, II, III
B. I, II, IV
C. I, III, IV
D. II III, IV
E. All of the above

Alpha 1-anticyhmotrypsin deficiency causes hepatic cirrhosis. Alpha2-antiplasmin deficiency causes hemorrhage. C1 inhibitor deficiency causes hereditary angioedema. Ceruloplasmin deficiency causes Menkes' disease.

25. Find the median: -2,0,2,4,8
a. 4
b. 3
c. 2
d. 2.4

Arrange the data points from smallest to largest. If the number of data points is odd, the median is the middle data point in the list. If the number of data points is even, the median is the average of the two middle data points in the list.

26. Which of the following processes does not result in the production of glycogen?
(I) Glycolysis;
(II) Gluconeogenesis;
(III) Glycogenolysis;
(IV) Glycogenesis

A. I, II, III
B. I, II
C. IV
D. All of the above

(I) **Glycolysis:** Metabolism of glucose molecule to pyruvate or lactate
(II) **Gluconeogenesis:** Formation of glucose-6-phosphate from non-carbohydrate source
(III) **Glycogenolysis:** Breakdown of glycogen to glucose for energy
(IV) **Glycogenesis:** Conversion of glucose to glycogen for storage

27. Which of the following parameters does not have an effect on centrifugal force?
a. temperature of the centrifuge
b. mass of the material being centrifuged
c. speed of rotation
d. Radius of the centrifuge

Fc=mv^2/r

28. Glucose-6-phosphatase deficiency with hepatomegaly, retarded growth and seizures:
A. Pompe
B. Cori Forbes
C. von Gierke
D. McArdle

The most common congenital form of glycogen storage disease is glucose-6-phosphate deficiency type 1, which is also called van Gierke disease. It is characterized by severe hypoglycemia that coincides with metabolic acidosis, ketonemia, and elevated lactate and alanine.

29. This safety equipment is used to reduc ethe risk of inhaling caustic chemicals by expelling noxious and hazardous vapors
a. Biosafety cabinet
b. Negative pressure isolator
c. Fume hood
d. Exhaust

FUME HOOD
-Expels noxious and hazardous fumes from chemical reagents
-Suitable for chemicals and non-sterile work
BIOSAFETY CABINET
-Recirculates filtered air in to the laboratory
-Utilized to ensure sterility of infectious work
-Prevent environment from contamination

30. The CV for HDL-cholesterol according to the NCEP guidelines:
A. ⩾2%
B. ⩾3%
C. ⩾4%
D. ⩾5%

Cholesterol: ⩾3%
HDL-cholesterol/LDL-cholesterol: ⩾4%
Triglycerides: ⩾5%
Laboratory Standardization Panel of NCEP (NCEP, 1995)

31. Which of the following does not correspond to Lean Six Sigma technique?
a. Define
b. Maintain
c. Analyze
d. Improve

Lean and Six Sigma are not the same but are complementary because they both focus on management and process improvement. Six Sigma focuses on removal of error, precision and accuracy

Define, Measure, Analyze, Improve and Control

32. The reference method for lipoprotein assay:
A. Electrophoresis
B. Chemical precipitation
C. Ultracentrifugation
D. Immunoassay

Ultracentrifugation is the reference method for the quantitation of lipoproteins based on their protein and triglyceride contents.

33. All are systematic errors, except:
a. 2:2s
b. 4:1s
c. 10:X
d. 1:2s

Random Error: 1:2s,1:3s, R:4s random=odd #s
•Mislabeling of specimen/sample Pipetting errors
•Improper mixing of sample and reagent
•Voltage and/or instrument fluctuations •Operator and environmental conditions

Systematic Error: 2:2s. 4:1s,8x,10:x systematic= even#s
•Improper calibration (Shift)
• Deterioration of reagents (Trend)
•Sample instability
•Unstable and inadequate reagent blank •Instrument drift
•Contaminated solutions

34. The plasma glucose range at which observable symptoms of hypoglycemia occur:
A. 80-86 mg/dL
B. 65-70 mg/dL
C. 50-60 mg/dL
D. 50-55 mg/dL

The plasma glucose concentration at which glucagon and other hyperglycemic hormones are released is between 65 to 70 mg/dL; at about 50 to 55 mg/dL, observable symptoms of hypoglycemia appear. The warning signs and symptoms of hypoglycemia are all related to the central nervous system.

35. This refers to the ability of a method to detect only the analyte it is designed to determine, also known as cross-reactivity:
a. LoD
b. Analytic specificity
c. LoQ
d. Analytic Sensitivity

Analytic sensitivity: Ability of a method to detect small quantities of an analyte
Analytic specificity: Ability of a method to detect only the analyte it is designed to determine
LoD (limit of detection): Lowest amount of analyte accurately detected by a method

36. The primary reagent used in the Jaffe method:
A. Phosphotungstic acid
B. Sodium nitroprusside and phenol
C. Alkaline Coper sulfate
D. Saturated picric acid and NaOH

The Jaffe method uses saturated picric acid, which oxidizes creatinine in alkali solution, forming creatinine picrate. The reaction is nonspecific; ketones, ascorbate, proteins, and other reducing agents contribute to the final color.

CLINICAL CHEMISTRY EXAMINATION AND RATIO

37. What is the patient's urea in % if the given BUN is 12 mg/dL?
A. 23.68
B. 5.68
C. 25.68
D. 5.60

Bun to urea conversion factor: 2. 14
BUN in mg/dL x 2. 14 = urea in mg/dL
Thus, 12 mg/dL x 2. 14 = 25. 68

38. When referring to quality control (QC) results, what parameter usually determines the acceptable range?
a. The 95% confidence interval for the mean
b. The range that includes 50% of the results
c. The central 68% of results
d. The range encompassed by +/- 2.5 standard deviations

68– 95–99Rule:
Mean+/- 1 SD=68.3%
Mean+/- 2SD =95.4%
Mean+/- 3SD =99.7%
In quality control, the +/- 2SD is ACCEPTABLE When you are establishing an expected range for control values, we get the +/- 2SD which is the acceptable limit

39. The principle behind Kjeldahl's procedure for total protein measurement:
A. Proteins are negatively charged.
B. The pKa of proteins is the same.
C. The nitrogen content of Proteins is constant.
D. Proteins have similar tyrosine and tryptophan content.

It assumes that proteins average 16% nitrogen by weight. Protein in grams per deciliter is calculated by multiplying protein nitrogen by 6.25. The Kjeldahl method is a reference method for total protein that is used to assign a protein assay value to calibrators.

40. Which does not belong to the group?
a. reproducibility
b. Precision
c. Repeatability
d. Practicability

Practicability: ability of a certain analytical procedure to be easily done the 3 other terms are synonymous / grouped together (reproducibility, precision and repeatability)

41. Which statement about biuret method is true?
A. It involves reaction of phenolic groups of copper II sulfate.
B. It measures coordinate bonds between copper II, carbonyl and imine groups of peptide bonds
C. It involves the protein error of indicator effect producing color when dyes bind protein.
D. It measures the reaction of phosphomolybdic acid with protein.

The biuret reaction is not sensitive to protein levels below 0. 1 gldL and, therefore, is not sensitive enough for assays of total protein in CSF, urine, or transudates. Slight hemolysis does not cause falsely high results, if the absorbance of the Cu+ 2-protein complexes is measured bichromatically. However, frankly hemolyzed samples contain sufficient globin to cause positive interference. The reagent reacts with peptides containing at least two peptide bonds, but due to the high concentration of proteins in plasma relative to peptides present this reactivity causes insignificant bias.

42. In an institution, a comprehensive program in which all areas of operation are monitored to ensure quality with the aim of providing the highest quality patient care:
a. Quality systems
b. Quality control
c. Quality assessment/assurance
d. All of the above

43. The accelerator used in Evelyn and Malloy method for bilirubin measurement:
A. Caffeine sodium benzoate
B. Sulfanilic acid
C. Methanol
D. Isopropanol

Bilirubin assay may be through Evelyn and Malloy method or Jendrassik and Grof. The former makes use of methanol as its coupling accelerator and the former caffeine sodium benzoate.

44. _ is the forward reaction for LDH. Meanwhile, ___ is the reverse reaction.
A. Wrobleuski La Due; Wacker
B. Wacker; Wrobleuski La Due
C. Wrobleuski La Due; Tanzer-Gilbarg
D. Tanzer-Gilbarg; Oliver-Rosalki

Creatine Kinase (CK)
Forward: Tanzer-Gilbarg
Reverse: Oliver-Rosalki
Lactate dehydrogenase (LOH)
Forward: Wacker
Reverse: Wrobleuski La Due

45. What term describes the extent of agreement among repeated analyses?
a. Random error
b. Precision
c. Accuracy
d. Reliability

Accuracy: Ability to determine the true and known value of a substance
Precision: Ability to reproduce the same results in repeated analysis of the sample
Reliability: Ability of an analytical procedure to maintain its original accuracy, precision, specificity and sensitivity over an extended period of time Reliability of a test result encompasses ALL something can be precise but not accurate.

46. Aids Leydig cells in males during testosterone production:
A. FSH
B. LH
C. Both
D. Neither

Testosterone, the predominant hormone secreted by the testes, is controlled primarily by two hormones: FSH and LH. FSH acts primarily on germinal stem cells and LH acts primarily on the Leydig cells.

47. The following statements are functions of a good quality control program EXCE
a. Monitors analytical processes
b. Detects analytical errors during analysis
c. Monitors pre-analytical processes
d. Prevents reporting of incorrect patient values

48. The most abundant estrogen in pre-menopausal women:
A. E1
B. E2
C. E3
D. E4

Estrone (E1) is the most abundant estrogen in post-menopausal women.
Es/radio/ (E2) is the most abundant estrogen secreted by the ovaries and is seen in pre-menopausal women with low levels in the menopausal stage.
Estriol (E3) is a metabolite of E2 found in maternal urine.

49. Which of the following serum constituents is unstable if a blood specimen is left standing at room temperature for 8 hours before processing?
a. cholesterol
b. triglyceride
c. creatinine
d. glucose

Glucose is metabolized in an unpreserved serum sample at room temperature at 7mg/dL/hr or 0.4mmol/L/hr
At 4°C, 2mg/dL/hr.

50. At pH 7.38, what is the ratio of carbonic acid to bicarbonate:
A. 1:20
B. 20:1
C. 1:10
D. 10:1

At normal pH, a ratio of one part carbonic acid to twenty parts bicarbonate is present in the extracellular fluid.

CLINICAL CHEMISTRY EXAMINATION AND RATIO

51. This is also known as the "total exhaust biosafety cabinet":
a. Class I
b. Class IIA
c. Class IIB1
d. Class IIB2

Biosafety cabinets	
Type	Airflow Pattern
Class I	In at front, rear and top through HEPA filter
Class IIA	**70% recirculated** through HEPA; exhaust through HEPA
Class IIB1	**30% recirculated** through HEPA; exhaust via HEPA and hard-ducted
ClassIIB2 **"Total Exhaust Biosafety Cabinets"**	**No recirculation**; total exhaust via HEPA and hard-ducted
Class B3 (now designated as **Class II A2**)	Same as IIA, but is surrounded by plenums under negative pressure
Class III	Exhaust air is incinerated and HEPA filtered or **double HEPA filtered** (2 HEPA filters) prior to being exhausted.

52. Metabolic acidosis is described as a(n):
A. Increase in CO2 and PCO2 with decreased pH
B. Decrease in CO2 with increased pH
C. Increase in CO2 with increased pH
D. Decrease in CO2 and PCO2 with decreased pH

Metabolic acidosis is caused by bicarbonate deficiency. It may be caused by diabetic ketoacidos, lactic acidosis (alcoholism), renal failure and diarrhea.

53. Which type of fire extinguisher should be used to deal with a laboratory fire consisting of ordinary combustibles (e.g. wood and paper)?
a. A
b. B
c. C
d. D

A : Ordinary combustible materials
B : Flammable liquids/gases
C : Energized electrical equipment
D : Reactive metals

54. Specimen used for long term arsenic exposure:
A. Urine
B. Blood
C. Hair
D. Sweat

The use of hair and nails as specimen are important in the evaluation of long-term (chronic) exposure.

55. Chemicals are to be stored?
a. In alphabetical order
b. Keeping incompatible chemicals apart
c. According to their physical state
d. According to their weight

56. CK isoenzyme usually associated with grave prognosis:
A. Macro-CK type 1
B. Macro-CK type 2
C. CK-BB
D. CK-MM and IgA complex

Macro-CK is found, often transiently, in sera of up to 6% hospitalized patients. It exists in two forms. Type 1 is a complex of CK, typically CK-BB, and an immunoglobulin, often IgG, but other complexes have been describes such as CK-MM with IgA. It often occurs in women older than 50. Type 2 is oligomeric CK-Mt found in adults who are severely ill with malignancies or liver disease or in children who have notable tissue distress. The appearance is associated with poor prognosis.

57. The following are processes involved in the regulation of sodium concentration?
I. Intake of water in response to thirst
II. excretion of water
III. blood volume status

A. I and II only
B. I and III only
C. II and III only
D. I, II and III

Intake of water in response to thirst
Stimulated or suppressed by plasma osmolality
Excretion of water
Largely affected by arginine vasopressin
Blood volume status
Affects Na excretion through aldosterone, angiotensin II, III and IV

58. The following are tissue sources of amylase:
(I) Small intestine;
(II) Fallopian tubes;
(III) Pancreas;
(IV) Salivary glands

A. B. I, II, III
B. I, II, IV
C. I, III, IV
D. II, III, IV
E. All of the above

The acinar cells of the pancreas and the salivary glands are the major tissue sources of serum amylase. Lesser concentrations are found in skeletal muscles, small intestines and the fallopian tubes.

59. Which of the following conditions may result in hypertonic hyponatremia?
a. Addison's disease
b. diabetes mellitus
c. diabetes insipidus
d. Dehydration

Diabetes mellitus
There is increase of glucose concentration Increase in glucose contributes to the amount of solute in the plasma = contributing to the hypertonicity Decreased in sodium concentration = Hyponatremia For every 100 mg/dL increase in blood glucose, serum sodium decreases by 1.6 mmol/L (indirect proportional relationship) Hyperkalemia
Diabetes insipidus
Deficient production of ADH/ vasopressin Increases water loss through urine, resulting to Hypernatremia
Addison's disease
Hyposecretion of aldosterone functions to increase sodium and increase water retention Hyponatremia
Dehydration
May be due to excessive water loss and results to increased sodium concentration which is hypernatremia

60. Which of the following enzymes may falsely increase in a sample left standing at room temperature?
A. ACP
B. ALP
C. AMY
D. AST

ALP assays should be run as soon as possible after collection. Activity in serum increases approximately 3% to 10% on standing at 25 or 4 degrees Celsius for several hours.

61. Choose the correct match:
a. Hypernatremia: Diabetes insipidus
b. hypernatremia: Diabetes mellitus
c. Hyponatremia: Diabetes insipidus
d. Hypernatremia: Addison's disease

Diabetes mellitus
- Sodium is decreased
Diabetes insipidus
- Polyuria occurs

- Na+is concentrated in the circulation leading to hypernatremia
Addison's disease
- Sodium is decreased
-Hyposecretion of aldosterone
-Aldosterone is for sodium retention

62. A patient diagnosed with acute pancreatitis and hyperlipemia was drawn blood for amylase and lipase testing. During collection, proper procedure was not observed leading to the hemolysis of the sample. Which of the following should be expected?
A. Increased amylase and normal lipase
B. Normal amylase and increased Lipase
C. Normal a lase and decreased lipase
D. Increased lipase and decreased lipase

Plasma triglycerides suppress or inhibit serum amylase activity. Amylase values may be normal in acute pancreatitis with hyperlipemia. Hemolysis should be avoided since hemoglobin inhibits the activity of serum lipase causing falsely low values.

63. Wha tis the fraction of the free calcium in blood?
A. 30%
B. 50%
C. 75%
D. 100%

FORMSOFCALCIUM
Ionized (Active)
45%
Unbound/free; circulates freely

Protein-bound
40%
Attached to albumin

Complexed with anions
15%
BoundtoHCO3, citrate, lactate; dissociable complex

64. Activation energy is:
A. Decreased by enzymes
B. The energy needed for enzyme reaction to stop
C. Increased by enzymes
D. Very high in catalyzed reactions

Activation energy is the energy required to raise all molecules in 1 mol of compound at a certain temperature to the transition state at the peak of the energy barrier. At the transition state, each molecule is equally likely to either participate in product formation or remain an unreacted molecule.

65. Which of the following electrolytes is important in the maintenance of myocardial rhythm and contractility?
K 2. Mg3.Ca4. Na
a. Only 1 is correct
b. 1 and 2 are correct
c. 1,2 and 3 are correct
d. Only 4 is correct

K, Mg, Ca- Needed for maintenance in rhythm and contractility
Na- Needed for volume and osmotic regulation

66. The saccharogenic method for amylase determination measures
A. The amount of product produced
B. The amount of substrate consumed
C. The amount of iodine present
D. The amount of starch present

Amyloclastic method measures the disappearance of starch substrate. Saccharogenic method measures the appearance of a product. Chromogenic method measures the increasing color production of product coupled with a chromogenic dye. Continuous monitoring involves coupling of several enzyme systems to monitor amylase activity.

67. The sample of choice for measuring blood osmolality is?
A. Serum
B. Plasma
C. Whole blood
D. Buffy coat

68. Uric acid is the final product of
A. Allantoin metabolism
B. Amino acid metabolism
C. Purine metabolism
D. The urea cycle

Uric acid is the product of catabolism of the purine nucleic acids.

69. Substances known to increase results when measuring creatinine by Jaffe reaction include all of the following, except:
A. Ascorbic acid
B. Bilirubin
C. Glucose
D. Alpha keto acids

The kinetic method based on Jaffe reaction is subject to positive bias from alpha keto acids and cephalosporins. Meanwhile, Jaffe without adsorbent is falsely increased with ascorbic acid, glucose, glutathione, alpha keto acids, uric acid and cephalosporins.

70. High concentrations of this substance is neurotoxic and often associated wit encephalopathy?
a. Glucose
b. Creatinine
c. Ammonia
d. uric acid

71. Nutritional assessment with poor protein-caloric status is associated with:
A. A decreased level of prealbumin
B. A low level of gamma globulins
C. An elevated ceruloplasmin concentration
D. An increased level of alpha1-fetoprotein

A low prealbumin level is a sensitive marker of poor nutritional status. When a diet is deficient in protein, hepatic synthesis of proteins is reduced.

72. Allantoin is produced from which of the ff substances?
a. urea
b. uric acid
c. ammonia
d. Creatine

Uric acid + uricase = allantoin

73. In addition to HDL, low levels of this protein is associated with increased risk of heart disease:
A. Albumin
B. Adiponectin
C. Cystatin C
D. Fibronectin

Lower levels of adiponectin correlate with an increased risk of heart disease, type 2 diabetes, metabolic syndrome, and obesity.

74. All of the following are conditions leading to decreased levels of urea except:
a. increased protein catabolism
b. severe vomiting
c. severe liver damage
d. decreased protein intake

increased protein catabolism = increase urea

75. A CSF albumin-serum albumin ratio was reported at 9.8 in a patient. How is this best interpreted?
A. This ratio is in the normal range.
B. The blood-brain barrier may be compromised leading to increased plasma albumin in the CSF.
C. There is an analytical error as it is biologically unlikely to achieve this value.
D. This is diagnostic of fungal meningitis. E. This is diagnostic of multiple sclerosis.

The reference value for the CSF albumin-serum albumin ratio is less than 2. 7 to 7.3; a value greater than this indicates that the increase in the CSF albumin came from the plasma due to damaged blood-brain barrier.

76. To convert conventional unit to SI units, the BUN value is multiplied by:
a. 0.055
b. 2.14
c. 0.467
d. 0.357

0.055 = conventional unit glucose-> SI unit glucose
2.14 = BUN-> urea
0.467 = urea-> BUN 0
.357 = conventional unit BUN-> SI unit BUN

77. In which of the following conditions would a normal level of myoglobin be expected?
A. Multiple myeloma
B. Acute myocardial infarction
C. Renal failure
D. Crushing trauma from a car accident

Myoglobin is a cardiac biomarker and is used along with troponin to rule out AMI. Elevations of myoglobin are also seen in conditions such as progressive muscular dystrophy and crushing injury in which skeletal muscle is damaged. Myoglobin is toxic to the kidneys and in severe muscle injury, levels of myoglobin may rise quickly, and the kidneys may be damaged by the increased amounts. Renal failure may also elevate levels of serum myoglobin as it is a small molecule and is supposed to be readily filtered by the kidneys in normal conditions.

CLINICAL CHEMISTRY EXAMINATION AND RATIO

78. The enzyme most specific for beta-D-glucose:
A. Glucose oxidase
B. Glucose-6-phosphate dehydrogenase
C. Hexokinase
D. Phosphohexose isomerase

Glucose oxidase method specifically measures beta-O-glucose using CSF or serum. Glucose oxidase acts on glucose forming glucuronic acid and peroxide.

79. The modification of diet in renal disease (MDRD) formula for calculating eGFR requires which four parameters?
a. urine creatinine, serum creatinine, height, weight
b. serum creatinine, age, gender, race
c. serum creatine, height, weight, age
d. Urine creatinine, gender, weight, age

MDRD formula is developed by modification of diet in renal disease study of chronic renal insufficiency. This said to be more accurate than Cockcroft and Gault formula.

80. A factor, other than average plasma glucose values, that can affect the HbA1c level is
A. Serum ketone bodies level
B. Red blood cell life span
C. Ascorbic acid intake
D. Increased triglyceride levels

The rate of formation of glycosylated hemoglobin is directly proportional to the plasma glucose concentrations. Because the average life span of a red blood cell is 120 days, the glycosylated hemoglobin level at any one time reflects the average blood glucose level over the previous 2 or 3 months.

81. Jaffe's reaction is used to determine which of the following analytes?
a. Urea
b. Creatinine
c. uric acid
d. ammonia

Jaffe's reagent: Picric acid + sodium hydroxide

82. Monitoring the levels of ketone bodies in the urine via nitroprusside reagents provides a semi quantitative measure of:
A. Acetoacetate
B. 3-beta-hydroxybutyrate
C. Acetone
D. All three ketone bodies

Ketone measurement using nitroprusside detects acetoacetic acid under alkaline pH producing a purple color as a positive result.

83. During chemotherapy for leukemia, which of the following analytes would most likely be elevated in the blood?
a. uric acid
b. urea
c. creatine
d. Ammonia

During chemotherapy, there is an accelerated breakdown of cell nucleus. Uric acid is tested to avoid nephrotoxicity

84. Which of the following statements concerning chylomicrons is false?
A. The major lipid transported by this lipoprotein is cholesterol.
B. This lipoprotein is produced in the intestinal mucosa.
C. The primary function is to carry dietary lipids to the liver.
D. It remains at the origin during lipoprotein electrophoresis.

Chylomicrons are produced by the intestines, where they are packaged with absorbed dietary lipids and apolipoproteins. The principal role of chylomicrons is the delivery of dietary lipids to hepatic and peripheral cells.

85. Which of these should be avoided before blood ammonia determination?
a. Cigarette smoking
b. Protein intake
c. Alcohol intake
d. Water in take

86. The most likely cause for serum or plasma to appear "milky" is the presence of
A. chylomicrons
B. VLDL
C. LDL
D. HDL

Because of their large size, they scatter light, which accounts for the turbidity or milky appearance of postprandial plasma. Because they are so light, they also readily float to the top of the plasma when stored for hours or overnight at 4 degrees Celsius and form a creamy layer.

87. Type I diabetes mellitus may be described by all of the following, except:
a. adult onset
b. prone to ketoacidosis
c. insulin dependent
d. autoimmune disorder

Type I diabetes is also known as the juvenile-onset type

88. A patient is admitted to the hospital with intense chest pains. The patient's physician ordered a lipid profile with cholesterol fractionation. Given the patient's result, what would be the LDL-C?
[Total cholesterol= 400 mg/dL; Triglycerides= 300 mg/dL; HDL-C: 100 mg/dL; LP electrophoresis: pending]

A. 240 mg/dL
B. 160 mg/dL
C. 200 mg/dL
D. 300 mg/dL

Using the following equations:
VLDL = TAG/5
LDL = Total cholesterol - (HDL-C+VLDL)
VLDL = 300/5 = 60 mg/dL
LDL = 400 - (100+60) = 240 mg/dL

89. Which of the following statements may be associated with the activity of insulin?
a. Increases glucose cellular uptake
b. Decreases cell membrane permeability to glucose
c. Decreases glucose uptake by muscle and fat cells
d. Increases blood glucose levels

Insulin: Decreases glucose level, promotes cellular uptake

90. Which of the following results is the most consistent with high risk for CHD?
A. 20 mg/dL HDL-C and 250 mg/dL total cholesterol
B. 35 mg/dL HDL-C and 200 mg/dL total cholesterol
C. 50 mg/dL HDL-C and 190 mg/dL total cholesterol
D. 55 mg/dL HDL-C and 180 mg/dL total cholesterol

Cholesterol is high and HDL-C is low which indicates higher risk for CHO.

91. Glucose renal threshold is:
a. 160-180 g/dL
b. 160-180 mg/dL
c. 120-140 g/dL
d. 120-140 mg/dL

Renal Threshold- Level of glucose that the kidneys can hold. If it exceeds the threshold level (160-180mg/dL), you can detect glucose in the urine (Equivalent to 8.8 9.9 mmol/L)

92. In the circulatory system, bicarbonate leaves the red blood cells and enters the plasma through an exchange mechanism with ___ to maintain electroneutrality.
A. Chloride
B. Carbonic acid
C. Lactate
D. Sodium

Bicarbonate diffuses out of the cell in exchange for chloride to maintain ionic charge electroneutrality given that both have a negative charge. The buffering capacity of the blood is maintained by the reversible exchange process between bicarbonate and chloride.

93. This is used recently to provide an independent index of mean glycemic control.
a. Glucose tolerance test
b. Glucose challenge test
c. Glycated hemoglobin
d. Postprandial blood sugar

Glycated Hemoglobin provides the average glucose level for three months

CLINICAL CHEMISTRY EXAMINATION AND RATIO

94. What is the presumed defect in most cases of familial type IIa hyperlipoproteinemia?
A. Defective receptors for LDL
B. Deficiency of hydroxymethyglutaryl-coA reductase
C. Deficiency of cholesterol esterase
D. Deficiency of LPL
E. Defective esterifying enzymes LCAT and ACAT

This disease is primarily caused by a genetic defect in the LDL receptor gene. It is clinically characterized by increased plasma LDL-cholesterol concentration, cholesterol deposits in the skin, tendons, and arteries.

95. Which of the following samples are not used for glucose analysis?
A. Serum, plasma, whole blood
B. Whole blood, capillary blood, urine
C. CSF, urine, capillary blood
D. Urine and tissue sample

96. Hyperchylomicronemia (type I) in childhood has been associated with which of the following?
A. A deficiency of apo C-II
B. A deficiency of LCAT
C. A deficiency of LP
D. A deficiency of apo A-I

Deficient or defective apo C-II, the required activator for LPL, reduced the activity of this enzyme, impairs chylomicron catabolism, and increases plasma triglycerides (500 to 10,000 mg/dL).

97. Which of the following hormones is produced by the beta cells of the islets of Langerhans and has a glycogenetic action?
a. Glucagon
b. ACTH
c. Epinephrine
d. Insulin

INSULIN the only one capable of decreasing blood sugar concentration; glycogenetic GLUCAGON increases blood sugar concentration; ACTION: glycogenolysis break down glycogen to form glucose

98. Which method of analysis will provide the most accurate electrolyte results if a grossly lipemic sample is used?
A. Direct ISE
B. Indirect ISE
C. Flame emission photometry
D. Atomic absorption

There are two types of ISE measurement, based on sample preparation: direct and indirect. With the indirect method, a diluted sample is used. There is no significant difference in results, except when samples are hyperlipidemic or hyperproteinemic. Excess lipids or proteins displace more plasma water, which leads to falsely decreased measurement of ionic activity in mi/limo/es per liter of plasma; whereas the direct method measures in plasma water only. In these cases, direct /SE is more accurate.

99. This process leads to the conversion of glucose to glycogen, which eventually is stored in the liver
a. Glycolysis
b. Gluconeogenesis
c. Glycogenesis
d. Glycogenolysis

GLUCONEOGENESIS formation of glucose from noncarbohydrate sources

100. The following may cause hypokalemia: (I) Acidosis; (II) Prolonged vomiting; (III) Hypomagnesemia; (IV) Hyperaldosteronism
A. I, II, III
B. I, II, IV
C. I, III, IV
D. II, III, IV
E. All of the above

(I) Acidosis: Metabolic acidosis causes hyperkalemia, not hypokalemia.
(II) Prolonged vomiting: GI loss through vomiting, diarrhea, gastric suction or discharge from an intestinal fistula.
(III) Hypomagnesemia: Magnesium deficiency diminishes the activity of the Na^+,K^+-ATPase and enhances the secretion of aldosterone.
(IV) Hyperaldosteronism: Aldosterone promotes sodium retention and potassium loss leading to hypokalemia and metabolic alkalosis.

101. A hemolyzed sample will cause falsely increased levels of the following, except:
A. Sodium
B. Potassium
C. Phosphate
D. Magnesium

Pseudohyponatremia may be seen in in vitro hemolysis and is considered the most common cause of false decrease. When red cells lyse, Na^+, K^+ and water are released. Na^+ concentration is lower in red cells, resulting in false decrease.

102. Cardioprotective status:
a. 65mg/dLHDLc
b. 150mg/dLLdLc
c. 35mg/dLHDLc
d. 130mg/dLLDLc
40 mg/dL of HDL, already at risk for heart disease As your age increases, your HDL levels should also increase.

For TC, desirable = <200 mg/dL
borderline high is 200-239 mg/dL
High = >240 mg/dL

TABLE 15-3 ADULT REFERENCE RANGES FOR LIPIDS

ANALYTE	REFERENCE RANGE
Total cholesterol	140–200 mg/dL (3.6–5.2 mmol/L)
HDL-C	40–75 mg/dL (1.0–2.0 mmol/L)
LDL-C	50–130 mg/dL (1.3–3.4 mmol/L)
Triglycerides	60–150 mg/dL (0.7–1.7 mmol/L)

HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol.

103. The sample of choice for measuring blood osmolality:
A. Serum
B. Plasma
C. Whole blood
D. Either serum or plasma

Osmolality may be measured in serum or urine. Plasma is not recommended for use because osmotically active substances may be introduced into the specimen from the anticoagulant.

104. Ellectrophoretic mobility of lipoproteins from the least anodal to the most.
a. Chylomicrons > LDL > VLDL > HDL
b. HDL>LDL>VLDL>Chylomicrons
c. VLDL>LDL>HDL>Chylomicrons
d. Chylomicrons > HDL > HDL >VLDL>LDL

105. Which plasma electrolyte has the most narrow reference range and is most regulated by the body?
A. Sodium
B. Potassium
C. Magnesium
D. Calcium
E. Chloride

The K^+ concentration has a major effect in the contraction of skeletal and cardiac muscles. An elevated K^+ level decreases the resting membrane potential of the cell, which decreases the net difference between the cell's resting potential and threshold (action) potential. The difference increases cell excitability, leading to muscle weakness.

106. Which of the following is NOT a minor lipoprotein?
a. Lp(a)
b. IDL
c. sinking pre-B lipoprotein
d. B-VLDL

107. The anticoagulant of choice for arterial blood gas measurements is ___ in the __ state.
A. Lithium heparin; Liquid
B. Lithium heparin; dry
C. Sodium citrate; dry
D. Potassium oxalate; liquid

While both dry (lyophilized) and liquid heparin are acceptable anticoagulants, the liquid form is not recommended because excessive amounts can dilute the sample and possibly alter the sample due to equilibration with room air.

108. Which of the following apolipoprotein is an index of antiatherogenic high density lipoprotein?
A. Apo-A1
B. Apo-B-100
C. d. Apo-B-48
D. Apo-C

CLINICAL CHEMISTRY EXAMINATION AND RATIO

109. Which of the following is the most common clinical application of hypertriglyceridemia?
A. Coronary heart disease
B. Diabetes mellitus
C. Pancreatitis
D. Myocardial infarction

Marked increases in triglyceride levels, between 1000 and 2000 mg/dL have been associated with increased risk for the development of pancreatitis.

110. Hypoventilation can compensate for
A. Nonrespiratory acidosis
B. Mixed alkalosis
C. Mixed acidosis
D. Nonrespiratory alkalosis

Primary nonrespiratory alkalosis results from a gain in HCO3-, causing an increase in the nonrespiratory component and pH. The body responds by depressing the respiratory center. The resulting hypoventilation increases retention of CO2.

111. A 24-year old graduate student was brought to the emergency department in a comatose state after being found unconscious in his room. A bottle of secobarbital was there on his bed stand. He did not respond to painful stimuli, his respiration was barely perceptible, and his pulse is weak.
Blood gas results are as follows:
[pH: 7.10; pCO2: 70 mmHg; pO2: 58 mmHg; HCO3-: 20 mmol/L].
What is the patient's acid-base status?

A. Metabolic acidosis
B. Respiratory acidosis
C. Metabolic alkalosis
D. Respiratory alkalosis

Hypoventilation caused by drugs such as barbiturates, morphine and alcohol will increase blood pCO2 levels (N. V. 35-45 mmHg), as well as mechanical asphyxiation leading to respiratory acidosis.

112. The core of lipoproteins are mostly composed of
A. Hydrophilic compounds
B. Hydrophobic compounds
C. Amphipathic molecules
D. Amphoteric substances

113. A patient's arterial blood gas results are as follows: [pH: 7.37; pCO2: 75 mmHg; HCO3-: 37 mmol/L]. These values are consistent with:

A. Compensated nonrespiratory acidosis
B. Compensated respiratory acidosis
C. Uncompensated respiratory alkalosis
D. Uncompensated nonrespiratory alkalosis

Respiratory acidosis results from a decrease in alveolar ventilation, causing decreased elimination of CO2 by the lungs (increased pCO2; N. V. 35-45 mmHg). The compensation occurs through nonrespiratory process. The kidneys increase the retention of H+ and increase the formation of HCO3-. When the HCO3 in the blood (N. V. 22-26 mmol/L) increases, the base-to-acid ratio will be altered and the pH will return normal, thus the compensated state.

114. At pH8.6, proteins are _____ charged and migrate toward the _____
a. positively, cathode
b. positively, anode
c. negatively, cathode
d. negatively, anode

115. Which of the following effects results from exposure of a normal arterial blood sample to room air?
A. pO2 increased, pCO2 decreased, pH increased
B. pO2 decreased, pCO2 increased, pH decreased C. pO2 increased, pCO2 decreased, pH decreased D. pO2 decreased, pCO2 decreased, pH decreased

The pO2 of air at sea level (21% O2) is about 150 mmHg. The pCO2 of air is only about 0.3 mmHg. Consequently, blood releases CO2 gas and gains O2 when exposed to air. Loss of CO2 shifts the equilibrium of the bicarbonate buffer system to the right, decreasing hydrogen ion concentration and blood becomes more alkaline.

116. A low____ level is a sensitive marker of poor nutritional status.
A. Transferrin
B. Prealbumin
C. Ceruloplasmin
D. Hemopexin

117. Extreme copper deficiency is seen in what fatal condition?
A. Menkes disease
B. Klinefelter's syndrome
C. Meese disease
D. Kayser-Fleischer rings

An extreme form of copper deficiency is seen in Menkes disease, with symptoms that usually appear at the age of 3 months and death usually occurring at age 5.

118. The solubility of proteins is highly dependent on which of the following?
A. Charge of the protein
B. Activity of the electrolytes surrounding the protein
C. concentration of solutes in the solution
D. concentration of free water available in the solution

119. Which trace metal is contained in glucose tolerance factor?
A. Chromium
B. Copper
C. Selenium
D. Zinc

Chromium is an essential dietary element and plays a role in maintaining normal metabolism of glucose, fat and cholesterol. Deficiency is characterized by glucose intolerance, glycosuria, hypercholesterolemia, decreased longevity, decreased sperm counts, and impaired fertility.

120. LOW LEVELS of maternal AFP indicate an increased risk for:
a. Anencephaly
b. Down syndrome
c. Spina bifida
d. Presence of twins

121. The definitive suppression test to prove autonomous production of growth hormone is
A. Oral glucose loading
B. Somatostatin infusion
C. Estrogen priming
D. Dexamethasone suppression

Definitive testing for determining the autonomous production of GH relies upon the normal suppressibility of GH by oral glucose loading. The test is performed after an overnight fast, and the patient is given 100g oral glucose load. GH is measured at time zero, 60, and 120 minutes after glucose ingestion. Following oral glucose loading, GH levels are undetectable in normal individuals; however, in patients with acromegaly, GH levels fail to suppress and may even paradoxically rise.

122. Characteristic of Wilson's disease except:
A. impaired biliary excretion of copper
B. presence of Kayser-Fleischer rings
C. deposition of copper in various organs
D. increased levels of serum ceruloplasmin

123. Which of the following is said to inhibit prolactin?
A. Serotonin
B. Dopamine
C. Epinephrine
D. Norepinephrine

Dopamine it the only neuroendocrine signal that inhibits prolactin.

124. A common cause of pre-hepatic jaundice is:
A. Obstruction of the common bile duct
B. Cirrhosis
C. hemolytic disorder
D. necrosis

125. The following are glycoproteins, except:
(I) FSH;
(II) HCG;
(III) TSH;
(IV) ACTH;
(V) GH

A. I, II
B. I, II, III
C. III, IV, V
D. IV, V

Glycoproteins: (I) FSH; (II) HCG; (III) TSH; Polypeptides: (IV) ACTH; (V) GH

CLINICAL CHEMISTRY EXAMINATION AND RATIO

126. TRH stimulates the secretion of
A. Prolactin and TSH
B. Prolactin
C. Growth hormone
D. TSH

Hypothalamic hormones may have multiple actions. For example, TRH stimulates the secretion of both TSH and prolactin; GnRH stimulates both LH and FSH production; and somatostatin inhibits GH and TSH release from the pituitary.

127. Urobilinogen is a compound produced by the reduction of bilirubin in the:
A. intestine
B. liver
C. gallbladder
D. Spleen

128. Elevated TJ and T4, decreased TSH
A. Primary hypothyroidism
B. Secondary hypothyroidism
C. Primary hyperthyroidism
D. Secondary hyperthyroidism

Hyperthyroidism is characterized by an excess of circulating thyroid hormone. Both primary and secondary hyperthyroidism have elevated T3 and T4; but TSH is decreased in primary hyperthyroidism and is elevated in secondary hyperthyroidism.

129. Which of the following liver functions prevents shortage of essential nutrients?
A. metabolic function
B. storage function
C. detoxification function
D. synthetic function

130. Secondary hyperthyroidism:
A. Increased T3, T4 and TSH
B. Increased T3, T4; decreased TSH
C. Decreased T3, T4; increased TSH
D. Decreased T3, T4 and TSH

TABLE 11-8
Diagnostic Indicators of Thyroid Disease

Disease	TSH	T_4 (total)	FT_4	T_3
Primary hyperthyroidism	Decreased	Increased	Increased	Increased
Secondary hyperthyroidism	Increased	Increased	Increased	Increased
Primary hypothyroidism	Increased	Decreased	Decreased	Decreased
Secondary hypothyroidism	Decreased	Decreased	Decreased	Decreased

131. The common substrate from which all adrenal steroids are produced:
A. DHEAS
B. Cholesterol
C. Pregnenolone
D. All of the above

Cholesterol is the parent cell of all steroid hormones. Cortical hormones are composed of a basic structure known as Cyclopentanoperhydrophenanthrene (CPPP) ring; a 17-carbon skeleton derived from cholesterol.

132. Purpose of adding caffeine sodium benzoate in the determination of bilirubin
A. to accelerate the reaction with conjugated bilirubin
B. to solubilize diazo reagent
C. to accelerate reaction with unconjugated bilirubin
D. to stabilize the reaction with B1 and B2

133. Best describes Kallmann's syndrome
A. Androgen insensitivity
B. Congenital GnRH Deficiency
C. Lack of germ cells
D. Gynecomastia

Kallmann's syndrome is due to the impaired secretion of GnRH and is the X-linked form of congenital GnRH deficiency. It manifests as hypogonadism during puberty. Certain men also have red-green color blindness, congenital deafness, or cerebellar dysfunction.

134. The protein that is necessary for the conjugation of indirect bilirubin.
A. Albumin
B. Ligandin
C. UDPGT
D. biliverdin reductase

135. Which of the following enzymes is most useful in establishing the hepatic origin of an elevated serum alkaline phosphatase?
A. 5'-nucleotidase
B. ALT
C. AST
D. LOH

5'-Nucleotidase is a phosphatase found in wide variety of cells. Serum levels become significantly elevated in hepatobiliary disease. There is no bone source of SNT, so it is useful in differentiating ALP elevations due to the liver from other conditions where ALP may be increased such as bone diseases, pregnancy, and childhood growth.

136. Which of the following does not belong to the group?
a. B2
b. conjugated bilirubin
c. water insoluble fraction
d. Cholebilirubin

137. Which form of hepatitis is caused by DNA virus?
A. Hepatitis A
B. Hepatitis B
C. Hepatitis C
D. Hepatitis D
E. Hepatitis E

HBV is a DNA virus classified in the Hepadnaviridae family. The rest are caused by RNA viruses.

138. Choose the correct pair
a. ALP: Biliary obstruction
b. AST: Pancreatitis
c. LPS: Salivary lesion
d. GGT: myocardial infarction

AST: for liver/heart/skeletal/muscle disorders
LPS: for pancreatitis
GGT: for alcoholic hepatitis and cirrhosis

139. Which of the following analytes has the highest specificity for cardiac injury?
A. TnI
B. CK-MB mass assays
C. Total CK-MB
D. AST

AST, LO and CK-MB were widely used biomarkers in the diagnosis of myocardial infarction but have been largely replaced by troponin assays. cTnI and TnT assays have high specificity to cardiac tissue and detection methods are sensitive enough to pick up even minor cardiac tissue damage.

140. Cholinesterase activity is _____ in cases of pesticide poisoning
a. Increased
b. Decreased
c. Normal
d. Variable

141. The measurement of serum cystatin C, a small protein produced by all nucleated cells, is useful for
A. Detecting an early decrease in renal function
B. Calculating creatinine clearance
C. Diagnosing end-stage renal disease
D. Monitoring dialysis patients

Cystatin C is a low-molecular-weight protein produced at a steady rate by most body tissues. It is freely filtered by the glomerulus, reabsorbed, and catabolized by the proximal tubule. Levels of cystatin Crise more quickly than creatinine in acute renal failure.

142. A common cause of a falsely increased LD1 fraction of lactic dehydrogenase is:
a. congestive heart failure
b. drug toxicity
c. liver disease
d. specimen hemolysis

143. Creatinine clearance results are corrected using patient's body surface area to account for the difference in
A. Muscle mass
B. Age
C. Dietary intake
D. Sex

Production and excretion of creatinine is related directly to muscle mass; when renal function is normal and stable, creatinine excretion is almost equal to its production, which depends primarily on muscle mass.

CLINICAL CHEMISTRY EXAMINATION AND RATIO

144. Of the following analytical methods, which the most commonly used as the confirmatory method for identification of drugs of abuse?
A. GC with mass spectrophotometry
B. Scanning differential calorimetry
C. Ion-specific electrode
D. Immunoassay
E. Nephelometry

Gas chromatography-Mass spectrometry (GC-MS) is the gold standard for confirmation of screening methods such as thin layer chromatography (TLC) and enzyme mediated immunologic technique (EMIT). It allows detection of low levels of drugs like cocaine and drug metabolites.

145. Which of the following sets of tests would be the most useful in diagnosing an AMI?
a. AST, LD, CK-MB
b. LD, CK-MB, troponin
c. CK-MB, troponin, myoglobin
d. LD, troponin, myoglobin

146. The major clinical use of CA-125 is monitoring treatment response of
A. Ovarian carcinoma
B. Colorectal cancer
C. Prostatic cancer
D. Breast cancer

CA-125 is a tumor marker for ovarian cancer and is clinically utilized in monitoring therapy.

147. Lactate dehydrogenase, malate dehydrogenase, isocitrate dehydrogenase, and hydroxybutyrate dehydrogenase all:
a. catalyze oxidation-reduction reactions
b. are liver enzymes
c. are class III enzymes
d. are cardiac enzymes

148. The term describing patients who are chronically calorie malnourished and lose both adipose and muscle tissue, but who do not demonstrate protein deficiency:
A. Marasmus
B. Kwashiorkor
C. Debilitated
D. None of these

Albumin helps identify chronic protein deficiency under conditions of adequate non-protein-calorie intake, which leads to marked hypoalbuminemia. This may results in net loss of albumin from both extravascular and intravascular pools, causing kwashiorkor. Second, albumin concentrations may help define marasmus, a deficiency of calories with adequate protein status.

149. Which of the following clinical disorders is associated with the greatest elevation of lactate dehydrogenase isoenzyme 1?
A. glomerulonephritis
B. Pancreatitis
C. pernicious anemia
D. Pneumonia

150. What is the ADA recommended cutoff value for adequate control of blood glucose in diabetics as measure by glycated hemoglobin?
A. 5%
B. 6.5%
C. 9.5%
D. 11%

The ADA recommends that 6. 5% be used as the cutoff value for determining the adequacy of treatment for diabetes. A glycated hemoglobin test should be performed at the time of diagnosis and 6 months thereafter if the result is <6. 5%. If the result is more, the treatment plan should be adjusted to achieve a lower level, and the test performed every 3 months until control is improved.

151. When myocardial infarct occurs, the first enzyme to become elevated is:
A. AST
B. ALT
C. CK
D. LD

152. Which of the following is a potential source of error in the hexokinase method?
A. Galactosemia
B. Hemolysis
C. Sample collected in fluoride
D. Ascorbic acid

The hexokinase method can be performed on serum or plasma using heparin, EDTA, citrate, or oxalate. RBCs contain glucose-6-phosphate and intracellular enzymes that generate NADH, causing positive interference. Therefore, hemolyzed sample require serum blank correction.

Given the following results:
ALP: marked increased
AST: slight increased
ALT: slight increased
GGT: marked increased.

This is most consistent with?
a. Acute hepatitis
b. Osteitis fibrosa
c. Chronic hepatitis
d. Obstructive jaundice

153. Urea is produced from
A. The catabolism of proteins and amino acids
B. Oxidation of purines
C. Oxidation of pyrimidines
D. The breakdown of complex carbohydrates

Urea is generated by deamination of amino acids. Most is derived from the hepatic catabolism of proteins. Uric acid is produced from the catabolism of purines. Oxidation of pyrimidines produces orotic acid.

154. Measurement of enzyme activity must be done in what condition?
a. Acidic environment
b. High temperature
c. First order kinetics
d. Zero order kinetics

155. Which of the following stains is used for lipoprotein electrophoresis?
A. Oil Red O
B. Coomassie Brilliant Blue
C. Amido Black
D. Ponceau S

Oil Red O and Sudan Black B stain neutral fats and are used to stain lipoprotein as well as fats in urine and stool. The other stains are used for proteins. Coomassie Brilliant Blue is more sensitive than Ponceau S or Amido Black, and all three stains have slightly greater affinity for albumin than globulins.

156. Catalyze the joining of two molecules
a. Isomerases
b. Ligases
c. Lyases
d. Transferases

157. Select the lipoprotein fraction that carries most of the endogenous triglycerides
A. VLDL
B. LDL
C. HDL
D. Chylomicrons

VLDL migrates in the pre-beta zone. It is about 50% triglyceride, whereas LDL is only 10% triglyceride by weight. Endogenous transport of triglycerides is the function of VLDL. Meanwhile, exogenous transport is done by chylomicrons.

158. Inactive form of thyroid hormone
A. T3
B. T4
C. Tg
D. TSH

159. A procedure for cholesterol is calibrated with a serum-based cholesterol standard that was determined by the Abell-Kendall method to be 200 mg/dL. Assuming the same volume of sample and reagent are used, calculate the cholesterol concentration in the patient's sample from the following results: [Standard concentration: 200 mg/dl; Absorbance of reagent blank: 0.00; Absorbance of standard: 0.860; Absorbance of patient serum: 0.740]

A. 123 mg/dL
B. 172 mg/dL
C. 232 mg/dL
D. 314 mg/dL

Formula used:
Cu = (Au/As) x Cs
where:
Cu= unknown
Au = Absorbance of unknown
Cs = Concentration of standard
Cu = Absorbance of standard
Cu = (Au/As) x Cs
Cu= (0.740 I 0.860) x 200 mg/dL
Cu= 172.0930 - 172 mg/dL

160. Predominant form of thyroid hormone in the circulation
A. T3
B. T4
C. Tg
D. TSH

161. Given a triglyceride value of 200 mgldL. Convert it to mmol/L.
A. 1.13
B. 1.26
C. 2.26
D. 3.13

The conversion factor of triglyceride from mgldL to mmol/L is 0. 0113.
200 mgldL x 0.0113 = 2.26 mmol/L

162. These markers are considered the best indicators of thyroid function:
a. TBG, TSH
b. TSH, T3
c. TSH, T4
d. T3, T4

163. The following are included in the criteria for patient preparation for OGTT:
(I) At least 8 hours of fasting;
(II) No smoking before the test;
(III) Unrestricted diet of 150 grams carbohydrates for 3 days prior;
(IV) No exercising during the test
A. I, II, III
B. I, II, IV
C. 1, 111, IV
D. II, Ill, IV
E. All of the above

The following must be observed before a patient undergoes sample collection for OGTT:
1. Patient is ambulatory
2. 8-14 hours offasting
3. No smoking, drinking and exercising before or during the test
4. Unrestricted diet of at least 150 grams of carbohydrates 3 days prior to the test

164. In newborn screening, what is the confirmatory test in cretinism and the expected result?
FT4
TSH
Elevated
Decreased

a. I, III
b. I, IV
c. II, III
d. II, IV

165. The treatment used for kernicterus
A. Therapeutic phlebotomy
B. Phototherapy
C. Diuretics
D. None of the above

Kernicterus is the deposition of bilirubin in the brain, particularly affecting the basal ganglia causing severe motor dysfunction and retardation. It is treated with phototherapy where light oxidizes bilirubin making it readily soluble in water for excretion.

166. Select the main estrogen produced by the ovaries and used to evaluate ovarian function
a. Estriol
b. Estradiol
c. Epiestriol
d. Hydroxyestrone

167. Red cell hemolysate is used in measuring
A. ACP
B. G6PD
C. Glutathione
D. All of the above

Glucose-6-phosphate dehydrogenase maintains NADPH in the reduced form in red blood cells. Red cell hemolysate and serum may be used to measure this enzyme.

168. Which of the following is the most potent androgen?
a. Androstenedione
b. Dehydroepiandrosterone
c. Androsterone
d. Testosterone

169. The analyte omittable in the anion gap formula
A. Na+
B. K+
C. Cl-
D. HCO3-

K+ may be omitted from the formula since its concentration is typically quite low. Omission usually does not affect the outcome of the calculations.

170. Primary glucocorticoid synthesized by the adrenal gland
a. Aldosterone
b. DHEA
c. Epinephrine
d. cortisol

171. Zimmerman reaction with a red-purple color indicates a sample is positive for
A. 17-hydroxycorticosteroid
B. 17-ketogenic steroids
C. 21-hydroxylase
D. None of the above

17-hydroxycorticosteroid is tested using the Porter-Silber method and presents a yellow color when positive. Meanwhile, 17-ketogenic steroids are tested using Zimmerman reaction with red-purple color as its positive result.
21-hydroxylase is a P450 enzyme involved in the biosynthesis of steroid hormones aldosterone and cortisol.

172. Which of the following is a mineralocorticoid
a. Cortisol
b. DHEA
c. Androstenedione
d. Aldosterone

173. Best describes first-pass mechanism
A. All blood from the GIT is routed to the liver before it enters the general circulation
B. Blood is first oxygenated in the lungs before distribution to the different body systems
C. Intravenous administration of drugs is associated to 100% bioavailability
D. Drugs transported to the liver has lesser bio-available fraction

First pass hepatic metabolism entails that when a drug is absorbed through the GIT and is transported to the liver, it loses a fraction of its bioavailability before it reaches the general circulation.

174. The anterior pituitary produces all of the following hormones, except:
a. ACTH
b. FSH
c. ADH
d. TSH

175. Which of the following best describes the action of parathyroid hormone?
a. PTH increases calcium and phosphorous reabsorption in the kidney
b. PTH decreases calcium and phosphorous release from bone
c. PTH decreases calcium and increases phosphorus reabsorption in the liver
d. PTH increases calcium reabsorption and decreases phosphorous reabsorption in the kidney

176. The major metabolite of epinephrine
A. MHPG
B.VMA
C. HVA
D. DHEA

RATIO The major metabolite of norepinephrine is 3-methoxy-4-hydroxyphenylglycol (MHPG). Meanwhile, the major metabolite of epinephrine is vanillylmandelic acid (VMA). Homovanillic acid (HVA) is the major metabolite of dopamine.

177. Which of the following is the primary metabolite of cocaine?
A. Benzoylecgonine
B. Norcocaine
C. P-hydroxycocaine
D. P-hydroxybenzoylecgonine

CLINICAL CHEMISTRY EXAMINATION AND RATIO

178. Deficiency in beta-carotene, a fat-soluble vitamin, may lead to
A. Rickets
B. Night blindness
C. Pellagra
D. Beri-beri

Beta-carotene or vitamin A deficiency may lead to night blindness. Rickets is caused by a deficiency in vitamin D; pellagra by deficient vitamin 83; and beri-beri by deficient vitamin B1.

179. Benzoylecgonine is detectable in which of the following samples for 72 hours following single use.
a. Urine
b. Serum
c. Whole blood
d. Nasal swab

180. Bilirubin is transported from the reticuloendothelial cells to the liver by:
A. Albumin
B. Bilirubin-binding globulin
C. Haptoglobin
D. Transferrin

Albumin transports bilirubin, haptoglobin transports free hemoglobin, and transferrin transports ferric iron. When albumin binding is exceeded, unbound bilirubin, called free bilirubin, increases. This may cross the blood-brain barrier resulting to kernicterus.

181. Lead poisoning can be tested using the following analytical methods, except:
a. Liquid chromatography
b. Free erythrocyte protoporphyrin (FEP)
c. Urinary delta-aminolevulinic acid (ALA)
d. atomic absorption spectrophotometry

182. How many milliliters of glacial acetic acid are needed to prepare 5.0 l of 12.0% v/v acetic acid?
A. 1000 ml
B. 800 ml
C. 600 ml
D. 400 ml
E. 100 ml

The expression percent v/v refers to the volume of one liquid in mL present in 100.0 mL of solution. To calculate, simply multiply the percentage (as mL) by the volume require (mL), then divide by 100 (mL).
(12.0 mL x 5000 mL) 1 100 mL = 600 mL

183. Which of the following enzymes is activated by calcium ions?
a. CK
b. Amylase
c. ALP
d. LD

184. The following are the routes of exposure of poisons EXCEPT
a. Inhalation
b. Ingestion
c. Subcutaneous injection
d. Transdermal injection

185. Which of the following enzymes is common to all enzymatic methods for triglyceride measurement?
a. Glycerol phosphate oxidase
b. Glycerol phosphate dehydrogenase
c. Glycerol kinase
d. Pyruvate kinase

186. Which of the following characterizes respiratory acidosis?
a. Excess bicarbonate
b. Deficit in bicarbonate
c. excess in dissolved carbon dioxide
d. deficit in dissolved carbon dioxide

187. Which enzyme is measured in whole blood?
a. Chymotrypsin
b. G6PD
c. Glycogen phosphorylase
d. Lipase

188. Which preservative is used for therapeutic drug monitoring?
a. EDTA
b. Sodium Fluoride
c. Citrate
d. Heparin

189. Which specimen is the sample of choice for lead screening?
a. Whole blood
b. Hair
c. Serum
d. Urine

190. For patients with hyperventilation as a result of severe anxiety, which of the following is likely to be present?
a. Metabolic acidosis
b. Respiratory acidosis
c. Metabolic alkalosis
d. Respiratory alkalosis

191. The description "floating beta-lipoprotein" refers to:
a. HDL
b. VLDL
c. B-LDL
d. B-VLDL

192. Salicylate assay is usually done if toxicity is suspected of:
a. Aspirin
b. Vancomycin
c. Ibuprofen
d. Acetaminophen

193. The lipoprotein that transports exogenous triglycerides
a. HDL
b. LDL
c. VLDL
d. Chylomicrons

194. Which blood gas parameter is measured amperometrically?
a. pH
b. pCO2
c. pO2
d. HCO3-

195. Which NPN fraction constitutes nearly half of the NPN substances in the blood?
a. Urea
b. Creatine
c. Ammonia
d. Uric acid

196. In pesticide poisoning, cholinesterase activity is
a. Normal
b. Decreased
c. Increased
d. Variable

197. Chemical modification of drug by cells?
a. Liberation
b. Absorption
c. Distribution
d. Metabolism

198. Substrate exhibiting high specificity for ACP:
a. Beta-glycerophosphate
b. Phenylphosphate
c. Thymolphthalein phosphate
d. Alpha-naphthylphosphate

199. Subacute thyroiditis will lead to
a. Hypothyroidism
b. Hyperthyroidism
c. Both a and b
d. NOTA

200. In cirrhosis, a predominant characteristic observed in electrophoretic serum pattern is:
a. Increase in α2-globulins
b. Bridging effect between beta and gamma globulin fraction
c. Monoclonal band in gamma globulin region
d. Polyclonal band in gamma globulin region

201. Largest concentration of thyroid hormone is bound to
a. Albumin
b. Prealbumin
c. Globulin
d. Free thyroid hormone

202. Which trace metal is contained in glucose tolerance factor?
a. Chromium
b. Copper
c. Selenium
d. Zinc

CLINICAL CHEMISTRY EXAMINATION AND RATIO

203. What is the effect of increase ADH and Aldosterone
a. Increase BP
b. Decrease BP
c. No effect on BP
d. Bradycardia

204. Increased intravascular hemolysis is indicated by a decrease in
a. Haptoglobin
b. Methemoglobin
c. Albumin
d. Hemopexin

205. What is the effect of increase glucose metabolism to pH?
a. Increase
b. Decrease
c. Not affected
d. Erroneous decrease

206. Of the following thyroid hormones, which is considered the most biologically active?
a. T3 bound to TBG
b. T4 bound to TBG
c. Free T4
d. Free T3

207. In HH, 0.03 is
a. The conversion factor of pCO2 dissolved in plasma at 37°C
b. The conversion factor of H2CO3 in plasma
c. The conversion factor of HCO3 - in plasma
d. A variable

208. Which of the following analytes has the highest specificity for cardiac injury?
a. TnI
b. CK-MB mass assays
c. Total CK-MB
d. AST

209. What is buffer
a. A system that changes pH
b. HCO3 - and H2CO3
c. A system that resists pH changes
d. Regulated only by kidneys and lungs

210. which of the following cardiac markers is the most useful indicator of congestive heart failure?
a. BNP
b. TnI
c. CK-MB
d. Glycogen phosphorylase isoenzyme BB

211. Compute for anion gap:
Na+ = 141 mmol/L
K + = 5 mmol/L
HCO-3 = 22 mmol/L
Cl- = 103 mmol/L

a. Low albumin
b. Bromide intoxication
c. Hypercalcemia
d. Lactic acidosis

212. The sample of choice for measuring blood osmolality is:
a. Serum
b. Plasma
c. Whole blood
d. Serum or plasma may both be used

213. Hyperkalemia, asymptomatic at >10 mmol/L, leads to
a. Arrythmia
b. Cardiac arrest
c. Tachycardia
d. Renal failure

214. Acromegaly is caused by:
a. Overproduction of growth hormone
b. Deficiency in growth hormone
c. Galactorrhea
d. Stimulation by GnRH

215. Diabetes insipidus causes hypernatremia due to
a. Decreased water intake
b. Increase water loss
c. Increase water intake
d. Increase Na+ intake

216. Select the most appropriate single screening test for thyroid disease.
a. FTI
b. TSH
c. Total T3
d. Total T4

217. This electrolyte is decreased in T cell immunodeficiency
a. Mg^{2+}
b. Ca^{2+}
c. Zn^{2+}
d. Fe^{2+}

218. Which isoenzyme of ALP is most heat stable?
a. Bone
b. Liver
c. Intestinal
d. Placental

219. The ff. will increase in hepatitis except
a. AST
b. ALT
c. GGT
d. CKMM

220. This is the reference method for quantitation of lipoproteins
a. Chemical precipitation
b. Ultracentrifugation
c. Electrophoresis 7
d. Abell, Levy, and Brodie method

221. Describe the ff. reaction: Lactate + NAD→ (LD)→ Pyruvate + NADH
a. Wacker
b. Wrobleuski La due
c. Forward reaction
d. Reverse reaction

222. Type I and V hyperlipoproteinemia are characterized by large increase in:
a. Chylomicrons
b. LDL
c. VLDL
d. HDL

223. It converts methanol and ethylene glycol
a. LD5
b. LD4
c. LD6
d. LD2

224. What is the standard glucose load for OGTT procedure?
a. 75 g
b. 150 g
c. 50 g
d. 100 g

225. Highest elevation of transaminases
a. Chronic hepatitis
b. Cirrhosis
c. Acute hepatitis
d. AOTA

226. nonprotein molecule, may be necessary for enzyme activity, that must bind to particular enzymes before a reaction occurs
a. Cofactors
b. Holoenzyme
c. Isoenzyme
d. Ligand

227. For every 1% change in the HbA1c value, ___ mg/dL is added to plasma glucose.
a. 15
b. 25
c. 35
d. 50

228. In uricase method, increase uric acid occurs in
a. Increase absorbance at 293 nm
b. Decrease absorbance at 293 nm
c. Production of allantoin which increase absorbance at 293 nm
d. Production of allantoin which decrease transmittance at 293nm

229. The diacetyl monoxime method measures:
a. Urea nitrogen only
b. Urea nitrogen and ammonia
c. Urea nitrogen and amino acids
d. Urea nitrogen and peptide bonds

CLINICAL CHEMISTRY EXAMINATION AND RATIO

230. Positive color for Jaffe reaction?
a. Blue
b. White
c. red tautomer
d. Orange

231. Which of the following is the primary mechanism for ADH release?
a. Hypovolemia
b. Hyperosmolar plasma
c. Renin release
d. Reduced renal blood flow

232. Which among the ff. tumor markers are oncofetal antigen
a. AFP and CEA
b. HCG and AFP
c. CYFRA and CA 153
d. CA 125 and CA 19-9

233. Hyperaldosteronism will cause _____ serum sodium and _____ serum potassium levels.
a. Increased; Decreased
b. Increased; Increased
c. Decreased; Increased
d. Decreased; Decreased

234. True about ammonia, except
a. Deamination product of amino acid
b. A neurotoxic
c. Increase in hepatic failure
d. NOTA

235. When measuring K^+ using ISE, what antibiotic will be incorporated into the membrane?
a. Vancomycin
b. Streptomycin
c. Valinomycin
d. Nonactin

236. Bilirubin is separated by HPLC to ___ fractions
a. 1
b. 2
c. 3
d. 4

237. Nephelometry is based on the measurement of light that is:
a. Blocked by particles in suspension
b. Scattered by particles in suspension
c. Produced by fluorescence
d. Produced by excitation of ground state atoms

238. A promising marker in the diagnosis of perilymphatic fluid fistula
a. CTX
b. B2 microglobulin
c. BTP
d. Adiponectin

239. With lesser degree of heart injury, Myoglobin is _____, CKMB is _____, and Troponin I is _____
a. All increased
b. Normal, increased, increased
c. Normal, normal, increased
d. Increased, normal, increased

240. Select the coupling enzyme used in the hexokinase method for glucose
a. Glucose-6-phosphate dehydrogenase
b. Peroxidase
c. Glucose dehydrogenase
d. Glucose-6-phosphatase

241. The ff. leads to Low A/G ratio
a. Severe liver disease, multiple myeloma
b. Hepatic cirrhosis, nephrotic syndrome, multiple myeloma, maldigestion
c. Nephrotic syndrome
d. Hepatic cirrhosis and nephrotic

242. Which of the following is the reference method for measuring serum glucose?
a. Somogyi-Nelson
b. Hexokinase
c. Glucose oxidase
d. Glucose dehydrogenase

243. This is not measured in standard electrophoresis?
a. Fibrinogen
b. Antibodies
c. AAT
d. NOTA

244. Which of the following results falls within the diagnostic criteria for diabetes mellitus?
a. Fasting plasma glucose of 120 mg/dL
b. Two-hour postprandial plasma glucose of 160 mg/dL
c. Two-hour plasma glucose of 180 mg/dL following a 75 g oral glucose challenge
d. Random plasma glucose of 250 mg/dL and presence of symptoms

245. Most widely used methods for determining albumin
a. Dye binding
b. Electrophoretic
c. Reagent strip: Sorensen
d. Reagent strip: Immunochromatographic

246. Elevation of serum amylase and lipase is commonly seen in
a. Acute pancreatitis
b. Acute appendicitis
c. Gallbladder disease
d. Acid reflux disease

247. Method for LDL-C determination
a. Enzymatic
b. Chemical
c. Chromatographic
d. Mathematical

248. A blood alcohol level of 0.35-0.50% is associated with:
a. Unable to stand/walk, vomiting, and impaired consciousness
b. Decreased inhibitions, loss of critical judgment, memory impairment and decreased reaction time
c. Coma and possible death
d. Mild, euphoria, decreased inhibitions, and some impairment of motor skills

249. The order of lipoprotein with the most cholesterol content to the least
a. LDL, VLDL, HDL, CHY
b. LDL, CHY, VLDL, HDL
c. LDL, VLDL, CHY, HDL
d. CHY, HDL, VLDL, LDL

250. Glassware and pipets are calibrated at a temperature of ___'C as inscribed in the apparatus.
a. 20'C
b. 22'C
c. 37'C
d. 4'C

251. In hexokinase test, what final product is being measured?
a. $NADP^+$
b. NADPH
c. 6 – phosphogluconate
d. H^+

252. This increases in diabetic ketoacidosis?
a. Acetoacetic acid
b. Acetone
c. B-hydroxybutyrate
d. AOTA

253. When a reaction is performed in zero-order kinetics
a. The rate of the reaction is independent of the substrate concentration
b. The substrate concentration is very low
c. The rate of reaction is directly proportional to the substrate concentration
d. The enzyme level is always high

254. A single control exceeds +2S, what is the initial action to do?
a. Ignore
b. Check for other violation
c. Report, no violation
d. Reject

CLINICAL CHEMISTRY EXAMINATION AND RATIO

255. Ammonia concentrations are usually measured to evaluate:
a. Acid-base status
b. Glomerular filtration
c. Hepatic encephalopathy
d. Renal failure

256. In SIX SIGMA process of improvements, it searches for the root causes of inefficiencies in the process
a. Define
b. Measure
c. Analyze
d. Control

257. A complete deficiency of hypoxanthine guanine phosphoribosyl transferase results in an increase of which analyte?
a. Uric acid
b. Urea
c. Creatinine
d. Ammonia

258. What cost is complaints?
a. Cost of conformance: Prevention cost
b. Cost of conformance: appraisal cost
c. Cost of nonconformance: Internal failure cost
d. Cost of nonconformance: external failure cost

259. Prerenal azotemia is caused by
a. Acute renal failure
b. Chronic renal failure
c. Congestive heart failure
d. Urinary tract obstruction

260. ____loss of blood can lead to shock and cardiac arrest among pediatric patient
a. 5%
b. 10%
c. 15%
d. 20%

261. High serum total protein with high levels of both albumin and globulins is usually seen in:
a. Waldenstrom's macroglobulinemia
b. Dehydration
c. Glomerulonephritis
d. Cirrhosis

262. Indicator/s of nerve puncture, except
a. Electric shock
b. Numbness
c. Burning sensation
d. NOTA

263. Nutritional assessment with poor protein-caloric status is associated with:
a. A decreased level of prealbumin
b. A low level of gamma-globulins
c. An elevated ceruloplasmin concentration
d. An increased level of α1-fetoprotein

264. Not for routine chemistry test
a. Green
b. Gray
c. Tiger
d. Lavender

265. The acute phase reactant proteins include all of the following, except:
a. Fibrinogen
b. Haptoglobin
c. Transferrin
d. α1-antitrypsin

266. Enzyme/s that will increase with intramuscular injection
a. CK
b. LD
c. Both a and b
d. NOTA

267. Which of the following types of analyzers offers random-access capabilities?
a. Discrete analyzers
b. Continuous flow analyzers
c. Centrifugal analyzers
d. None of the above

268. What is the dilution if 3 mL of serum is diluted with 5 mL of saline?
a. 0.6
b. 3:5
c. 1.67
d. 0.375

269. Convert 34.8'C to 'F
a. 94.7
b. 105.2
c. 34.8
d. 72.3

270. Control sample that is chemically & physically similar to unknown specimen & is tested in exactly the same manner, it monitors _____ of test system
a. Accuracy
b. Specificity
c. Sensitivity
d. Precision

271. Which of the following chemistry analyzers uses "slides" to contain the entire reagent system?
a. Vitros
b. ACA
c. Paramax
d. Coulter

272. For each osmole, freezing point is lowered by
a. -1 °C
b. -1.86 °C
c. -1.20 °C
d. -1.76 °C

273. Which of these substances cannot be preserved by freezing?
a. BUN
b. CK
c. LDH
d. ACP

274. Unit name for "AMOUNT OF SUBSTANCE"
a. Mole
b. mmol
c. umol
d. mg/dl

275. STAT laboratory analyses should be reported to the ordering physician within:
a. 30 minutes to 1 hour
b. 10 to 20 minutes
c. 1 to 2 hours
d. 3 hours

276. Orientation, training, and continuing education
a. Work practice control
b. Engineering control
c. PPE
d. Emergency equipment

277. The purpose of the glass coils in a continuous flow system is to:
a. Provide proper mixing
b. Prevent carry-over of sample
c. Allow visual inspection
d. Allow close packing of tubing

278. The VLDL fraction primarily transports what substance?
A. Cholesterol
B. Chylomicron
C. Triglyceride
D. Phospholipid

279. Ingestion of which of the following drugs may cause hypoglycemia?
A. Ethanol
B. Propranolol
C. Salicylate
D. All the above

280. When mixed with phosphotungstic acid, what compound causes the reduction of the former to a tungsten blue complex?
A. Urea
B. Ammonia
C. Creatinine
D. Uric acid

CLINICAL CHEMISTRY EXAMINATION AND RATIO

281. The standing plasma test is used to detect
a. Protein
b. Chylomicrons
c. Glucose
d. LDL

282. Which of the following is not associated with silver stains?
A. Reactive to nanogram concentrations of proteins
B. Polypeptides stain a variety of colors
C. Not as sensitive as Coomassie brilliant blue
D. Preconcentration of CSF not necessary

283. A post-prandial blood sugar sample is taken:
a. At any time after intake of food
b. 2 hours after intake of food
c. After 8 hours of fasting
d. 1 hour after intake of food

284. Which of the following techniques is more commonly used to measure vitamins?
A. High-performance liquid chromatography
B. Spectrophotometry
C. Nephelometry
D. Microbiological

285. Hypokalemia may be caused by each of the following, except:
a. Acidosis
b. Prolonged vomiting or diarrhea
c. Hypomagnesemia
d. Hyperaldosteronism

286. Heroin is synthesized from what drug?
A. Diazepam
B. Morphine
C. Ecgonine
D. Chlorpromazine

287. A hemolyzed sample will cause falsely increased levels of each of the following, except:
a. Potassium
b. Sodium
c. Phosphate
d. Magnesium

288. Which of the following compounds is not a precursor of the estrogens?
A. Progesterone
B. Testosterone
C. Cholesterol
D. Aldosterone

289. The normal ratio of carbonic acid to bicarbonate in arterial blood is:
a. 7.4:6.1
b. 20:1
c. 0.0003:1.39
d. 1:20

290. In order to maintain electrical neutrality in the red blood cell, bicarbonate leaves the red blood cell and enters the plasma through an exchange mechanism with what electrolyte?
A. Sodium
B. Potassium
C. Chloride
D. Phosphate

291. Which of the following is the primary mechanism of compensation for metabolic acidosis?
a. Hyperventilation
b. Hypoventilation
c. Aldosterone release
d. Bicarbonate excretion

292. Which of the following is a spectrophotometric method for quantifying serum chloride?
A. Ferric perchlorate
B. Ammonium molybdate
C. Bathophenanthroline
D. Cresolphthalein complexone

293. The major carrier protein of T3 and T4 in the circulation is:
a. Albumin
b. Thyroglobulin
c. TBG
d. Prealbumin

294. Which compounds originally condense to form aminolevulinic acid?
A. Oxoglutarate and aspartate
B. Isocitrate and coenzyme II
C. Oxalacetate and malate
D. Succinyl coenzyme A and glycine

295. All of the following are correct matches, except:
a. Peptide: Insulin, TSH, FSH
b. Steroid: T4, T3
c. Amino acids: Norepinephrine, Epinephrine
d. Fatty acids: Prostaglandins

296. When measuring enzyme activity, if the instrument is operating 5°C lower than the temperature prescribed for the method, how will the results be affected?
A. Lower than expected
B. Higher than expected
C. Varied, showing no particular pattern
D. All will be clinically abnormal.

297. The assay employed for 17-ketosteroids, in which steroids react with m-dinitrobenzene in alcoholic KOH solution resulting to the formation of a purple color:
a. Kober reaction
b. Zimmerman reaction
c. Porter-Silber method
d. Pisano method

298. The turbid, or milky, appearance of serum after fat ingestion is termed postprandial lipemia, which is caused by the presence of what substance?
A. Bilirubin
B. Cholesterol
C. Chylomicron
D. Phospholipid

299. Which of the following polypeptide hormones may be described as having alpha chains that are biochemically identical but beta chains that are biochemically unique?
a. FSH, TSH, ACTH, TRH
b. LH, ACTH, HCG, TRH
c. TSH, LH, TRH, HCG
d. HCG, FSH, TSH, LH

300. Which of the following carbohydrates is a polysaccharide?
A. Starch
B. Sucrose
C. Lactose
D. Glucose

301. A marked increase in 5-HIAA excretion occurs in patients with:
a. Argentaffinoma
b. Pheochromocytoma
c. Diabetes insipidus
d. Diabetes mellitus

302. When it is not possible to perform a creatinine assay on a fresh urine specimen, to what pH level should the urine be adjusted?
A. 3.0
B. 5.0
C. 7.0
D. 9.0

303. Cocaine is metabolized to:
a. Carbamazepine
b. Codeine
c. Hydrocodone
d. Benzoylecgonine

304. In what condition would an increased level of serum albumin be expected?
A. Malnutrition
B. Acute inflammation
C. Dehydration
D. Renal disease

305. The medication of choice for treatment of manic-depression is:
a. Carbamazepine
b. Lithium carbonate
c. Phenobarbital
d. Phenytoin

CLINICAL CHEMISTRY EXAMINATION AND RATIO

306. In spectrophotometric analysis, what is the purpose of the reagent blank?
A. Correct for interfering chromogens
B. Correct for lipemia
C. Correct for protein
D. Correct for color contribution of the reagents

307. Caffeine is an important metabolite of this drug:
a. Acetaminophen
b. Digoxin
c. Theophylline
d. Phenobarbital

308. Which vitamin is a constituent of two redox coenzymes?
A. Vitamin A
B. Vitamin B2
C. Vitamin B6
D. Vitamin C

309. What is the confirmatory method for measuring drugs of abuse?
a. HPLC
b. EMIT
c. GC-MS
d. TLC

310. Of the following specimens, which would be appropriate for determining exposure to lead?
A. EDTA plasma
B. Serum
C. Whole blood
D. Cerebrospinal fluid

311. Plasma renin activity (PRA) measurements are usually made by measuring which of the following using immunoassay?
A. Angiotensinogen
B. Angiotensin I
C. Angiotensin II
D. Angiotensin-converting enzyme

312. Which of the following components is not needed in a chemiluminescent immunoassay analyzer?
a. Source lamp
b. Monochromator
c. Photodetector
d. Wash station

313. What is the term that describes the sum of carbonic acid and bicarbonate in plasma?
A. Total CO2
B. Standard bicarbonate
C. Buffer base
D. Base excess

314. Which instrument requires a primary and secondary monochromator?
a. Spectrophotometer
b. Atomic absorption spectrophotometer
c. Fluorometer
d. Nephelometer

315. What is the normal renal threshold of sodium (measured in millimoles per liter)?
A. 80-85
B. 90-110
C. 110-130
D. 135-148

316. The reagent blank corrects for absorbance caused by:
a. The color of reagents
b. Sample turbidity
c. Bilirubin and hemolysis
d. All of the above

317. What is the immediate precursor of bilirubin formation?
A. Mesobilirubinogen
B. Verdohemoglobin
C. Urobilinogen
D. Biliverdin

318. Which of the following light sources is used in atomic absorption spectrophotometry?
a. Laser
b. Tungsten light
c. Deuterium lamp
d. Hollow cathode lamp

319. To what class of enzymes does lactate dehydrogenase belong?
A. Isomerases
B. Ligases
C. Oxidoreductases
D. Transferases

320. In absorption spectrophotometry:
a. Absorbance is directly proportional to transmittance
b. Percent transmittance is directly proportional to concentration
c. Percent transmittance is directly proportional to the light path length
d. Absorbance is directly proportional to concentration

321. What compound is a crucial intermediary in the metabolism of triglyceride to form energy?
A. Bile
B. Acetyl-coenzyme A
C. Acetoacetate
D. Pyruvate

322. CK, AST, and ALT are examples of what type of enzymes?
a. Hydrolases
b. Kinases
c. Isomerases
d. Oxidoreductases

333. What is the glucose concentration in fasting whole blood?
A. Less than the concentration in plasma or serum
B. Greater than the concentration in plasma or serum
C. Equal to the concentration in plasma or serum
D. Meaningless because it is not stable

334. Which of the following conditions will elevate ionized calcium?
a. Diabetes mellitus
b. Hyperlipidemia
c. Acidosis
d. Alkalosis

335. What endogenous substance may cause a positive interference in the urease/glutamate dehydrogenase assay?
A. Ammonia
B. Creatinine
C. Glucose
D. Cholesterol

336. Which of the following electrolytes is the chief plasma cation whose main function is maintaining osmotic pressure?
a. Chloride
b. Potassium
c. Sodium
d. Bicarbonate

337. Proteins, carbohydrates, and lipids are the three major biochemical compounds of human metabolism. What is the element that distinguishes proteins from carbohydrate and lipid compounds?
A. Carbon
B. Hydrogen
C. Oxygen
D. Nitrogen

338. Which of the following hormones involved in calcium regulation acts by decreasing both calcium and phosphorus?
a. PTH
b. Calcitonin
c. Vitamin D
d. Cortisol

339. Which of the following lamps provides a continuous spectrum of radiant energy in the visible, near IR, and near UV regions of the spectrum?
A. Tungsten-filament
B. Hydrogen
C. Deuterium
D. Mercury vapor

340. Which of the following is most likely to produce an elevated plasma potassium result?
a. Hypoparathyroidism
b. Cushing's syndrome
c. Diarrhea
d. Hemolysis

CLINICAL CHEMISTRY EXAMINATION AND RATIO

341. In which of the following conditions is PSA least likely to be increased?
A. Precancerous lesions of the prostate
B. Postprostate biopsy
C. Benign prostatic hypertrophy
D. Post–digital rectal examination

342. A nurse calls the laboratory technologist on duty asking about blood collection for the analysis of enzymes (AST, ALP, ALT, GGT, CK).
Which of the following tubes would you suggest the technologist collect?
a. Red top
b. EDTA
c. Oxalate
d. Fluoride

343. Drugs rapidly infused intravenously usually follow which elimination model?
A. One compartment, first order
B. One compartment, logarithmic
C. Biphasic or two compartment with serum level rapidly falling in the first phase
D. Michaelis–Menton or concentration dependent elimination

344. Which of the following conditions can "physiologically" elevate serum ALP?
a. Hyperparathyroidism
b. Diabetes
c. Third-trimester pregnancy
d. Nephrotic syndrome

345. Which of the following statements regarding adrenal cortical dysfunction is true?
A. Patients with Cushing's syndrome usually have hyperkalemia
B. Cushing's syndrome is associated with glucose intolerance
C. Addison's disease is associated with hypernatremia
D. Addison's disease is caused by elevated levels of cortisol

346. Which of the following statements regarding CK is true?
a. Levels are unaffected by strenuous exercise
b. Levels are unaffected by repeated intramuscular injections
c. Highest levels are seen in Duchenne's muscular dystrophy
d. The enzyme is highly specific for heart injury

347. In the Oliver–Rosalki method for CK, adenosine monophosphate (AMP) is added to the substrate in order to:
A. Inhibit adenylate kinase
B. Block the oxidation of glutathione
C. Increase the amount of ADP that is available
D. Block the action of adenosine pentaphosphate

348. Which of the following enzymes catalyzes the conversion of PNPP to a colored p-nitrophenol product?
a. AST
b. ALT
c. ALP
d. GGT

349. Which of the following proteins migrates in the β region at pH 8.6?
A. Haptoglobin
B. Orosomucoprotein
C. Antichymotrypsin
D. Transferrin

350. The most commonly used challenge test to assist in evaluating a potential growth hormone deficiency is the:
a. Insulin challenge test
b. Dexamethasone suppression test
c. Oral glucose tolerance test
d. Captopril suppression test

351. Creatinine is considered the substance of choice to measure endogenous renal clearance because:
A. The rate of formation per day is independent of body size
B. It is completely filtered by the glomeruli
C. Plasma levels are highly dependent upon diet
D. Clearance is the same for both men and women

352. A TRH stimulation test is performed, and a flat response is received from this test procedure. This most likely indicates:
a. Secondary hypothyroidism
b. Tertiary hypothyroidism
c. Primary hypothyroidism
d. Secondary hyperthyroidism

353. Which statement regarding measurement of Hgb A1c is true?
A. Levels do not need to be done fasting
B. Both the labile and stable Hgb A1c fractions are measured
C. Samples should be measured within 2 hours of collection
D. The assay must be done by chromatography

354. A serum thyroid panel reveals an increase in total T4, normal TSH, and a normal fT4.
What is the most likely cause of these results?
a. Increased thyroxine-binding protein
b. Secondary hyperthyroidism
c. Subclinical hypothyroidism
d. Subclinical hyperthyroidism

355. Which of the following materials is best suited for verifying the wavelength calibration of a spectrophotometer?
A. Neutral density filters
B. Potassium dichromate solutions traceable to the National Bureau of Standards reference
C. Wratten filters
D. Holmium oxide glass

356. What is the blood pH when the partial pressure of carbon dioxide is 45 mmHg and the bicarbonate is 28 mmol/L?
a. 7.00
b. 7.11
c. 7.33
d. 7.41

357. Which statement is true regarding the volume distribution (Vd) of a drug?
A. Vd is equal to the peak blood concentration divided by the dose given
B. Vd is the theoretical volume in liters into which the drug distributes
C. The higher the Vd, the lower the dose needed to reach the desired blood level of drug
D. The Vd is the principal determinant

358. To maintain electrical neutrality in the red blood cell, bicarbonate leaves the red blood cell and enters the plasma through an exchange mechanism with which of the following?
a. Sodium
b. Chloride
c. Phosphate
d. Calcium

359. A female with severe excessive pubic and facial hair growth (hirsutism) should be tested for which of the following hormones?
A. Estrogen and progesterone
B. Chorionic gonadotropin
C. Growth hormone
D. Testosterone and dehydroepiandrosterone sulfate

360. Which of the following statements about enzymatic reactions is true?
A. NADH has absorbance maximas at 340 and 366 nm
B. Enzyme concentration must be in excess to achieve zero-order kinetics
C. Rate is proportional to substrate concentration in a zero-order reaction
D. Accumulation of the product increases the reaction rate

361. A patient with emphysema who has fluid accumulation in the alveolar sacs is likely to be in which of the following acid-base clinical states?
a. Respiratory alkalosis
b. Respiratory acidosis
c. Metabolic acidosis
d. Metabolic alkalosis

362. Which of the following is one advantage of high-resolution (HR) agarose electrophoresis over lower current electrophoresis?
A. High-resolution procedures detect monoclonal and oligoclonal bands at a lower concentration
B. A smaller sample volume is used
C. Results are obtained more rapidly
D. Densitometric scanning of HR gels is more accurate

363. Which of the following fractions of bilirubin in high concentrations is associated with kernicterus in newborns?
a. Delta bilirubin
b. Unconjugated bilirubin
c. Conjugated bilirubin
d. Unconjugated and delta bilirubin

CLINICAL CHEMISTRY EXAMINATION AND RATIO

364. Urea is produced from:
A. The catabolism of proteins and amino acids
B. Oxidation of purines
C. Oxidation of pyrimidines
D. The breakdown of complex carbohydrates

365. What is the blood pH when the partial pressure of carbon dioxide (PCO2) is 60 mm Hg and the bicarbonate concentration is 18 mmol/L?
A. 6.89
B. 7.00
C. 7.10
D. 7.30

366. Which of the following analytes is the best indicator of hepatobiliary damage?
a. AST
b. ALT
c. ALP
d. Bilirubin

367. Which formula correctly describes the relationship between absorbance and %T?
A. A = 2 – log %T
B. A = log 1/T
C. A = –log T
D. All of these options

358. Hepatocellular damage may be best assessed by which of the following parameters?
a. Serum AST and ALT levels
b. GGT and ALP
c. Bilirubin, GGT, and ALP
d. Ammonia and urea

369. Which formula is most accurate in predicting plasma osmolality?
a. Na + 2(Cl) + BUN + Glucose
b. 2(Na) + 2(Cl) + Glucose + BUN
c. 2(Na) + Glucose/18 + BUN/2.8
d. 2(BUN) + Glucose/18 + Cl/2.8

370. The red complex developed in the Jaffe method to determine creatinine measurements is a result of the complexing of creatinine with which of the following?
a. Alkaline picrate
b. Diacetyl monoxide
c. Sulfuric acid
d. Sodium hydroxide

371. A plasma glucose result is 100 mg/dL.
The corresponding glucose in whole blood would approximate:
a. 58 mg/dL
b. 87 mg/dL
c. 98 mg/dL
d. 114 mg/dL

372. Which process is promoted by insulin?
a. Glycogenolysis
b. Gluconeogenesis
c. Esterification of cholesterol
d. Uptake of glucose by the cells

373. What is the most appropriate fasting procedure when a lipid study of triglycerides, total cholesterol, HDL, and LDL tests are ordered?
a. 8 hours, nothing but water allowed
b. 10 hours, water, smoking, coffee, tea (no sugar or cream) allowed
c. 12 hours, nothing but water allowed
d. 16 hours, water, smoking, coffee, tea (no sugar or cream) allowed

374. Which of the following apoproteins is inversely related to risk for coronary heart disease and is a surrogate marker for HDL?
a. Apo A-I
b. Apo B
c. Apo B100
d. Apo E

375. A patient sample is assayed for fasting triglycerides and a triglyceride value of 1036 mg/dL. This value is of immediate concern because of its association with which of the following conditions?
a. Coronary heart disease
b. Diabetes
c. Pancreatitis
d. Gout

376. According to NCEP, which lipid or lipoprotein class is more important for therapeutic decision making (diet and medication decisions)?
a. Chylomicrons
b. LDL
c. HDL
d. Cholesterol

377. Which of the following would be most adversely affected by a non-fasting sample?
a. HDL
b. LDL
c. Cholesterol
d. Triglycerides

378. Which of the following is considered a lipid?
a. Chylomicrons
b. LDL
c. Cholesterol
d. HDL

379. The extent to which measurements agree with the true value of the quantity being measured is known as:
a. Acceptable limits
b. Accuracy
c. Precision
d. Reliability

380. Which of the following methods is most useful in order to detect sample misidentification?
a. Cumulative summation
b. Critical limit
c. Delta limit
d. Significant change limit

381. Which of the following statistical tests is used to compare the means of two methods?
a. Student's t-test
b. F-distribution
c. Correlation coefficient (r)
d. Linear regression analysis

382. Which plot will give the earliest indication of a shift or trend?
a. Levy-Jennings
b. Tonks-Youden
c. Cusum
d. Histogram

383. What does the preparation of a LJ QC chart for any single constituent of serum require?
a. Analysis of control serum over a period of 20 consecutive days
b. 20 to 30 analyses of the control serum on 1 day, in one batch
c. Analyses consistently performed by one person
d. Weekly analyses of the control serum for 1 month

384. A trend in QC results is most likely caused by:
a. Deterioration of the reagent
b. Miscalibration of the instrument
c. Improper dilution of standards
d. electronic noise

385. The Lean Six Sigma quality improvement methodology includes all of the following except:
a. Define
b. Measure
c. Analyze
d. Communicate

386. Which of the following conditions is cause for rejecting an analytical run?
a. Two consecutive controls greater than 2s above or below the mean
b. Three consecutive controls greater than 1s above the mean
c. Four controls steadily increasing in value but less than ± 1s from the mean
d. One control above +1s and the other below -1s from the mean

387. Which of the following quality control (QC) rules would be broken 1 out of 20 times by chance alone?
a. 1 2s
b. 2 2s
c. 1 3s
d. 1 4s

388. When referring to quality control results, what parameter usually determines the acceptable range?
a. The 95% confidence interval for the mean
b. The range that includes 50% of the results
c. The central 68% of results
d. The range encompassed by ± standard deviations

CLINICAL CHEMISTRY EXAMINATION AND RATIO

389. Lipolytic product of VLDL catabolism taken up by the liver or converted to LDL
A. Lp(a)
B. B-VLDL
C. IDL
D. Lpx

390. Catalyzes the esterification of cholesterol
A. LCAT
B. LDL-R
C. LDL
D. All of the above

LDL-R
Mediates endocytosis of lipoproteins
LPL
catalyzes hydrolysis of TAG in lipoproteins releasing free fatty acids and glycerol to tissues

391. Aside from HDL, which other lipoprotein is/are Apo A-IV associated with?
A. CM
B. VLDL
C. LDL
D. Both A and B

392. Apo-B 100 is mainly distributed in?
I. LDL
II. VLDL
III. IDL
IV. HDL

A. I only
B. I and II only
C. I, II and III only
D. A. B. I, II, III, IV

393. Which of the following are chemical methods of measuring glucose?
A. Hagedorn Jensen, Folin Wu, Hexokinase
B. Glucose oxidase, Nelson somogyi, Neocuproine
C. O-toluidine, Folin Wu, Nelson somogyi
D. Glucose oxidase, Hexokinase, Glucose dehydrogenase

Copper reduction: Folin Wu, Nelson somogyi, Neocuproine
Ferric reduction: Hagedorn Jensen
Condensation: O-Toluidine
Enzymatic: Glucose oxidase, Hexokinase, Glucose dehydrogenase

394. Which type of method is Nelson Somogyi classified?
A. Condensation
B. Copper reduction
C. Enzymatic
D. Ferric reduction

395. A hyperglycemic hormone which is produced from the adrenal medulla.
A. Cortisol
B. Insulin
C. Epinephrine
D. Glucagon

Glucagon: Pancreas (alpha)
Somatostatin: Pancreas (delta)
Cortisol: adrenal (cortex)
Epinephrine: adrenal (medulla)
ACTH, GH: anterior pituitary
Thyroxine : thyroid
HPL: placenta

396. A type of DM caused by insulin resistance with progressive insulin deficiency.
A. Type I
B. Type II
C. Type III
D. Gestational

Type I
Autoimmune/idiopathic beta cell destruction leading to absolute insulin deficiency
GDM
Glucose intolerance during pregnancy that disappears post-partum

397. In which cases is HbA1c unreliable?
A. Nephrotic syndrome
B. Cushing syndrome
C. Hemolytic disorders
D. Thyroid disease

398. Type 1 DM:
I. Frequency: >90%
II. IAA
III. Diabetic ketoacidosis
IV. Oral hypoglycemic agents

A. I and IV
B. II and III
C. I and III
D. II and IV

399. Reflects glucose concentration over the preceding 1-2 weeks
A. 1, 5 Anhydroglucitol
B. Glycated hemoglobin
C. Fructosamine
D. Whole blood glucose

2-14 days: A. 1, 5 Anhydroglucitol
2-3 months: HBA1c
2-3 weeks: Fructosamine

400. Type of centrifuge which is used to separate layers of different specific gravities
A. Cytocentrifuge
B. Ultracentrifuge
C. Angle head
D. Swinging bucket

Horizontal swinging bucket
tubes attain a horizontal position during spinning and a vertical position when at rest
Fixed/ angle head
tubes are at fixed angle when rotating
Ultracentrifuge
used to separate layers of different specific gravities
Cytocentrifuge
for body fluid cell counts

401. For specific procedures such as chromatography, AAS, immunoassays.
A. Chemically pure grade
B. Analytic Reagent grade
C. Technical grade
D. Ultrapure grade

402. What is the maximum colony count in CFU/ml of Type III reagent water?
A. <10
B. <100
C. <1000
D. Not specified

403. What is the color absorbed at a wavelength of 500 560nm?
A. Green
B. Orange
C. Red
D. A. B. Yellow

404. According to the Beer-Lambert's law, the concentration of a substance is _____ to the logarithm of transmitted light and _____ to the amount of light absorbed.
A. Directly proportional, Inversely proportional
B. Inversely proportional, Directly proportional
C. Directly proportional, Directly proportional
D. Inversely proportional, Inversely proportional

405. Solution containing various analytes with known target values.
A. Control
B. Standard
C. Blank
D. Reagent

406. Analyses are performed on a collection specimens sequentially and each specimen is analyzed for a different selection of tests
A. Parallel analysis
B. Random access analysis
C. Batch analysis
D. Sequential analysis

SEQUENTIAL
Each specimen in a batch enters the analytical process one after another
PARALLEL
All specimens are subjected to a series of analytical process at the same time
BATCH ANALYSIS
Many specimens are grouped in the same analytical session

407. An enzyme-catalyzed chemical reaction produces light emission
A. Crystal scintillation
B. Chemiluminescence
C. Bioluminescence
D. Electrochemiluminescence

408. Component of a spectrophotometer which isolates specific wavelength.
Entrance slit
B. Light source
C. Monochromator
D. Photodetector

LIGHT SOURCE: Provides polychromatic light
ENTRANCE SLIT: Prevents stray light
MONOCHROMATOR: Wavelength selector
EXIT SLIT: Controls the bandpass
CUVETTE: Sample cell
PHOTODETECTOR: Converts transmitted light to electrical energy
READ OUT DEVICE: Displays output

409. Type of centrifuge in which tubes attain a horizontal position during spinning and a vertical position when at rest.
A. Ultracentrifuge
B. Angle-head
C. Cytocentrifuge
D. Swingingbucket

410. What is the design and drainage characteristic of a Serologic pipet?
A. To deliver, Self draining
B. To deliver, Blow-out
C. To contain, Self draining
D. To contain, Blow-out

Pipet: Design and Drainage Characteristic
Volumetric : To deliver, Self draining
Ostwald Folin: To deliver, Blow-out
Serologic: To deliver, Blow-out
Mohr: To deliver, Blow-out

411. What is the design and drainage characteristic of a Volumetric pipet?
A. To deliver, Self draining
B. To deliver, Blow-out
C. To contain, Self draining
D. To contain, Blow-out

412. Which type of plastic material is frequently used as tubing?
A. Teflon
B. Polyvinylchloride
C. Polycarbonate
D. Polypropylene

Autoclave: Non autoclavable
Teflon: Polyethylene
Polypropylene: Polystyrene
Polycarbonate: Polyvinylchloride

413. Which of the ff type of glass material is 6x stronger than borosilicate?
A. Corex
B. Pyrex
C. Vycor
D. Both A and B

414. The following analytes show diurnal variation. Which group increases during morning?
A. Growth hormone, ACP,TSH
B. Cortisol, PTH, ACTH
C. Aldosterone, Iron, Cortisol
D. ACTH, PTH, Cortisol

INCREASE AM: Aldosterone, Iron, Cortisol, ACTH
INCREASE PM: GH, PTH, ACP, TSH

415. Needle gauge used to collect blood from scalp or tiny veins of premature infants
A. 21
B. 23
C. 20
D. 25

416. Flagging and notification of panic values belongs to which phase of laboratory testing?
A. Pre analytical
B. Post analytical
C. Analytical
D. All of the above

417. In the hierarchy of controls, which of the following is the most effective
A. Substitution
B. Administrativecontrols
C. PPE
D. Elimination

Most effective
Elimination
Substitution
Engineering controls

Least effective
PPE

418. Four consecutive control values exceed 1SD from the target value
A. R 4s
B. 8 1s
C. 4 1s
D. 1 3s

419. What is the major cause of trend?
A. Deterioration of reagents
B. Calibration error
C. Maintenance error
D. Temperature fluctuations

420. Abrupt change in the distribution of control values such that they accumulate on one side of the mean for 6consecutivedays.
A. Outliers
B. Shift
C. Trend
D. Errors

421. Random error:
I. Affects accuracy
II. Affects precision
III. Unstable reagent blanks
IV. Voltage fluctuations

A. I and III
B. II and IV
C. I and II
D. III and IV

422. Involves testing blind samples sent periodically by regulatory agencies to participating laboratories.
A. Internal QC
B. External QC
C. Intralab QC
D. Both A and C

Internal QC : DAILY MONITORING
External QC: LONG TERM ACCURACY

423. Ability to produce a series of results that agree closely with each other.
A. Accuracy
B. Precision
C. Reliability
D. Recalibration

RELIABILITY: Ability to maintain accuracy and precision over an extended period of time
ACCURACY: Closeness of the result to the actual value

424. Transporting of specimen for the testing of ammonia requires it to be placed on ice. Which phase of laboratory testing does this belong?
A. Pre analytical
B. Postanalytical
C. Analytical
D. All of the above

425. It is referred to as the proportion of individuals with the disease who have a positive test result.
A. Analytical sensitivity
B. Analytical specificity
C. Diagnostic sensitivity
D. Diagnosticspecificity

CLINICAL CHEMISTRY EXAMINATION AND RATIO

ANALYTICAL SENSITIVITY:
Ability of a method to detect the smallest concentration of an analyte
ANALYTICAL SPECIFICITY
Ability of a method to detect only the analyte of interest
DIAGNOSTIC SENSITIVITY
Proportion of individuals with the disease who have a positive result
DIAGNOSTIC SPECIFICITY
Proportion of individuals with no disease who have a negative result

426. Ability of a method to detect only the analyte of interest
A. Analytical sensitivity
B. Analytical specificity
C. Diagnostic specificity
D. Diagnostic sensitivity

It is usually done by running _2__control materials _2X___a day over a 10 day period.

427. What is the first step in method evaluation?
A. Accuracy study
B. Recovery study
C. Precision study
D. Developmental study

428. In establishing a reference interval, it requires at least_____study in dividuals
A. 20
B. 60
C. 120
D. 140

Referenceinterval issetbasedon the__45%____confidenceinterval

429. In verifying a reference interval it requires at least ____study individuals.
A. 20
B. 60
C. 120
D. 140

Reference Interval is adopted if__<10____ of the subjects fall outside the range.

430. The Coefficient of Variation is the best indicator of:
A. Accuracy
B. Precision
C. Both A and B
D. Neither A nor B

431. Which of the following refers to the most frequently occurring value in a data set?
A. Mean
B. Median
C. Mode
D. Standard deviation

Measure of center
MEAN: Average or arithmetic mean
MEDIAN: midpoint of a data set after the values have been rank ordered

432. TAG levels that shows increased turbidity or lactescence
A. >200mg/dl
B. >300mg/dl
C. 500mg/dl
D. 600mg/dl

>400 mg/dl: TAG level which show Increased turbidity or lactescence

433. Changing from supine to sitting or standing position cause increase levels of:
A. Potassium
B. Calcium
C. Glucose
D. Phosphate

Increase levels: enzyme, albumin, calcium

434. Chronic alcoholism:
A. Hypoglycemia
B. Hyperglycemia
C. Normoglycemia
D. Any of the above

435. How are sleeping patients identified?
A. identified by nurse or relative
B. Identified by an Identification bracelet
C. Awakened and identified in the same manner as conscious in patients
D. No need to identify to prevent disrupting their sleep

436. Transport of drug from the site of administration to the blood.
A. Excretion
B. Liberation
C. Distribution
D. Absorption

LIBERATION: Release of drug
ABSORPTION: Transport of drug from site of admin to the blood
DISTRIBUTION: Delivery of drug to tissue
METABOLISM: Chemical modification of drug by cells
EXCRETION: Drugs and its metabolites are excreted from the body

437. Rapid sodium channel belongs to which class of cardioactive drug
A. Class I
B. Class II
C. Class III
D. Class IV

438. K+ channel blockers belongs to which class of cardio active drug:
A. Class I
B. Class II
C. Class III
D. Class IV

Class I : RAPID SODIUM CHANNEL BLOCKERS
Class II : BETA RECEPTOR BLOCKERS
Class III: K CHANNEL BLOCKERS
Class IV: Ca CHANEL BLOCKERS

439. Used with techniques such as spectrophotometry to zero the instrument before measuring test samples and other blanks.

A. Sample blank
B. Reagent blank
C. Method blank
D. Equipment blank

REAGENT BLANK: Zero the instrument BEFORE measuring test samples
SAMPLE BLANK: Zero the instrument DURING a test procedure

440. Used as a skin cleanser for ethanol testing
A. 70% alcohol
B. 95% alcohol
C. Benzalkonium chloride
D. A and C can be used

441. What is the color of venous blood?
A. dark red
B. Bright red
C. Bluish green
D. dark brown

Arterial blood : BRIGHT RED OXYGENATED
Venous blood: DARK RED, DEOXYGENATED

442. As little as____contamination with____dextrose will increase glucose in a blood sample by 500mg/dl
A. 10%,15%
B. 15%,10%
C. 10%,5%
D. 5%,10%

443. Late local complication:
A. Syncope
B. Serum hepatitis
C. Hemoconcentration
D. Thrombosis

CLINICAL CHEMISTRY EXAMINATION AND RATIO

444. Major end product of protein and amino acid catabolism
A. Ammonia
B. Creatinine
C. Uric acid
D. Urea

CREATININE
Chief product of muscle metabolism
URIC ACID
Major end product of endogenous purine catabolism
AMMONIA
Major end product of amino acid metabolism

445. Arrange the NPN from greatest concentration to least
A. Ammonia, uric acid, creatinine, urea
B. Urea, AA, Creatinine, Creatine
C. Urea, Uric Acid, Amino acid, Ammonia
D. Ammonia, AA, Urea, Creatinine

446. A clinical syndrome comprised of a marked elevation in plasma urea and other nitrogenous waste products, accompanied by acidemia and electrolyte imbalance of renal failure
A. Uremia
B. Azotemia
C. Anemia
D. Glycemia

447. First enzyme to elevate in AMI
A. Myoglobin
B. Troponin
C. CK
D. AST

448. First marker to be detected in AMI
A. Myoglobin
B. Troponin
C. CK
D. AST

449. Arterialized capillary blood is used for measuring:
A. pH
B. pH and p02
C. pH and pCO2
D. ph ,p02 , pCO2

450. All but one are photosensitive analytes
A. Vitamin A
B. Beta carotene
C. Porphyrin
D. Bilirubin

451. Most common non reducing sugar
A. Grape sugar
B. Cane sugar
C. Fruit sugar
D. Milk sugar

452. Most common Glycogen storage disorder
A. Hers
B. Anderson
C. Tarui
D. VonGierke

453. pH: 7.25
pCO2: 43mmHg
TCO2:19mmol/L
A. Respiratory acidosis
B. Respiratory alkalosis
C. Metabolic acidosis
D. Metabolic alkalosis

454. pH: 7.19
pCO2: 49mmHg
TCO2:27mmol/L
A. Respiratory alkalosis
B. Respiratory acidosis
C. Metabolic alkalosis
D. Metabolic acidosis

455. Urine metabolite of serotonin
A. Indican
B. 5HIAA
C. Melatonin
D. Tyrosine

456. Major mineralocoticoid is_____and is found in _____.
A. Cortisol; zona glomerulosa
B. Aldosterone; zona glomerulosa
C. Cortisol; Zona fasciculata
D. Aldosterone; Zona fasciculata

Aldosterone : ZONA GLOMERULOSA
Cortisol: ZONA FASCICULATA
DHEAS: ZONA RETICULARIS

457. Which of the following enzymes catalyzes the conversion of starch to glucose and maltose
A. Lipase
B. Amylase
C. ALT
D. GGT

458. Relationship between wavelength and frequency
A. Direct
B. Inverse
C. Indeterminate
D. Norelationship

459. LASER stands for
A. Light Administration by Stimulated Emission of Radiation
B. Light Amplification by Stimulated Efficiency of Radiation
C. Light Amplification by Stimulated Emission of Radiation
D. Light Administration by Stimulated Efficiency of Radiation

460. Lipids are_____in blood and_____inorganic solvents
A. Soluble,soluble
B. Insoluble,soluble
C. Soluble, insoluble
D. Insoluble, insoluble

461. Activator of LCAT
A. Apo A1
B. Apo B48
C. Apo B100
D. Apo C

462. A prolactin inhibiting factor
A. Dopamine
B. Somaostatin
C. Serotonin
D. Epinephrine

463. Principal iodinated hormone secreted by the thyroid gland
A. 3535tetraiodothyronine
B. Thyroxine
C. T3
D. Both A and B

464. Most potent estrogen
A. Estrone
B. Estradiol
C. Estriol
D. AOTA

E1 ESTRONE: Most abundant in post menopausal women
E2 ESTRADIOL: menopausal women Most abundant in pre menopausal
E3 ESTRIOL: Major estrogen during pregnancy

465. The net effect of calcitonin on the metabolism of Ca^{2+} andphosphorus
A. Decreased Ca and Phosphorus
B. Increased Ca and Phosphorus
C. Decrease Ca and Increased Phosphorus
D. Increase Ca and Decreased Phosphorus

CLINICAL CHEMISTRY EXAMINATION AND RATIO

466. Reverse cholesterol transport
A. HDL
B. LDL
C. VLDL
D. Chylomicron

467. Transports exogenous/dietary TAG
A. HDL
B. LDL
C. VLDL
D. Chylomicron

CHYLOMICRON
Transports dietary TAG in plasma to hepatic and peripheral cells
VLDL
Transports endogenous TAG from liver to peripheral tissues
LDL
Forward cholesterol transport
HDL
Reverse cholesterol transport

468. Major apolipoprotein of HDL
A. ApoB-48
B. ApoB-100
C. ApoA-1
D. ApoC

Chylomicrons : Apo B48
VLDL and LDL: Apo B100
HDL: Apo A-1

469. Opiate that is used to treat cough and is a mild analgesic
A. Nicotine
B. Heroin
C. Morphine
D. Codeine

470. Floating beta lipoprotein seen in type 3 hyperlipoproteinemia
A. IDL
B. B-VLDL
C. Lp(a)
D. Lpx

Lp Ca: Sinking pre beta lipoprotein
B-VLDL: Floating beta lipoprotein

471. Measurement of pH change as NH3 diffuses through a selective membrane
A. Enzymatic
B. Colorimetric
C. Potentiometric
D. A. Spectrophotometric

472. A specialized colorimeter designed to scan and quantitate electrophoretic pattern.
A. Hydrometer
B. Electrometer
C. Potentiometer
D. Densitometer

473. Regularly repeating structures stabilized by hydrogen bonds between the amino acids
A. Primary
B. Secondary
C. Tertiary
D. Quaternary

474. Overall shape or conformation of the protein molecule
A. Primary
B. Secondary
C. Tertiary
D. Quaternary

QUATERNARY: Results from the interaction of more than one protein molecule or subunit
PRIMARY: number and types of amino acids in a specific amino acid sequence

475. Biochemical marker of bone resorption
A. B2-microglobulin
B. Amyloid
C. CTX
D. Btraceprotein

476. How many spikes are there in a normal serum electrophoretic pattern?
A. 2 spikes
B. 3 spikes
C. 4 spikes
D. 5 spikes

Albumin : 1 SPIKE
Globulin: 4 SPIKE

477. To abolish liver tissue function, more than ____of the liver must be destroyed
A. 50%
B. 65%
C. 75%
D. 80%

478. Among the functions of the liver, which is the last function to be affected?
A. Conjugation
B. Synthetic
C. Storage
D. Detoxification

479. Circulating inhibitor of bilirubin conjugation
A. Dubin Johnson
B. Lucey Driscoll
C. Gilbert's
D. CriglerNajjar

480. Classification of enzyme which catalyzes the removal of one group without hydrolysis, leaving double bonds in the molecular structure of product.
A. Lyase
B. Ligase
C. Transferase
D. Isomerase

TRANSFERASE
Catalyzes the transfer of a chemical or functional group from one molecule to another
LIGASE
Catalyzes the joining of two substrate molecules
ISOMERASE
Catalyzes intramolecular rearrangement of the substrate compound

481. Normal serum LD:
A. 2>1>3>4>5
B. 1>2>3>4>5
C. 5>4>3>2>1
D. 3>1>4>2>5

Normal Serum : 2>1>3>4>5
AMI : 1>2>3>4>5
Normal CSF : 1>2>3>4>5
Bacterial meningitis: 5>4>3>2>1

482. Reverse CK method
A. Wacker
B. Wroblewski LaDue
C. Tanzer Gilvarg
D. Oliver Rosalki

Forward : Tanzer Gilvarg
Reverse: Oliver Rosalki

483. Marker for congestive heart failure
A. Troponin T
B. Troponin I
C. BNP
D. Myoglobin

MYOGLOBIN: Earliest but not specific cardiac marker
TROPONIN T: Sensitive marker for unstable angina
TROPONIN I: Highly specific for AMI

484. Which of the following causes primary respiratory acidosis?
A. Anxiety
B. Starvation
C. Asphyxiation
D. Hypokalemia

CLINICAL CHEMISTRY EXAMINATION AND RATIO

485. Compensatory mechanism in metabolic acidosis:
A. Hyperventilation
B. Hypoventilation
C. IncreasedHCO3reabsorption
D. DecreasedHCO3reabsorption

486. Compensatory mechanism for respiratory alkalosis:
A. Hyperventilation
B. Hypoventilation
C. IncreasedHCO3reabsorption
D. DecreasedHCO3reabsorption

487. Gold standard for drug testing.
A. GC-MS
B. Paper chromatography
C. MS/MS
D. TLC

488. Reagent used in ultracentrifugation for quantitation of lipoproteins
A. Potassium iodide
B. Potassium chloride
C. Potassium bromide
D. Potassium dioxide

489. Chief plasma cation whose main function is maintaining osmotic pressure
A. Potassium
B. Sodium
C. Chloride
D. Calcium

490. To maintain electrical neutrality in the red blood cell ,bicarbonat eleaves the red blood cell and enters the plasma through an exchange mechanism with which of the following?
A. TCO2
B. Sodium
C. Chloride
D. Phosphate

491. A nurse calls the laboratory technologist on duty asking about blood collection for the analysis of enzymes(AST,ALP,ALT,GGT,CK).
Which of the following tubes would you suggest the technologist collect?
A. Redtop
B. EDTA
C. Oxalate
D. Fluoride

492. Which of the following conditions can "physiologically" elevate serum alkaline phosphatase?
A. Hyperparathyroidism
B. Diabetes
C. 3rd trimester pregnancy
D. Nephrotic syndrome

493. Which of the following blood gas disorders is most commonly associated with an abnormal anion gap?
A. Metabolicacidosis
B. Metabolicalkalosis
C. Respiratoryacidosis
D. Respiratoryalkalosis

494. The anion gap is useful (among other things)as an inexpensive measure of quality control for which of the following analytes?
A. Blood gas analyses
B. Na,K,Cl,andTCO2
C. Ca, Phosphorus and Magnesium
D. AST .ALT, GGT and ALP

495. The reagent blank corrects for absorbance caused by:
A. The color of reagents
B. Sample turbidity
C. Bilirubin and hemolysis
D. The intrinsic absorbance of both the reagents and sample matrix

496. Which of the following effects results from exposure of a normal arterial blood sample to room air?
A. PO2increased,PCO2decreased,pHincreased
B. PO2decreased,PCO2increased,pHdecreased
C. PO2increased,PCO2decreased,pHdecreased
D. PO2decreased,PCO2decreased,pHdecreased

497. High serum total protein but low albumin is usually seen in:
A. Multiple myeloma
B. Hepatic cirrhosis
C. Glomerulonephritis
D. Nephrotic syndrome

498. A female with severe excessive pubic and facial hair growth(hirsutism)should be tested for which of the following hormones?
A. Estrogen and progesterone
B. Chorionic gonadotropin
C. Growth hormone
D. Testosterone and dehydroepiandrosterone sulfate

499. Which specimen is the sample of choice for lead screening?
A. Whole blood
B. Hair
C. Serum
D. Urine

500. What is the major intracellular cation?
A. Sodium
B. Potassium
C. Calcium
D. Magnesium

SODIUM
Major extracellular cation
CALCIUM
Most abundant cation in the body
MAGNESIUM
Fourth most abundant cation in the body