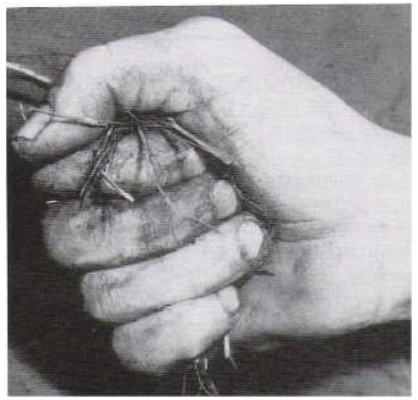
1. A 58-year-old man comes to the OPD due to a one-month history of progressive dyspnoea, generalized weakness, fatigue, and palpitations. He also reports tingling and numbness in both lower limbs. His daughter adds that since his wife's death a year ago, the patient has not been taking care of himself. Blood pressure is 105/50 mm Hg and pulse is 104/ min. Cardiovascular examination shows a displaced apical impulse at the sixth intercostal space, a third heart sound, and high-volume, collapsing carotid pulses. Bilateral basal crackles, 2+ bilateral pedal edema, and mild hepatomegaly are also present. Neurologic examination shows decreased light touch and vibration sense in the feet, with decreased knee and ankle reflexes bilaterally. Laboratory evaluation shows normal blood counts. Deficiency of which of the following nutrients is most likely responsible for this patient's symptoms?

A. Ascorbic acid
B. Cobalamin
C. Niacin
D. Thiamine

2. An autopsy was performed on a woman who was reportedly discovered near a village lake. All the following indicate antemortem drowning except:



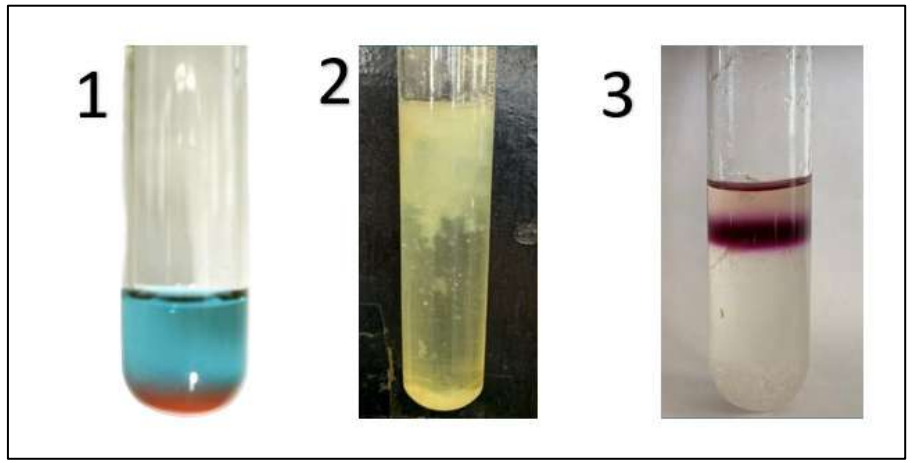
A.

B.

C.

D.

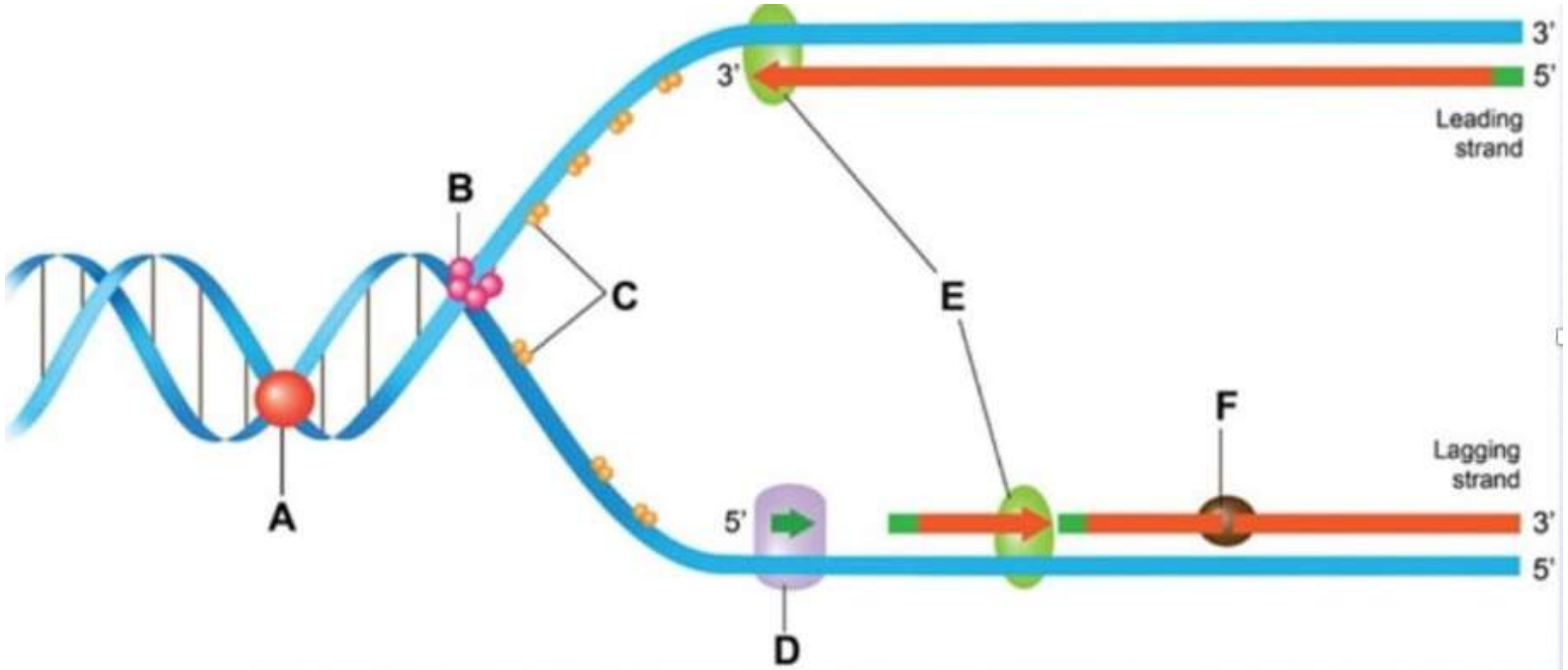
3. Which of the following tests will be positive in the urine of a patient who has undergone prolonged starvation?



A. 1 and 3
B. Only 3
C. 1, 2 and 3
D. 1 and 2

4. A microbiologist performs a genetic experiment in which cultures of Escherichia coli are treated with a chemical that induces a high frequency of mutations. Individual bacterial colonies are isolated to identify a mutant strain that lacks a specific enzyme involved in DNA replication. This specific enzyme is responsible for removing short fragments of RNA that are base paired to the DNA template. Which of the following enzymes is most likely deficient in this strain of E coli?

A. DNA polymerase I
B. DNA polymerase Ill
C. Gyrase
D. Primase


3'
5'
Leading strand
B
C
E
F
Lagging strand
A
5'
3'
5'
D

5. “Do-It right” for first aid includes all except:

A. Reassure the patient
B. Immobilise the limb.
C. Apply tight torniquet to block arterial circulation of venom.
D. Get to hospital immediately.

CARRY NO RIGHT
No torniquet/incision/cautery/sucking/coffee/alcohol
R-Reassure
I-Immobilize
G-Go to
H-Hospital
T-Tell symptoms

Measures that can be taken in the case of snakebite:

- Immediately apply a broad firm bandage (Sutherland wrap on the bitten area and around the limb. As much of the limb should be bandaged as possible. It should be tight enough to occlude the superficial venous and lymphatic return, but not the arterial or deep venous flow. A pressure of 50 to 70 mm Hg is maintained.

Measures contraindicated in the case of snakebite:

- Suction and incision of the wound
- Electric shock treatment of wound site
- Application of tourniquets because they obstruct arterial flow and cause ischemia
- Ice water immersion of the bitten limb
- Do not attempt to kill or catch the snake as it may be dangerous.
- Administration of AS locally at the wound site.
- Herbal/local remedies

6. The initial template DNA strand reads as follows: 5' CATTCAATATCGATC 3'. What would be the resulting mRNA sequence after transcription?

A. 3’ GAUCGAUAUUGAAUA 5'
B. 5’ GATCGATATTGAATUT 3'
C. 5’ GAUCGAUAUUGAAUG 3'
D. 3’ GATCGATATTGAATU 5'

5’——— C A T T C A A T A T C G A T C ——— 3’ **Template Strand**

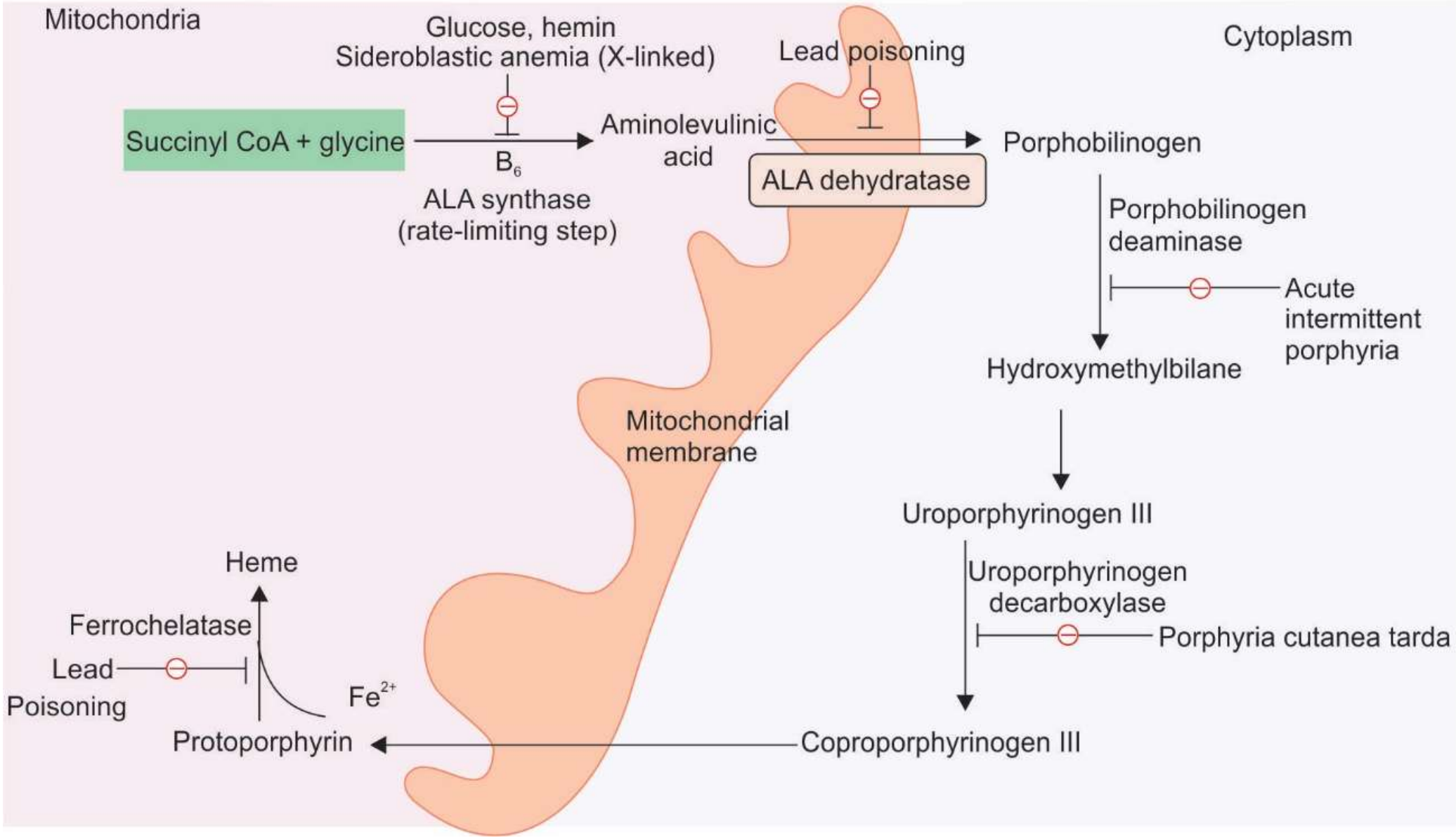
3’——— G T A A G T T A T A G C T A G ——— 5’ **Non-Template Strand**

The sequence of mRNA formed from DNA will be same as non-template strand except that T is replaced by U and we always give sequence in 5’ – 3’. So giving mRNA sequence in 5 ‘ – 3’ as:

5’——— G A U C G A U A U U G A A U G ———3’

7. A 22-year-old man comes to the office due to recurrent blistering on the back of his hands and forearms for the past several years as shown. The patient usually develops small itchy spots but lately has had large blisters that heal with hyperpigmentation after rupturing. The patient works as a night security guard and has had no exposure to chemicals or animals. He drinks 2-3 cans of beer daily. Which of the following enzymes is most likely deficient in this patient?

A. Aminolevulinate dehydratase
B. Aminolevulinate synthase
C. Porphobilinogen deaminase
D. Uroporphyrinogen decarboxylase


Mitochondria
Cytoplasm
Glucose, hemin
Sideroblastic anemia (X-linked)
Lead poisoning
Succinyl CoA + glycine
Aminolevulinic acid
B6
ALA synthase
(rate-limiting step)
ALA dehydratase
Porphobilinogen
Porphobilinogen deaminase
Acute intermittent porphyria
Hydroxymethylbilane
Mitochondrial membrane
Uroporphyrinogen III
Uroporphyrinogen decarboxylase
Porphyria cutanea tarda
Heme
Ferrochelatase
Lead Poisoning
Fe2+
Protoporphyrin
Coproporphyrinogen III

8. Match the following:

Options:

A. 1-A, 2-D, 3-C, 4-G

B. 1-B, 2-E, 3-D, 4-F

C. 1-B, 2-E, 3-C, 4-D

D. 1-A, 2-G, 3-E, 4-C

1. 	A. Bansdola
2. 	B. Garroting
3. 	C. Mugging
4. 	D. Throttling
	E. Burking
	F. Gagging
	G. Smothering

9. Which methods among the following can identify changes in the DNA sequence?

1. Restriction fragment length analysis
2. Flow cytometry
3. Pyrosequencing
4. FISH

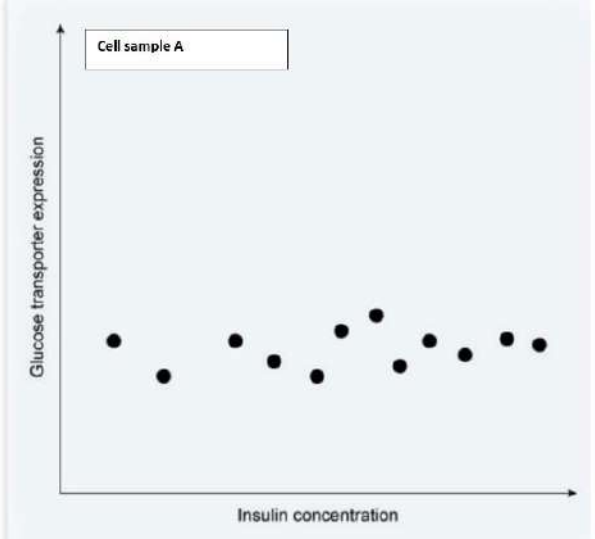
Options:

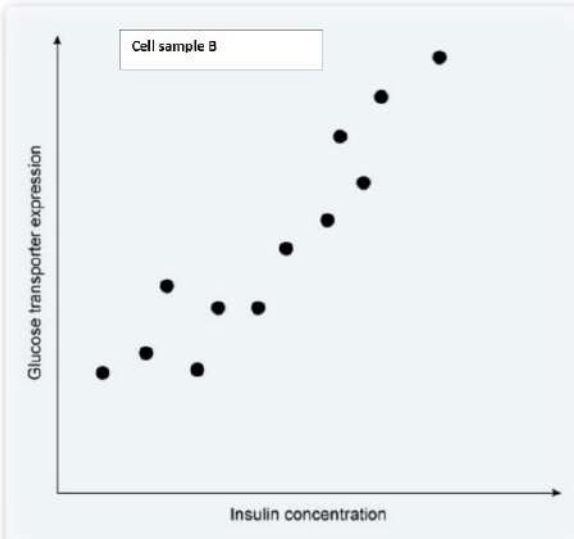
A. 1 and 3
B. 1, 2, and 3
C. 2, 3, and 4
D. 1, 2, and 4

10. 52-year-old man is being evaluated in the emergency department for abdominal pain associated with watery diarrhea. His symptoms have been progressive over the last month. He says that he is depressed and often has difficulty remembering things. The patient has a 20-year history of alcohol abuse. On examination, he appears dishevelled. A pigmented scaly skin rash is present in the malar distribution of his face, neck, and back of his hands as shown. The rash has been present for several months and worsens on exposure to sunlight. Activity of which of the following enzymes would be decreased in the patient because of this deficiency?

A. Citrate synthase
B. Hexokinase
C. lsocitrate dehydrogenase
D. Succinate dehydrogenase

11. Researchers are investigating the relationship between glucose transport proteins and insulin concentration in different types of tissues. Experiments in which cells are taken from various tissue samples and exposed to increasing concentrations of insulin are performed. The number of surface glucose transporters are then measured. The results from 2 cell samples are plotted on the graphs below. Which of the following cell types are most likely represented in cell samples A and B, respectively?



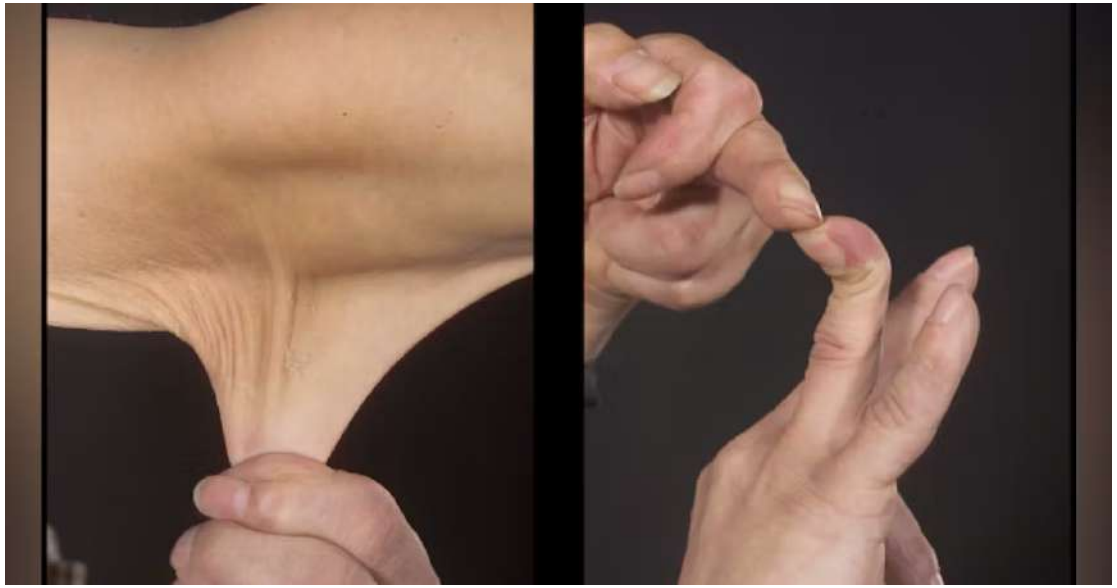


A. A- Neurons, B-Hepatocytes
B. A-Intestinal epithelial, B-Pancreatic beta cells
C. A-Renal tubular cells, B- Hepatocytes
D. A-Renal tubular cells, B-Skeletal myocytes

12. Identify the incorrect pair:

A. Public display of genitalia - Exhibitionism
B. Seeing a female undressing- Voyeurism
C. Wearing clothes of opposite sex- Eonism
D. Wanting to be made to suffer for sexual pleasure- Sadism.

13. 24-year-old woman comes to the OPD for a preemployment medical evaluation. The patient has no known medical problems but reports that her skin bruises and scars easily. She says that most of her family members have a very "flexible" body, and her brother works in a circus as a contortionist. Physical examination findings are shown. This patient most likely has an inherited defect in which of the following proteins?



A. Collagen
B. Elastin
C. Fibrillin-1
D. Hyaluronic acid

Villefranche classification (genetic basis): defective collagen

Classical (AD): Type V collagen

Hypermobility (AD): unknown

Vascular (AD): Type III collagen

Kyphoscoliosis (AR):
deficiency of lysyl hydroxylase

Arthrochalasia (AD): Type I collagen

Dermatosporaxis (AR):
Type I collagen processing

AD = autosomal dominant, AR = autosomal rec

Villefranche	Berlin	Inheritance	Clinical features
Classic	Types I and II	Autosomal dominant	Soft hyperextensible skin Mesomorphic build Cigarette-paper scarring Molluscoid pseudotumors Spheroids
Hypermobility	Type III	Autosomal dominant	Marked joint hypermobility
Vascular	Type IV	Autosomal dominant	Bruising Thin translucent skin Aneurysms, vascular rupture, bowel rupture
Kyphoscoliosis	Type VI	Autosomal recessive	Neonatal muscle hypotonia Joint hyperextensibility Kyphoscoliosis Ocular lesions
Arthrochalasia	Types VIIA and VIIB	Autosomal dominant	Short stature Extreme joint laxity Congenital dislocation of the hip
Dermato-sparaxis	Type VIIC	Autosomal recessive	Skin fragility Cutis laxa
Other	Type V	X-linked	As for classic type
Other	Type VIII	Unknown	Hyperextensible skin Mucosal fragility Periodontitis
Other	Type X	Unknown	Classical manifestations Platelet aggregation defect

*Autosomal recessive forms of classical EDS are also described.
Modified from Beighton, P. et al. (1998) *American Journal of Medical Genetics*, 77, 31–37.

14. A 50-year-old lady underwent a total abdominal hysterectomy. She came to the hospital after one week with acute pain in the abdomen with features suggestive of perforation. An X-ray showed the following picture. Identify the type of offense for which the surgeon can be held responsible?

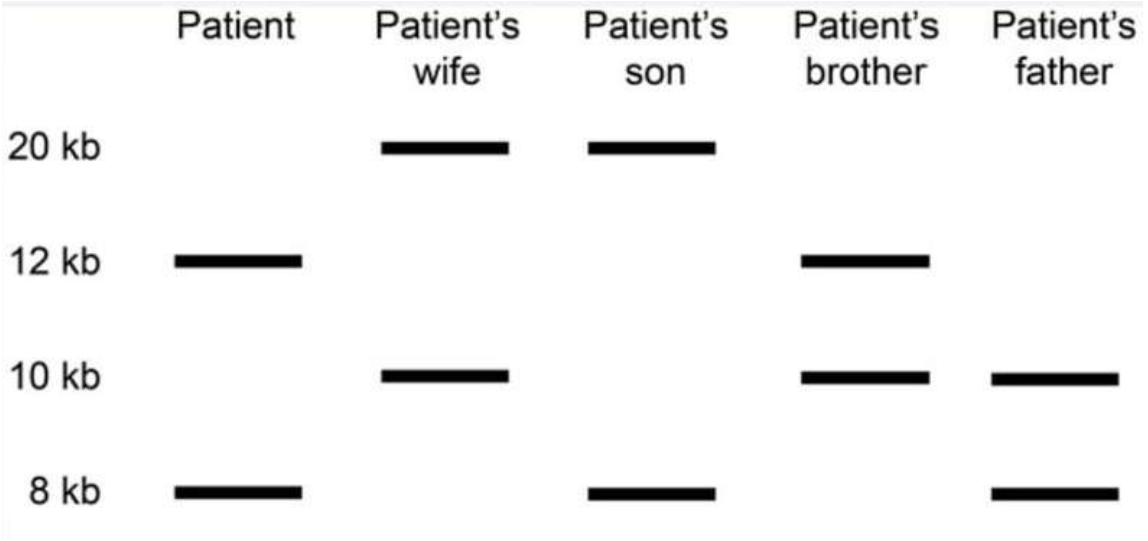
A. Novus actus interveniens
B. Res ipsa loquitur
C. Res judicata
D. Vicarious liability

15. All are true about the hexose monophosphate shunt:
1. Has a role in prevention of methHb
2. Source of NADPH
3. Utilizes ribose.
4. Will be affected in thiamine deficiency.

Options:

A. 1, 2, 3, 4
B. 2, 3, 4
C. 1, 2, 4
D. 3

16. A 34-year-old man is found to have an LDL level of 310 mg/dl and a normal serum triglyceride level. His father suffered a myocardial infarction at age 39, and his paternal grandfather died of a heart attack at age 40. The patient's wife has a normal lipid profile. DNA samples are obtained from several family members for genetic analysis. Southern blotting of restriction fragments from a region containing the LDL receptor gene shows the following pattern. Identify the correct statement:



A. The disease is transmitted in an X-linked recessive fashion.

B. The mutation is probably located in the 10 kb band.

C. The patient's brother most likely inherited the mutation.

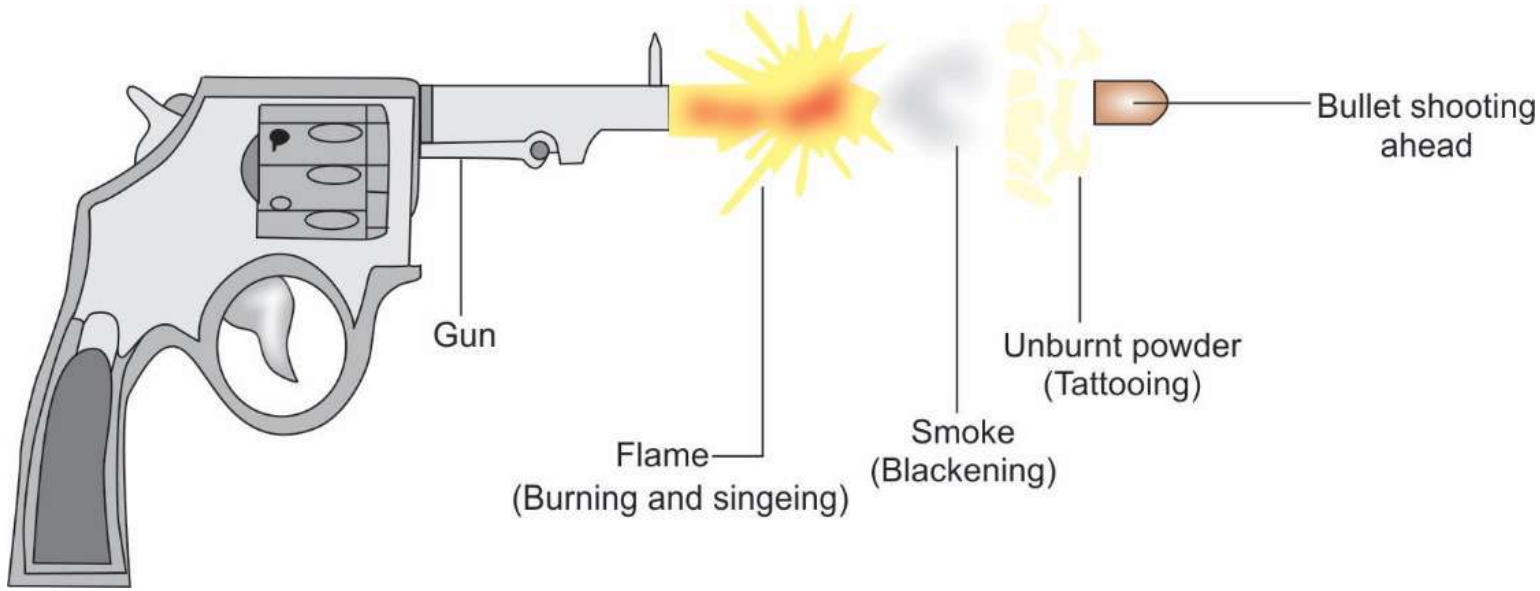
D. The patient's son most likely inherited the mutation.

17. Identify the correct statement with regards to the changes around an entry wound:

1. Grease collar - due to the deposition of the lubricant of the bullet in the tissues
2. Burn injuries - occur due to flame released during the firing
3. Blackening – due to deposit of smoke
4. Tattooing -Due to unburned grains of gunpowder

Options:

A. 1, 2, 3, 4
B. 1, 3, 4
C. 2, 3
D. 2, 4


Bullet shooting
ahead
Gun
Unburnt powder
(Tattooing)
Flame
(Burning and singeing)
Smoke
(Blackening)

18. Pick the mechanism of death in cold water drowning?

A. Asphyxia
B. Laryngeal spasm
C. Vagal inhibition
D. Cardiac arrest

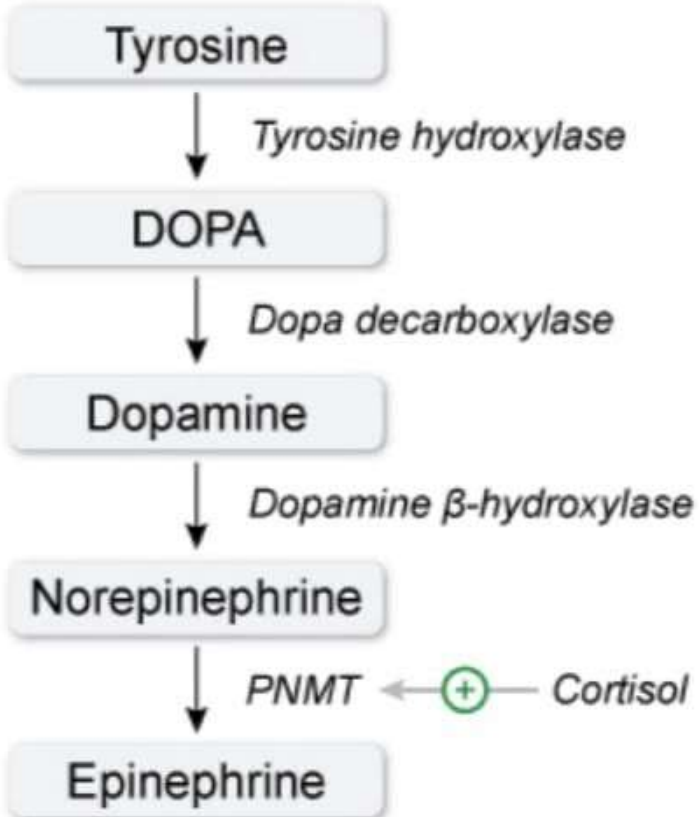
19. 15-year-old boy is found to have unexplained erythrocytosis on routine laboratory analysis. Evaluation of his immediate family shows that his father and sister also have elevated red cell levels. Genetic sequencing of the 13-globin gene is performed in the affected family members. The results showed a single base substitution at amino acid position 82 that replaces the normal lysine residue with methionine. Further analysis shows that this amino acid replacement impairs the ionic interaction between the 13-subunit and 2,3-bisphosphoglycerate. As a result of this mutation, the patient's haemoglobin will be most like which of the following haemoglobin types?

A. Haemoglobin A1c
B. Haemoglobin C
C. Haemoglobin F
D. Haemoglobin S

20. A group of investigators are studying the regulation of catecholamine synthesis in response to severe stress. In the experiments, subject rats are randomly assigned to either an experimental or a control group. The experimental rats undergo resection of the pituitary gland, and the control rats undergo craniotomy without pituitary resection. The experimental animals are subsequently found to have decreased production of epinephrine by the adrenal medulla and cortisol from the adrenal cortex compared with the control animals. Decreased activity of which of the following enzymes is most likely responsible for the lower epinephrine in the experimental animals?

A. Catechol-0-methyl transferase
B. Phenyl ethanolamine-N-methyltransferase
C. Dopamine beta-hydroxylase
D. Monoamine oxidase

Catecholamine synthesis



21. Amar was tried in a court in the case of Akbar's murder in the park. Anthony appeared in court and salt that he saw Amar with an axe in his hand while passing the park. What is this evidence known as?

A. Hostile
B. Circumstantial
C. Direct
D. Hearsay

22. A 6-year-old African American male is brought to your office for a routine check-up. His mother remarks that he often seems uninterested in playing with his peers and appears to "run out of breath quickly." His medical records reveal that he has missed several pediatric vaccinations and has been hospitalized twice, once with a "chest infection" and once with abdominal pain. The patient mentions to you that occasionally his "bones hurt." Which of the following protein changes most likely accounts for this patient's condition?

A. Phenylalanine deletion
B. Valine substitution for glutamic acid
C. Phenylalanine substitution for proline
D. Valine substitution for lysine

23. Match the following:

Tooth	Age of eruption
A. Canine	1. 6-7 years
B. Lateral incisor	2. 8-9 years
C. First molar	3. 11-12 years
D. Third molar	4. 17-25 years

A. A-1, B-3, C-2, D-4
B. A-3, B-4, C-1, D-2
C. A-3, B-2, C-1, D-4
D. A-2. B-3, C-4, D-1

Tooth	Age of eruption
First molar	6-7 years
Central incisors	6-8 years
Lateral incisors	7-9 years
First premolar	9-11 years
Second premolar	10-12 years
Canine	11-12 years
Second molar	12-14 years
Third molar	17-25 years

24. Which of the features given below is of a male pelvis?

1. Triangular obturator foramen
2. U-shaped pubic angle
3. Everted ischial tuberosity
4. Large greater sciatic notch
5. Large acetabulum
6. Deep preauricular sulcus

Options:

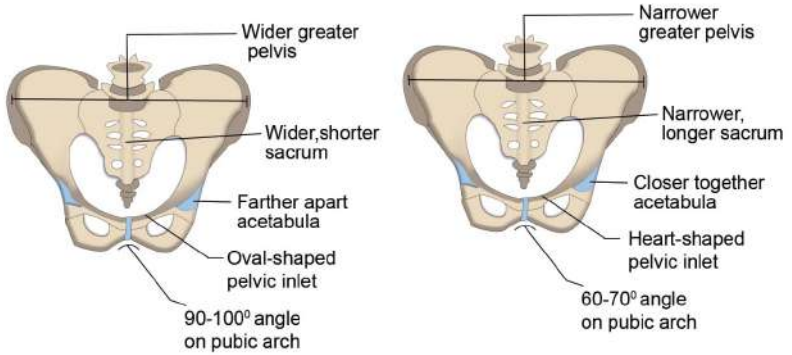
A. 2, 3, 4, 5

B. 4, 5, 6

C. Only 5

D. 1 and 3

	Female Pelvis	Male Pelvis
Shape of the pelvis	Wider	Narrower
Pelvic inlet, outlet	Larger	Smaller
Coccyx	Moveable and more curved anteriorly	Immovable and less curved anteriorly
Public arch	Wider	V shaped
Subpubic Angle	Greater than 90º	Less than 90º
Pelvic brim	Large and round	Small and heart-shaped
Sciatic notch	Wider	Narrower
Obturator foramen	Small and triangular-shaped	Large and oval-shaped
Sacroiliac joint surface	Short, wider and curved	Long, narrow and straight
Pelvic acetabulum	Small and faced anteriorly	Large and faced laterally



25. A researcher is studying the role of glucose metabolites in normal cellular function. A specific human cell type is incubated in glucose-rich media. Intracellular levels of glucose metabolizing enzymes, intermediate products, and generated ATP are measured. In these cells, glycolysis of a single glucose molecule always yields pyruvate but sometimes generates no net ATP. Which of the following cells is most likely being studied in this experiment?

A. Adipocytes
B. Erythrocytes
C. Hepatocytes
D. Skeletal muscle cells

26. Match the following in relation to fingerprint changes:

1. Incomplete atrophy of ridges	A. Radiation
2. Loss of pattern with ridge atrophy	B. Scleroderma
3. Altered ridges	C. Celiac disease
4. Permanent loss of fingerprints	D. Acromegaly
5. Distance between ridges is changes but pattern is retained	E. Dermatitis

Options:

A. 1-E, 2-C, 3-B, 4-A, 5-D

B. 1-D, 2-B, 3-C, 4-E, 5-A

C. 1-C, 2-A, 3-D, 4-B, 5-E

D. 1-D, 2-C, 3-A, 4-E, 5-B

Change	Disease
Complete loss	Burns, Celiac disease
Permanent impairment	RT, Electrical injury, Leprosy,
Change in distance	Acromegaly, Rickets
Ridge alteration	Scleroderma, Eczema, Acanthosis nigricans

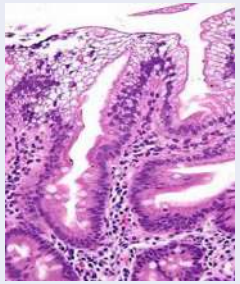
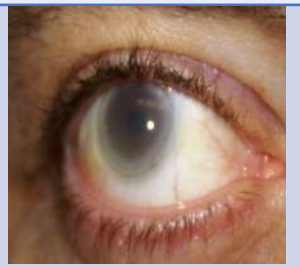
27. Match the following:

A. 1-A, 2-F, 3-B, 4-C

B. 1-F, 2-D, 3-C, 4-B

C. 1-A, 2-D, 3-C, 4-B

D. 1-A, 2-F, 3-B, 4-E

1. 	A. ATP-Binding Cassette Transporter-1
2. 	B. Partial LCAT deficiency
3. 	C. MTTP gene
4. 	D. Phytanoyl CoA oxidase
	E. MCAD Deficiency
	F. PEX gene

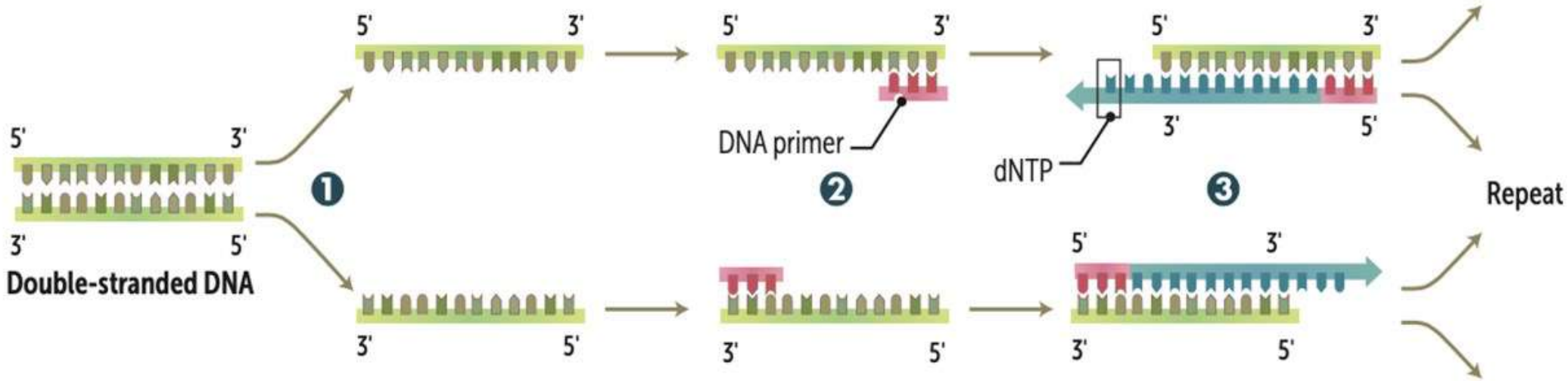
28. A 34-year-old woman comes to the OPD after her sister was diagnosed with breast cancer. Her sister was found to have a multiple base pair insertion affecting exon 11 of the BRCA 1 gene that leads to a frameshift mutation. A screening test to evaluate for a similar insertion mutation in the patient's BRCA 1 gene is performed. The test uses polymerase chain reaction (PCR) to amplify the target exon and gel electrophoresis to assess the size of the exon compared to the wild-type allele. Which of the following must be known to perform the amplification part of this analysis?

A. Restriction enzyme susceptibility sites within the target exon

B. The amino acid sequence of the abnormal BRCA 1 protein

C. The complete nucleotide sequence of the target exon

D. The nucleotide sequence of the regions flanking the target exon.



1. **Denaturation**-DNA template, DNA primers, a heat stable DNA polymerase, and deoxynucleotide triphosphates (dNTPs) heated to **95°C** to separate the DNA strands.
2. **Annealing**- **55°C**
3. **Elongation**-**72° C**

29. Match the following appearances with the timeline:

A. A-4, B-1, C-2, D-3

B. A-3, B-1, C-2, D-4

C. A-4, B-2, C-1, D-3

D. A-1, B-2, C-3, D-4

A. 	1. 6 hrs
B. 	2. 2-3 days
C. 	3. 4-5 days
D. 	4. 15-20d

30. A 24-year-old woman is admitted to the hospital with a diagnosis of acute appendicitis. The patient had no food, only sips of water since 30hours. Blood pressure is 115/72 mm Hg and pulse is 106/ min. Mucous membranes are dry and there is tenderness in the right lower quadrant of the abdomen. Laboratory evaluation shows mild leucocytosis, normal serum electrolytes, borderline low serum glucose levels, and moderate ketones in the urine. Based on the evaluation, it is suspected that this patient is utilizing ketone bodies as a significant reserve of energy. Which of the following tissues cannot use this energy source?

A. Brain
B. Erythrocytes
C. Heart muscle
D. Skeletal muscle

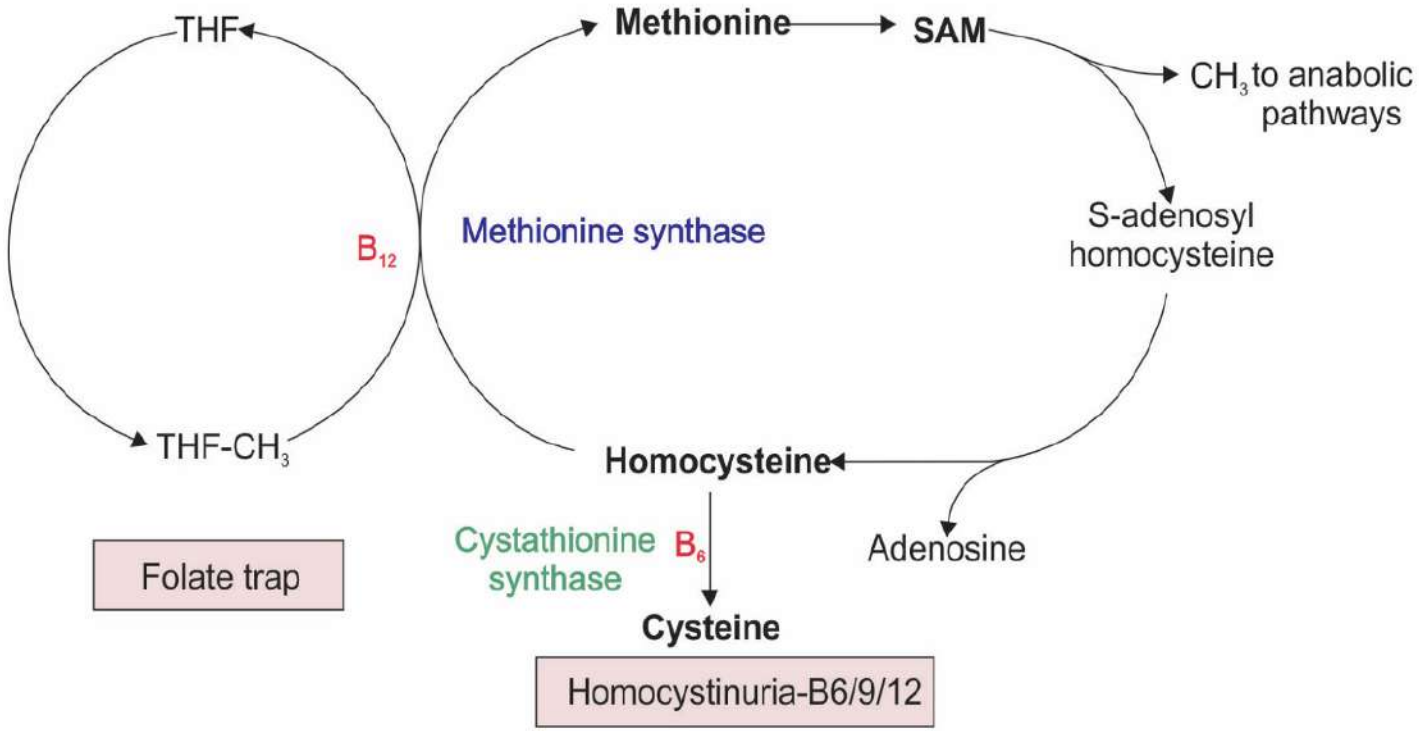
31. A 34-year-old previously healthy man comes to the emergency department due to a 3-hour history of chest pain, diaphoresis, and dyspnea. He does not smoke, exercises regularly, and eats a balanced diet. His father died at age 56 from a myocardial infarction. His blood pressure is 110/70 mm Hg and pulse is 110/min and regular. ECG shows ST elevation in the anterolateral leads. Coronary angiogram reveals proximal left anterior descending artery stenosis and thrombosis, which is treated with angioplasty and stent.
Placement. Laboratory results are as follows:
Total cholesterol: 160 mg/dL
Low-density lipoprotein: 90 mg/dL
Glucose, serum : 98 mg/dL
Homocysteine, plasma : 21.5 µmol/L (normal: 4-14 µmol/ L)
Further testing reveals a homozygous mutation in the methylene tetrahydrofolate reductase gene that leads to decreased enzymatic activity. Due to this defect, the patient most likely has impairment converting homocysteine to which of the following?

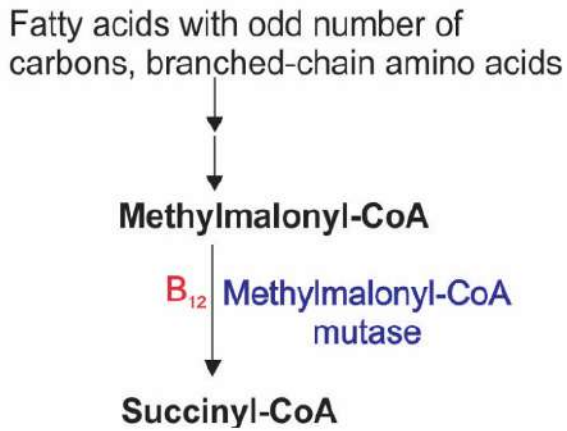
A. Cystathionine

B. Cysteine

C. Methionine

D. Methylmalonyl-CoA


THF
Methionine
SAM
CH_3 to anabolic pathways
B_{12}
Methionine synthase
S-adenosyl homocysteine
$THF-CH_3$
Homocysteine
Cystathionine synthase
B_6
Adenosine
Folate trap
Cysteine
Homocystinuria-B6/9/12


Fatty acids with odd number of carbons, branched-chain amino acids
Methylmalonyl-CoA
B_{12}
Methylmalonyl-CoA mutase
Succinyl-CoA

32. What is the cause of the lesion shown in the image below?

A. Lightning strike
B. Electrocution
C. Marbling
D. Trickling down of acid

33. Match the following weapons with the possible injuries caused by them:

A. Axe	1. Incised wound
B. RTA	2. Tram track wound
C. Blade	3. Grazed abrasion
D. Lathi	4. Chop wound

A. A-4, B-3, C-1, D-2

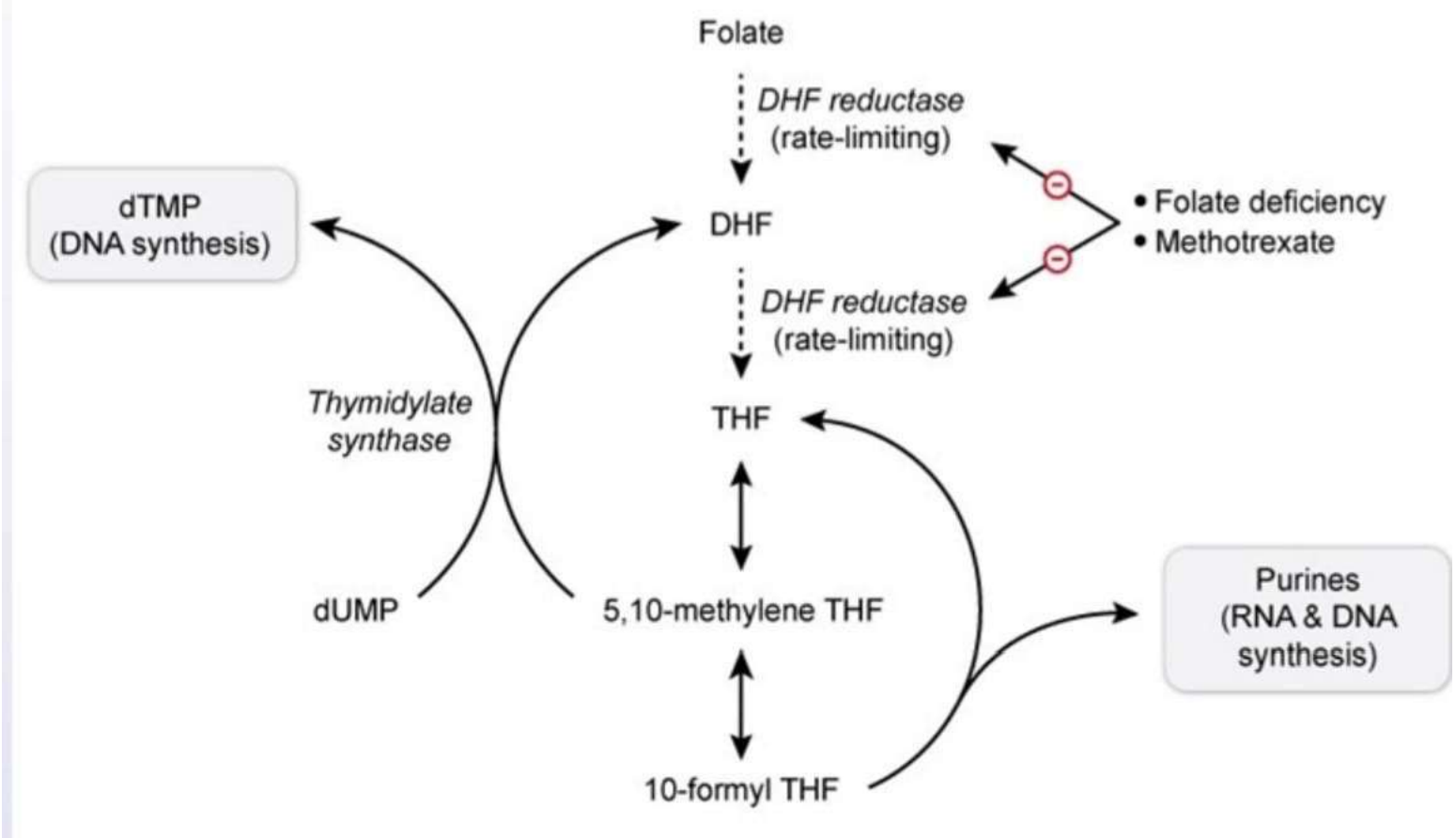
B. A-1, B-3, C-4, D-2

C. A-1, B-2, C-4, D-3

D. A-4, B-1, C-3, D-2

34. In an animal experiment, mice proerythroblasts are cultured in 2 different growth media; the first medium is folate deficient, whereas the second (control) is supplemented with folic acid. Both media contain high concentrations of erythropoietin. Over 48 hours, cells in the control media proliferate and differentiate into reticulocytes, whereas in the folate-deficient media, cell proliferation is minimal, with most cells undergoing apoptosis. In another experiment, a substance is added to the folate-deficient media, which prevents apoptosis and permits proliferation of the proerythroblasts. Which of the following is the most likely substance added to the growth medium?

A. Cobalamin
B. Cytosine
C. Homocysteine
D. Thymidine


Folate
DHF reductase
(rate-limiting)
dTMP
(DNA synthesis)
DHF
• Folate deficiency
• Methotrexate
DHF reductase
(rate-limiting)
Thymidylate
synthase
THF
dUMP
5,10-methylene THF
Purines
(RNA & DNA
synthesis)
10-formyl THF

35. Match the following with the respective ages of fusion:

A. Medial end of clavicle	1. 22-25 years
B. Sacrum as a single bone	2. 50 years
C. Crista scapulae	3. 45 years
D. Lambdoid suture	4. 21-25 years

A. A-1, B-2, C-3, D-4

B. A-4, B-1, C-2, D-3

C. A-4, B-3, C-1, D-2

D. A-1, B-4, C-3, D-2

36. The drowned dead body of a young man found in the sea and was brought in for postmortem examination. Which of the following findings do you see in seawater drowning?

1. Hypernatremia
2. Hyponatremia
3. Hyperkalemia
4. Myocardial anoxia
5. Hemodilution

Options:

A. 1 and 3

B. 1 and 4

C. 2, 3 and 5

D. 4 and 5

37. A 39-year-old woman comes to the emergency department due to several episodes of severe upper abdominal pain. Her pain is triggered by fatty foods and resolves pontaneously. Past medical history is notable for hypertension, for which the patient takes a calcium channel blocker, and hypertriglyceridemia, which is treated with a fibrate. She undergoes a laparoscopic cholecystectomy, with multiple stones noted in the contents of the gallbladder. Decreased activity of which of the following enzymes would most likely have contributed to this patient's condition?

A. Aromatase

B. 13-glucuronidase

C. Cholesterol 7a-hydroxylase

D. HMG-CoA reductase

38. Choose the right sequence of steps in the conversion of cholesterol to testosterone?

A. 17-alpha hydroxylase
B. 20, 22-desmolase
C. 17, 20-lyase
D. 3 beta hydroxy steroid dehydrogenase

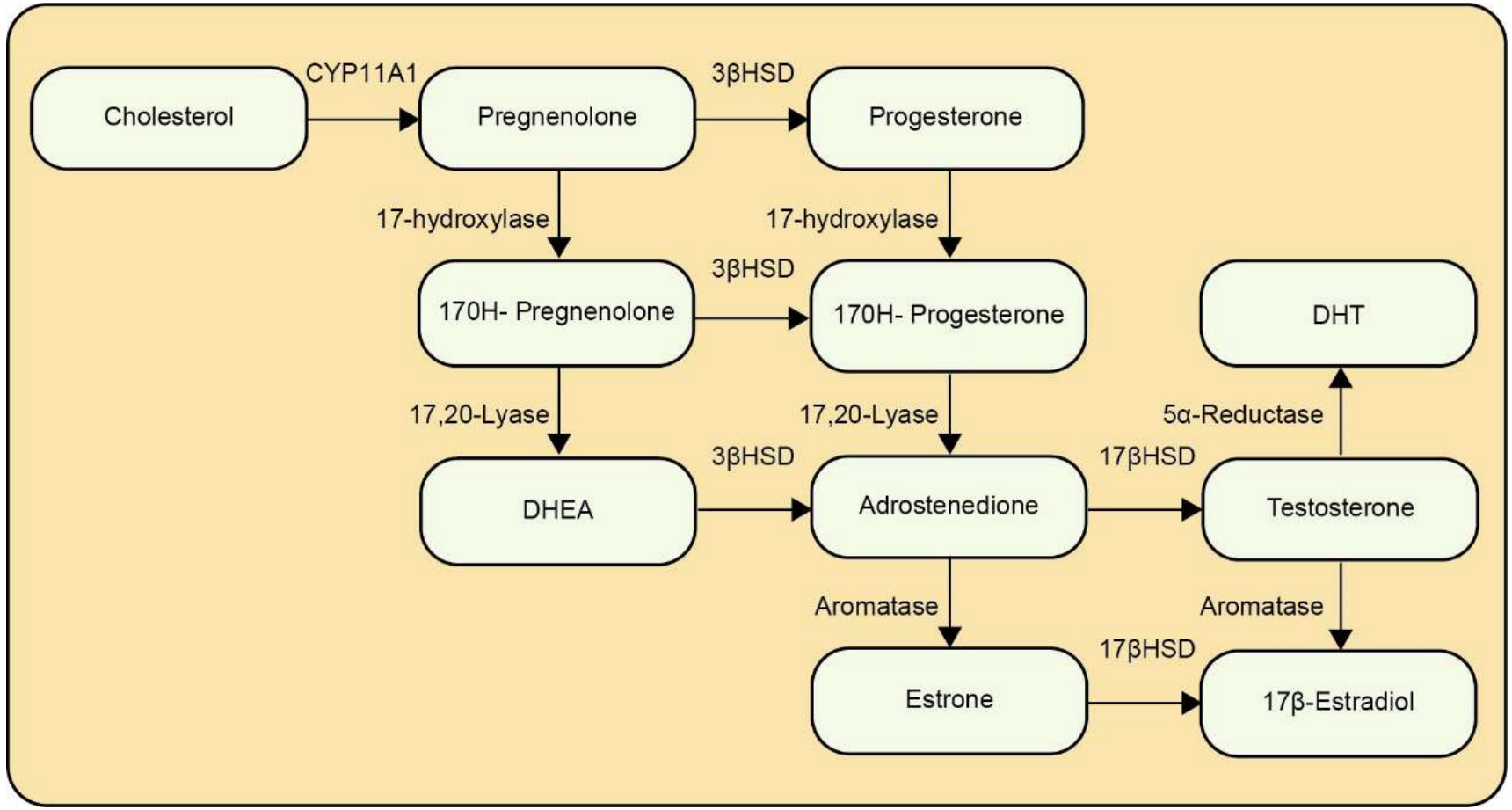
Options:

A. B, D, A, C

B. A, C, D, B

C. B, A, C, D

D. D, A, B, C


Cholesterol
CYP11A1
Pregnenolone
3βHSD
Progesterone
17-hydroxylase
17-hydroxylase
170H- Pregnenolone
3βHSD
170H- Progesterone
DHT
17,20-Lyase
17,20-Lyase
5α-Reductase
3βHSD
17βHSD
DHEA
Adrostenedione
Testosterone
Aromatase
Aromatase
17βHSD
Estrone
17β-Estradiol

39. Match the following poisons and their probable mechanism of action:

A. Zine chloride	1. Abortifacient
B. Chloral hydrate	2. Irritant
C. Quinine	3. Corrosive
D. Potassium carbonate	4. Stupefying

Options:

A. A-2, B-4, C-1, D-3

B. A-4, B-3, C-2, D-1

C. A-4, B-2, C-1, D-3

D. A-2. B-3. C-4, D-1

40. E. coli colonies grown on a lactose-containing medium up-regulate the production of the enzymes 13-galactosidase and galactoside permease. Which of the following best explains the synchronous production of both enzymes in response to lactose?

A. There are two activator binding sites for one activator protein.

B. There are two repressors for one inducer.

C. There are two promoters near each other.

D. There is one mRNA coding for both enzymes.

41. A 5-year-old boy with developmental delay is brought to the OPD due to difficulty "seeing the board" at school. Examination shows a tall, thin habitus with elongated limbs. Funduscopy shows bilateral lens subluxation. Four years later, the patient dies suddenly of a massive cerebrovascular accident. Autopsy shows middle cerebral artery thrombosis and old renal infarcts. His parents wish to know if anything could have been done to have prevented his death. Which of the following would have been the most appropriate supplementation for this patient?

A. Ascorbic acid
B. Carnitine
C. Pyridoxine
D. Thiamine

42. A doctor used the same needle used in a patient with HIV to inject in another patient. The latter patient on testing found to be infected with HIV. The doctor is punishable for this negligence according to which section of Indian Penal Code?

A. Section 166B

B. Section 203

C. Section 202

D. Section 269

43. A research scientist is studying biochemical reactions that take place in the liver. He cultures hepatocytes in a growth media enriched with glutamate labelled with nitrogen isotopes. After some time, he finds that the nitrogen isotopes are transferred to oxaloacetate, forming aspartate in the process. Which of the following substances is most likely involved in this reaction?

A. Biotin

B. Folic acid

C. Niacin

D. Pyridoxine

44. Match the following:

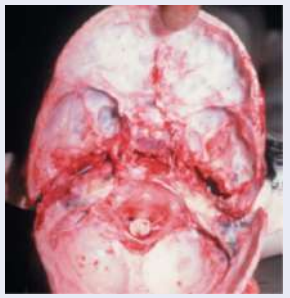
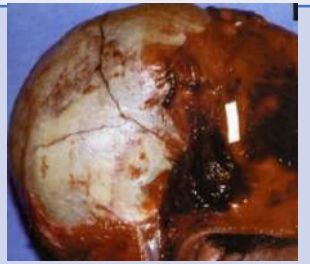
Options:

A. 1-C, 2-A, 3-D, 4-B

B. 1-D, 2-B, 3-A, 4-C

C. 1-A, 2-B, 3-C, 4-D

D. 1-C, 2-B, 3-A, 4-D

1. 	A. Depressed
2. 	B. Fissured
3. 	C. Hinge
4. 	D. Gutter

45. Which is the correct sequence of steps in the isolation of desirable protein using recombinant DNA technology?

1. Expression of protein and lysis of bacterial cell
2. Incorporation of genes into bacteria
3. SDS PAGE
4. Protein elution
5. Hybridization

Options:

A. 2, 1, 3, 5, 4

B. 1, 2, 4, 3, 5

C. 1, 5, 2, 4, 3

D. 2, 4, 5, 3, 1

1. **Incorporation of genes into bacteria**: Required gene is incorporated into the bacteria using cloning vectors like bacterial plasmids, phages, or cosmids. **Recombinant DNA is the DNA of interest is ligated into the vector DNA.** This vector is then inserted into a host cell (E.g., E. coli bacteria) where it is replicated.

2. **Expression of protein and lysis of bacterial cell**: Once recombinant DNA is incorporated, the inserted gene expresses itself to produce the desired protein. **Bacterial cell is lysed to release the proteins.**

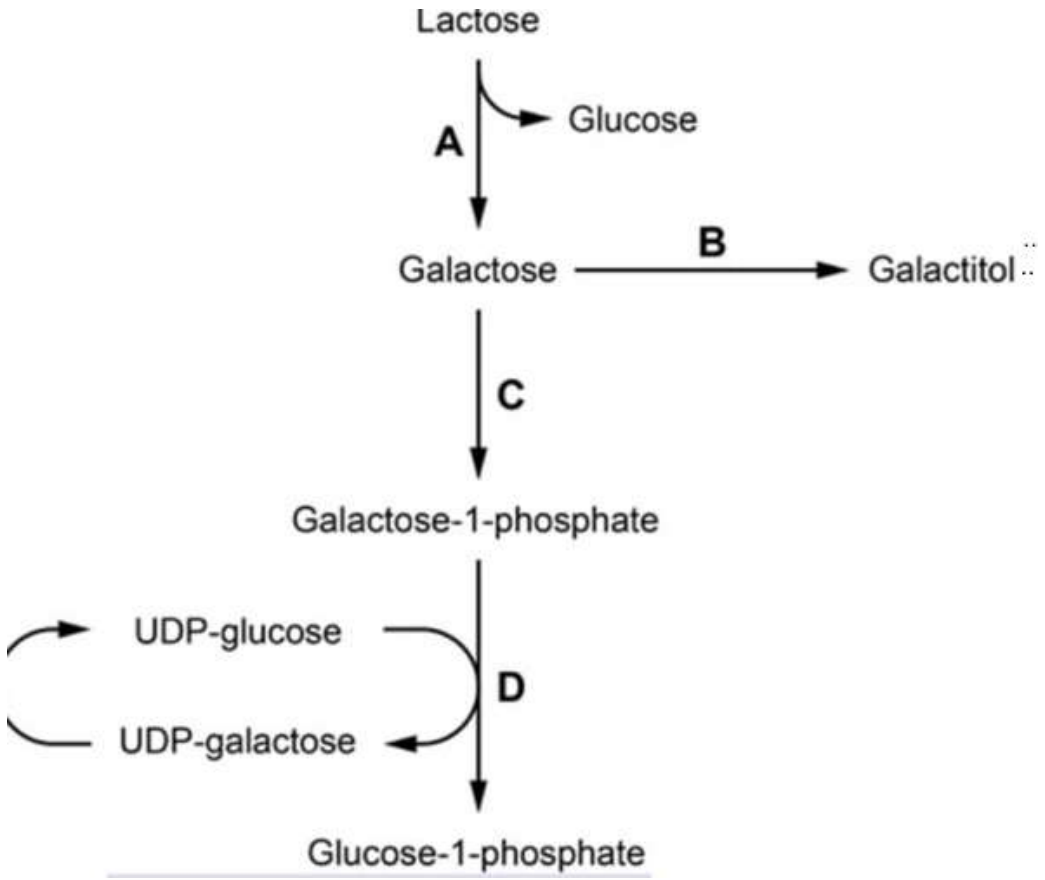
3. **SDS-PAGE** (sodium dodecyl sulfate-polyacrylamide gel **electrophoresis)**: It used to separate the desired protein based on molecular weight.

4. **Hybridization and blotting**: Western blotting techniques on nitrocellulose paper is done to confirm if isolated protein is the desired one.

5. **Protein elution** - Extraction of the produced protein.

46. A 5-day-old term newborn is brought to the emergency department for multiple episodes of emesis. The breastfed infant has been having fewer wet diapers over the last 2 days. Vital signs show tachycardia, tachypnea, and hypotension. Physical examination shows an icteric, lethargic baby with a sunken fontanelle, dry mucous membranes, and hepatomegaly. A blood culture is drawn, and empiric antibiotics are initiated. Serum studies show hypoglycemia and elevated transaminases. The ammonia level is normal. Preliminary results from arterial blood culture show gram-negative rods. The infant is placed on a special formula and gradually improves over the next few days. Which of the following steps in metabolism is most likely impaired in this patient?

A. A
B. B
C. C
D. D



47. Identify the gestational age of the fetus if the Crown Rump Length is 21 cm, length of lower limb is 10 cm, gestational age of the fetus will be:

A. 6 to 7 months
B. 4 to 5 months
C. 7 to 8 months
D. Term

48. Identify the incorrect statements:
1. Normally LDH 2 is predominant in the blood and LDH 1 is predominant in the heart. During a myocardial infarction, due to damage to the cardiac tissue, LDH 1 is released into the bloodstream resulting in a high LDH1:LDH2 ratio called flipped LDH ratio.
2. Consumption of polished rice leads to thiamine deficiency which leads to defective transketolase activity.
3. Zinc deficiency presents with erythematous scaly patches in the perioral region, mucosal ulcers, and impaired epithelial wound healing.
4. Copper deficiency presents with pigmentation of hair, hypothermia, degenerative changes in aortic elastin, osteopenia.

Options:

A. 1, 2, 3, 4

B. 3, 4

C. 2, 4

D. 1, 4

49. A 2-year-old boy is being evaluated for failure to thrive and developmental delay. His past medical history is significant for recurrent ear infections since age 6 months. Physical examination shows coarse facial features, corneal clouding, hepatosplenomegaly, and restricted joint mobility. Mass spectrometry analysis is performed on cultured fibroblasts and reveals deficient phosphorylation of mannose residues on certain glycoproteins in the Golgi apparatus. Normally, these proteins are most likely to be transported to which of the following cellular locations?

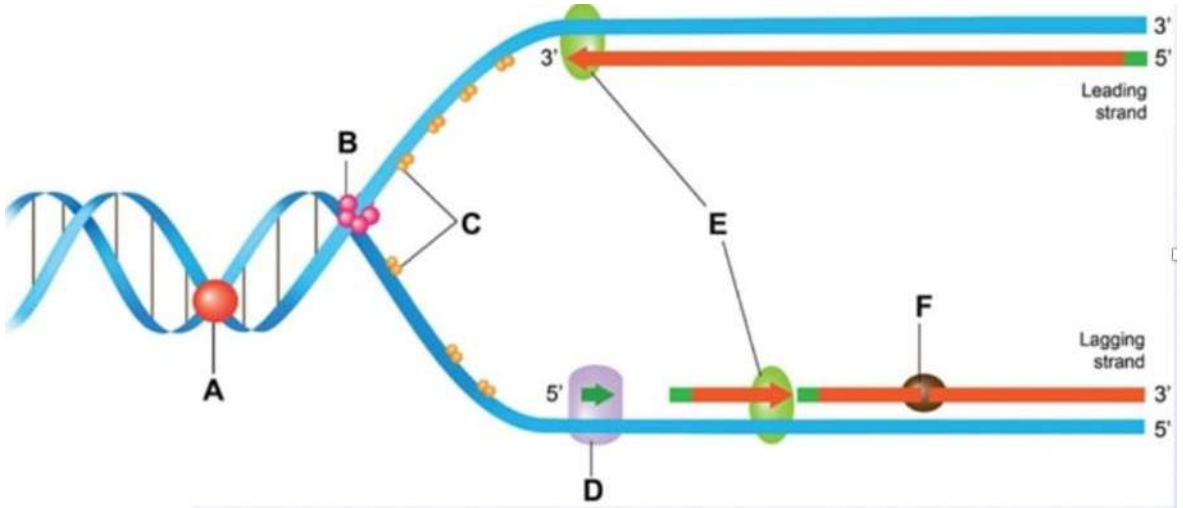
A. Extracellular space
B. Lysosome
C. Mitochondria
D. Nucleus

50. From early to late, which muscles develop rigor mortis?

A. Orbicularis oculi, facial muscles, thorax, upper limb
B. Orbicularis oculi, neck, facial muscles, upper limb, thorax
C. Neck, muscles of eyelid, upper limb, thorax
D. Neck, muscles of eyelid, facial muscles, thorax, upper limb

51. A 13-year-old boy with growth retardation, microcephaly, sun-sensitive skin rash, and recurrent infections is being evaluated for a possible inherited genetic defect. The patient is the second-born child of a first cousin marriage. His parents and siblings are healthy, but 2 of his maternal cousins have similar signs and symptoms. Genetic analysis of the patient reveals a defect in the BLM gene that codes for DNA helicase. Which of the following is the most likely site of action of this enzyme in the DNA replication fork shown?

A. A
B. B
C. C
D. D



52. Identify the false statement regarding teeth and ethnicity?

A. In Africanoids the cusps of molars are wide and deep with shovel shaped cusps in incisors

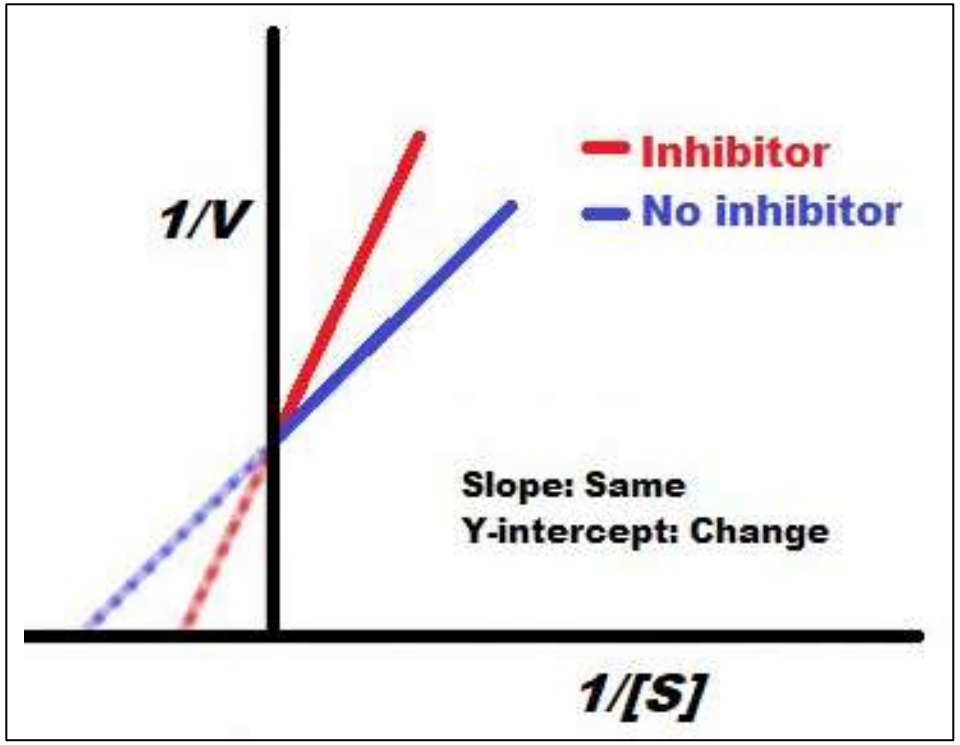
B. Caucasians have carabelli cusps

C. Upper third molar is most commonly absent in Mongolians

D. Prominent lingual ridge and labial ridge in mongols

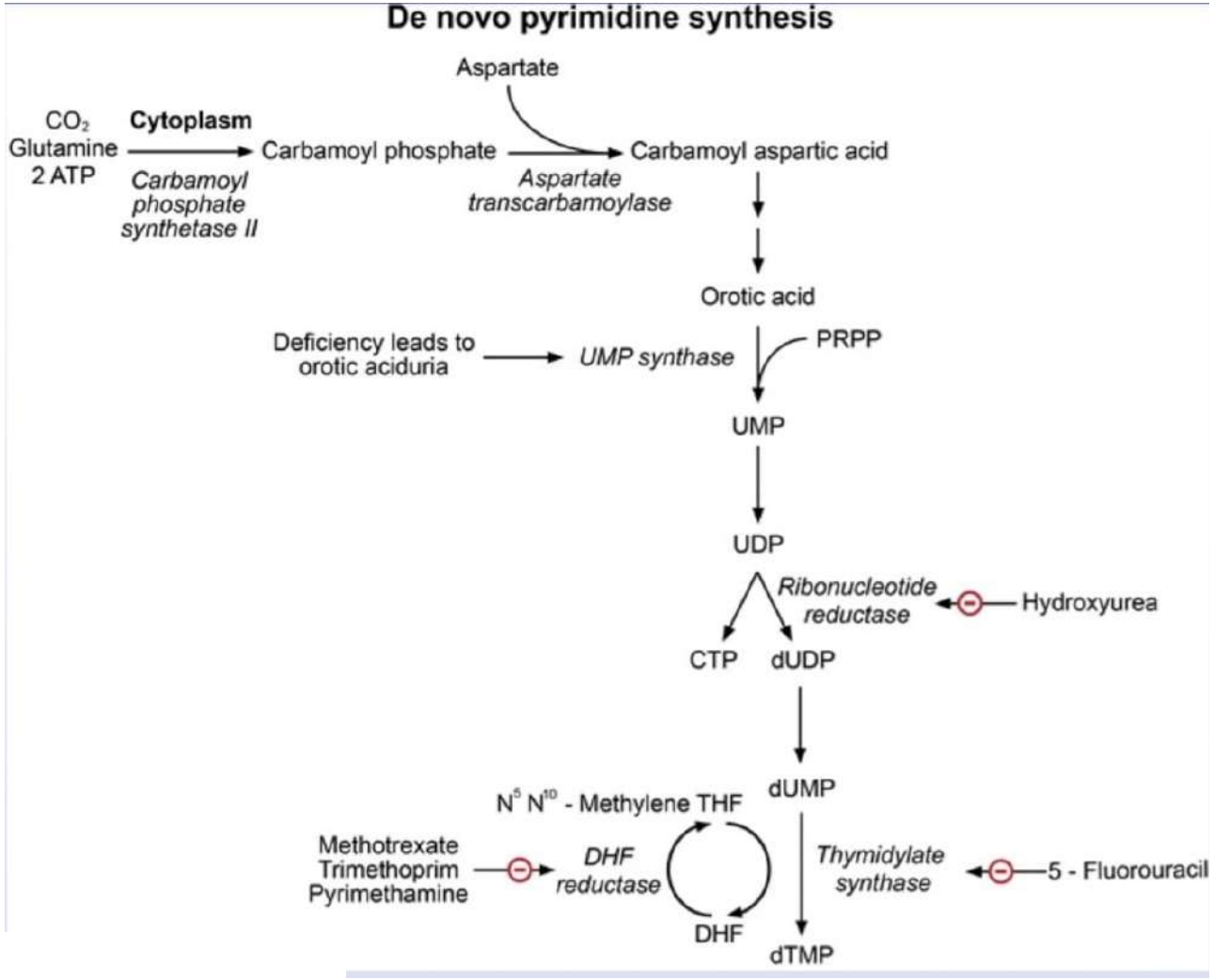
53. Which of the following types of inhibition is depicted in the given Lineweaver-Burk plot?

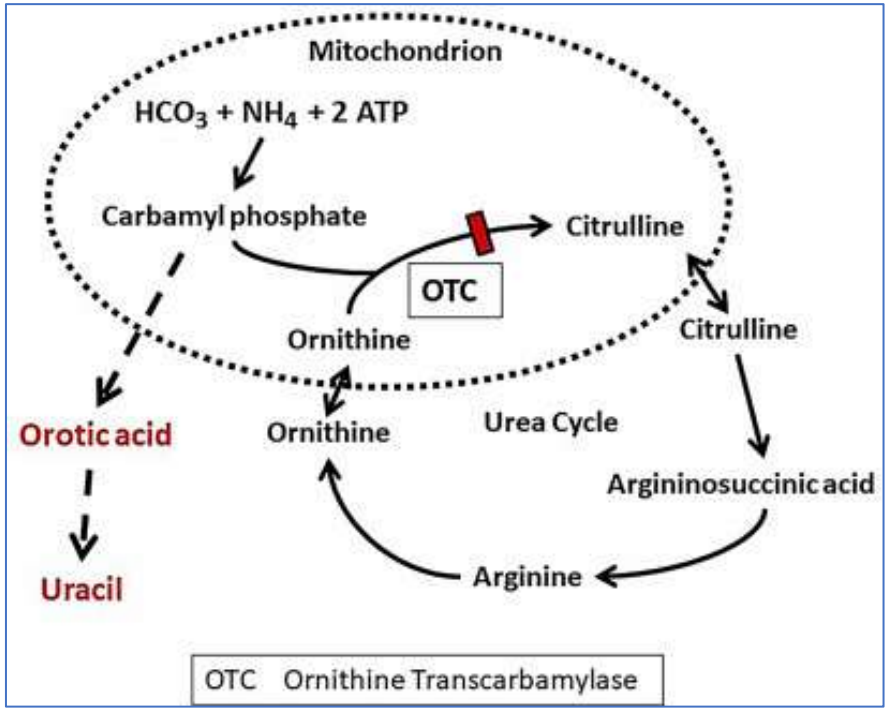
A. Competitive inhibition
B. Non-competitive inhibition
C. Uncompetitive inhibition
D. Suicidal inhibition



54. A 2-year-old boy is brought to the emergency department with fever, vomiting, and sleepiness. Since the newborn period, the parents say that the patient has had multiple similar episodes. Lab results revealed increased blood ammonia levels during these episodes and markedly increased orotic acid excretion in the urine. Physical examination shows a tachypneic boy who is unresponsive to all stimuli. Which of the following enzymes is most likely to be deficient in this patient?

A. Carbamoyl phosphate synthetase I
B. Hypoxanthine-guanine phosphoribosyltransferase
C. Ornithine transcarbamylase
D. Uridine monophosphate synthetase


De novo pyrimidine synthesis
Aspartate
CO_2
Glutamine
2 ATP
Cytoplasm
Carbamoyl phosphate
Carbamoyl aspartic acid
Carbamoyl phosphate synthetase II
Aspartate transcarbamoylase
Orotic acid
Deficiency leads to orotic aciduria
UMP synthase
PRPP
UMP
UDP
Ribonucleotide reductase
Hydroxyurea
CTP
dUDP
dUMP
N^5 N^{10} - Methylene THF
Methotrexate
Trimethoprim
Pyrimethamine
DHF reductase
DHF
Thymidylate synthase
5 - Fluorouracil
dTMP


Mitochondrion
$HCO_3 + NH_4 + 2$ ATP
Carbamyl phosphate
Citrulline
OTC
Ornithine
Citrulline
Orotic acid
Ornithine
Urea Cycle
Argininosuccinic acid
Uracil
Arginine
OTC Ornithine Transcarbamylase

55. Match the following:

1. Cocaine	a. Hunan hand
2. LSD	b. White lady
3. Abrus precatorius	c. Purple wedge
4. Capsaicin	d. Gunchi

A. 1=a, 2=b, 3=c, 4=d

B. 1=b, 2=c, 3=d, 4=a

C. 1=d, 2=a, 3=b, 4=c

D. 1=c, 2=d, 3=a, 4=b

56. A 4-month-old boy is being evaluated for a hereditary metabolic disorder after presenting with failure to thrive and developmental delay. He had several seizures during the neonatal period. Physical examination reveals an abnormal head shape with a large anterior fontanelle and widely splayed cranial sutures. Profound hypotonia and hepatomegaly are also noted. Biochemical studies show elevated levels of very long chain fatty acids (VLCFAs) and phytanic acid. Cultured skin fibroblasts show impaired ability to oxidize VLCFAs. This patient's condition is best explained by dysfunction of which of the following cellular structures?

A. Golgi apparatus

B. Lysosomes

C. Mitochondria

D. Peroxisomes

57. An 18-year-old man comes to the office due to a progressive skin rash over the past year. He also has a long-standing history of an intermittent burning sensation in his palms and soles that is exacerbated by stress and fatigue. The burning sensation is particularly severe after exercise, during which the patient notes that he sweats minimally. Laboratory evaluation reveals an undetectable level of a-galactosidase A. Which of the following conditions is this patient at greatest risk for developing?

A. Ataxia
B. Hepatomegaly
C. Optic atrophy
D. Renal failure

58. A child before playing consumed fruit from the garden. After some time, he developed a high fever, confusion, photophobia, and unable to urinate. What are the likely causative agent and the appropriate antidote used in this case?

A. Datura, Pralidoxime
B. Datura, Physostigmine
C. Yellow oleander, Pralidoxime
D. Yellow oleander, Physostigmine

59. Identify the correct statements:

1. Phosphatidylcholine is most abundant phospholipid in surfactant.
2. Cardiolipin is deficient in Barth syndrome.
3. Ceramidase deficiency is associated with Fabry disease.
4. Triglycerides are not amphipathic.

Options:

A. 1, 2, 3, 4

B. 1, 2, 4

C. 2, 3

D. 3, 4

60. A 5-month-old boy is brought to the office due to poor feeding. His mother says that he has difficulty holding his head up while breastfeeding and his suckling seems weaker than it used to be. Physical examination shows hepatomegaly and hypotonia in all 4 limbs. Cardiac auscultation reveals a gallop rhythm, and chest x-ray shows severe cardiomegaly. Muscle biopsy shows enlarged lysosomes containing periodic acid-Schiff (PAS}-positive material. Which of the following enzymes is most likely deficient in this patient?

A. Acid-glucosidase
B. Debranching enzyme
C. Galactokinase
D. Glucose-6-phosphatase

61. The method of autopsy carried out en masse to remove from tongue to prostate is?

A. Virchow technique
B. Rokitansky technique
C. Ghon technique
D. Letulle technique

62. Which of the following is not a substrate for glucose formation?

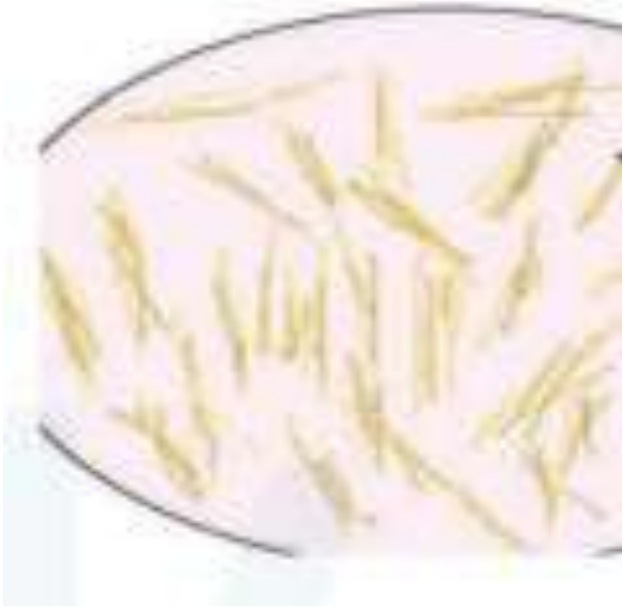
A. Acetyl coenzyme A
B. Glycerol
C. Alanine
D. Lactate

63. 45-year-old man is referred to an endocrinologist for newly diagnosed diabetes mellitus. A week ago, his primary care physician noted an elevated fasting serum glucose level. The endocrinologist discusses the different treatment options available, including oral and injectable medications. He recommends treatment with a medication that alters glucose metabolism within the liver by increasing the concentration of fructose 2, 6-bisphosphate within hepatocytes. Which of the following conversions will be inhibited by high intracellular concentrations of this metabolite?

A. Acetyl CoA to fatty acids
B. Alanine to glucose
C. Fructose-6-phosphate to fructose-1,6-bisphosphate
D. Glucose to glycogen

64. A 10-year-old male child came to the casualty with difficulty in walking and pain in the perianal region. On subjecting the specimen from the perianal region to a test, following appearance is seen under the microscope. What is the test done?

A. Barberio’s test
B. Florence test
C. Teichmann test
D. Acid phosphatase test



65. Which of the following statements are true regarding mitochondrial DNA?

1. Higher rate of mutations as compared to the nuclear genome.
2. Double-stranded circular DNA with about 16,000 base pairs
3. Constitutes 1% of cellular DNA.
4. Encodes for 20% of electron transport chain proteins.

Options:

A. 1, 3, 4

B. 1, 2, 3, 4

C. 2, 4

D. 2, 3

66. A research scientist studying the metabolic pathways that contribute to obesity, feeds experimental animals a high-carbohydrate, high-protein diet for a prolonged period. A sample of liver tissue is then obtained from the animals, and the activity of various enzymes involved in fatty acid metabolism is measured and recorded. It is determined that beta-oxidation of fatty acids is inhibited within these cells because of the diet. An increase in which of the following substances is most likely responsible for the observed effect?

A. Acetoacetate
B. Carnitine
C. Citrate
D. Malonyl-CoA

67. A death certificate is given below. What is the underlying cause of death in this case?

NAME OF DECEASED					For use of Statistical Office
Sex	Age at Death				
	If 1 year or more, age in years	If less than 1 year, age in month	If less than one month, age in days	If less than one day, age in hours	
3. Male 4. Female					
CAUSE OF DEATH I Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc. (a) Myocardial infarction due to (or as a consequences of) Antecedent cause (b) Bone mets due to (or as a consequences of) Morbid conditions, if any, giving rise to the above cause, stating underlying conditions last (c) Ca breast II Other significant conditions contributing to the death but not related to the disease or condition causing it Type 2 DM				Interval between onset and death approx.	

A. Type 2 diabetes mellitus
B. Myocardial infarction
C. Carcinoma breast
D. Metastasis to bone

68. The following documents are exceptions to oral evidence in court except:

A. Postmortem reports
B. Dying declaration
C. Reports of Fingerprint Bureau
D. Chemical Examiner's reports

69. A 36-year-old man comes to the OPD due to skin lesions on his palms. The patient has yellowish skin nodules over the palmar creases that have been increasing in size and number over the past several years. He also has small clusters of yellow papules on his elbows, knees, and buttocks. His father died of a myocardial infarction at age 56. Immunoblot analysis suggests a lack of ApoE3 and Apo E4 in his circulating lipoproteins. Which of the following is most likely impaired in this patient?

A. ApoC-II production
B. Cholesterol esterification in the blood
C. Chylomicron remnant uptake by liver cells
D. LDL particle uptake by hepatocytes

Hyperlipoproteinemias

Type	Inheritance	Pathogenesis	↑Blood level	Clinical
I-Hyper-chylomicronemia	AR	Lipoprotein lipase or ApoC-II deficiency	Chylomicrons, TG, cholesterol	Pancreatitis, eruptive/pruritic xanthomas
II- Familial hyper cholesterolemia	AD	Absent LDL receptors, or ApoB-100	IIa: LDL, cholesterol	Accelerated atherosclerosis, tendon (Achilles) xanthomas, and corneal arcus.
III-Dysbeta-lipoproteinemia	AR	Defective ApoE	Chylomicrons, VLDL	Premature atherosclerosis, tuberoeruptive and palmar xanthoma, Broad beta band
IV-Hyper-triglyceridemia	AD	Hepatic overproduction of VLDL	VLDL, TG	Acute pancreatitis

70. A 30-year-old individual diagnosed with schizophrenia commits an act that would otherwise be considered a criminal offense. The act was committed during a period of acute psychotic episode. The individual's medical history indicates sporadic adherence to rescribed antipsychotic medication. The prosecution has charged the individual with the offense. Based on the provided information, which of the following statements is most accurate regarding the applicability of Section 84 of IPC in this case?

A. The accused cannot invoke Section 84 since the act was committed while not adhering to prescribed medication.

B. Section 84 applies as the offence was committed during psychotic episode, regardless of medication adherence.

C. Section 84 is inapplicable due to the sporadic nature of the individual's symptoms.

D. The accused can only invoke Section 84 if the act was committed during a state of complete unconsciousness.

71. A 46-year-old man comes to the emergency department due to recurrent nosebleeds. He has been placed in homeless shelters on multiple occasions but has not remained there for any prolonged periods. Physical examination shows swollen gums, scattered ecchymoses, and hyperkeratosis. He also has a chronic ulcer on the left lower extremity that does not appear to be infected. Which of the following mechanisms accounts for this patient's examination findings?

A. Abnormal oxidative decarboxylation of ketoacids
B. Abnormal proline hydroxylation
C. Abnormal transamination
D. Deficient methionine synthesis

72. 31-year-old previously healthy man comes to the OPD due to myalgias, anorexia, and skin rash. The patient works as a personal trainer and is a bodybuilding enthusiast. He denies using anabolic steroids but has been consuming large amounts of raw egg whites for the past several months. Physical examination shows macular dermatitis of the extremities. A water-soluble vitamin deficiency is suspected as the cause of his condition. Which of the following biochemical conversions most likely uses the deficient vitamin as a cofactor?

A. Glucose to ribose-5-phosphate
B. Pyruvate to acetyl-CoA
C. Pyruvate to alanine
D. Pyruvate to oxaloacetate

73. Match the following with the correct toxin:

A. Arsenic
B. Cadmium
C. Thallium
D. Phosphorus
E. Mercury
F. Lead

A. 1-A, 2-B, 3-C, 4-D

B. 1-F, 2-D, 3-A, 4-B

C. 1-A, 2-D, 3-C, 4-B

D. 1-F, 2-D, 3-C, 4-B

74. Which of the following is seen in low insulin: glucagon ratio?

A. Activation of lipoprotein lipase
B. Activation of glycogen synthase
C. Activation of phosphofructokinase 1
D. Activation of hormone-sensitive lipase

75. A 6-month-old girl is brought to the OPD by her mother for a checkup appointment. Physical examination shows hepatomegaly, hypotonia, and height and weight below the 10th percentile. Laboratory studies show hypoglycemia and ketoacidosis. A liver biopsy shows hepatic fibrosis without fat accumulation. Further analysis reveals abundant quantities of a multibranched polysaccharide with abnormally short outer chains within the cytosol of the hepatocytes. What is the likely diagnosis?

A. Pompe disease
B. Cori disease
C. Anderson disease
D. Tarui disease

76. A woman gave birth to twins belonging to two different fathers. This case would be best described as?

A. Superfetation
B. Superfecundation
C. Supposititious child
D. Atavism

77. Match the following

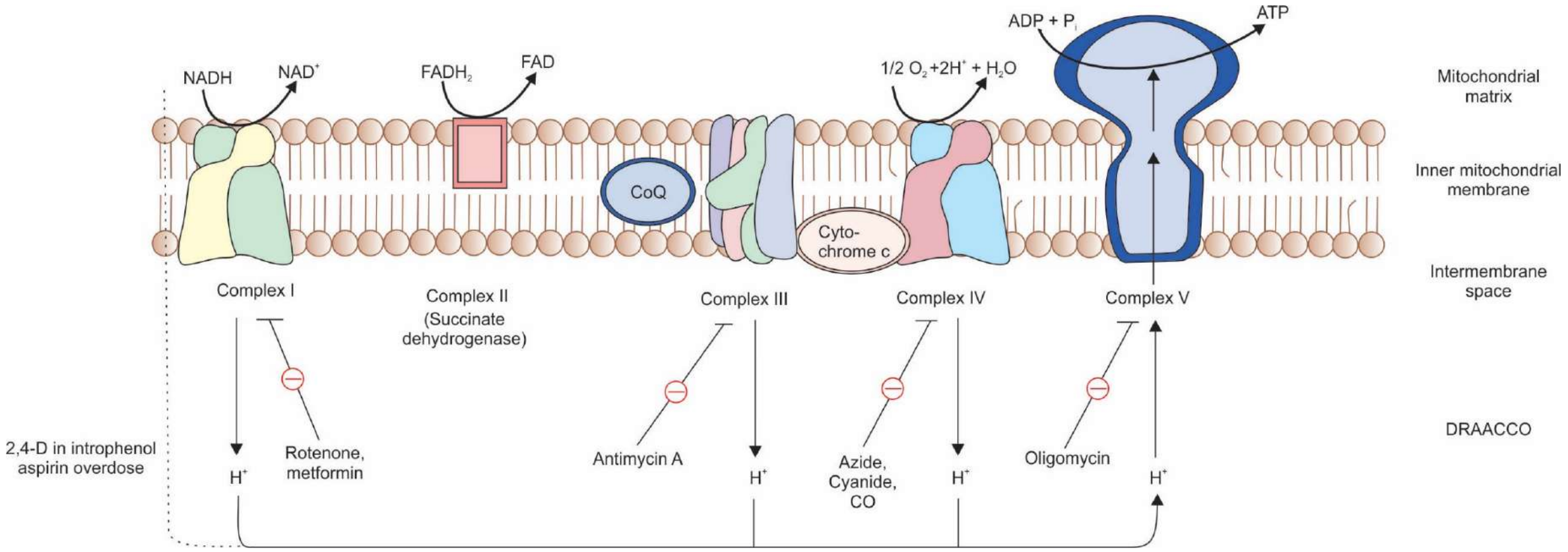
1. Increased H+ ions in the intermembrane space of mitochondria	A. Hydrogen sulphide
2. Inhibition of cytochrome oxidase	B. Malonate
3. Inhibition of Vit B2-derived substrate	C. Oligomycin
4. Inhibition of Vit B3-derived substrate	D. 2,4-Dinitrophenol
5. Allows electron transport but no ATP synthesis	E. Rotetone

A. 1-E, 2-A, 3-D, 4-B, 5-C

B. 1-C, 2-A, 3-B, 4-E, 5-D

C. 1-B, 2-C, 3-D, 4-E, 5-A

D. 1-C, 2-B, 3-E, 4-A, 5-D


NADH
NAD+
FADH2
FAD
ADP + Pi
ATP
1/2 O2 +2H+ + H2O
Mitochondrial matrix
Inner mitochondrial membrane
Intermembrane space
CoQ
Cyto-chrome c
Complex I
Complex II (Succinate dehydrogenase)
Complex III
Complex IV
Complex V
2,4-D in introphenol aspirin overdose
Rotenone, metformin
Antimycin A
Azide, Cyanide, CO
Oligomycin
H+
H+
H+
H+
DRAACCO

78. A 6-month-old boy is brought to the emergency department by his mother because of recent onset of vomiting, irritability, and jaundice. The infant was born at term and had been healthy until the onset of these symptoms. All his vaccinations are up to date. He had been breast-fed exclusively until 1 week ago, when cereals and fruit juices were introduced into his diet. Further evaluation reveals hepatomegaly and abnormal liver function tests. Which of the following enzymes is most likely to be deficient in this patient?

A. Galactose- 1-phosphate uridyl transferase
B. Aldolase B
C. Fructokinase
D. Galactokinase

79. Match the following:

1.	A 51-year-old bomb blast victim is brought to the casualty with life-threatening injuries. There was a lot of chaos and no one was available to sign consent for emergency surgery. Despite surgery the patient died.	A.	Res Ipsa loquitor
2.	A gynecologist performs a hysterectomy for endometrial carcinoma. Despite the adequate precaution, the ureter was injured intraoperatively.	B.	Criminal negligence
3.	A surgeon returns home from a party after many pegs of alcohol and was called to perform an emergency operation. During the operation, the assisting staff noticed the surgeon's hand shaking and instruments falling. He eventually nicks an artery and the patient collapses. Under which of the following terms will this incident be tried?	C.	Doctrine of anticipation
4.	A 45-year-old female patient is told about the benefits and complications of hysterectomy and she agrees to the procedure	D.	Doctrine of extended consent
		E.	Doctrine of conjugated consent
		F.	Novus actus interveniens
		G.	Medical maloccurrence
		H.	Dichotomy
		I.	Informed consent
		J.	Implied consent

Options:

A. 1-F, 2-G, 3-B,4-I

B. 1-D,2-H,3-A, 4-J

C. 1-C, 2-G, 3-B, 4-I

D. 1-C, 2-A, 3-F, 4-D

80. A 35-year-old female is hospitalized with headaches and vomiting. She has a long history of psychiatric illness and is known to practice eccentric. dietary habits. Physical findings include papilledema, dry skin, and hepatosplenomegaly. Head CT scan is ordered immediately but is negative for intracranial mass. Which of the following is a likely cause of this patient's condition?

A. Thiamine deficiency
B. Riboflavin deficiency
C. Vitamin C overuse
D. Vitamin A overuse

81. A 14-year-old boy is brought to the emergency department due to excessive urination and thirst. He has lost 4.5 kg in the last 3 weeks. Physical examination shows dry mucous membranes. Laboratory studies reveal blood glucose of 455 mg/dl, normal anion gap, and hemoglobin A1 c of 11.3%. The patient is diagnosed with type 1 diabetes, and treatment with insulin is initiated. In addition to lowering blood glucose, insulin increases glycogen synthesis in hepatocytes. Activation of which of the following molecules most likely promotes this metabolic effect?

A. Janus kinase (JAK)
B. Phospholipase C
C. Protein kinase A
D. Protein phosphatase

82. Identify the true statements:

1. Dimercaprol + Calcium EDTA is recommended for acute Lead poisoning with signs of encephalopathy.
2. Dimercaprol is indicated in acute arsenic poisoning.
3. Activated charcoal is indicated in phenobarbital, aspirin, alcohol toxicity.
4. Prazosin is the DOC for autonomic storm following scorpion bite.

Options:

A. 1, 2, 3, 4

B. 1, 2, 4

C. 3, 4

D. 2, 4

CHELATORS:
BAL-
DMSA/Succimer-
D-penicillamine-
EDTA-
Desferioxamine-

83. Match the following plants

Options:

A. 1-A, 2-E, 3-D, 4-C

B. 1-A, 2-C, 3-D, 4-E

C. 1-F, 2-C,3-D, 4-E

D. 1-F, 2-B, 3-E, 4-D

1. 	A. Erythroxylum coca
2. 	B. Datura
3. 	C. Digitalis Purpura
4. 	D. Cannabis
	E. Aconite
	F. Atropa belladonna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84. 4-day-old infant is brought to the emergency department with abnormal movements. The patient has had intermittent episodes of tonic posturing over the past 3 hours as well as poor feeding, vomiting, and irritability for the past 2 days. The mother also reports that his diapers smell like "caramelizing sugar." Laboratory studies of plasma and urine confirm the diagnosis. In addition to appropriate dietary restriction, supplementation with which of the following may improve this infant's condition?

A. Arginine
B. Cobalamin
C. Pyridoxine
D. Thiamine

85. Identify the type of physical restraint given in the picture below:

A. Choke/carotid hold
B. Carotid sleeper hold
C. Hog tie
D. Bar arm

86. Identify the true statements:

1. Xanthurenic aciduria arises due to a deficiency in vitamin B6
2. Steroid synthesis requires abundant SER in cells
3. Liver lacks the ability to utilize ketone bodies due to deficiency of Thiolase
4. Proteins have the highest thermic effect

Options:

A. 1, 2, 3, 4

B. 1, 2, 4

C. 2, 4

D. 3

87. 46-year-old obese man is referred to a dietitian for evaluation of his food intake. He has been trying to lose weight but has been unsuccessful. The patient is 172.7 cm (5 ft 8 in) tall and weighs 113 kg. Analysis of his food intake shows that he is consuming 3600 Calories a day. The dietitian recommends increasing physical activity and implementing a dietary plan. In the first phase, the patient is advised to reduce his daily dietary intake to 3,000 Calories, with 30% coming from protein. How much protein per day will this patient consume on the new dietary plan?

A. 130 g
B. 160 g
C. 180 g
D. 225 g

88. Identify the true statements:
1. In case of professional misconduct, the patient's records on demand should be provided within 72 hours.
2. The First-hand knowledge rule is applicable to common witness
3. Postmortem caloricity is seen in death due to burns
4. The test in which weight of lungs is compared with body weight is Ploucquet's Test

Options:

A. 1, 2, 3, 4

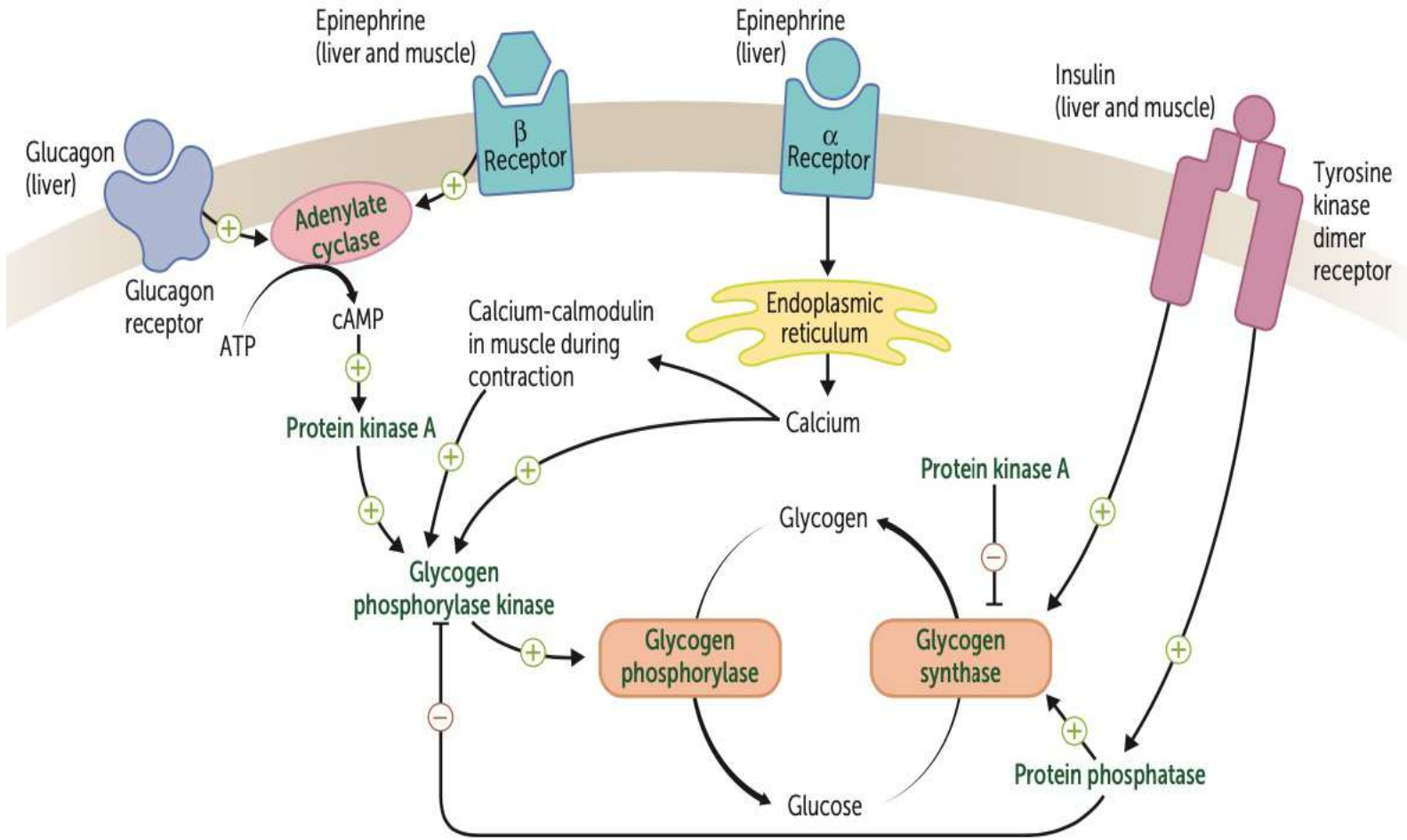
B. 1, 2, 4

C. 2, 4

D. 2

89. 31-year-old man comes to the OPD for a routine checkup. The patient is a fitness trainer and lifts weights recreationally. He has been consuming carbohydrate-rich food prior to his weightlifting sessions and claims that it increases muscle strength. A literature review shows that the rate of glycogenolysis within myocytes increases several hundredfold during active skeletal muscle contraction. Which of the following substances is most likely responsible for increasing the reaction rate during active contraction?

A. ATP
B. Ca2+
C. cAMP
D. Glucose-6-phosphate


Epinephrine
(liver and muscle)
β
Receptor
Epinephrine
(liver)
α
Receptor
Insulin
(liver and muscle)
Tyrosine
kinase
dimer
receptor
Glucagon
(liver)
Glucagon
receptor
Adenylate
cyclase
ATP
cAMP
Calcium-calmodulin
in muscle during
contraction
Endoplasmic
reticulum
Protein kinase A
Calcium
Protein kinase A
Glycogen
Glycogen
phosphorylase kinase
Glycogen
phosphorylase
Glycogen
synthase
Protein phosphatase
Glucose

90. Leading Questions are permitted in all except:

A. Cross Examination
B. Dying Deposition
C. Hostile witness
D. Re-examination

91. Which of the following enzymes use selenocysteine?

1. Glutathione peroxidase
2. Glutathione synthase
3. Deiodinase
4. Thioredoxin reductase

Options:

A. 1, 3, 4

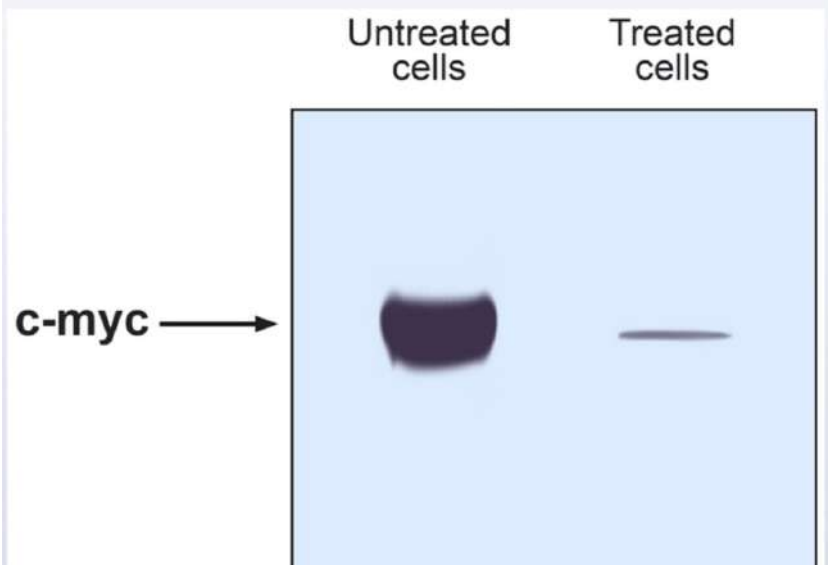
B. 1, 2, 3

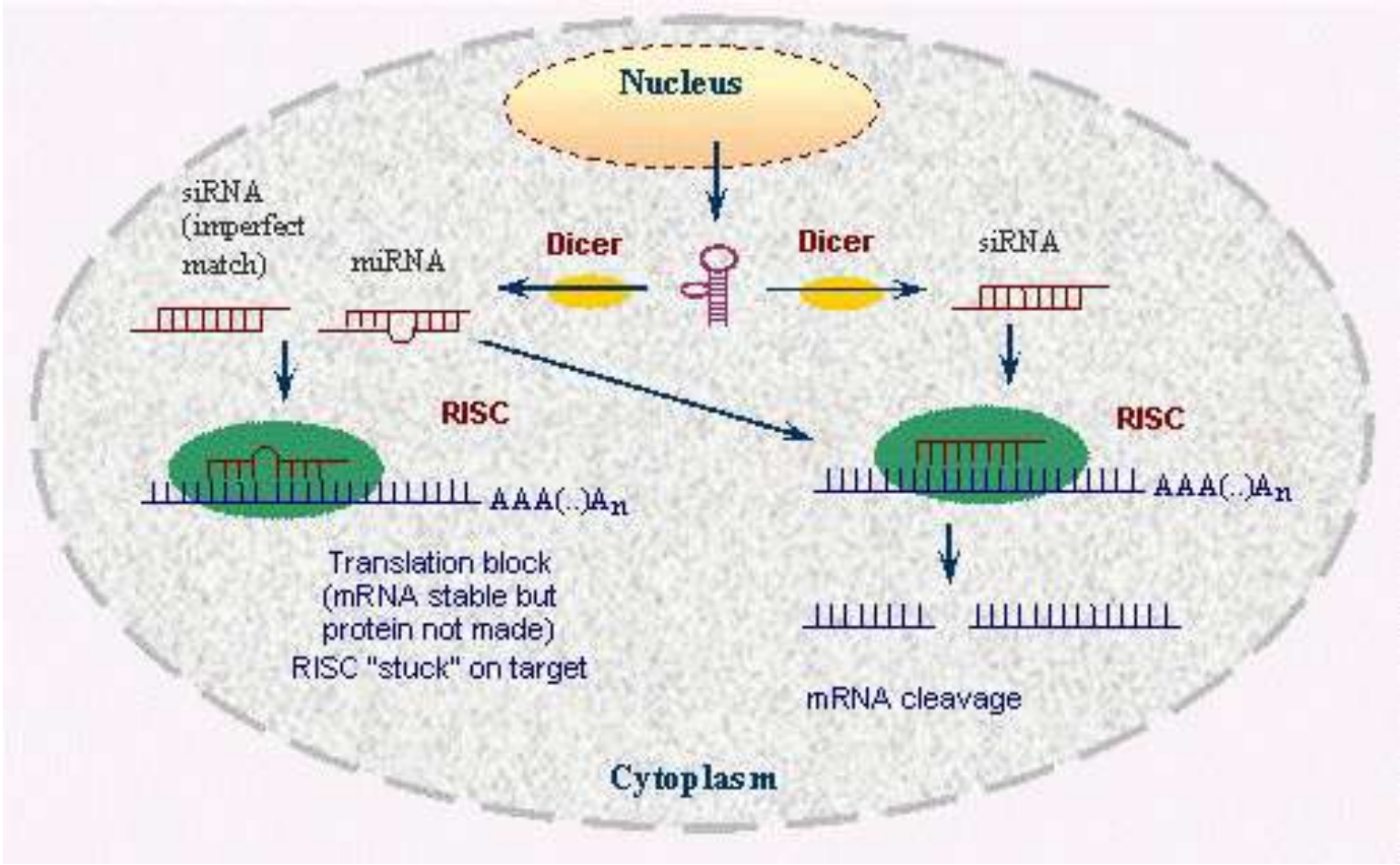
C. 2, 3, 4

D. 1, 2, 4

92. A pharmaceutical corporation investigating new therapeutic agents for treatment of Burkitt lymphoma synthesizes a double-stranded RNA molecule that is 21 base pairs in length. The RNA molecule has a base pair sequence that is complementary to a region of mRNA encoding c-Myc. Introduction of the RNA molecule into tumor cells results in a significant reduction in cell growth. Western blot analysis of equivalent numbers of treated and untreated cells is shown below. Which of the following processes was most likely directly interrupted in the cells exposed to the RNA molecule?

A. DNA replication
B. DNA transcription
C. mRNA translation
D. Proteasome activity




Nucleus
siRNA
(imperfect
match)
miRNA
Dicer
Dicer
siRNA
RISC
RISC
AAA(..)An
AAA(..)An
Translation block
(mRNA stable but
protein not made)
RISC "stuck" on target
mRNA cleavage
Cytoplasm

93. Identify the range of the firearm wound:

A. Close shot entry wound
B. Contact shot entry wound
C. Distant shot entry wound
D. Intermediate shot entry wound

94. Identify the true statements:

1. Tm of DNA increases with more G-C
2. DNA fingerprinting is used to detect DNA-protein interaction.
3. Best method for detection of mutations with low allele frequency is Droplet digital PCR.
4. The repair mechanism associated with CRISPR-Cas9 is base excision repair.
5. miRNA binds to 3' UTR to inhibit translation.

Options:

A. 1, 2, 3, 4, 5

B. 1, 2, 4, 5

C. 1, 3, 5

D. 2, 4

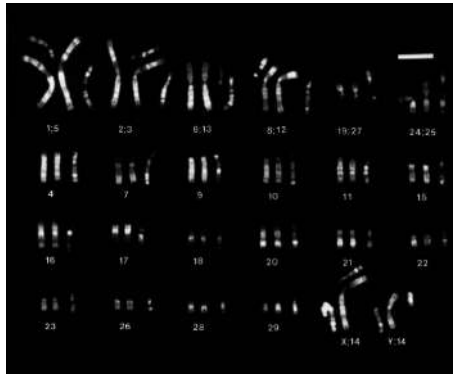
95. A 3-year-old boy is brought to the physician by his parents because he has not yet begun to walk or speak. Assessment of his developmental milestones shows severe intellectual disability. He dies 6 months later from refractory seizures resulting in respiratory failure. Autopsy shows pallor of the substantia nigra, locus ceruleus, and vagal nucleus dorsalis. The underlying condition responsible for this patient's death is most likely caused by a deficiency of which of the following enzymes?

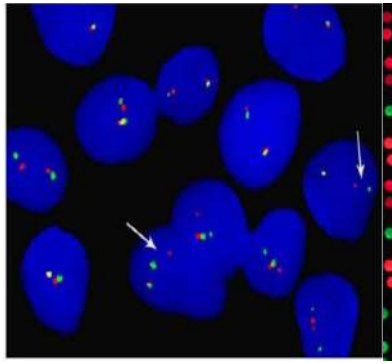
A. Branched chain ketoacid dehydrogenase
B. Dopamine hydroxylase
C. Homogentisic acid oxidase
D. Phenylalanine hydroxylase

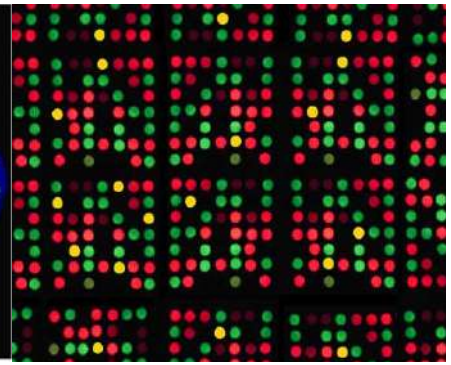
96. A 33-year-old male with attempted poisoning was brought to the casualty in a drowsy state. His pulse was 140/min, respiratory rate - 30/min. His ABG showed metabolic acidosis. Urine analysis showed Calcium oxalate crystals. Identify the likely poison?

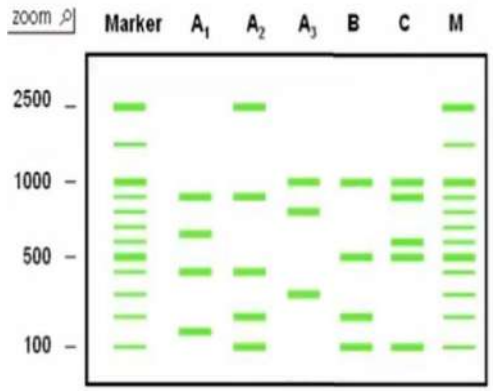
A. Formaldehyde
B. Ethylene glycol
C. Paraldehyde
D. Methyl alcohol

97. Match the following techniques:









A.	G-Banded Karyotype
B.	**C-Banded Karyotype**
C.	**Q-banded Karyotype**
D.	**FISH**
E.	**RFLP**
F.	**FELUDA**
G.	**NGS**
H.	**CGH**
I.	**RT-PCR**

A. 1-A, 2-E, 3-G, 4-E

B. 1-B, 2-D, 3-H, 4-F

C. 1-C, 2-D, 3-H, 4-E

D. 1-D, 2-A, 3-G, 4-I

98. An 8-month-old girl is brought to the office for evaluation of irritability and regression of motor skills. Her parents have also noticed that she startles easily with loud noises. Head circumference measurement is consistent with macrocephaly. Bilateral funduscopic evaluation shows a bright red fovea centralis that is surrounded by a contrasting white macula. Peripheral vision is decreased. Abdominal examination is normal. Accumulation of which of the following metabolites is most likely present in this patient's tissues?

A. Galactocerebroside
B. Glucocerebroside
C. GM2 ganglioside
D. Sphingomyelin

99. Identify the incorrect pair:

A. 313 – Criminal abortion without the consent of mother

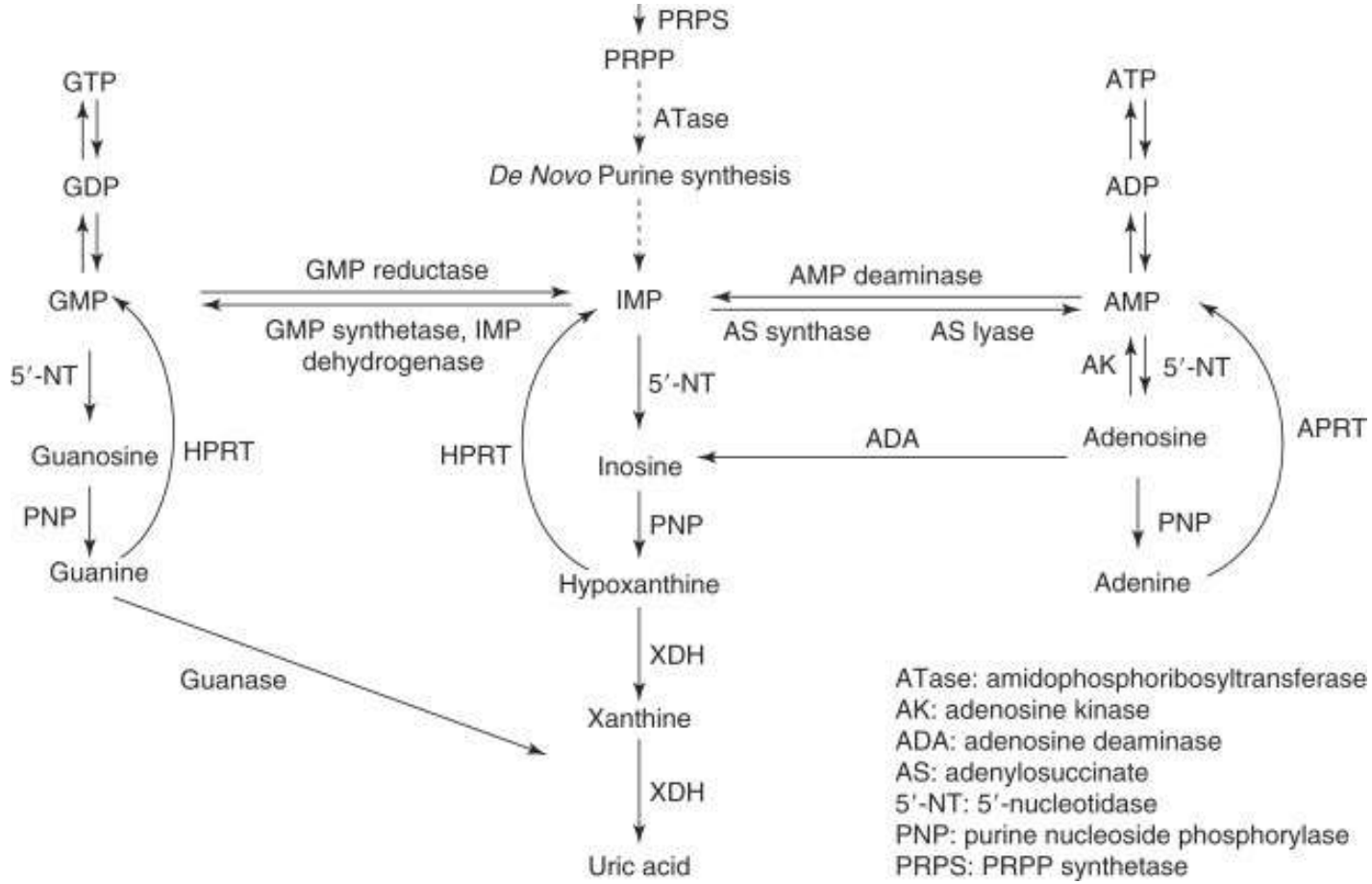
B. 314 – Death of mother during criminal abortion

C. 318 - Concealing the birth of a newborn by secret disposal of dead body

D. 193 IPC: Definition of Perjury

100. A 6-month-old boy is brought to the OPD by his mother out of concern that he is not developing normally. He has been feeding regularly and has had no medical problems other than a mild respiratory infection a month earlier. Physical examination reveals delayed developmental milestones and hypotonia. Two years later, the child is found to have involuntary movements and demonstrates a tendency to aggressively bite his own lips and fingers. Laboratory analysis shows an elevated blood uric acid level. Activity of which of the following enzymes is most likely increased because of this patient's condition?

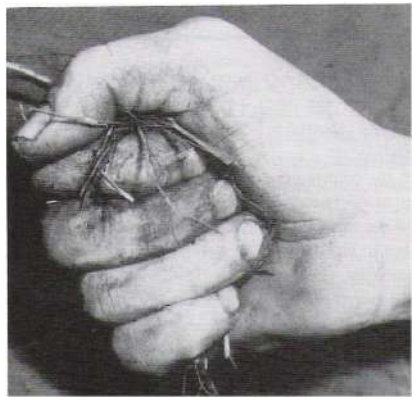
A. Aspartate carbamoyl transferase
B. Dihydroorotase
C. Hypoxanthine-guanine phosphoribosyl transferase
D. Phosphoribosyl pyrophosphate amido transferase


PRPS
PRPP
ATase
De Novo Purine synthesis
GTP
GDP
GMP
5′-NT
Guanosine
HPRT
PNP
Guanine
GMP reductase
GMP synthetase, IMP dehydrogenase
IMP
5′-NT
HPRT
Inosine
PNP
Hypoxanthine
XDH
Xanthine
XDH
Uric acid
Guanase
AMP deaminase
AS synthase
AS lyase
ATP
ADP
AMP
AK
5′-NT
ADA
Adenosine
PNP
Adenine
APRT
ATase: amidophosphoribosyltransferase
AK: adenosine kinase
ADA: adenosine deaminase
AS: adenylosuccinate
5′-NT: 5′-nucleotidase
PNP: purine nucleoside phosphorylase
PRPS: PRPP synthetase

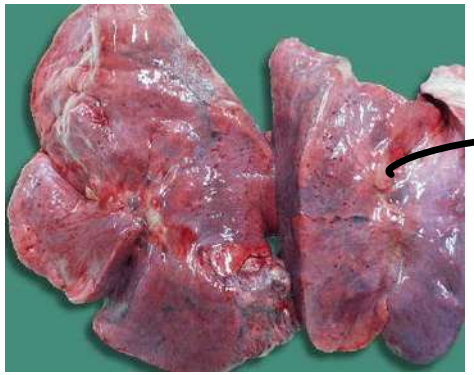
1. A 58-year-old man comes to the OPD due to a one-month history of progressive dyspnoea, generalized weakness, fatigue, and palpitations. He also reports tingling and numbness in both lower limbs. His daughter adds that since his wife's death a year ago, the patient has not been taking care of himself. Blood pressure is 105/50 mm Hg and pulse is 104/ min. Cardiovascular examination shows a displaced apical impulse at the sixth intercostal space, a third heart sound, and high-volume, collapsing carotid pulses. Bilateral basal crackles, 2+ bilateral pedal edema, and mild hepatomegaly are also present. Neurologic examination shows decreased light touch and vibration sense in the feet, with decreased knee and ankle reflexes bilaterally. Laboratory evaluation shows normal blood counts. Deficiency of which of the following nutrients is most likely responsible for this patient's symptoms?

A. Ascorbic acid
B. Cobalamin
C. Niacin
D. Thiamine

2. An autopsy was performed on a woman who was reportedly discovered near a village lake. All the following indicate antemortem drowning except:



A.

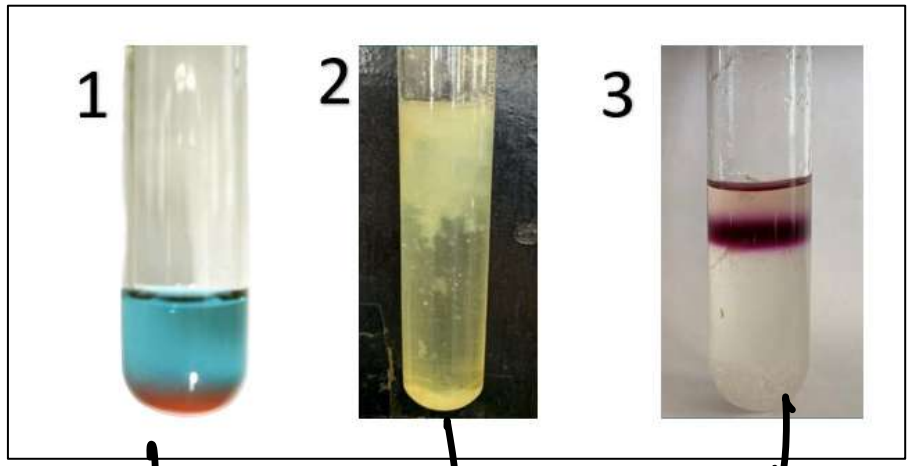


B.

C.

D.

3. Which of the following tests will be positive in the urine of a patient who has undergone prolonged starvation?



KB ↑

Benedict (red sugars)

Δ prot

Roltera

A. 1 and 3 → DKA

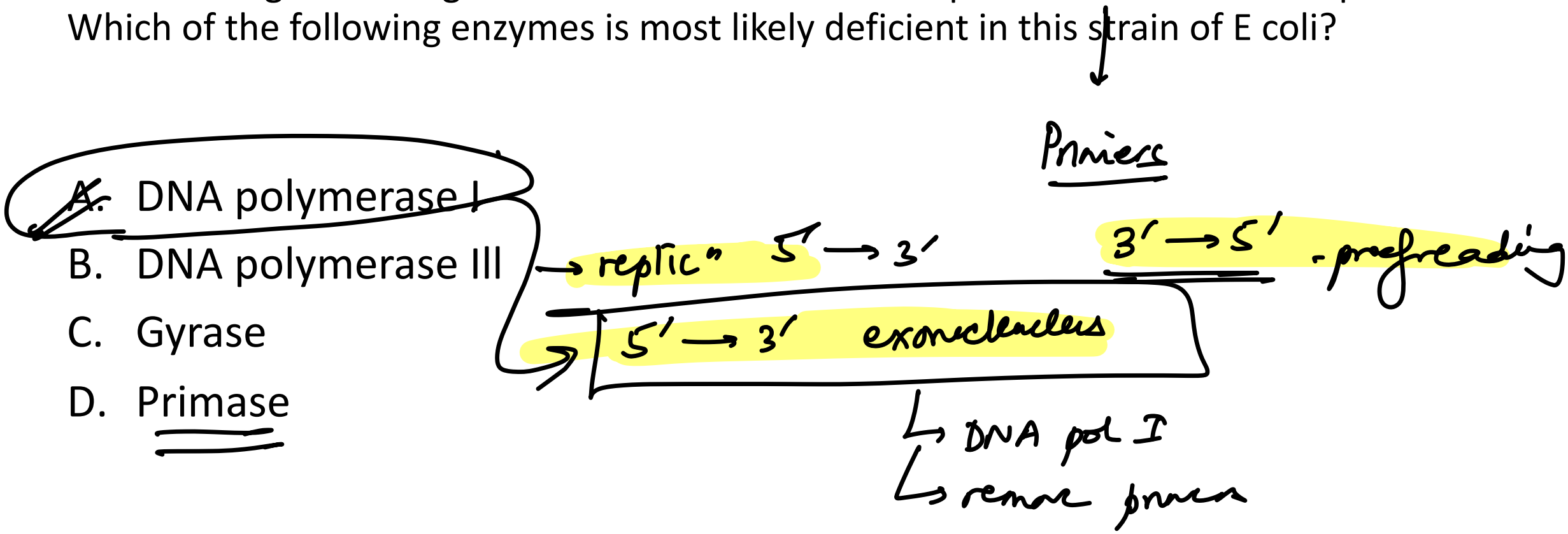
B. Only 3 → BHB -ve

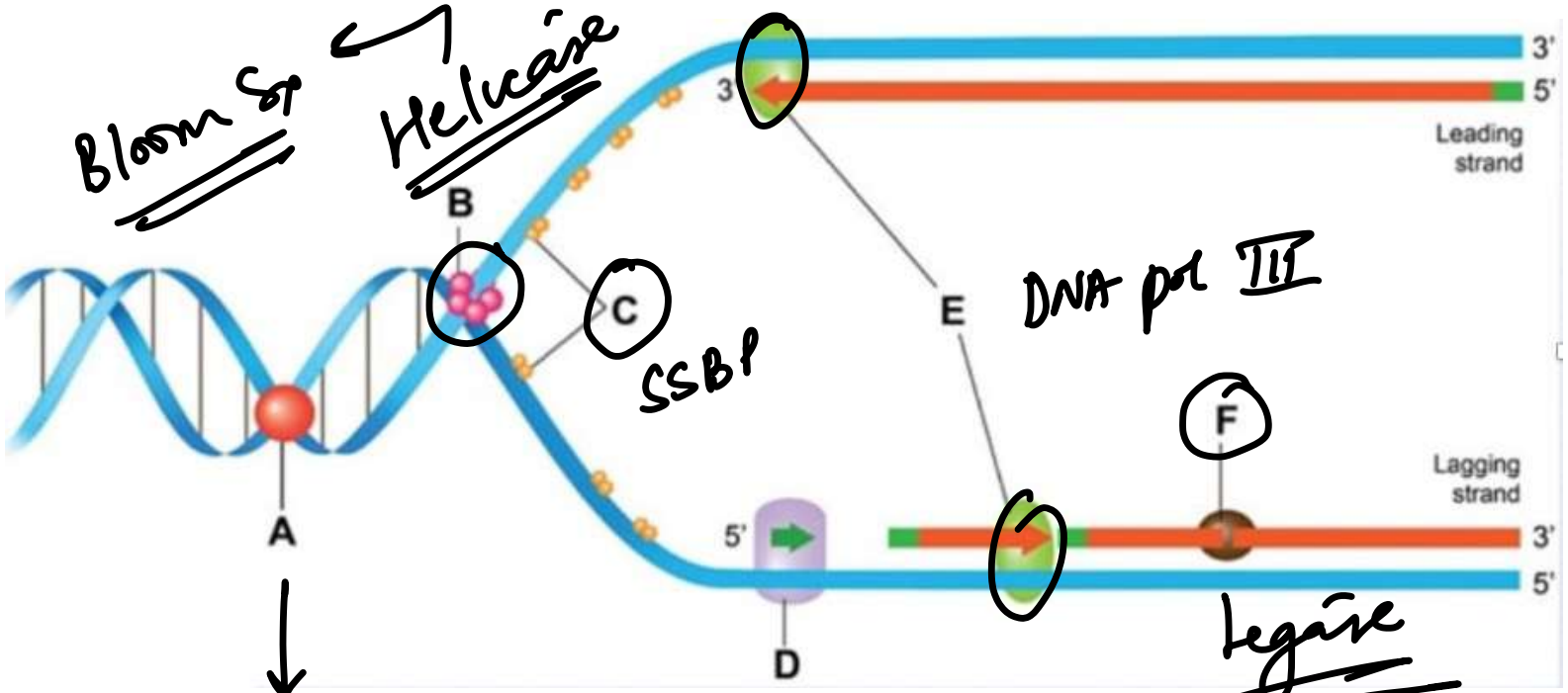
C. 1, 2 and 3

D. 1 and 2

4. A microbiologist performs a genetic experiment in which cultures of Escherichia coli are treated with a chemical that induces a high frequency of mutations. Individual bacterial colonies are isolated to identify a mutant strain that lacks a specific enzyme involved in DNA replication. This specific enzyme is responsible for removing short fragments of RNA that are base paired to the DNA template. Which of the following enzymes is most likely deficient in this strain of E coli?

A. DNA polymerase I
B. DNA polymerase III
C. Gyrase
D. Primase





Bloom Syn ← Helicase

SSBP

DNA pol III

Legase

Topo II / Gyrase

Primer

FQ⊖

5. “Do-It right” for first aid includes all except:

A. Reassure the patient
B. Immobilise the limb.
C. Apply tight torniquet to block arterial circulation of venom.
D. Get to hospital immediately.

CARRY NO RIGHT

No tight tourniquet/incision/cautery/sucking/coffee/alcohol

R-Reassure

I-Immobilize

G-Go to

H-Hospital

T-Tell symptoms

Measures that can be taken in the case of snakebite:

- Immediately apply a broad firm bandage (Sutherland wrap on the bitten area and around the limb. As much of the limb should be bandaged as possible. It should be tight enough to occlude the superficial venous and lymphatic return, but not the arterial or deep venous flow. A pressure of 50 to 70 mm Hg is maintained.

Measures contraindicated in the case of snakebite:

- Suction and incision of the wound
- Electric shock treatment of wound site
- Application of tourniquets because they obstruct arterial flow and cause ischemia
- Ice water immersion of the bitten limb
- Do not attempt to kill or catch the snake as it may be dangerous.
- Administration of AS locally at the wound site.
- Herbal/local remedies

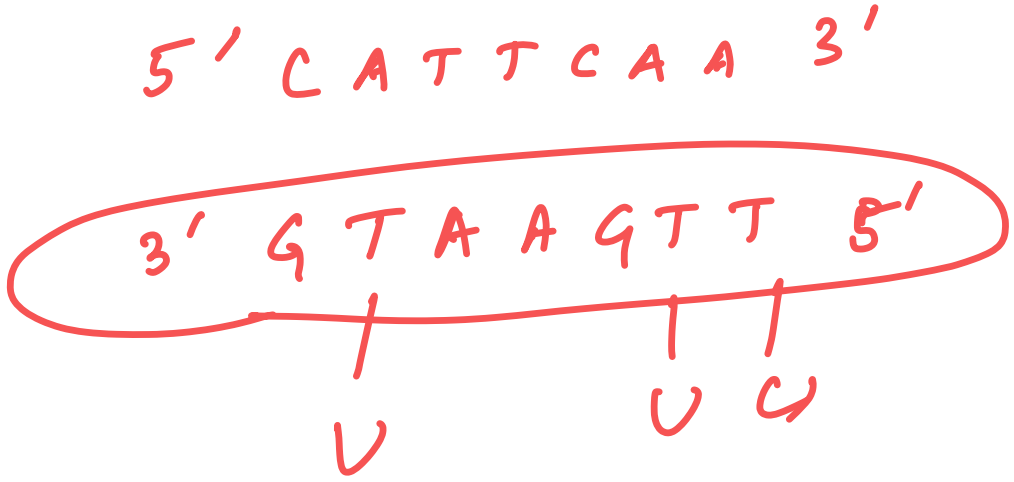
6. The initial template DNA strand reads as follows: 5' CATTCAATATCGATC 3'. What would be the resulting mRNA sequence after transcription?

A. 3’ GAUCGAUAUUGAAUA 5'

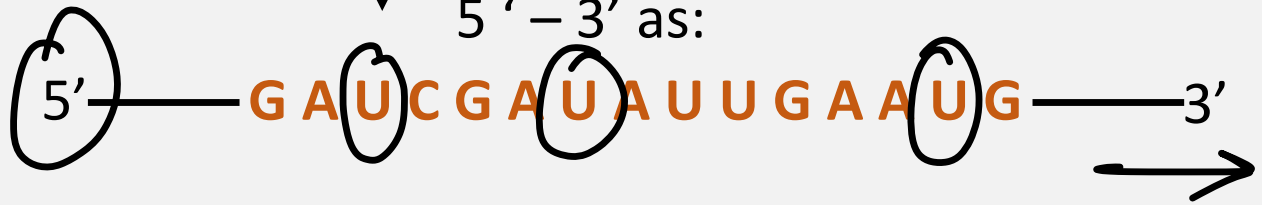
B. 5’ GATCGATATTGAATUT 3'

C. 5’ GAUCGAUAUUGAAUG 3'

D. 3’ GATCGATATTGAATU 5'

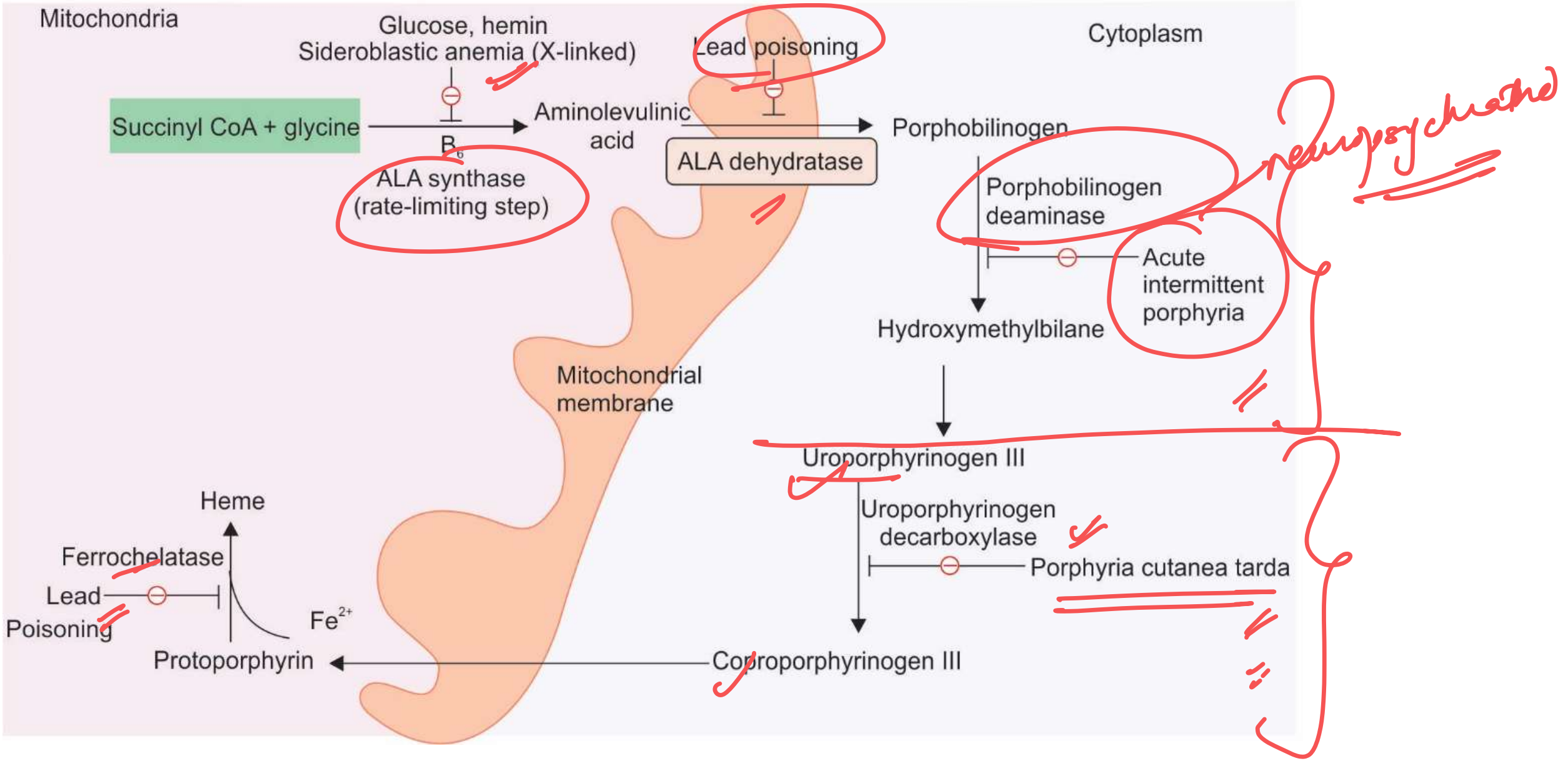


The sequence of mRNA formed from DNA will be same as non-template strand except that T is replaced by U and we always give sequence in 5’ – 3’. So giving mRNA sequence in 5 ‘ – 3’ as:



7. A 22-year-old man comes to the office due to recurrent blistering on the back of his hands and forearms for the past several years as shown. The patient usually develops small itchy spots but lately has had large blisters that heal with hyperpigmentation after rupturing. The patient works as a night security guard and has had no exposure to chemicals or animals. He drinks 2-3 cans of beer daily. Which of the following enzymes is most likely deficient in this patient?

A. Aminolevulinate dehydratase
B. Aminolevulinate synthase
C. Porphobilinogen deaminase
D. Uroporphyrinogen decarboxylase


Mitochondria
Glucose, hemin
Sideroblastic anemia (X-linked)
Lead poisoning
Cytoplasm
Succinyl CoA + glycine
Aminolevulinic acid
B_6
ALA synthase
(rate-limiting step)
ALA dehydratase
Porphobilinogen
Porphobilinogen deaminase
Acute intermittent porphyria
Hydroxymethylbilane
Mitochondrial membrane
Uroporphyrinogen III
Uroporphyrinogen decarboxylase
Porphyria cutanea tarda
Heme
Ferrochelatase
Lead Poisoning
Fe^{2+}
Protoporphyrin
Coproporphyrinogen III

8. Match the following:

Options:

A. 1-A, 2-D, 3-C, 4-G

B. 1-B, 2-E, 3-D, 4-F

C. 1-B, 2-E, 3-C, 4-D

D. 1-A, 2-G, 3-E, 4-C

1. 	A. Bansdola
2. 	B. Garroting
3. 	C. Mugging
4. 	D. Throttling
	E. Burking
	F. Gagging
	G. Smothering

9. Which methods among the following can identify changes in the DNA sequence?

1. Restriction fragment length analysis
2. Flow cytometry
3. Pyrosequencing
4. FISH

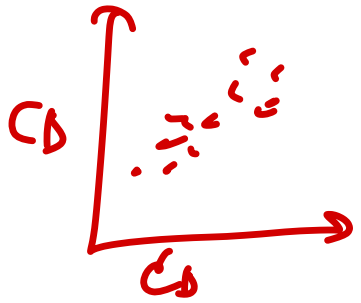
Options:

A. 1 and 3

B. 1, 2, and 3

C. 2, 3, and 4

D. 1, 2, and 4



10. 52-year-old man is being evaluated in the emergency department for abdominal pain associated with watery diarrhea. His symptoms have been progressive over the last month. He says that he is depressed and often has difficulty remembering things. The patient has a 20-year history of alcohol abuse. On examination, he appears dishevelled. A pigmented scaly skin rash is present in the malar distribution of his face, neck, and back of his hands as shown. The rash has been present for several months and worsens on exposure to sunlight. Activity of which of the following enzymes would be decreased in the patient because of this deficiency?

NADH

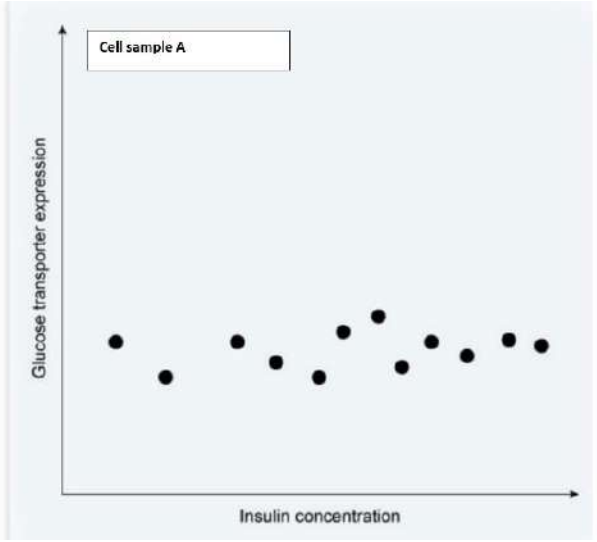
Niacin

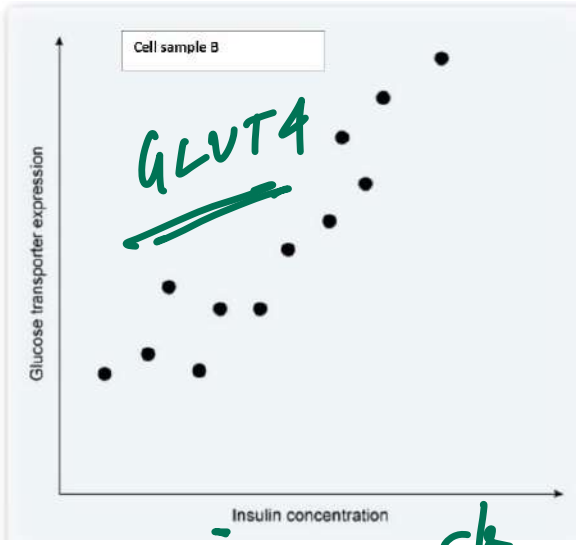
Pellagra

A. Citrate synthase
B. Hexokinase
C. Isocitrate dehydrogenase
D. Succinate dehydrogenase

FADH

11. Researchers are investigating the relationship between glucose transport proteins and insulin concentration in different types of tissues. Experiments in which cells are taken from various tissue samples and exposed to increasing concentrations of insulin are performed. The number of surface glucose transporters are then measured. The results from 2 cell samples are plotted on the graphs below. Which of the following cell types are most likely represented in cell samples A and B, respectively?





A. A- Neurons, B-Hepatocytes

B. A-Intestinal epithelial, B-Pancreatic beta cells

C. A-Renal tubular cells, B- Hepatocytes

D. A-Renal tubular cells, B-Skeletal myocytes

adip
muscle
sk

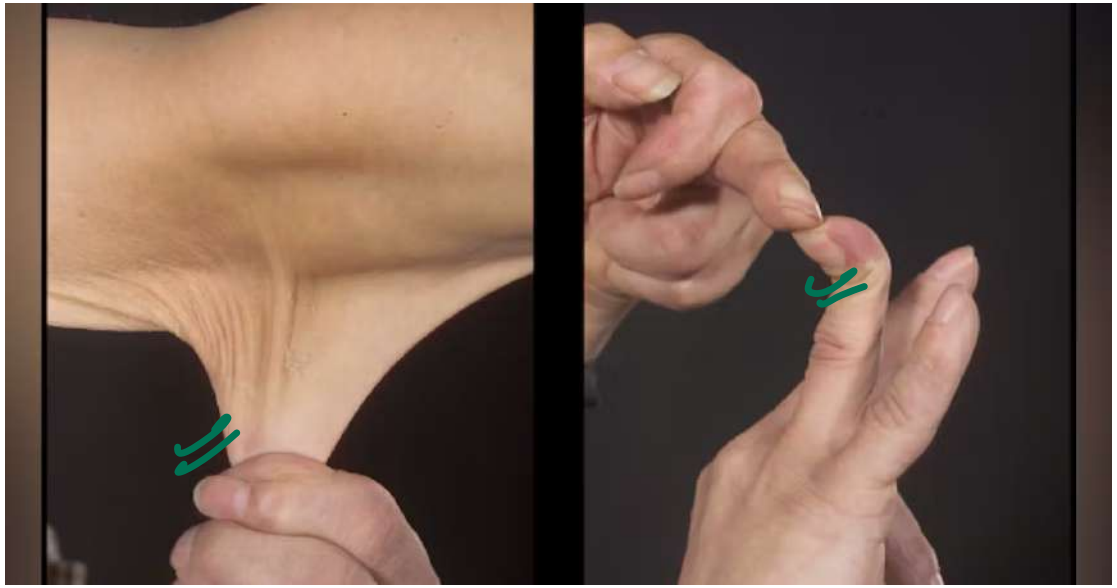
12. Identify the incorrect pair:

A. Public display of genitalia - Exhibitionism
B. Seeing a female undressing- Voyeurism
C. Wearing clothes of opposite sex- Eonism
D. Wanting to be made to suffer for sexual pleasure- Sadism.

Masochism

13. 24-year-old woman comes to the OPD for a preemployment medical evaluation. The patient has no known medical problems but reports that her skin bruises and scars easily. She says that most of her family members have a very "flexible" body, and her brother works in a circus as a contortionist. Physical examination findings are shown. This patient most likely has an inherited defect in which of the following proteins?

EDS



A. Collagen

B. Elastin

C. Fibrillin-1 → Marfan's

D. Hyaluronic acid → capsule

S. pyogenes

Villefranche classification (genetic basis): defective collagen

Classical (AD): Type V collagen

Hypermobility (AD): unknown

Vascular (AD): Type III collagen

Kyphoscoliosis (AR):
deficiency of lysyl hydroxylase

Arthrochalasia (AD): Type I collagen

Dermatosporaxis (AR):
Type I collagen processing

AD = autosomal dominant, AR = autosomal rec

Villefranche	Berlin	Inheritance	Clinical features
Classic	Types I and II	Autosomal dominant	Soft hyperextensible skin Mesomorphic build Cigarette-paper scarring Molluscoid pseudotumors Spheroids
Hypermobility	Type III	Autosomal dominant	Marked joint hypermobility
Vascular	Type IV	Autosomal dominant	Bruising Thin translucent skin Aneurysms, vascular rupture, bowel rupture
Kyphoscoliosis	Type VI	Autosomal recessive	Neonatal muscle hypotonia Joint hyperextensibility Kyphoscoliosis Ocular lesions
Arthrochalasia	Types VIIA and VIIB	Autosomal dominant	Short stature Extreme joint laxity Congenital dislocation of the hip
Dermato-sparaxis	Type VIIC	Autosomal recessive	Skin fragility Cutis laxa
Other	Type V	X-linked	As for classic type
Other	Type VIII	Unknown	Hyperextensible skin Mucosal fragility Periodontitis
Other	Type X	Unknown	Classical manifestations Platelet aggregation defect

*Autosomal recessive forms of classical EDS are also described.
Modified from Beighton, P. et al. (1998) *American Journal of Medical Genetics*, 77, 31–37.

14. A 50-year-old lady underwent a total abdominal hysterectomy. She came to the hospital after one week with acute pain in the abdomen with features suggestive of perforation. An X-ray showed the following picture. Identify the type of offense for which the surgeon can be held responsible?

A. Novus actus interveniens
B. Res ipsa loquitur
C. Res judicata
D. Vicarious liability

15. All are true about the hexose monophosphate shunt:

1. Has a role in prevention of methHb
2. Source of NADPH
3. Utilizes ribose.
4. Will be affected in thiamine deficiency.

Options:

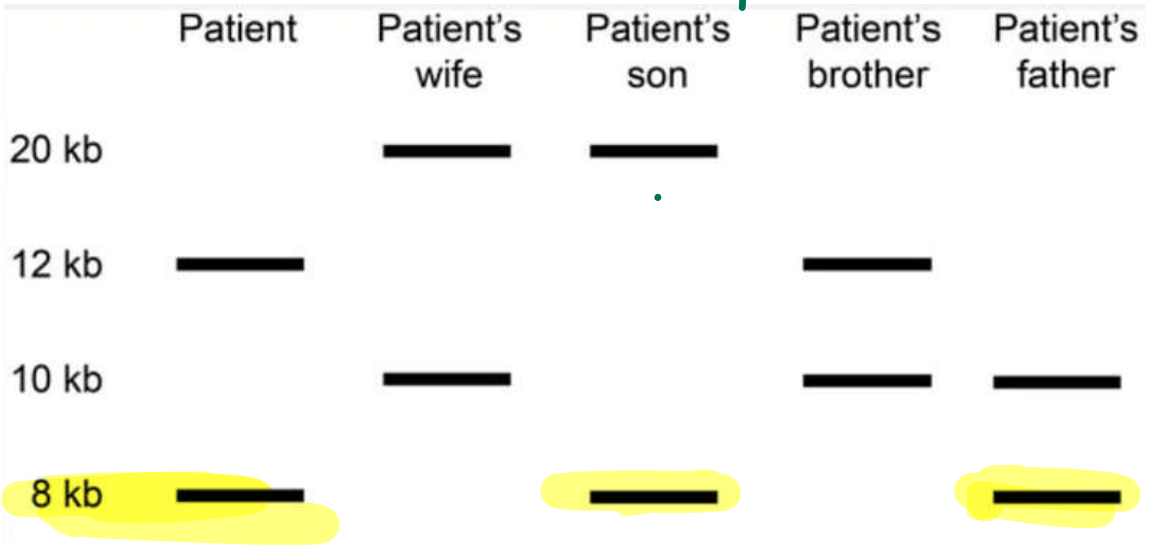
A. 1, 2, 3, 4

B. 2, 3, 4

C. 1, 2, 4

D. 3

16. A 34-year-old man is found to have an LDL level of 310 mg/dl and a normal serum triglyceride level. His father suffered a myocardial infarction at age 39, and his paternal grandfather died of a heart attack at age 40. The patient's wife has a normal lipid profile. DNA samples are obtained from several family members for genetic analysis. Southern blotting of restriction fragments from a region containing the LDL receptor gene shows the following pattern. Identify the correct statement:



A. The disease is transmitted in an X-linked recessive fashion.

B. The mutation is probably located in the 10 kb band.

C. The patient's brother most likely inherited the mutation.

D. The patient's son most likely inherited the mutation.

17. Identify the correct statement with regards to the changes around an entry wound:

1. Grease collar - due to the deposition of the lubricant of the bullet in the tissues
2. Burn injuries - occur due to flame released during the firing
3. Blackening – due to deposit of smoke
4. Tattooing -Due to unburned grains of gunpowder

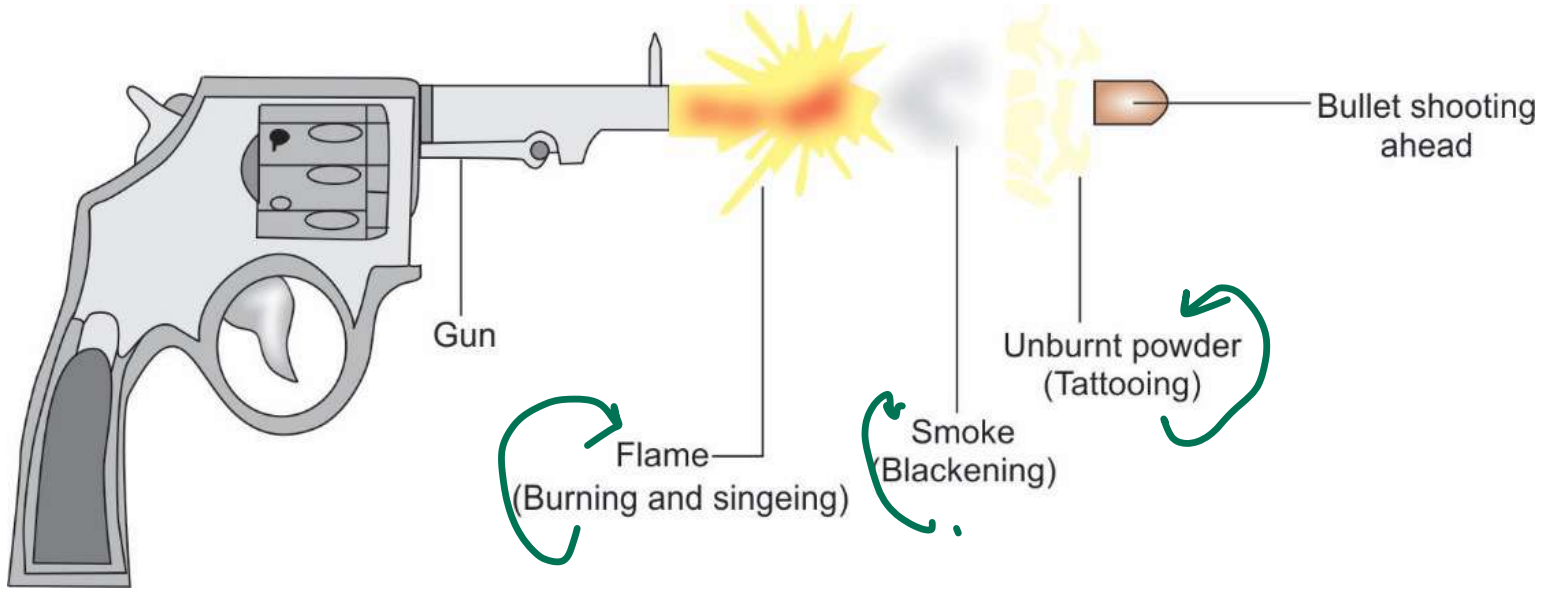
Options:

A. 1, 2, 3, 4

B. 1, 3, 4

C. 2, 3

D. 2, 4


Bullet shooting ahead
Gun
Unburnt powder (Tattooing)
Flame (Burning and singeing)
Smoke (Blackening)

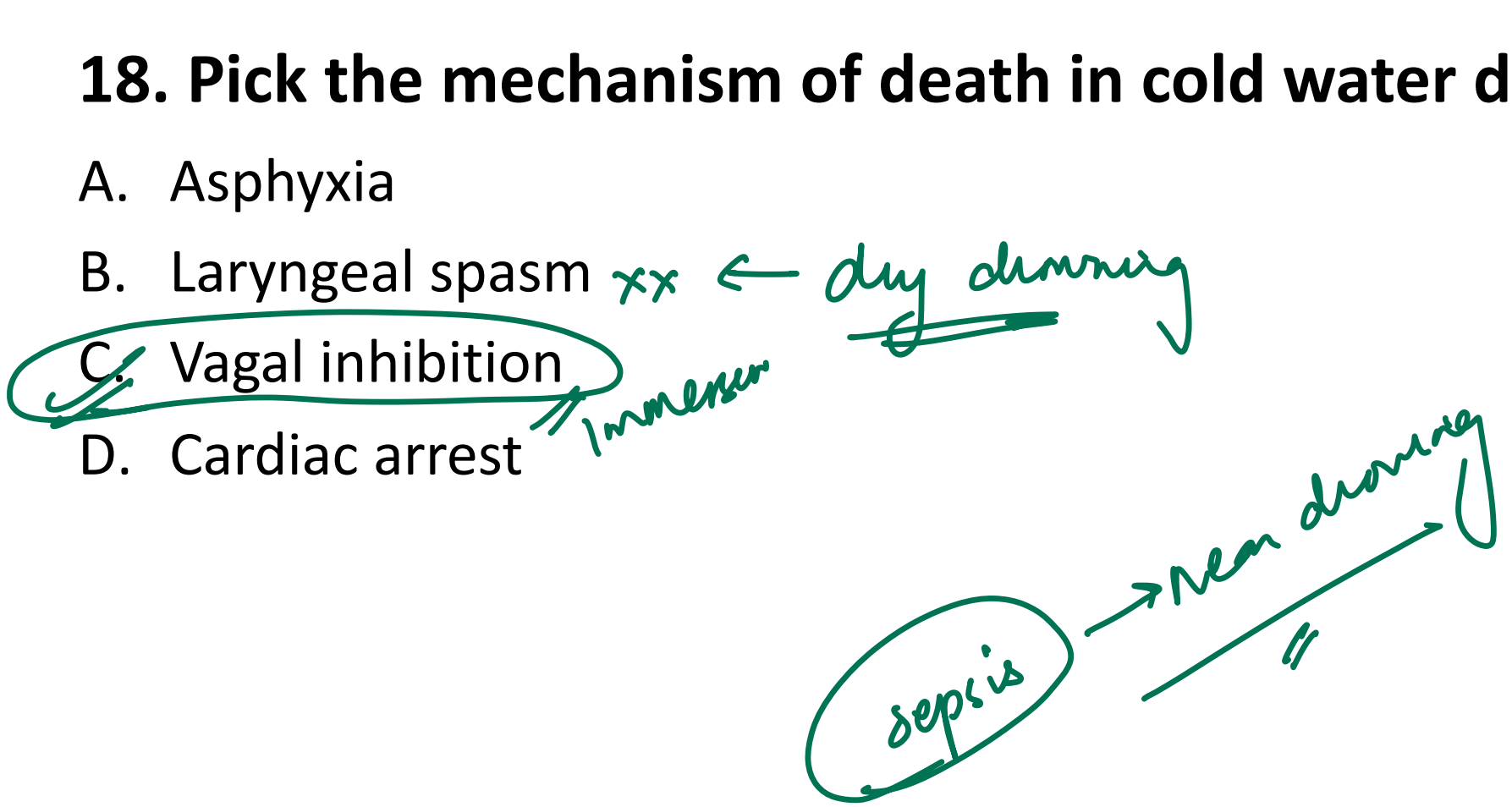
18. Pick the mechanism of death in cold water drowning?

A. Asphyxia

B. Laryngeal spasm

C. Vagal inhibition

D. Cardiac arrest

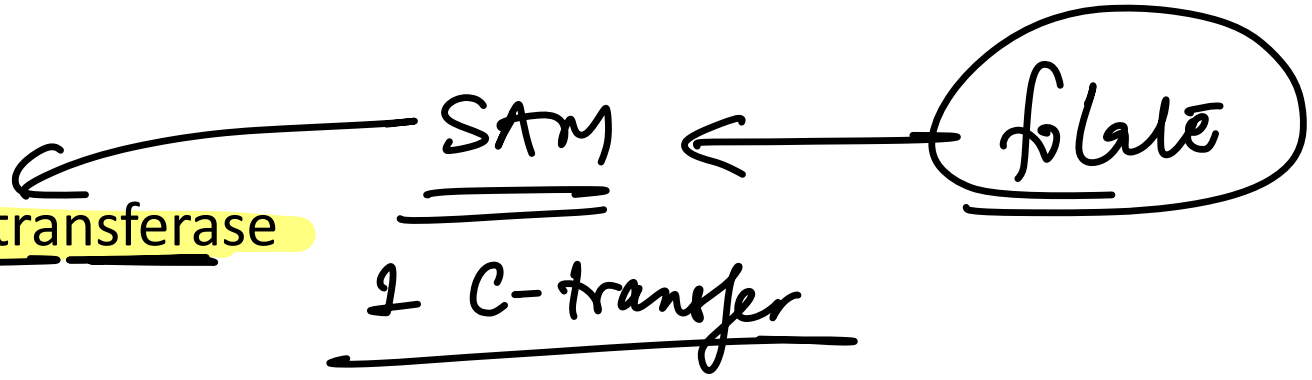


19. 15-year-old boy is found to have unexplained erythrocytosis on routine laboratory analysis. Evaluation of his immediate family shows that his father and sister also have elevated red cell levels. Genetic sequencing of the 13-globin gene is performed in the affected family members. The results showed a single base substitution at amino acid position 82 that replaces the normal lysine residue with methionine. Further analysis shows that this amino acid replacement impairs the ionic interaction between the 13-subunit and 2,3-bisphosphoglycerate. As a result of this mutation, the patient's haemoglobin will be most like which of the following haemoglobin types?

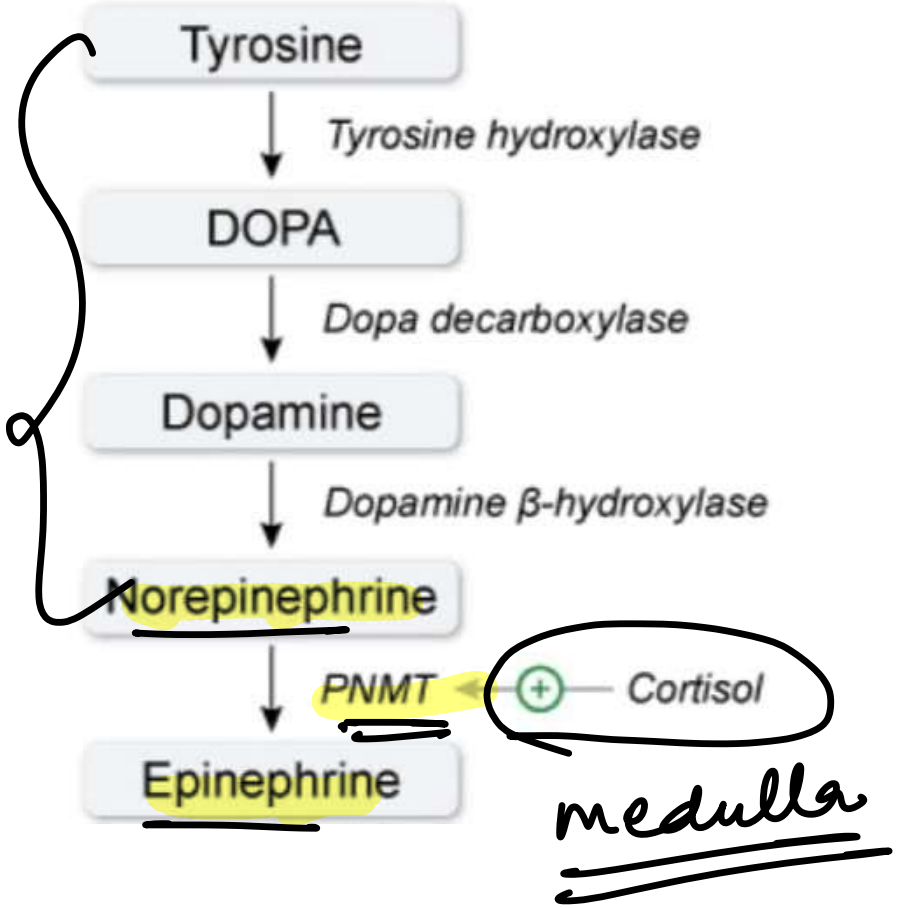
A. Haemoglobin A1c
B. Haemoglobin C
C. Haemoglobin F
D. Haemoglobin S

20. A group of investigators are studying the regulation of catecholamine synthesis in response to severe stress. In the experiments, subject rats are randomly assigned to either an experimental or a control group. The experimental rats undergo resection of the pituitary gland, and the control rats undergo craniotomy without pituitary resection. The experimental animals are subsequently found to have decreased production of epinephrine by the adrenal medulla and cortisol from the adrenal cortex compared with the control animals. Decreased activity of which of the following enzymes is most likely responsible for the lower epinephrine in the experimental animals?

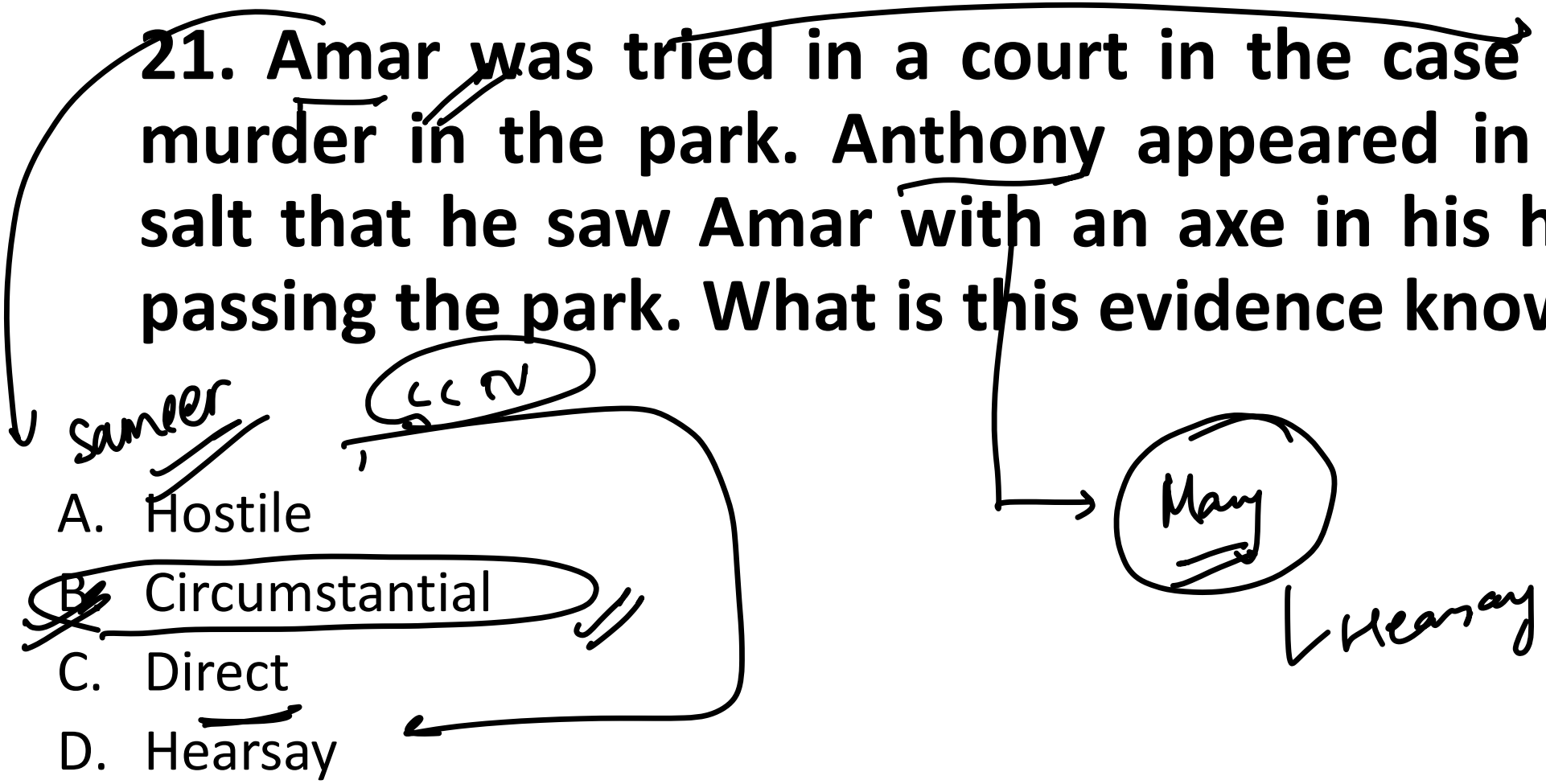
A. Catechol-0-methyl transferase
B. Phenyl ethanolamine-N-methyltransferase
C. Dopamine beta-hydroxylase
D. Monoamine oxidase



Catecholamine synthesis



21. Amar was tried in a court in the case of Akbar's murder in the park. Anthony appeared in court and salt that he saw Amar with an axe in his hand while passing the park. What is this evidence known as?



A. Hostile
B. Circumstantial
C. Direct
D. Hearsay

22. A 6-year-old African American male is brought to your office for a routine check-up. His mother remarks that he often seems uninterested in playing with his peers and appears to "run out of breath quickly." His medical records reveal that he has missed several pediatric vaccinations and has been hospitalized twice, once with a "chest infection" and once with abdominal pain. The patient mentions to you that occasionally his "bones hurt." Which of the following protein changes most likely accounts for this patient's condition?

SCA

A. Phenylalanine deletion
B. Valine substitution for glutamic acid
C. Phenylalanine substitution for proline
D. Valine substitution for lysine

XX

HbC

23. Match the following:

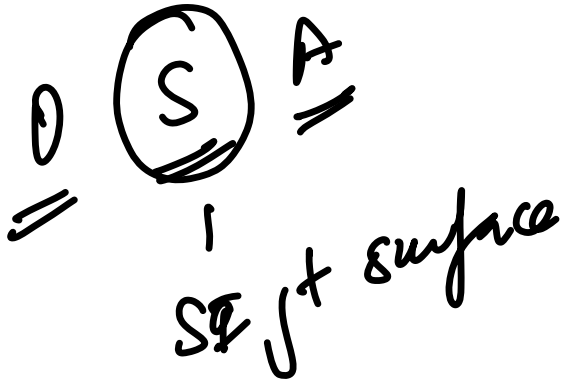
Tooth	Age of eruption
A. Canine	1. 6-7 years
B. Lateral incisor	2. 8-9 years
C. First molar	3. 11-12 years
D. Third molar	4. 17-25 years

A. A-1, B-3, C-2, D-4
B. A-3, B-4, C-1, D-2
C. A-3, B-2, C-1, D-4
D. A-2. B-3, C-4, D-1

Tooth	Age of eruption
First molar	6-7 years
Central incisors	6-8 years
Lateral incisors	7-9 years
First premolar	9-11 years
Second premolar	10-12 years
Canine	11-12 years
Second molar	12-14 years
Third molar	17-25 years

24. Which of the features given below is of a male pelvis?

1. Triangular obturator foramen
2. U-shaped pubic angle
3. Everted ischial tuberosity
4. Large greater sciatic notch
5. Large acetabulum
6. Deep preauricular sulcus



Options:

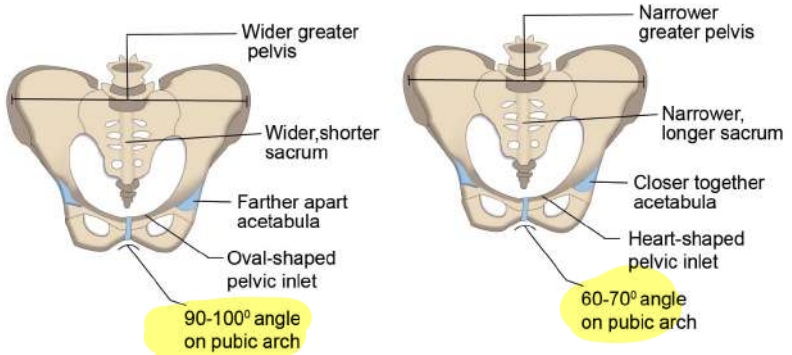
A. 2, 3, 4, 5

B. 4, 5, 6

C. Only 5

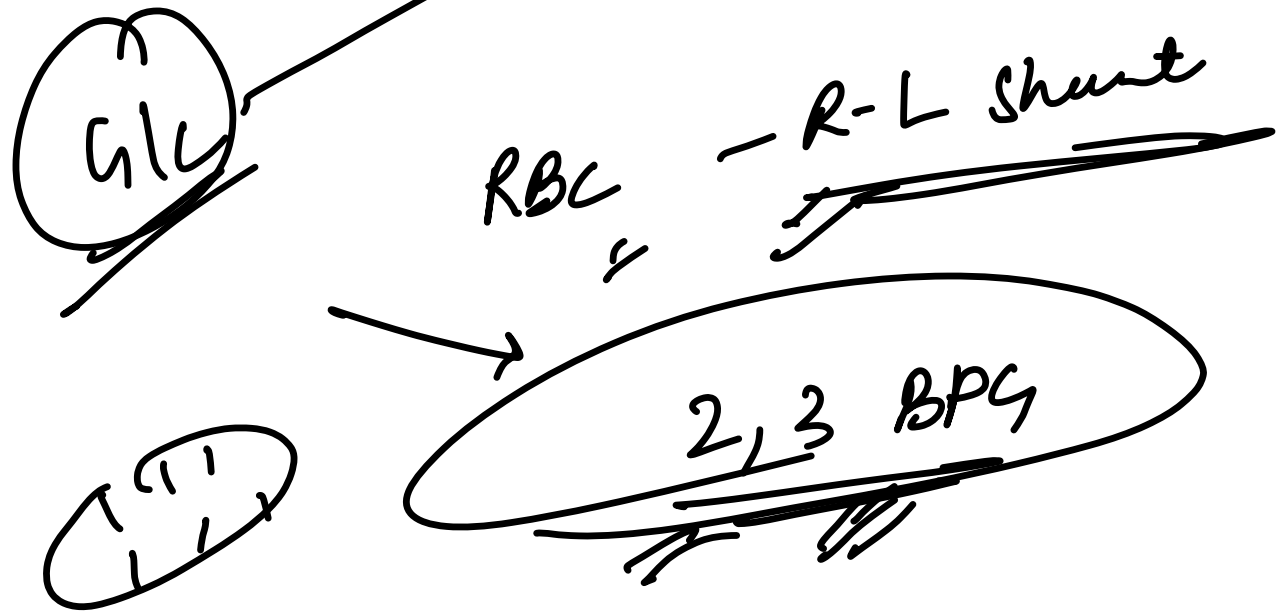
D. 1 and 3

	Female Pelvis	Male Pelvis
Shape of the pelvis	Wider	Narrower
Pelvic inlet, outlet	Larger	Smaller
Coccyx	Moveable and more curved anteriorly	Immovable and less curved anteriorly
Public arch	Wider	V shaped
Subpubic Angle	Greater than 90º	Less than 90º
Pelvic brim	Large and round	Small and heart-shaped
Sciatic notch	Wider	Narrower
Obturator foramen	Small and triangular-shaped	Large and oval-shaped
Sacroiliac joint surface	Short, wider and curved	Long, narrow and straight
Pelvic acetabulum	Small and faced anteriorly	Large and faced laterally



25. A researcher is studying the role of glucose metabolites in normal cellular function. A specific human cell type is incubated in glucose-rich media. Intracellular levels of glucose metabolizing enzymes, intermediate products, and generated ATP are measured. In these cells, glycolysis of a single glucose molecule always yields pyruvate but sometimes generates no net ATP. Which of the following cells is most likely being studied in this experiment?

A. Adipocytes
B. Erythrocytes
C. Hepatocytes
D. Skeletal muscle cells



26. Match the following in relation to fingerprint changes:

1. Incomplete atrophy of ridges	A. Radiation
2. Loss of pattern with ridge atrophy	B. Scleroderma
3. Altered ridges	C. Celiac disease
4. Permanent loss of fingerprints	D. Acromegaly
5. Distance between ridges is changes but pattern is retained	E. Dermatitis

Options:

A. 1-E, 2-C, 3-B, 4-A, 5-D

B. 1-D, 2-B, 3-C, 4-E, 5-A

C. 1-C, 2-A, 3-D, 4-B, 5-E

D. 1-D, 2-C, 3-A, 4-E, 5-B

Change	Disease
Complete loss	Burns, Celiac disease
Permanent impairment	RT, Electrical injury, Leprosy,
Change in distance	Acromegaly, Rickets
Ridge alteration	Scleroderma, Eczema, Acanthosis nigricans

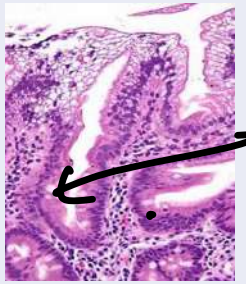
27. Match the following:

A. 1-A, 2-F, 3-B, 4-C

B. 1-F, 2-D, 3-C, 4-B

C. 1-A, 2-D, 3-C, 4-B

D. 1-A, 2-F, 3-B, 4-E

1. 	A. ATP-Binding Cassette Transporter-1
2. 	B. Partial LCAT deficiency
3. 	C. MTTP gene
4. 	D. Phytanoyl CoA oxidase
Norum's 1	E. MCAD Deficiency
Complete	F. PEX gene

28. A 34-year-old woman comes to the OPD after her sister was diagnosed with breast cancer. Her sister was found to have a multiple base pair insertion affecting exon 11 of the BRCA 1 gene that leads to a frameshift mutation. A screening test to evaluate for a similar insertion mutation in the patient's BRCA 1 gene is performed. The test uses polymerase chain reaction (PCR) to amplify the target exon and gel electrophoresis to assess the size of the exon compared to the wild-type allele. Which of the following must be known to perform the amplification part of this analysis?

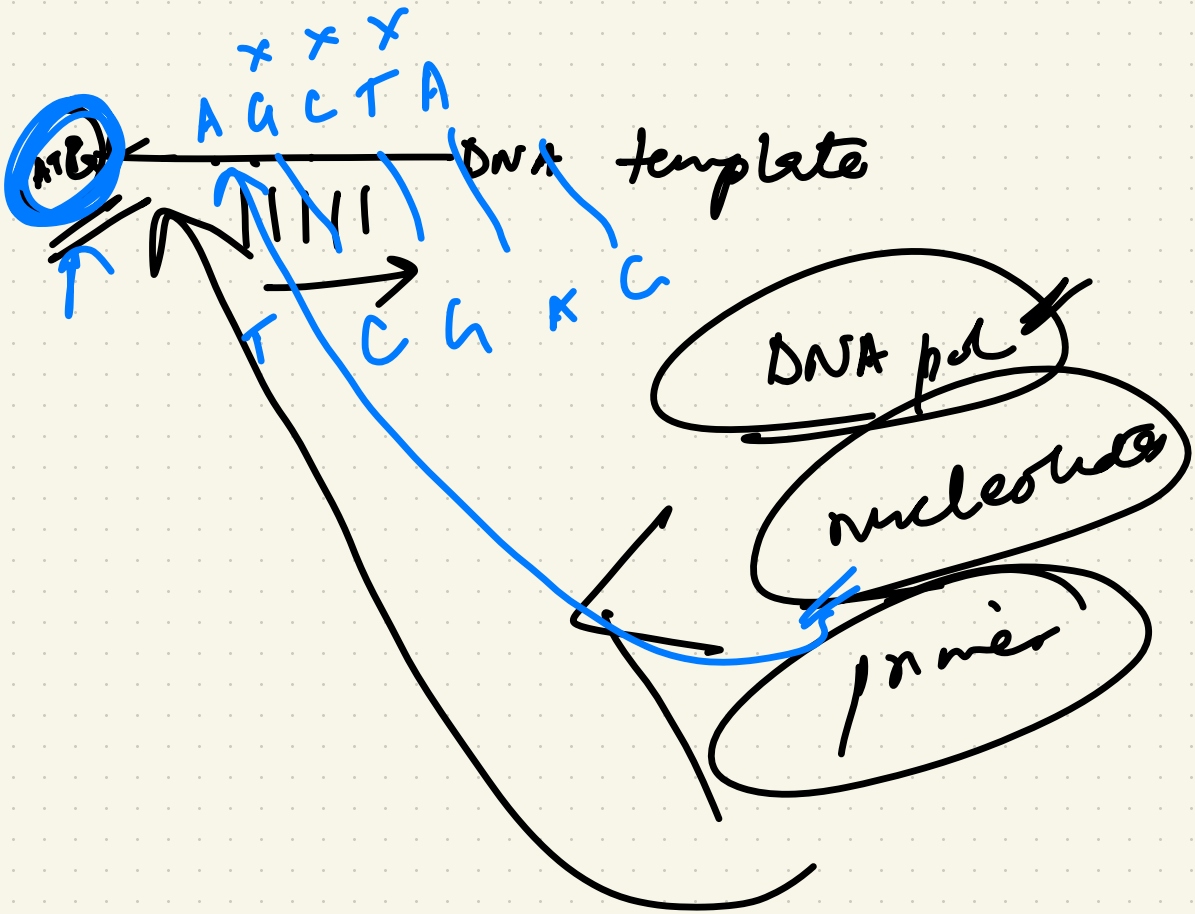
RFLP

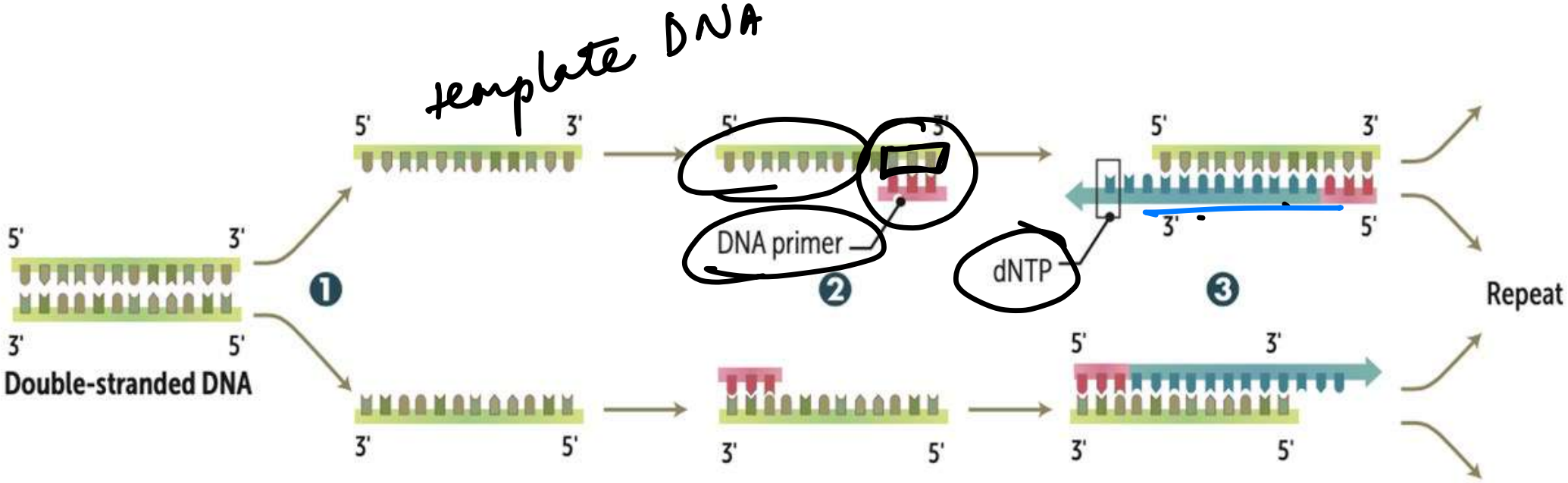
A. Restriction enzyme susceptibility sites within the target exon

B. The amino acid sequence of the abnormal BRCA 1 protein

C. The complete nucleotide sequence of the target exon

D. The nucleotide sequence of the regions flanking the target exon.


x x x
A G C T A
DNA template
T C G K C
DNA pol
nucleotide
primer



1. **Denaturation**-DNA template, DNA primers, a heat stable DNA polymerase, and deoxynucleotide triphosphates (dNTPs) heated to 95°C to separate the DNA strands.
2. **Annealing**- 55°C
3. **Elongation**-72° C

29. Match the following appearances with the timeline:

A. A-4, B-1, C-2, D-3

B. A-3, B-1, C-2, D-4

C. A-4, B-2, C-1, D-3

D. A-1, B-2, C-3, D-4

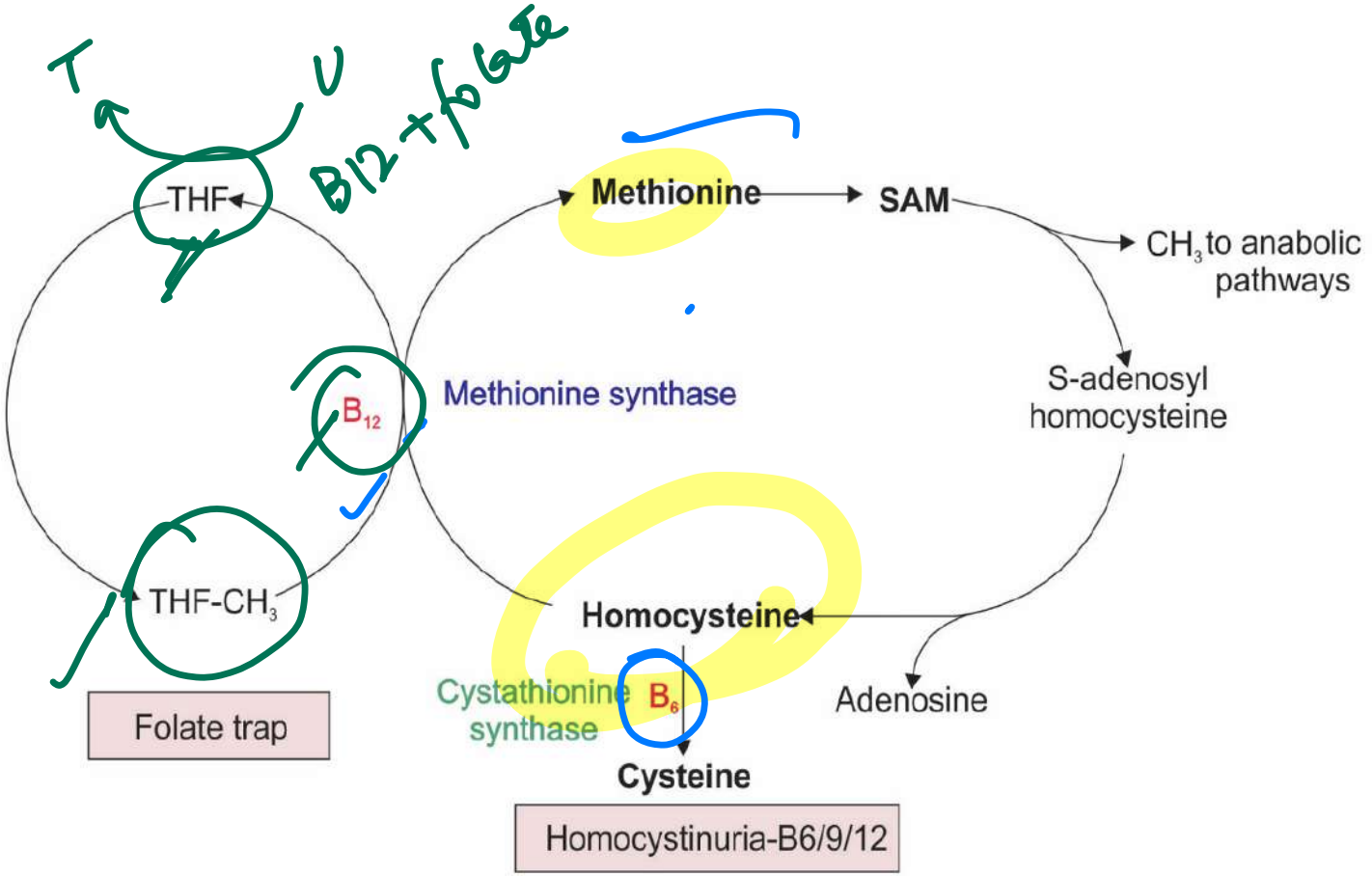
A.		1. 6 hrs
B.		2. 2-3 days
C.		3. 4-5 days
D.		4. 15-20d

30. A 24-year-old woman is admitted to the hospital with a diagnosis of acute appendicitis. The patient had no food, only sips of water since 30hours. Blood pressure is 115/72 mm Hg and pulse is 106/ min. Mucous membranes are dry and there is tenderness in the right lower quadrant of the abdomen. Laboratory evaluation shows mild leucocytosis, normal serum electrolytes, borderline low serum glucose levels, and moderate ketones in the urine. Based on the evaluation, it is suspected that this patient is utilizing ketone bodies as a significant reserve of energy. Which of the following tissues cannot use this energy source?

A. Brain
B. Erythrocytes
C. Heart muscle
D. Skeletal muscle

31. A 34-year-old previously healthy man comes to the emergency department due to a 3-hour history of chest pain, diaphoresis, and dyspnea. He does not smoke, exercises regularly, and eats a balanced diet. His father died at age 56 from a myocardial infarction. His blood pressure is 110/70 mm Hg and pulse is 110/min and regular. ECG shows ST elevation in the anterolateral leads. Coronary angiogram reveals proximal left anterior descending artery stenosis and thrombosis, which is treated with angioplasty and stent.
Placement. Laboratory results are as follows:
Total cholesterol: 160 mg/dL
Low-density lipoprotein: 90 mg/dL
Glucose, serum : 98 mg/dL
Homocysteine, plasma : 21.5 µmol/L (normal: 4-14 µmol/ L)
Further testing reveals a homozygous mutation in the methylene tetrahydrofolate reductase gene that leads to decreased enzymatic activity. Due to this defect, the patient most likely has impairment converting homocysteine to which of the following?

A. Cystathionine
B. Cysteine
C. Methionine
D. Methylmalonyl-CoA



Fatty acids with odd number of carbons, branched-chain amino acids

↓

Methylmalonyl-CoA

↓ B_{12} Methylmalonyl-CoA mutase

Succinyl-CoA

32. What is the cause of the lesion shown in the image below?

A. Lightning strike
B. Electrocution
C. Marbling
D. Trickling down of acid

33. Match the following weapons with the possible injuries caused by them:

A. Axe	1. Incised wound
B. RTA	2. Tram track wound
C. Blade	3. Grazed abrasion
D. Lathi	4. Chop wound

A. A-4, B-3, C-1, D-2

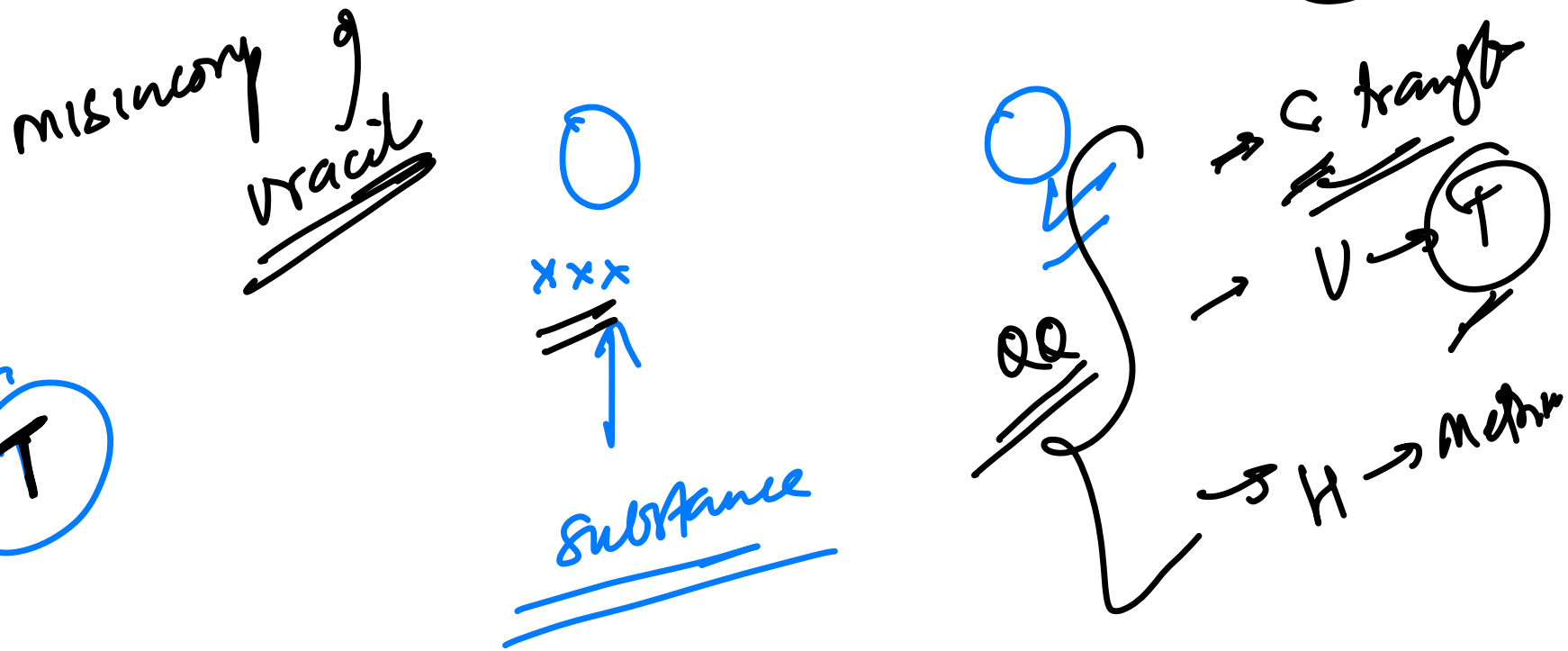
B. A-1, B-3, C-4, D-2

C. A-1, B-2, C-4, D-3

D. A-4, B-1, C-3, D-2

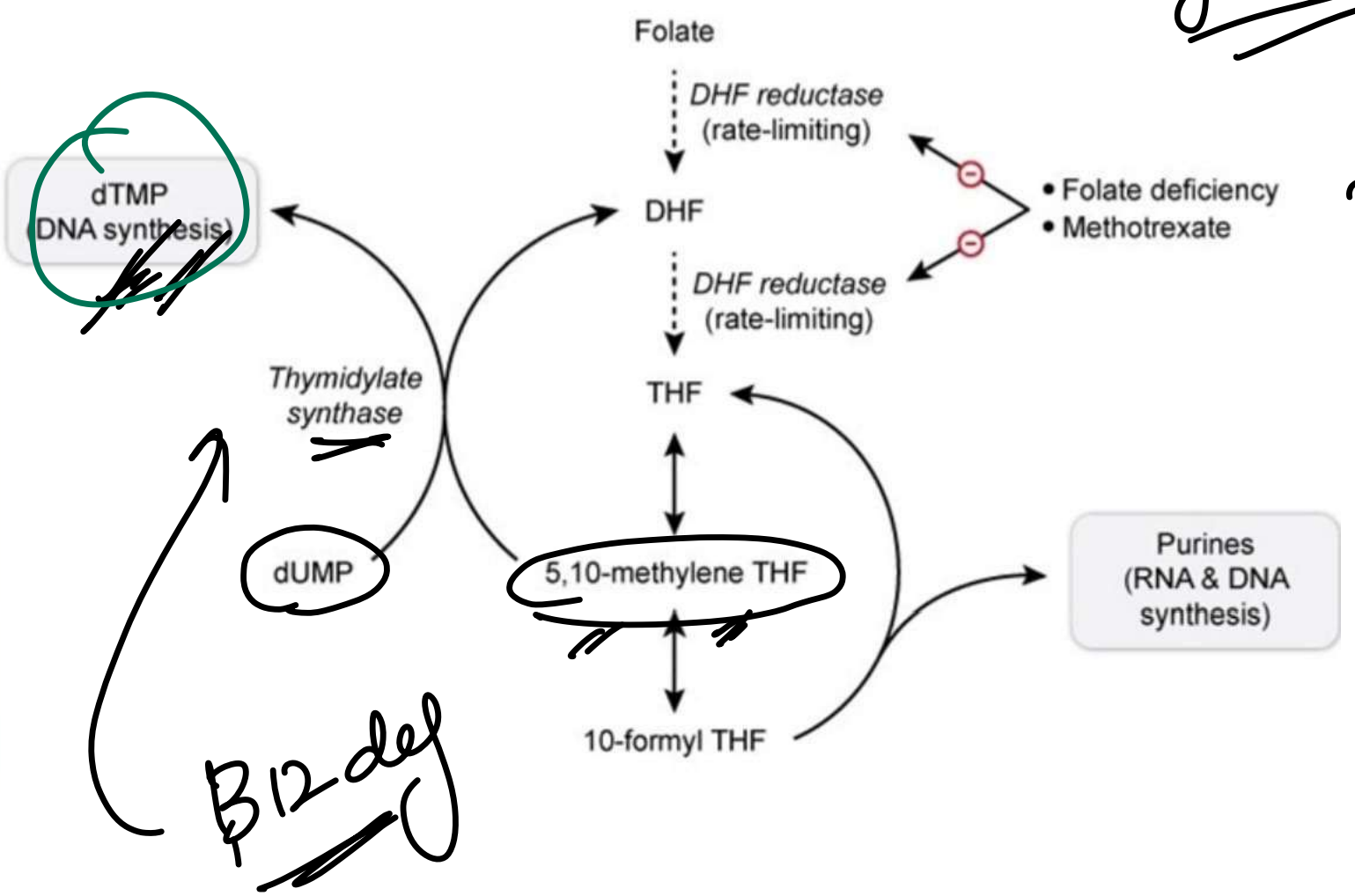
34. In an animal experiment, mice proerythroblasts are cultured in 2 different growth media; the first medium is folate deficient, whereas the second (control) is supplemented with folic acid. Both media contain high concentrations of erythropoietin. Over 48 hours, cells in the control media proliferate and differentiate into reticulocytes, whereas in the folate-deficient media, cell proliferation is minimal, with most cells undergoing apoptosis. In another experiment, a substance is added to the folate-deficient media, which prevents apoptosis and permits proliferation of the proerythroblasts. Which of the following is the most likely substance added to the growth medium?

A. Cobalamin
B. Cytosine
C. Homocysteine
D. Thymidine



megaloblastic anemia

↓ folate → IBR



35. Match the following with the respective ages of fusion:

A. Medial end of clavicle	1. 22-25 years
B. Sacrum as a single bone	2. 50 years
C. Crista scapulae	3. 45 years
D. Lambdoid suture	4. 21-25 years

A. A-1, B-2, C-3, D-4

B. A-4, B-1, C-2, D-3

C. A-4, B-3, C-1, D-2

D. A-1, B-4, C-3, D-2

36. The drowned dead body of a young man found in the sea and was brought in for postmortem examination. Which of the following findings do you see in seawater drowning?

1. Hypernatremia
2. Hyponatremia
3. Hyperkalemia
4. Myocardial anoxia
5. Hemodilution

↑Na ↑Cl

Options:

A. 1 and 3

B. 1 and 4

C. 2, 3 and 5

D. 4 and 5

37. A 39-year-old woman comes to the emergency department due to several episodes of severe upper abdominal pain. Her pain is triggered by fatty foods and resolves pontaneously. Past medical history is notable for hypertension, for which the patient takes a calcium channel blocker, and hypertriglyceridemia, which is treated with a fibrate. She undergoes a laparoscopic cholecystectomy, with multiple stones noted in the contents of the gallbladder. Decreased activity of which of the following enzymes would most likely have contributed to this patient's condition?

A. Aromatase

B. 13-glucuronidase

C. Cholesterol 7a-hydroxylase

D. HMG-CoA reductase

38. Choose the right sequence of steps in the conversion of cholesterol to testosterone?

A. 17-alpha hydroxylase
B. 20, 22-desmolase
C. 17, 20-lyase
D. 3 beta hydroxy steroid dehydrogenase

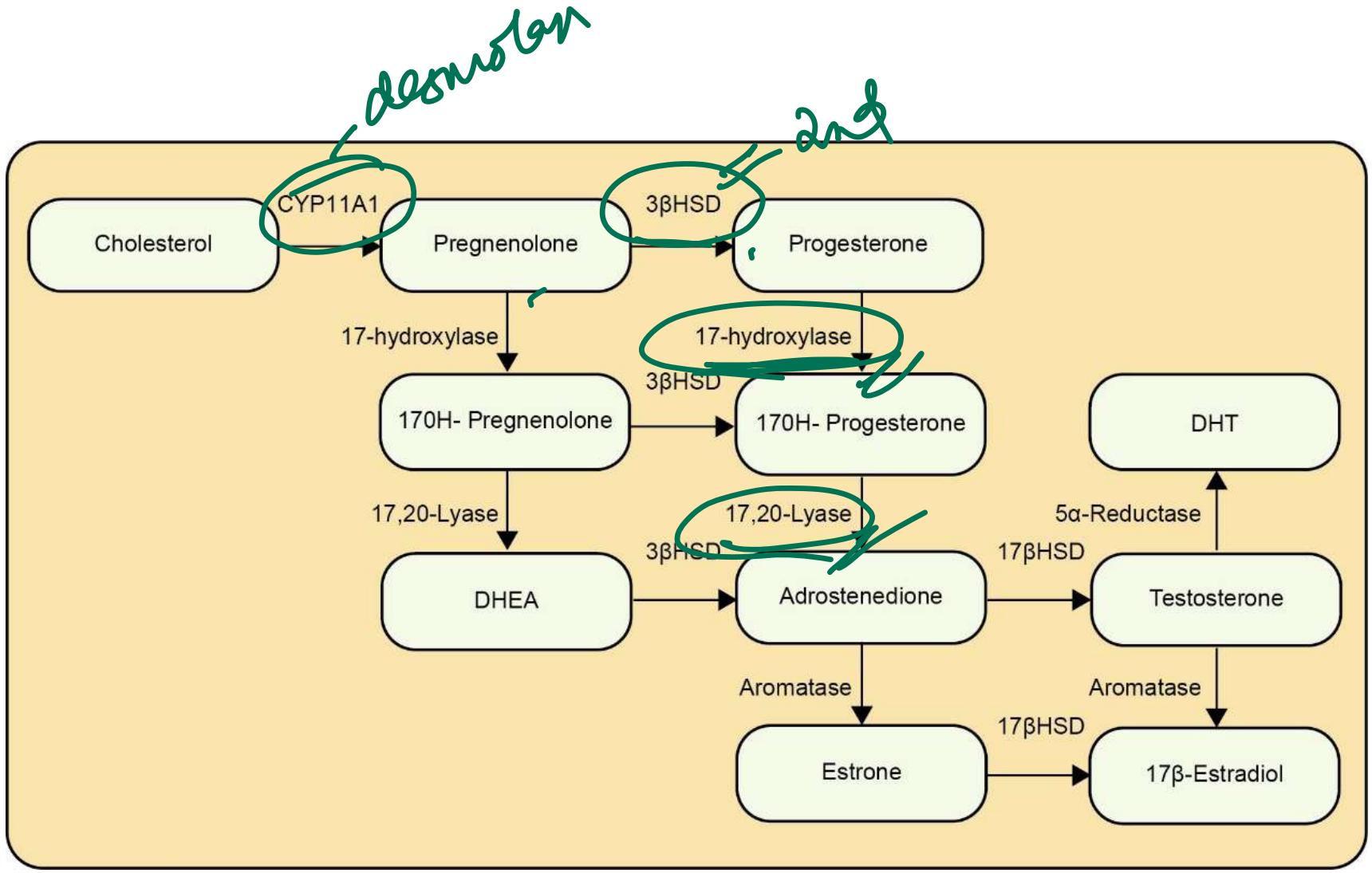
Options:

A. B, D, A, C

B. A, C, D, B

C. B, A, C, D

D. D, A, B, C


Cholesterol
CYP11A1
Pregnenolone
3βHSD
Progesterone
17-hydroxylase
17-hydroxylase
3βHSD
170H- Pregnenolone
170H- Progesterone
DHT
17,20-Lyase
17,20-Lyase
5α-Reductase
3βHSD
17βHSD
DHEA
Adrostenedione
Testosterone
Aromatase
Aromatase
17βHSD
Estrone
17β-Estradiol

39. Match the following poisons and their probable mechanism of action:

A. Zine chloride	1. Abortifacient
B. Chloral hydrate	2. Irritant
C. Quinine	3. Corrosive
D. Potassium carbonate	4. Stupefying

Options:

A. A-2, B-4, C-1, D-3

B. A-4, B-3, C-2, D-1

C. A-4, B-2, C-1, D-3

D. A-2. B-3. C-4, D-1

40. E. coli colonies grown on a lactose-containing medium up-regulate the production of the enzymes 13-galactosidase and galactoside permease. Which of the following best explains the synchronous production of both enzymes in response to lactose?

A. There are two activator binding sites for one activator protein.

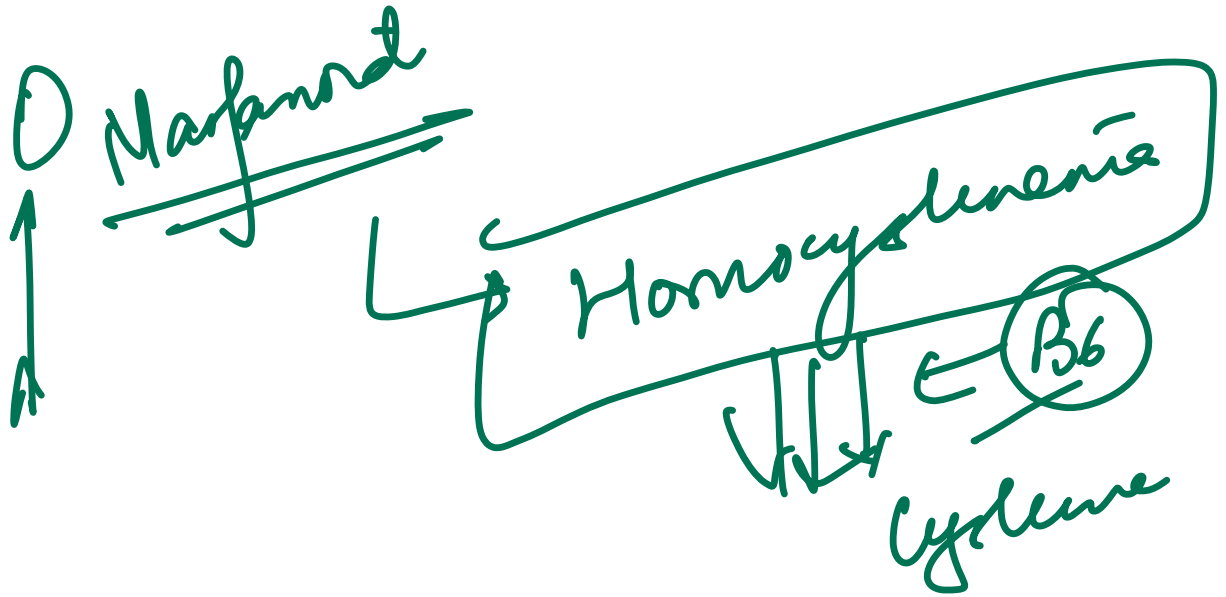
B. There are two repressors for one inducer.

C. There ~~are~~ two promoters near each other.

D. There is one mRNA coding for both enzymes.

41. A 5-year-old boy with developmental delay is brought to the OPD due to difficulty "seeing the board" at school. Examination shows a tall, thin habitus with elongated limbs. Funduscopy shows bilateral lens subluxation. Four years later, the patient dies suddenly of a massive cerebrovascular accident. Autopsy shows middle cerebral artery thrombosis and old renal infarcts. His parents wish to know if anything could have been done to have prevented his death. Which of the following would have been the most appropriate supplementation for this patient?

A. Ascorbic acid
B. Carnitine
C. Pyridoxine
D. Thiamine



42. A doctor used the same needle used in a patient with HIV to inject in another patient. The latter patient on testing found to be infected with HIV. The doctor is punishable for this negligence according to which section of Indian Penal Code?

A. Section 166B

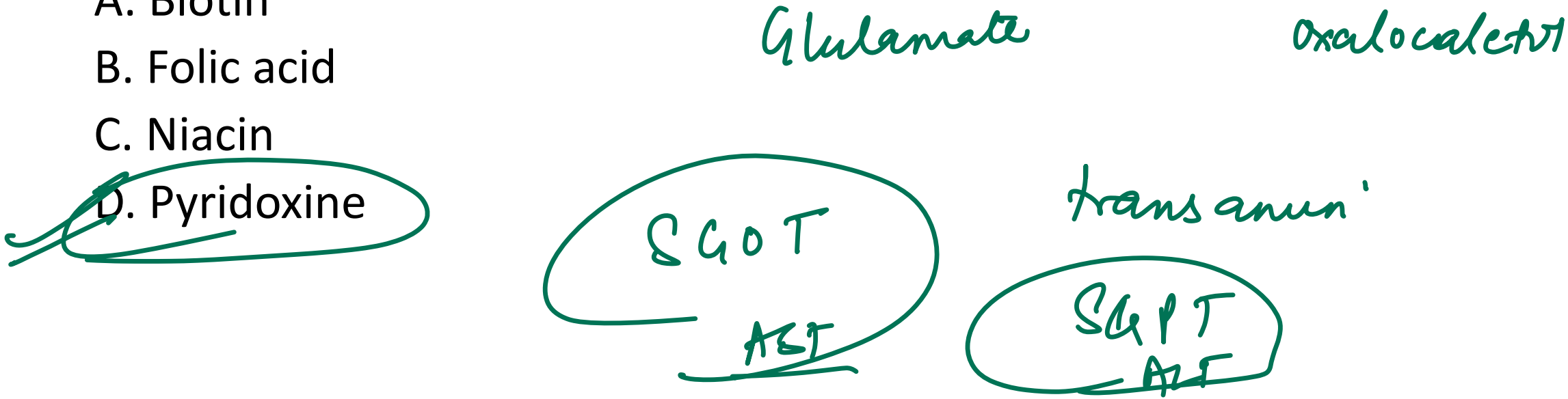
B. Section 203

C. Section 202

D. Section 269

43. A research scientist is studying biochemical reactions that take place in the liver. He cultures hepatocytes in a growth media enriched with glutamate labelled with nitrogen isotopes. After some time, he finds that the nitrogen isotopes are transferred to oxaloacetate, forming aspartate in the process. Which of the following substances is most likely involved in this reaction?

A. Biotin
B. Folic acid
C. Niacin
D. Pyridoxine



44. Match the following:

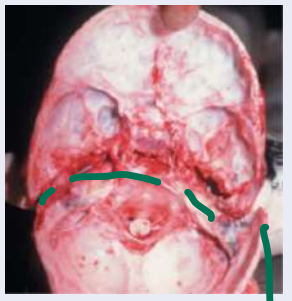
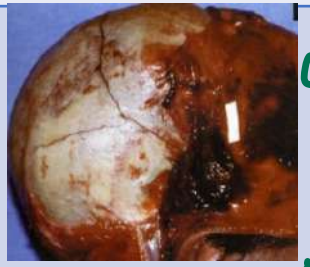
Options:

A. 1-C, 2-A, 3-D, 4-B

B. 1-D, 2-B, 3-A, 4-C

C. 1-A, 2-B, 3-C, 4-D

D. 1-C, 2-B, 3-A, 4-D

1. 	A. Depressed
2. 	B. Fissured
3. 	C. Hinge
4. 	D. Gutter

45. Which is the correct sequence of steps in the isolation of desirable protein using recombinant DNA technology?

1. Expression of protein and lysis of bacterial cell
2. Incorporation of genes into bacteria
3. SDS PAGE
4. Protein elution
5. Hybridization

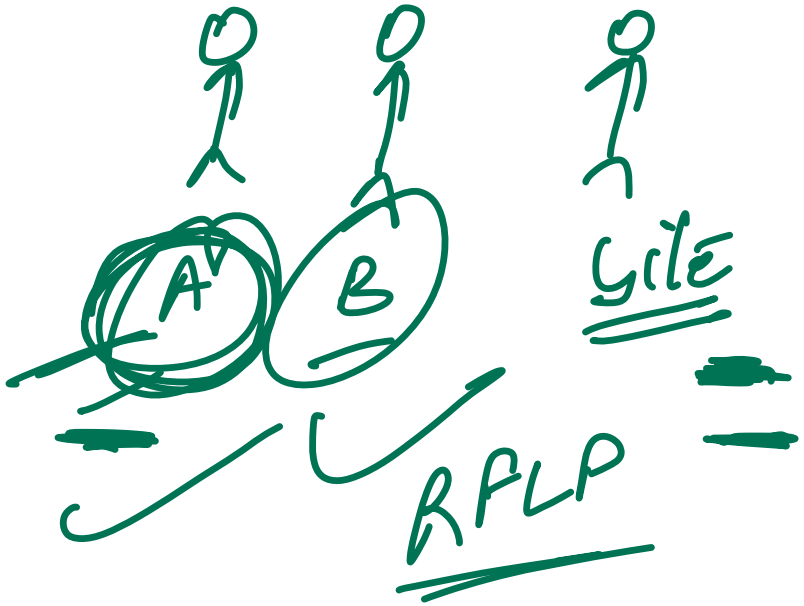
Options:

A. 2, 1, 3, 5, 4

B. 1, 2, 4, 3, 5

C. 1, 5, 2, 4, 3

D. 2, 4, 5, 3, 1



1. **Incorporation of genes into bacteria**: Required gene is incorporated into the bacteria using cloning vectors like bacterial plasmids, phages, or cosmids. **Recombinant DNA is the DNA of interest is ligated into the vector DNA.** This vector is then inserted into a host cell (E.g., E. coli bacteria) where it is replicated.

2. **Expression of protein and lysis of bacterial cell**: Once recombinant DNA is incorporated, the inserted gene expresses itself to produce the desired protein. **Bacterial cell is lysed to release the proteins.**

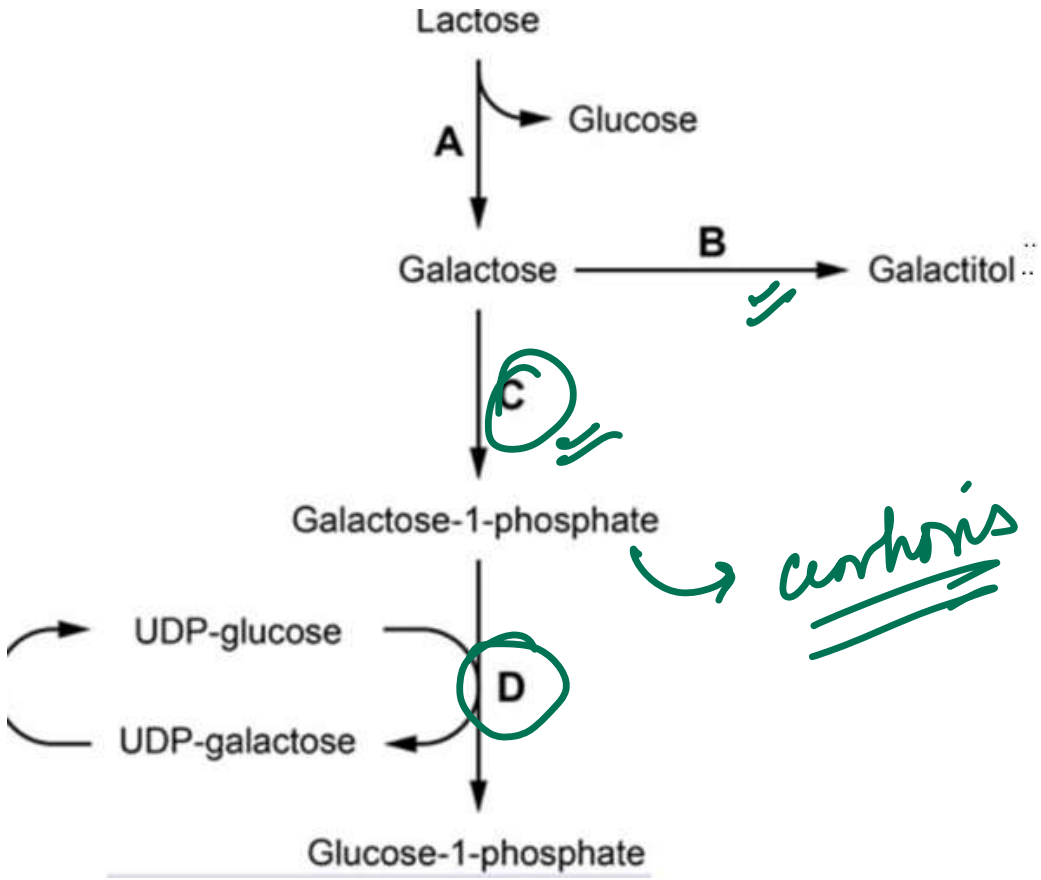
3. **SDS-PAGE** (sodium dodecyl sulfate-polyacrylamide gel **electrophoresis)**: It used to separate the desired protein based on molecular weight.

4. **Hybridization and blotting**: Western blotting techniques on nitrocellulose paper is done to confirm if isolated protein is the desired one.

5. **Protein elution** - Extraction of the produced protein.

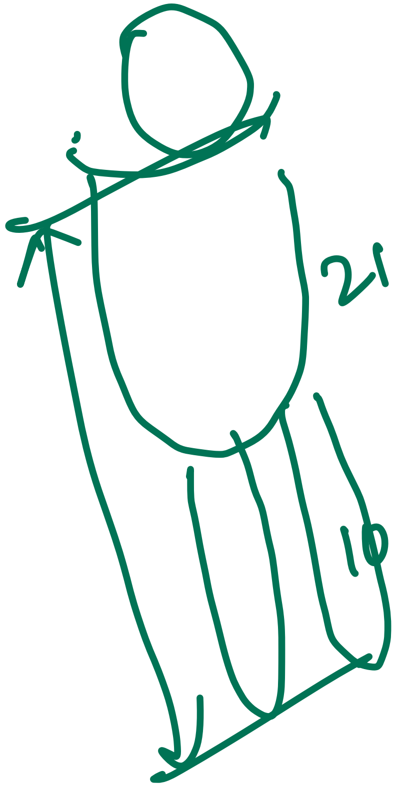
46. A 5-day-old term newborn is brought to the emergency department for multiple episodes of emesis. The breastfed infant has been having fewer wet diapers over the last 2 days. Vital signs show tachycardia, tachypnea, and hypotension. Physical examination shows an icteric, lethargic baby with a sunken fontanelle, dry mucous membranes, and hepatomegaly. A blood culture is drawn, and empiric antibiotics are initiated. Serum studies show hypoglycemia and elevated transaminases. The ammonia level is normal. Preliminary results from arterial blood culture show gram-negative rods. The infant is placed on a special formula and gradually improves over the next few days. Which of the following steps in metabolism is most likely impaired in this patient?

A. A
B. B
C. C
D. D



47. Identify the gestational age of the fetus if the Crown Rump Length is 21 cm, length of lower limb is 10 cm, gestational age of the fetus will be:

A. 6 to 7 months
B. 4 to 5 months
C. 7 to 8 months
D. Term



48. Identify the incorrect statements:

1. Normally LDH 2 is predominant in the blood and LDH 1 is predominant in the heart. During a myocardial infarction, due to damage to the cardiac tissue, LDH 1 is released into the bloodstream resulting in a high LDH1:LDH2 ratio called flipped LDH ratio.
2. Consumption of polished rice leads to thiamine deficiency which leads to defective transketolase activity.
3. Zinc deficiency presents with erythematous scaly patches in the perioral region, mucosal ulcers, and impaired epithelial wound healing.
4. Copper deficiency presents with pigmentation of hair, hypothermia, degenerative changes in aortic elastin, osteopenia.

Options:

A. 1, 2, 3, 4

B. 3, 4

C. 2, 4

D. 1, 4

49. A 2-year-old boy is being evaluated for failure to thrive and developmental delay. His past medical history is significant for recurrent ear infections since age 6 months. Physical examination shows coarse facial features, corneal clouding, hepatosplenomegaly, and restricted joint mobility. Mass spectrometry analysis is performed on cultured fibroblasts and reveals deficient phosphorylation of mannose residues on certain glycoproteins in the Golgi apparatus. Normally, these proteins are most likely to be transported to which of the following cellular locations?

I-cell disease

A. Extracellular space

B. Lysosome

C. Mitochondria

D. Nucleus

50. From early to late, which muscles develop rigor mortis?

A. Orbicularis oculi, facial muscles, thorax, upper limb

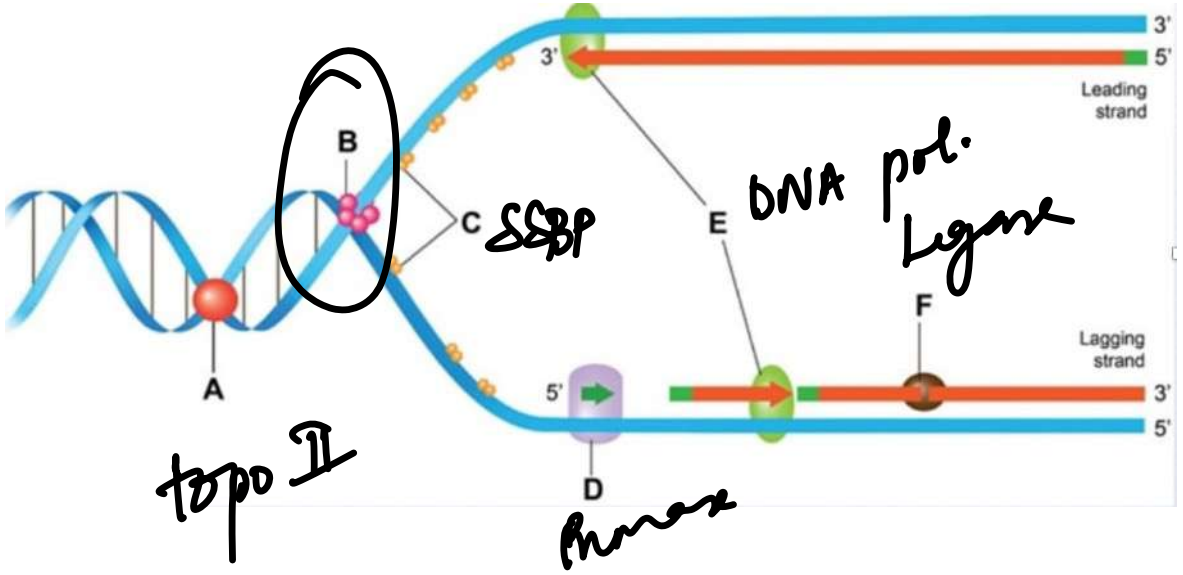
B. Orbicularis oculi, neck, facial muscles, upper limb, thorax

C. Neck, muscles of eyelid, upper limb, thorax

D. Neck, muscles of eyelid, facial muscles, thorax, upper limb

51. A 13-year-old boy with growth retardation, microcephaly, sun-sensitive skin rash, and recurrent infections is being evaluated for a possible inherited genetic defect. The patient is the second-born child of a first cousin marriage. His parents and siblings are healthy, but 2 of his maternal cousins have similar signs and symptoms. Genetic analysis of the patient reveals a defect in the BLM gene that codes for DNA helicase. Which of the following is the most likely site of action of this enzyme in the DNA replication fork shown?

A. A
B. B
C. C
D. D



52. Identify the false statement regarding teeth and ethnicity?

A. In Africanoids the cusps of molars are wide and deep with shovel shaped cusps in incisors

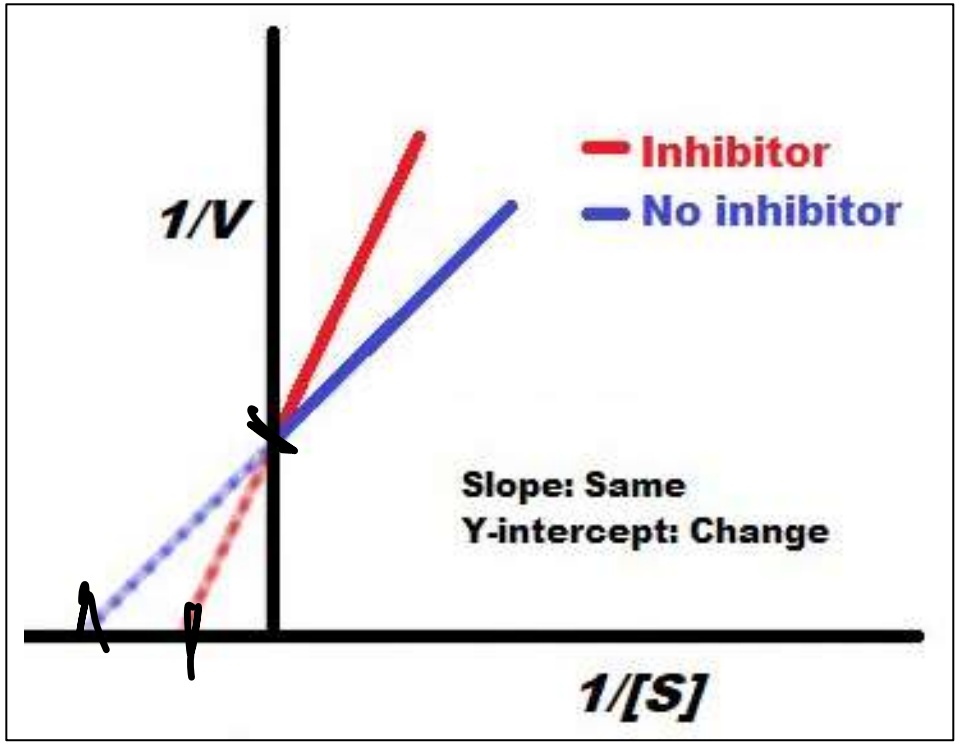
B. Caucasians have carabelli cusps

C. Upper third molar is most commonly absent in Mongolians

D. Prominent lingual ridge and labial ridge in mongols

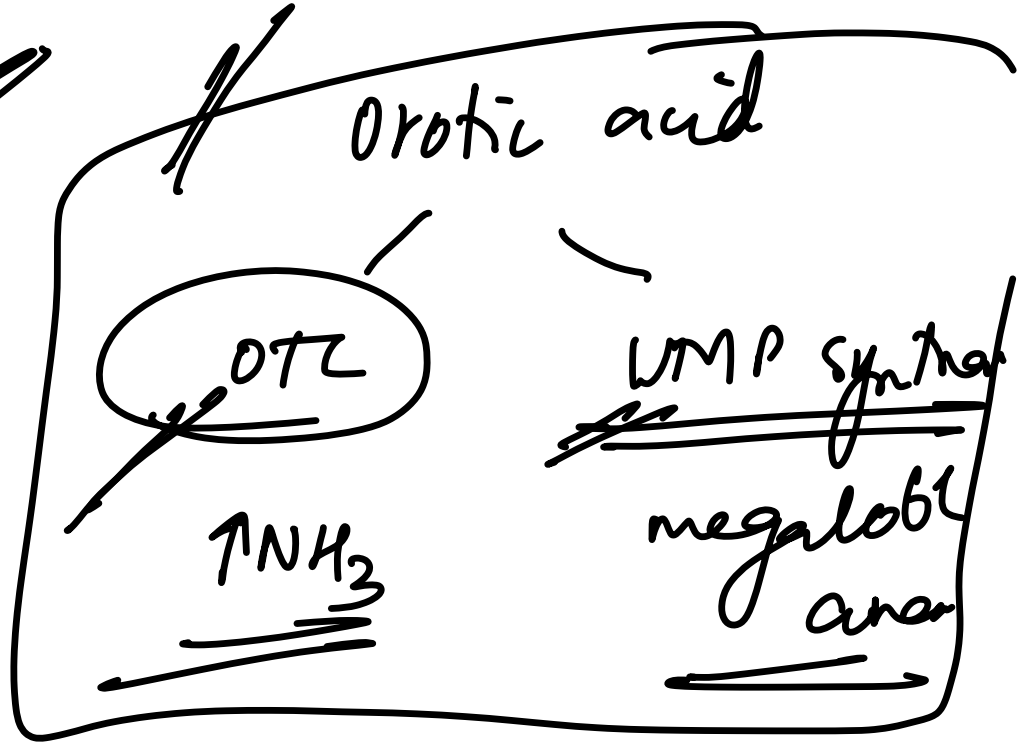
53. Which of the following types of inhibition is depicted in the given Lineweaver-Burk plot?

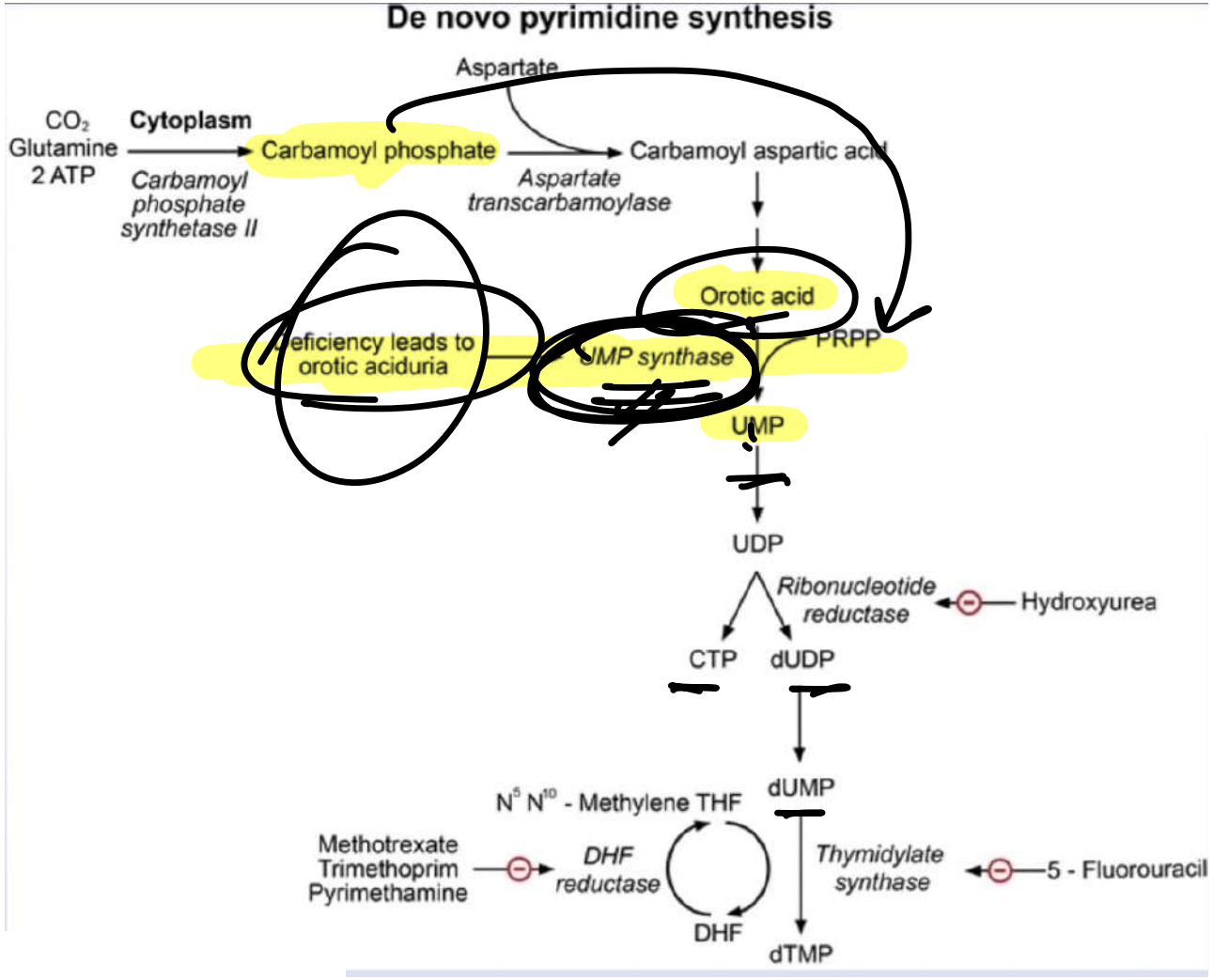
A. Competitive inhibition
B. Non-competitive inhibition
C. Uncompetitive inhibition
D. Suicidal inhibition

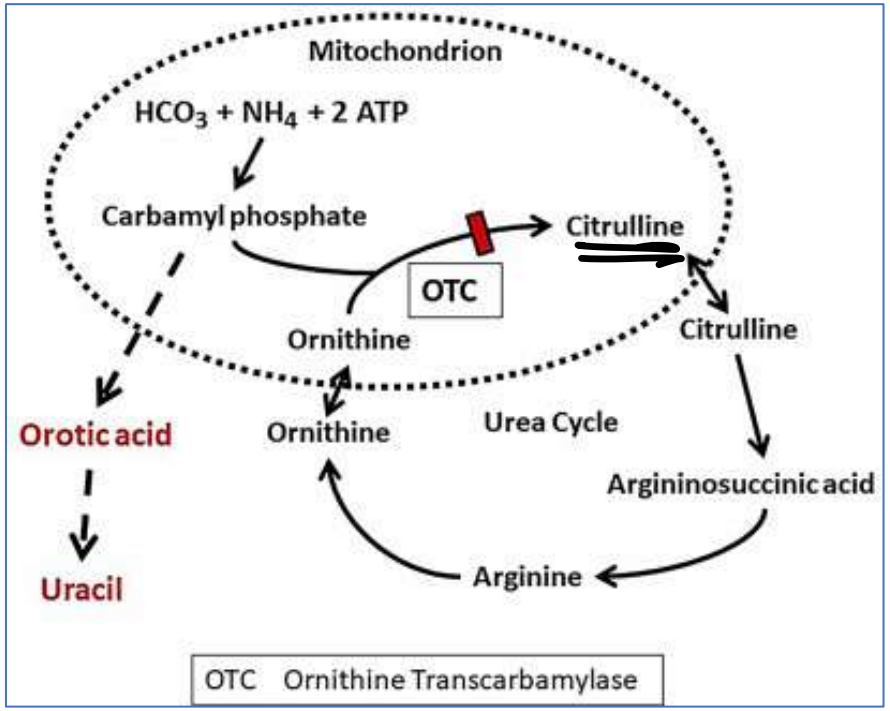


54. A 2-year-old boy is brought to the emergency department with fever, vomiting, and sleepiness. Since the newborn period, the parents say that the patient has had multiple similar episodes. Lab results revealed increased blood ammonia levels during these episodes and markedly increased orotic acid excretion in the urine. Physical examination shows a tachypneic boy who is unresponsive to all stimuli. Which of the following enzymes is most likely to be deficient in this patient?

A. Carbamoyl phosphate synthetase I
B. Hypoxanthine-guanine phosphoribosyltransferase
C. Ornithine transcarbamylase
D. Uridine monophosphate synthetase




De novo pyrimidine synthesis
Aspartate
CO_2
Glutamine
2 ATP
Cytoplasm
Carbamoyl phosphate
Carbamoyl aspartic acid
Carbamoyl phosphate synthetase II
Aspartate transcarbamoylase
Orotic acid
Deficiency leads to orotic aciduria
UMP synthase
PRPP
UMP
UDP
Ribonucleotide reductase
Hydroxyurea
CTP
dUDP
dUMP
N^5 N^{10} - Methylene THF
Methotrexate
Trimethoprim
Pyrimethamine
DHF reductase
DHF
Thymidylate synthase
5 - Fluorouracil
dTMP


Mitochondrion
$HCO_3 + NH_4 + 2$ ATP
Carbamyl phosphate
OTC
Citrulline
Ornithine
Citrulline
Orotic acid
Ornithine
Urea Cycle
Argininosuccinic acid
Uracil
Arginine
OTC Ornithine Transcarbamylase

55. Match the following:

1. Cocaine	a. Hunan hand
2. LSD	b. White lady
3. Abrus precatorius	c. Purple wedge
4. Capsaicin	d. Gunchi

A. 1=a, 2=b, 3=c, 4=d

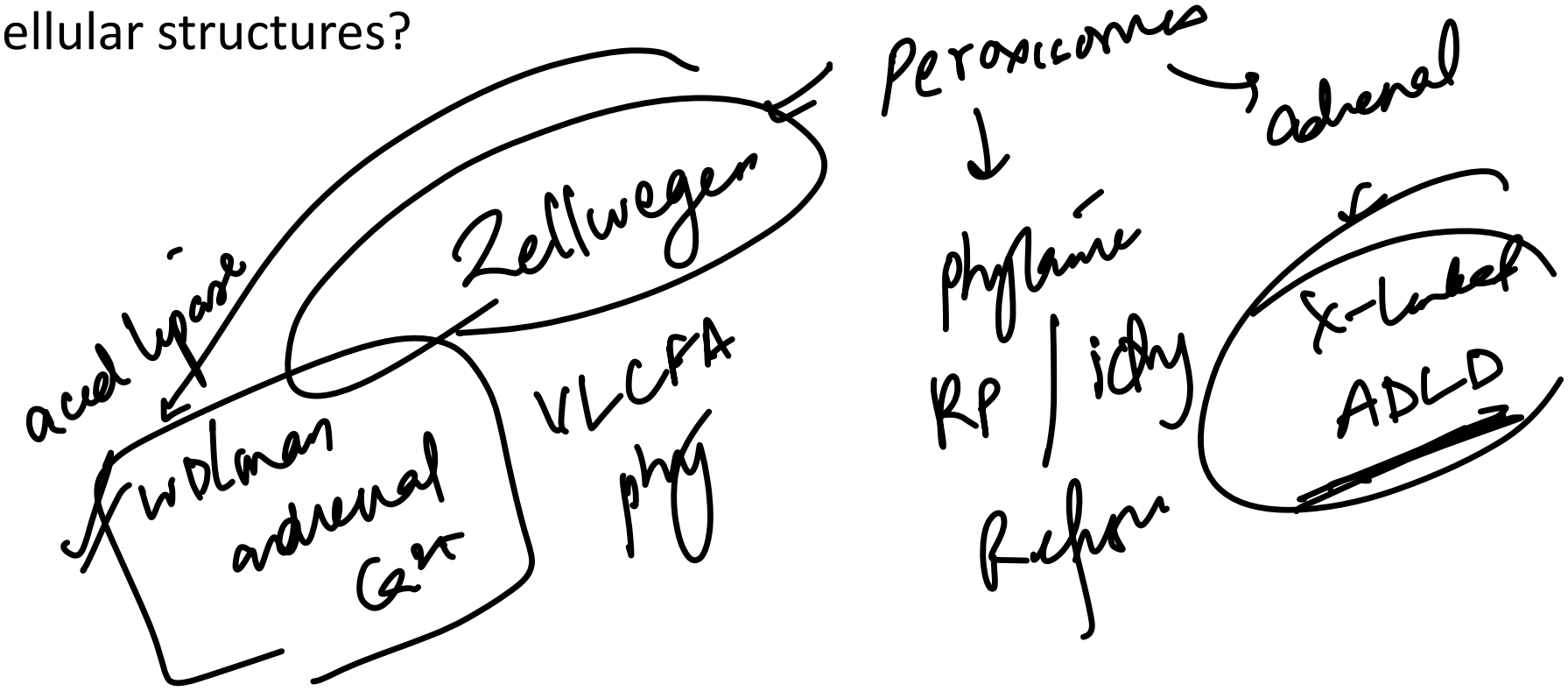
B. 1=b, 2=c, 3=d, 4=a

C. 1=d, 2=a, 3=b, 4=c

D. 1=c, 2=d, 3=a, 4=b

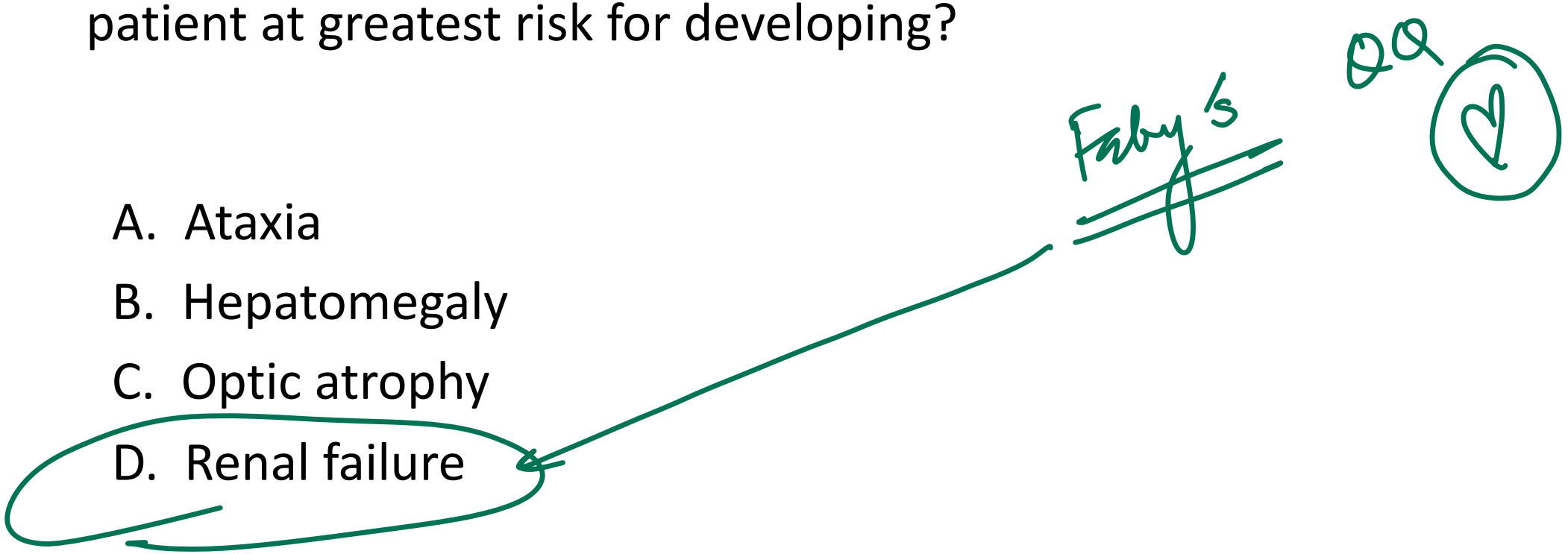
56. A 4-month-old boy is being evaluated for a hereditary metabolic disorder after presenting with failure to thrive and developmental delay. He had several seizures during the neonatal period. Physical examination reveals an abnormal head shape with a large anterior fontanelle and widely splayed cranial sutures. Profound hypotonia and hepatomegaly are also noted. Biochemical studies show elevated levels of very long chain fatty acids (VLCFAs) and phytanic acid. Cultured skin fibroblasts show impaired ability to oxidize VLCFAs. This patient's condition is best explained by dysfunction of which of the following cellular structures?

A. Golgi apparatus
B. Lysosomes
C. Mitochondria
D. Peroxisomes



57. An 18-year-old man comes to the office due to a progressive skin rash over the past year. He also has a long-standing history of an intermittent burning sensation in his palms and soles that is exacerbated by stress and fatigue. The burning sensation is particularly severe after exercise, during which the patient notes that he sweats minimally. Laboratory evaluation reveals an undetectable level of a-galactosidase A. Which of the following conditions is this patient at greatest risk for developing?

A. Ataxia
B. Hepatomegaly
C. Optic atrophy
D. Renal failure



58. A child before playing consumed fruit from the garden. After some time, he developed a high fever, confusion, photophobia, and unable to urinate. What are the likely causative agent and the appropriate antidote used in this case?

A. Datura, Pralidoxime

B. Datura, Physostigmine

C. Yellow oleander, Pralidoxime

D. Yellow oleander, Physostigmine

OP — datura

cholin — atro

antichol — physostigmine

59. Identify the correct statements:

1. Phosphatidylcholine is most abundant phospholipid in surfactant.
2. Cardiolipin is deficient in Barth syndrome.
3. Ceramidase deficiency is associated with Fabry disease.
4. Triglycerides are not amphipathic.

Options:

A. 1, 2, 3, 4

B. 1, 2, 4

C. 2, 3

D. 3, 4

60. A 5-month-old boy is brought to the office due to poor feeding. His mother says that he has difficulty holding his head up while breastfeeding and his suckling seems weaker than it used to be. Physical examination shows hepatomegaly and hypotonia in all 4 limbs. Cardiac auscultation reveals a gallop rhythm, and chest x-ray shows severe cardiomegaly. Muscle biopsy shows enlarged lysosomes containing periodic acid-Schiff (PAS}-positive material. Which of the following enzymes is most likely deficient in this patient?

A. Acid-glucosidase
B. Debranching enzyme
C. Galactokinase
D. Glucose-6-phosphatase

61. The method of autopsy carried out en masse to remove from tongue to prostate is?

Letulle

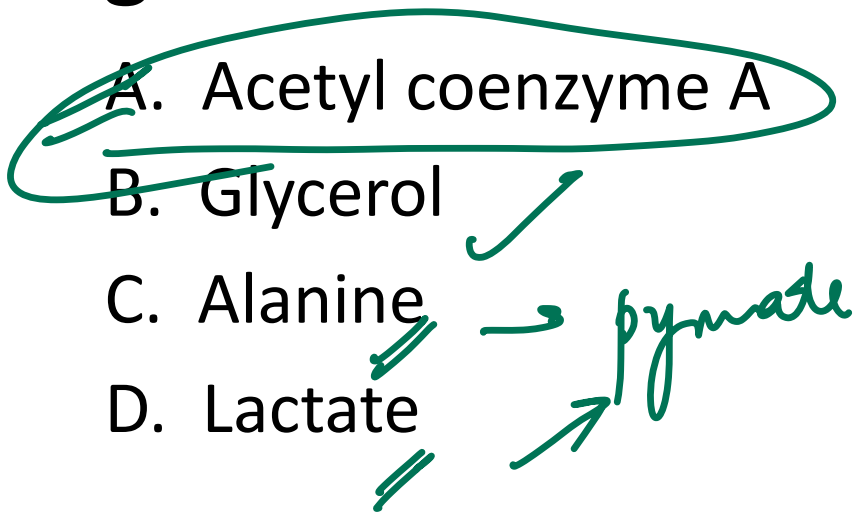
A. Virchow technique
B. Rokitansky technique
C. Ghon technique
D. Letulle technique

In situ

Block

62. Which of the following is not a substrate for glucose formation?

A. Acetyl coenzyme A
B. Glycerol
C. Alanine
D. Lactate



63. 45-year-old man is referred to an endocrinologist for newly diagnosed diabetes mellitus. A week ago, his primary care physician noted an elevated fasting serum glucose level. The endocrinologist discusses the different treatment options available, including oral and injectable medications. He recommends treatment with a medication that alters glucose metabolism within the liver by increasing the concentration of fructose 2, 6-bisphosphate within hepatocytes. Which of the following conversions will be inhibited by high intracellular concentrations of this metabolite?

A. Acetyl CoA to fatty acids

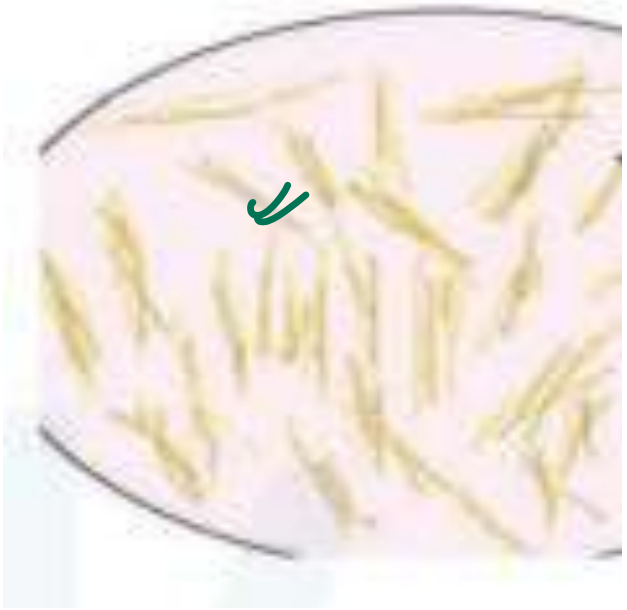
B. Alanine to glucose

C. Fructose-6-phosphate to fructose-1,6-bisphosphate

D. Glucose to glycogen

64. A 10-year-old male child came to the casualty with difficulty in walking and pain in the perianal region. On subjecting the specimen from the perianal region to a test, following appearance is seen under the microscope. What is the test done?

Barberio



A. Barberio's test
B. Florence test
C. Teichmann test
D. Acid phosphatase test

65. Which of the following statements are true regarding mitochondrial DNA?

1. Higher rate of mutations as compared to the nuclear genome.
2. Double-stranded circular DNA with about 16,000 base pairs
3. Constitutes 1% of cellular DNA.
4. Encodes for 20% of electron transport chain proteins.

1%

Options:

A. 1, 3, 4

B. 1, 2, 3, 4

C. 2, 4

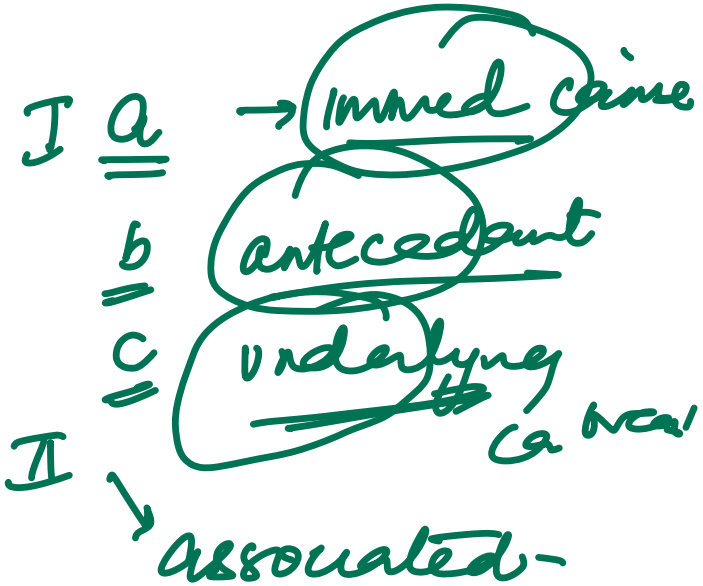
D. 2, 3

66. A research scientist studying the metabolic pathways that contribute to obesity, feeds experimental animals a high-carbohydrate, high-protein diet for a prolonged period. A sample of liver tissue is then obtained from the animals, and the activity of various enzymes involved in fatty acid metabolism is measured and recorded. It is determined that beta-oxidation of fatty acids is inhibited within these cells because of the diet. An increase in which of the following substances is most likely responsible for the observed effect?

A. Acetoacetate
B. Carnitine
C. Citrate
D. Malonyl-CoA

67. A death certificate is given below. What is the underlying cause of death in this case?

NAME OF DECEASED					For use of Statistical Office
Sex	Age at Death				
	If 1 year or more, age in years	If less than 1 year, age in month	If less than one month, age in days	If less than one day, age in hours	
3. Male 4. Female					
CAUSE OF DEATH I Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia, etc. (a) Myocardial infarction due to (or as a consequences of) Antecedent cause Morbid conditions, if any, giving rise to the above cause, stating underlying conditions last (b) Bone mets due to (or as a consequences of) (c) Ca breast II Other significant conditions contributing to the death but not related to the disease or condition causing it Type 2 DM				Interval between onset and death approx.	



A. Type 2 diabetes mellitus

B. Myocardial infarction

C. Carcinoma breast

D. Metastasis to bone

68. The following documents are exceptions to oral evidence in court except:

A. Postmortem reports
B. Dying declaration
C. Reports of Fingerprint Bureau
D. Chemical Examiner's reports

69. A 36-year-old man comes to the OPD due to skin lesions on his palms. The patient has yellowish skin nodules over the palmar creases that have been increasing in size and number over the past several years. He also has small clusters of yellow papules on his elbows, knees, and buttocks. His father died of a myocardial infarction at age 56. Immunoblot analysis suggests a lack of ApoE3 and Apo E4 in his circulating lipoproteins. Which of the following is most likely impaired in this patient?

A. ApoC-II production
B. Cholesterol esterification in the blood
C. Chylomicron remnant uptake by liver cells
D. LDL particle uptake by hepatocytes

Apo E
3-E

Hyperlipoproteinemias

Type	Inheritance	Pathogenesis	↑Blood level	Clinical
I-Hyper-chylomicronemia	AR	Lipoprotein lipase or ApoC-II deficiency	Chylomicrons, TG, cholesterol	Pancreatitis, eruptive/pruritic xanthomas
II- Familial hyper cholesterolemia	AD	Absent LDL receptors, or ApoB-100	IIa: LDL, cholesterol	Accelerated atherosclerosis, tendon (Achilles) xanthomas, and corneal arcus.
III-Dysbeta-lipoproteinemia	AR	Defective ApoE	Chylomicrons, VLDL	Premature atherosclerosis, tuberoeruptive and palmar xanthoma, Broad beta band
IV-Hyper-triglyceridemia	AD	Hepatic overproduction of VLDL	VLDL, TG	Acute pancreatitis

70. A 30-year-old individual diagnosed with schizophrenia commits an act that would otherwise be considered a criminal offense. The act was committed during a period of acute psychotic episode. The individual's medical history indicates sporadic adherence to rescribed antipsychotic medication. The prosecution has charged the individual with the offense. Based on the provided information, which of the following statements is most accurate regarding the applicability of Section 84 of IPC in this case?

A. The accused cannot invoke Section 84 since the act was committed while not adhering to prescribed medication.

B. Section 84 applies as the offence was committed during psychotic episode, regardless of medication adherence.

C. Section 84 is inapplicable due to the sporadic nature of the individual's symptoms.

D. The accused can only invoke Section 84 if the act was committed during a state of complete unconsciousness.

71. A 46-year-old man comes to the emergency department due to recurrent nosebleeds. He has been placed in homeless shelters on multiple occasions but has not remained there for any prolonged periods. Physical examination shows swollen gums, scattered ecchymoses, and hyperkeratosis. He also has a chronic ulcer on the left lower extremity that does not appear to be infected. Which of the following mechanisms accounts for this patient's examination findings?

A. Abnormal oxidative decarboxylation of ketoacids
B. Abnormal proline hydroxylation
C. Abnormal transamination
D. Deficient methionine synthesis

72. 31-year-old previously healthy man comes to the OPD due to myalgias, anorexia, and skin rash. The patient works as a personal trainer and is a bodybuilding enthusiast. He denies using anabolic steroids but has been consuming large amounts of raw egg whites for the past several months. Physical examination shows macular dermatitis of the extremities. A water-soluble vitamin deficiency is suspected as the cause of his condition. Which of the following biochemical conversions most likely uses the deficient vitamin as a cofactor?

A. Glucose to ribose-5-phosphate
B. Pyruvate to acetyl-CoA
C. Pyruvate to alanine
D. Pyruvate to oxaloacetate

Biotin

Carboxylase

73. Match the following with the correct toxin:

A. Arsenic
B. Cadmium
C. Thallium
D. Phosphorus
E. Mercury
F. Lead

A. 1-A, 2-B, 3-C, 4-D

B. 1-F, 2-D, 3-A, 4-B

C. 1-A, 2-D, 3-C, 4-B

D. 1-F, 2-D, 3-C, 4-B

74. Which of the following is seen in low insulin: glucagon ratio?

A. Activation of lipoprotein lipase
B. Activation of glycogen synthase
C. Activation of phosphofructokinase 1
D. Activation of hormone-sensitive lipase

75. A 6-month-old girl is brought to the OPD by her mother for a checkup appointment. Physical examination shows hepatomegaly, hypotonia, and height and weight below the 10th percentile. Laboratory studies show hypoglycemia and ketoacidosis. A liver biopsy shows hepatic fibrosis without fat accumulation. Further analysis reveals abundant quantities of a multibranched polysaccharide with abnormally short outer chains within the cytosol of the hepatocytes. What is the likely diagnosis?

debranching

A. Pompe disease
B. Cori disease
C. Anderson disease
D. Tarui disease

76. A woman gave birth to twins belonging to two different fathers. This case would be best described as?

A. Superfetation
B. Superfecundation
C. Supposititious child
D. Atavism

77. Match the following

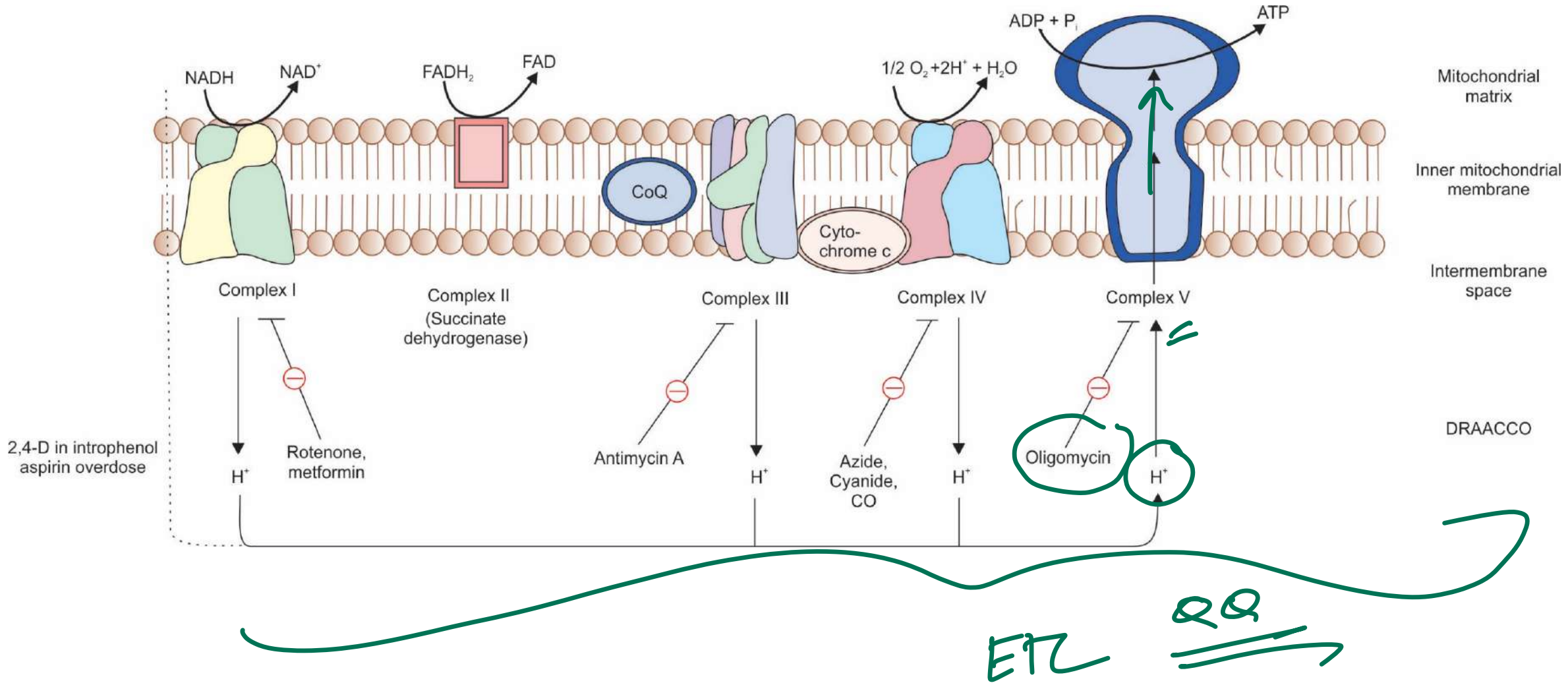
1. Increased H+ ions in the intermembrane space of mitochondria	A. Hydrogen sulphide
2. Inhibition of cytochrome oxidase	B. Malonate
3. Inhibition of Vit B2-derived substrate	C. Oligomycin
4. Inhibition of Vit B3-derived substrate	D. 2,4-Dinitrophenol
5. Allows electron transport but no ATP synthesis	E. Rotetone

A. 1-E, 2-A, 3-D, 4-B, 5-C

B. 1-C, 2-A, 3-B, 4-E, 5-D

C. 1-B, 2-C, 3-D, 4-E, 5-A

D. 1-C, 2-B, 3-E, 4-A, 5-D


NADH
NAD+
FADH2
FAD
CoQ
Cyto-
chrome c
1/2 O2 +2H+ + H2O
ADP + Pi
ATP
Mitochondrial
matrix
Inner mitochondrial
membrane
Intermembrane
space
Complex I
Complex II
(Succinate
dehydrogenase)
Complex III
Complex IV
Complex V
2,4-D in introphenol
aspirin overdose
Rotenone,
metformin
Antimycin A
Azide,
Cyanide,
CO
Oligomycin
H+
DRAACCO

78. A 6-month-old boy is brought to the emergency department by his mother because of recent onset of vomiting, irritability, and jaundice. The infant was born at term and had been healthy until the onset of these symptoms. All his vaccinations are up to date. He had been breast-fed exclusively until 1 week ago, when cereals and fruit juices were introduced into his diet. Further evaluation reveals hepatomegaly and abnormal liver function tests. Which of the following enzymes is most likely to be deficient in this patient?

A. Galactose- 1-phosphate uridyl transferase
B. Aldolase B
C. Fructokinase
D. Galactokinase

79. Match the following:

1.	A 51-year-old bomb blast victim is brought to the casualty with life-threatening injuries. There was a lot of chaos and no one was available to sign consent for emergency surgery. Despite surgery the patient died.	A.	Res Ipsa loquitor
2.	A gynecologist performs a hysterectomy for endometrial carcinoma. Despite the adequate precaution, the ureter was injured intraoperatively.	B.	Criminal negligence
3.	A surgeon returns home from a party after many pegs of alcohol and was called to perform an emergency operation. During the operation, the assisting staff noticed the surgeon's hand shaking and instruments falling. He eventually nicks an artery and the patient collapses. Under which of the following terms will this incident be tried?	C.	Doctrine of anticipation
4.	A 45-year-old female patient is told about the benefits and complications of hysterectomy and she agrees to the procedure	D.	Doctrine of extended consent
		E.	Doctrine of conjugated consent
		F.	Novus actus interveniens
		G.	Medical maloccurrence
		H.	Dichotomy
		I.	Informed consent
		J.	Implied consent

Options:

A. 1-F, 2-G, 3-B,4-I

B. 1-D,2-H,3-A, 4-J

C. 1-C, 2-G, 3-B, 4-I

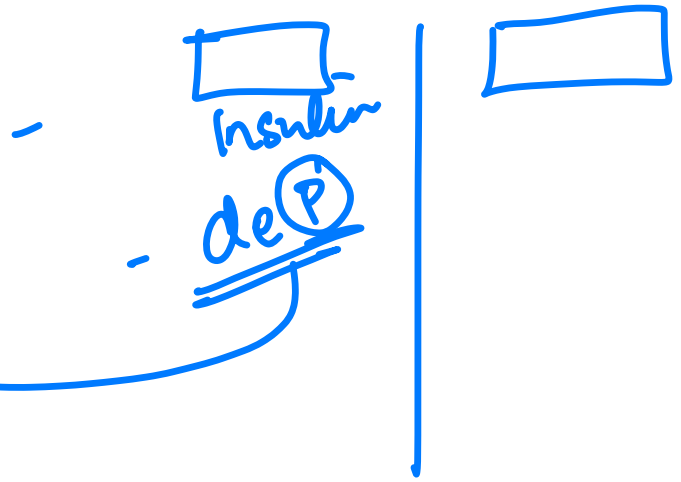
D. 1-C, 2-A, 3-F, 4-D

80. A 35-year-old female is hospitalized with headaches and vomiting. She has a long history of psychiatric illness and is known to practice eccentric. dietary habits. Physical findings include papilledema, dry skin, and hepatosplenomegaly. Head CT scan is ordered immediately but is negative for intracranial mass. Which of the following is a likely cause of this patient's condition?

A. Thiamine deficiency
B. Riboflavin deficiency
C. Vitamin C overuse
D. Vitamin A overuse

81. A 14-year-old boy is brought to the emergency department due to excessive urination and thirst. He has lost 4.5 kg in the last 3 weeks. Physical examination shows dry mucous membranes. Laboratory studies reveal blood glucose of 455 mg/dl, normal anion gap, and hemoglobin A1 c of 11.3%. The patient is diagnosed with type 1 diabetes, and treatment with insulin is initiated. In addition to lowering blood glucose, insulin increases glycogen synthesis in hepatocytes. Activation of which of the following molecules most likely promotes this metabolic effect?

A. Janus kinase (JAK)
B. Phospholipase C
C. Protein kinase A
D. Protein phosphatase



82. Identify the true statements:

1. Dimercaprol + Calcium EDTA is recommended for acute Lead poisoning with signs of encephalopathy.
2. Dimercaprol is indicated in acute arsenic poisoning.
3. Activated charcoal is indicated in phenobarbital, aspirin, alcohol toxicity.
4. Prazosin is the DOC for autonomic storm following scorpion bite.

Options:

A. 1, 2, 3, 4

B. 1, 2, 4

C. 3, 4

D. 2, 4

CHELATORS:

BAL- Hg, As, Pb

DMSA/Succimer- Hg, As, Pb

D-penicillamine- Hg, Pb, Cu

EDTA- Pb

Desferioxamine- Fe

83. Match the following plants

Options:

A. 1-A, 2-E, 3-D, 4-C

B. 1-A, 2-C, 3-D, 4-E

C. 1-F, 2-C, 3-D, 4-E

D. 1-F, 2-B, 3-E, 4-D

1. 	A. Erythroxylum coca
2. 	B. Datura
3. 	C. Digitalis Purpura
4. 	D. Cannabis
	E. Aconite
	F. Atropa belladonna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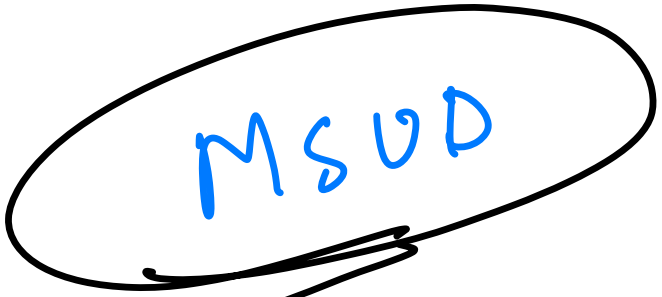
84. 4-day-old infant is brought to the emergency department with abnormal movements. The patient has had intermittent episodes of tonic posturing over the past 3 hours as well as poor feeding, vomiting, and irritability for the past 2 days. The mother also reports that his diapers smell like "caramelizing sugar." Laboratory studies of plasma and urine confirm the diagnosis. In addition to appropriate dietary restriction, supplementation with which of the following may improve this infant's condition?



A. Arginine
B. Cobalamin
C. Pyridoxine
D. Thiamine

85. Identify the type of physical restraint given in the picture below:

A. Choke/carotid hold
B. Carotid sleeper hold
C. Hog tie
D. Bar arm

86. Identify the true statements:

1. Xanthurenic aciduria arises due to a deficiency in vitamin B6
2. Steroid synthesis requires abundant SER in cells
3. Liver lacks the ability to utilize ketone bodies due to deficiency of ~~Thiolase~~
4. Proteins have the highest thermic effect

Options:

A. 1, 2, 3, 4

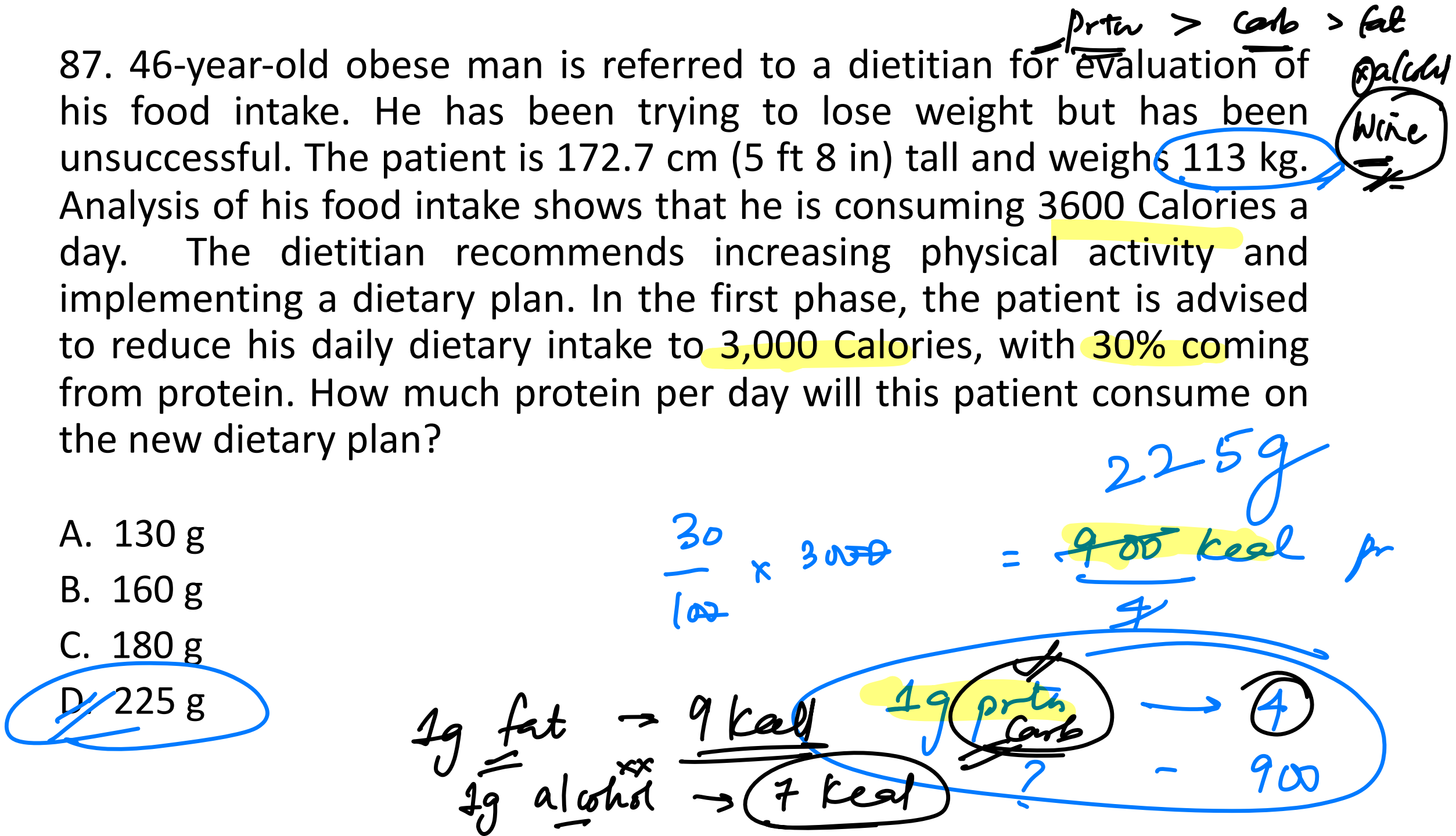
B. 1, 2, 4

C. 2, 4

D. 3

87. 46-year-old obese man is referred to a dietitian for evaluation of his food intake. He has been trying to lose weight but has been unsuccessful. The patient is 172.7 cm (5 ft 8 in) tall and weighs 113 kg. Analysis of his food intake shows that he is consuming 3600 Calories a day. The dietitian recommends increasing physical activity and implementing a dietary plan. In the first phase, the patient is advised to reduce his daily dietary intake to 3,000 Calories, with 30% coming from protein. How much protein per day will this patient consume on the new dietary plan?

A. 130 g
B. 160 g
C. 180 g
D. 225 g



88. Identify the true statements:

1. In case of professional misconduct, the patient's records on demand should be provided within 72 hours.
2. The First-hand knowledge rule is applicable to common witness
3. Postmortem caloricity is seen in death due to burns
4. The test in which weight of lungs is compared with body weight is Ploucquet's Test

Options:

A. 1, 2, 3, 4

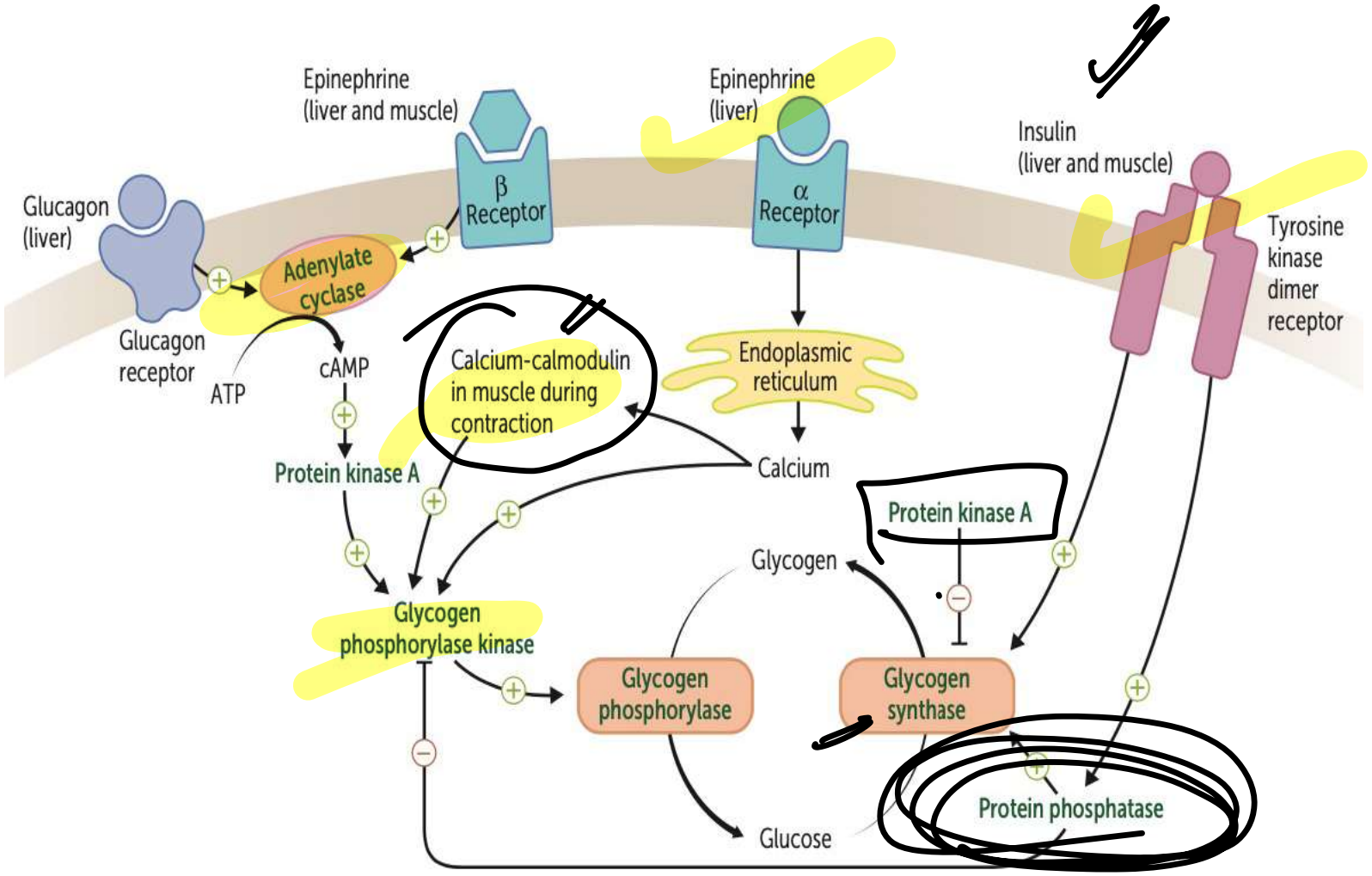
B. 1, 2, 4

C. 2, 4

D. 2

89. 31-year-old man comes to the OPD for a routine checkup. The patient is a fitness trainer and lifts weights recreationally. He has been consuming carbohydrate-rich food prior to his weightlifting sessions and claims that it increases muscle strength. A literature review shows that the rate of glycogenolysis within myocytes increases several hundredfold during active skeletal muscle contraction. Which of the following substances is most likely responsible for increasing the reaction rate during active contraction?

A. ATP
B. Ca2+
C. cAMP
D. Glucose-6-phosphate


Epinephrine
(liver and muscle)
Epinephrine
(liver)
Insulin
(liver and muscle)
Glucagon
(liver)
β
Receptor
α
Receptor
Tyrosine
kinase
dimer
receptor
Adenylate
cyclase
Glucagon
receptor
ATP
cAMP
Calcium-calmodulin
in muscle during
contraction
Endoplasmic
reticulum
Protein kinase A
Calcium
Protein kinase A
Glycogen
Glycogen
phosphorylase kinase
Glycogen
phosphorylase
Glycogen
synthase
Protein phosphatase
Glucose

90. Leading Questions are permitted in all except:

A. Cross Examination
B. Dying Deposition
C. Hostile witness
D. Re-examination

91. Which of the following enzymes use selenocysteine?

1. Glutathione peroxidase
2. Glutathione synthase
3. Deiodinase
4. Thioredoxin reductase

Options:

A. 1, 3, 4

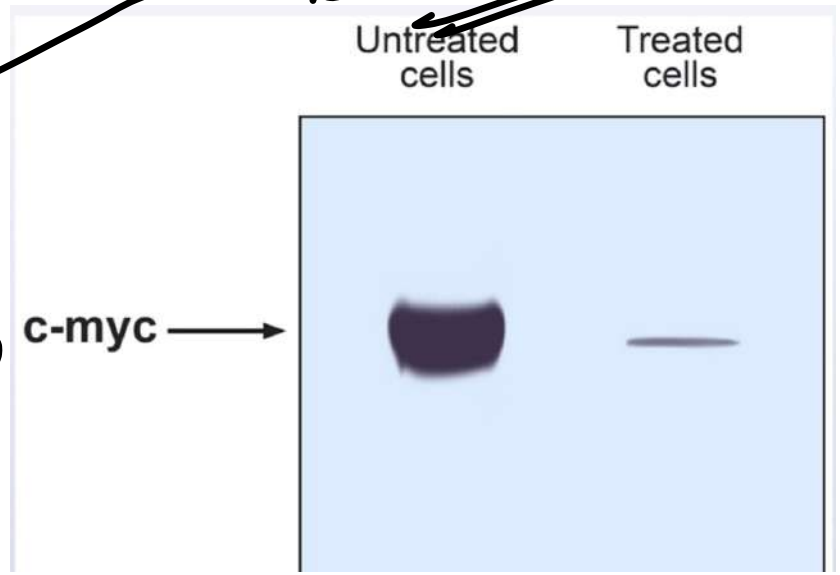
B. 1, 2, 3

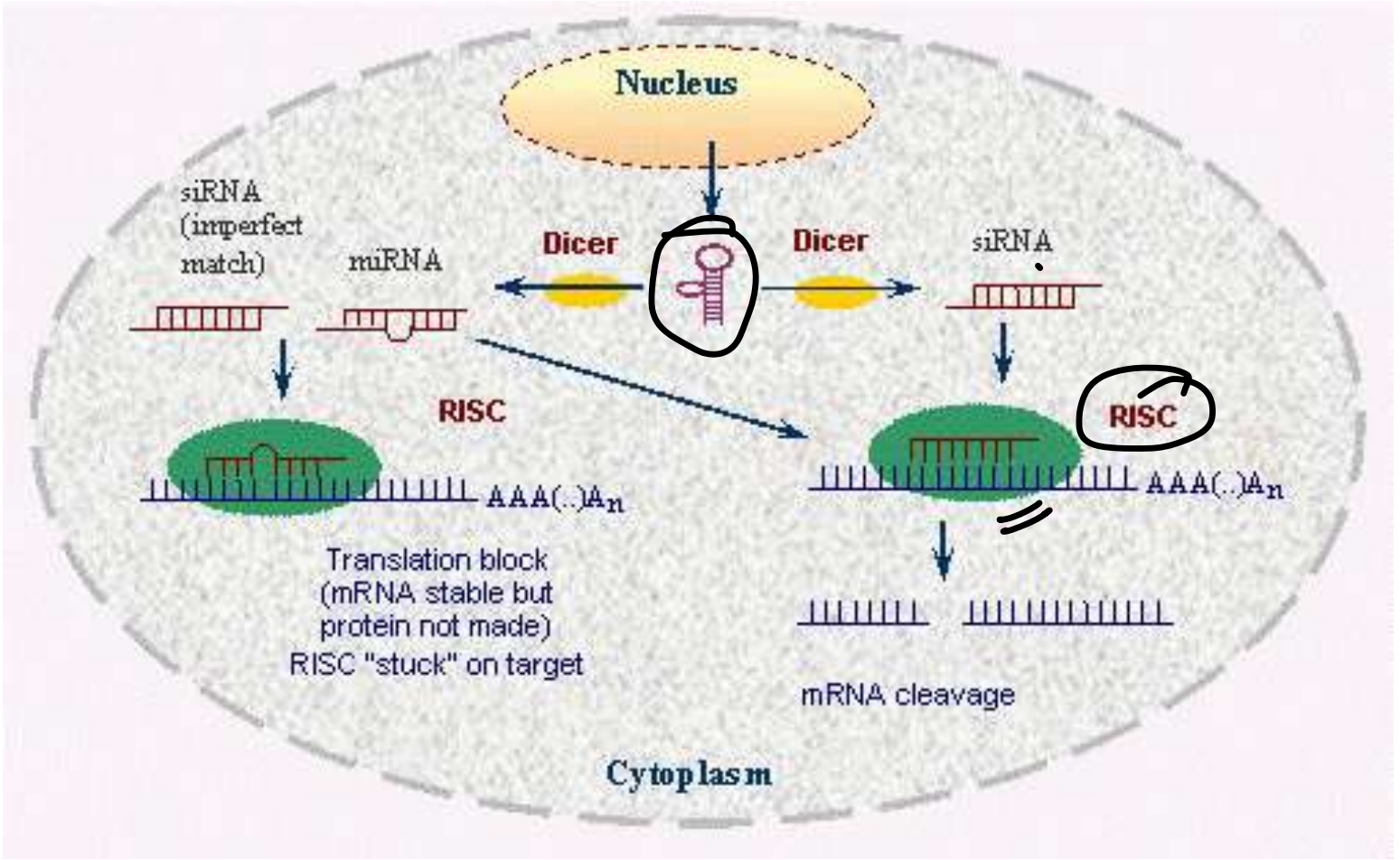
C. 2, 3, 4

D. 1, 2, 4

92. A pharmaceutical corporation investigating new therapeutic agents for treatment of Burkitt lymphoma synthesizes a double-stranded RNA molecule that is 21 base pairs in length. The RNA molecule has a base pair sequence that is complementary to a region of mRNA encoding c-Myc. Introduction of the RNA molecule into tumor cells results in a significant reduction in cell growth. Western blot analysis of equivalent numbers of treated and untreated cells is shown below. Which of the following processes was most likely directly interrupted in the cells exposed to the RNA molecule?

A. DNA replication
B. DNA transcription
C. mRNA translation
D. Proteasome activity




Nucleus
siRNA
(imperfect
match)
miRNA
Dicer
Dicer
siRNA
RISC
RISC
AAA(..)An
AAA(..)An
Translation block
(mRNA stable but
protein not made)
RISC "stuck" on target
mRNA cleavage
Cytoplasm

93. Identify the range of the firearm wound:

A. Close shot entry wound
B. Contact shot entry wound
C. Distant shot entry wound
D. Intermediate shot entry wound

94. Identify the true statements:

1. Tm of DNA increases with more G-C
2. DNA fingerprinting is used to detect DNA-protein interaction.
3. Best method for detection of mutations with low allele frequency is Droplet digital PCR.
4. The repair mechanism associated with CRISPR-Cas9 is base excision repair.
5. miRNA binds to 3' UTR to inhibit translation.

Options:

A. 1, 2, 3, 4, 5

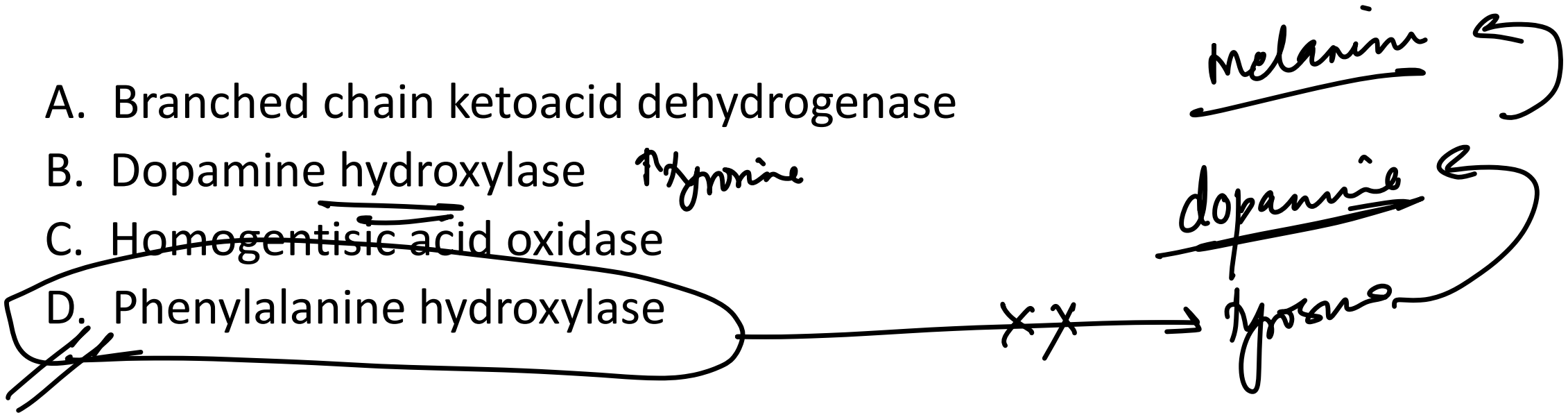
B. 1, 2, 4, 5

C. 1, 3, 5

D. 2, 4

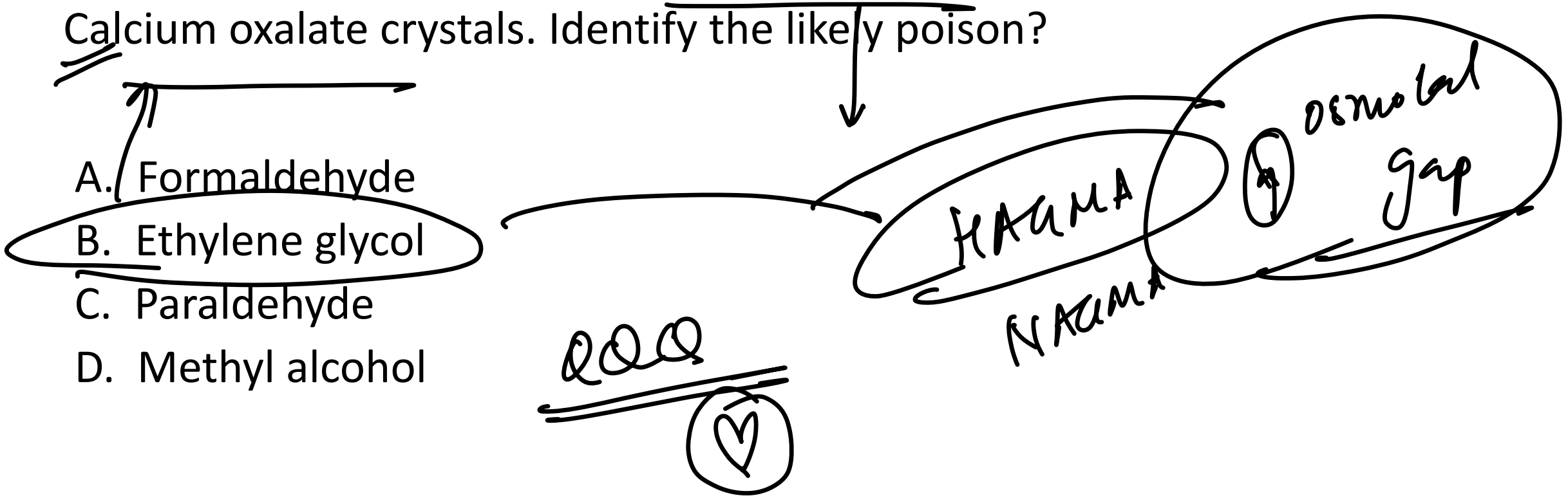
95. A 3-year-old boy is brought to the physician by his parents because he has not yet begun to walk or speak. Assessment of his developmental milestones shows severe intellectual disability. He dies 6 months later from refractory seizures resulting in respiratory failure. Autopsy shows pallor of the substantia nigra, locus ceruleus, and vagal nucleus dorsalis. The underlying condition responsible for this patient's death is most likely caused by a deficiency of which of the following enzymes?

A. Branched chain ketoacid dehydrogenase
B. Dopamine hydroxylase
C. Homogentisic acid oxidase
D. Phenylalanine hydroxylase

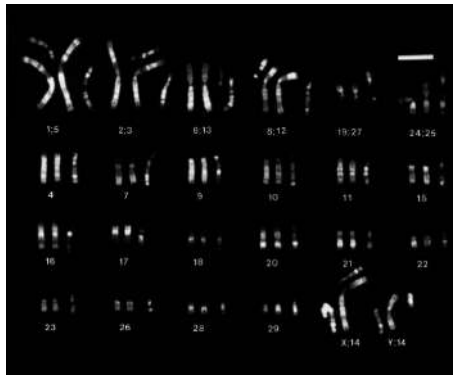


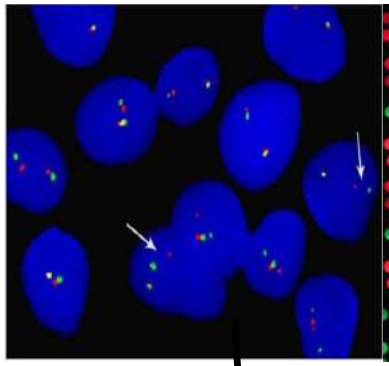
96. A 33-year-old male with attempted poisoning was brought to the casualty in a drowsy state. His pulse was 140/min, respiratory rate - 30/min. His ABG showed metabolic acidosis. Urine analysis showed Calcium oxalate crystals. Identify the likely poison?

A. Formaldehyde
B. Ethylene glycol
C. Paraldehyde
D. Methyl alcohol

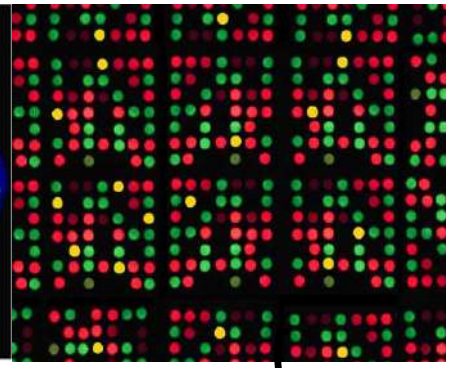


97. Match the following techniques:

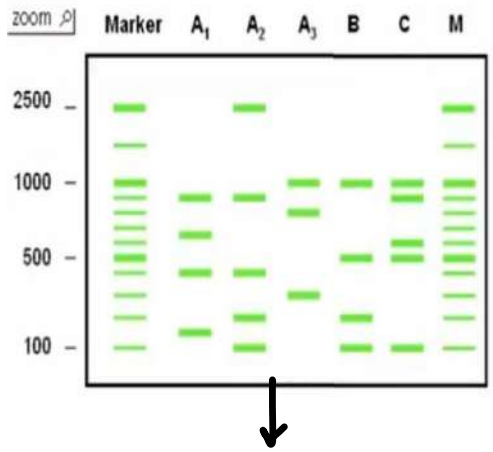




FISH



CGH



RFLP

A. 1-A, 2-E, 3-G, 4-E

B. 1-B, 2-D, 3-H, 4-F

C. 1-C, 2-D, 3-H, 4-E

D. 1-D, 2-A, 3-G, 4-I

A.	G-Banded Karyotype
B.	C-Banded Karyotype
C.	Q-banded Karyotype
D.	FISH
E.	RFLP
F.	FELUDA
G.	NGS
H.	CGH
I.	RT-PCR

98. An 8-month-old girl is brought to the office for evaluation of irritability and regression of motor skills. Her parents have also noticed that she startles easily with loud noises. Head circumference measurement is consistent with macrocephaly. Bilateral funduscopic evaluation shows a bright red fovea centralis that is surrounded by a contrasting white macula. Peripheral vision is decreased. Abdominal examination is normal. Accumulation of which of the following metabolites is most likely present in this patient's tissues?

Tay Sachs

CRS

A. Galactocerebroside
B. Glucocerebroside
C. GM2 ganglioside
D. Sphingomyelin

99. Identify the incorrect pair:

A. 313 – Criminal abortion without the consent of mother

B. 314 – Death of mother during criminal abortion

C. 318 - Concealing the birth of a newborn by secret disposal of dead body

D. 193 IPC: Definition of Perjury

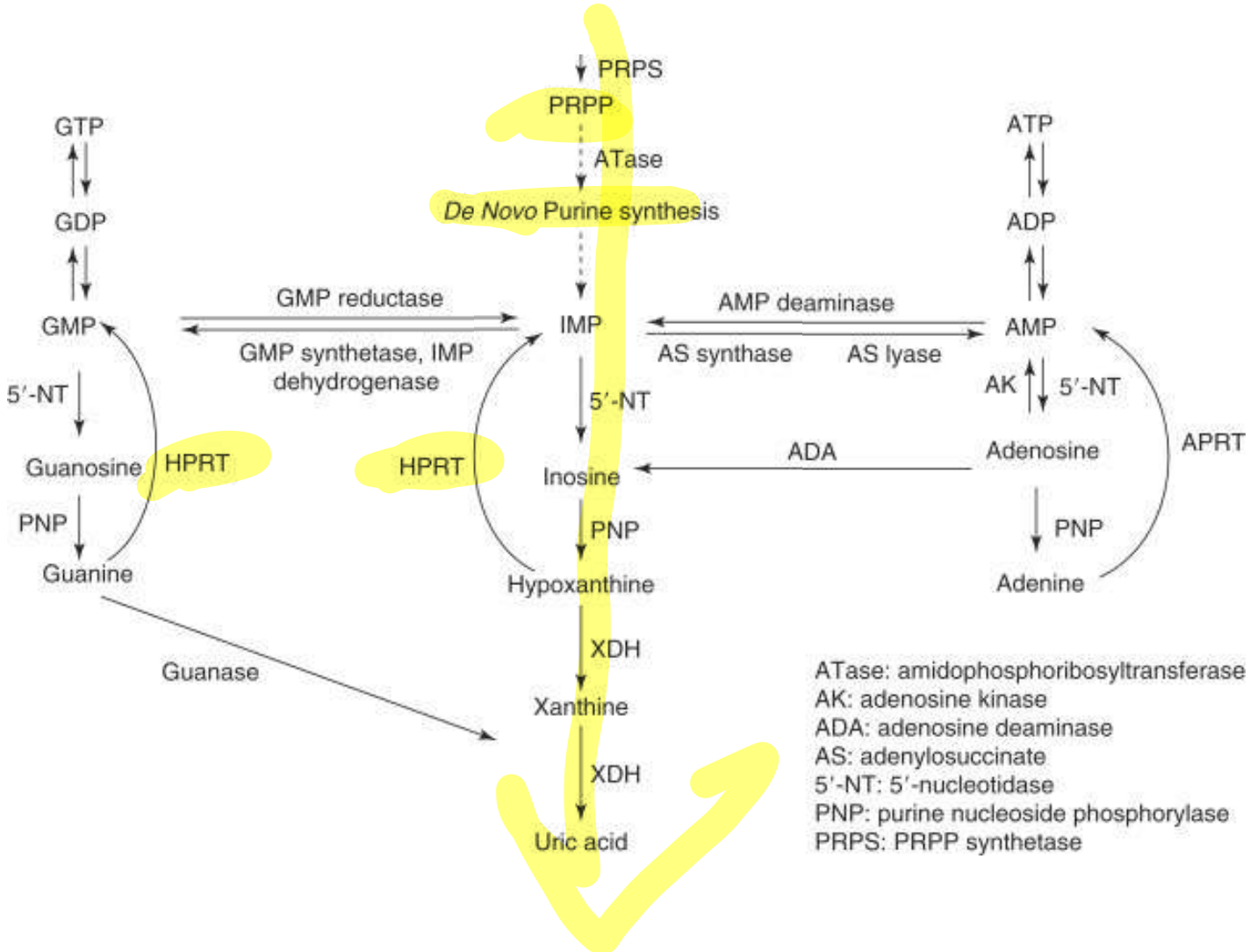
100. A 6-month-old boy is brought to the OPD by his mother out of concern that he is not developing normally. He has been feeding regularly and has had no medical problems other than a mild respiratory infection a month earlier. Physical examination reveals delayed developmental milestones and hypotonia. Two years later, the child is found to have involuntary movements and demonstrates a tendency to aggressively bite his own lips and fingers. Laboratory analysis shows an elevated blood uric acid level. Activity of which of the following enzymes is most likely increased because of this patient's condition?

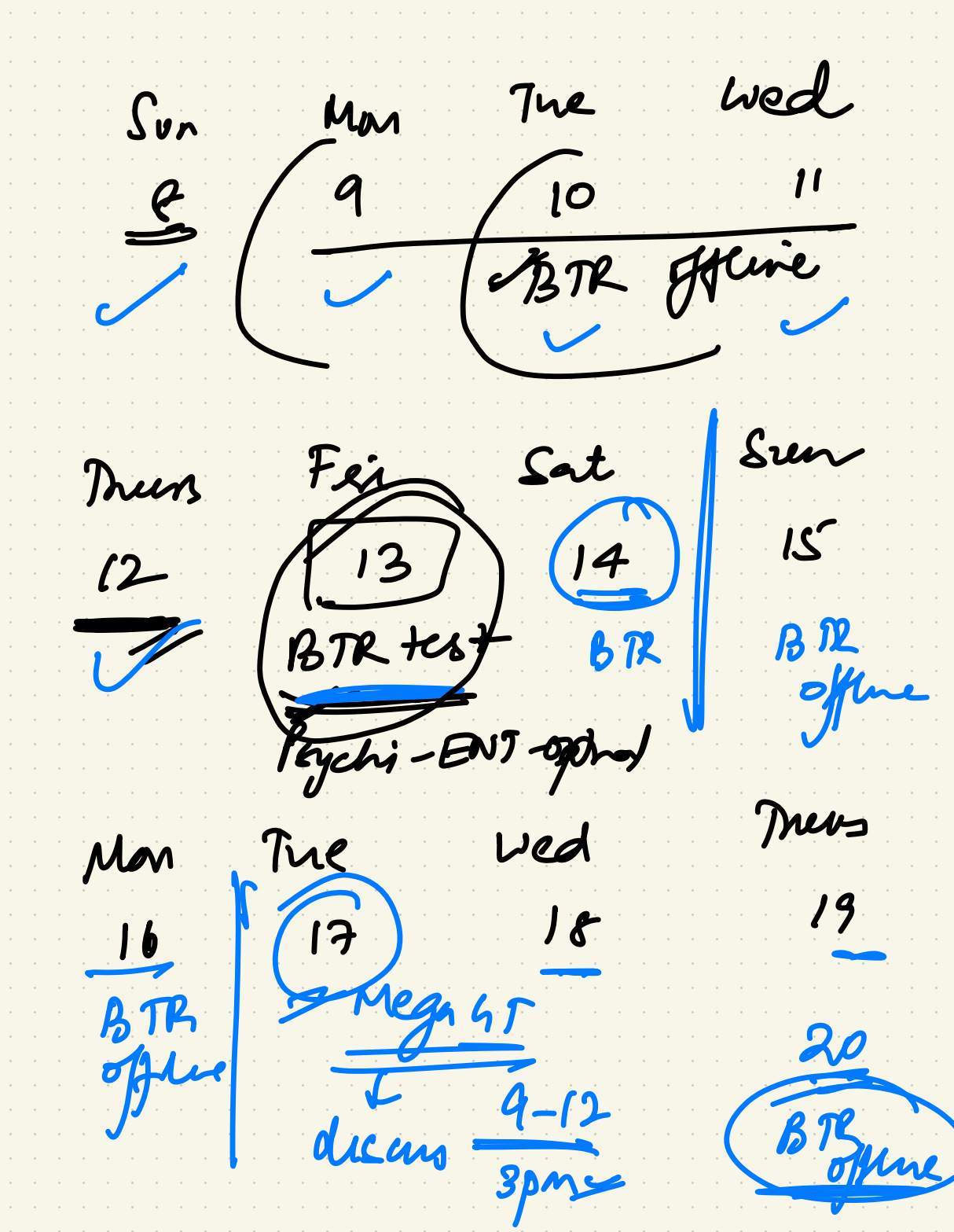
Lesch-Nyhan

A. Aspartate carbamoyl transferase
B. Dihydroorotase
C. Hypoxanthine-guanine phosphoribosyl transferase
D. Phosphoribosyl pyrophosphate amido transferase

XR

donor


PRPS
PRPP
ATase
De Novo Purine synthesis
GTP
GDP
GMP
5′-NT
Guanosine
HPRT
PNP
Guanine
GMP reductase
GMP synthetase, IMP dehydrogenase
IMP
5′-NT
HPRT
Inosine
PNP
Hypoxanthine
XDH
Xanthine
XDH
Uric acid
Guanase
AMP deaminase
AS synthase
AS lyase
ATP
ADP
AMP
AK
5′-NT
ADA
Adenosine
PNP
Adenine
APRT
ATase: amidophosphoribosyltransferase
AK: adenosine kinase
ADA: adenosine deaminase
AS: adenylosuccinate
5′-NT: 5′-nucleotidase
PNP: purine nucleoside phosphorylase
PRPS: PRPP synthetase


Sun
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BTR test
Psychi - ENT optional
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Thurs
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BTR
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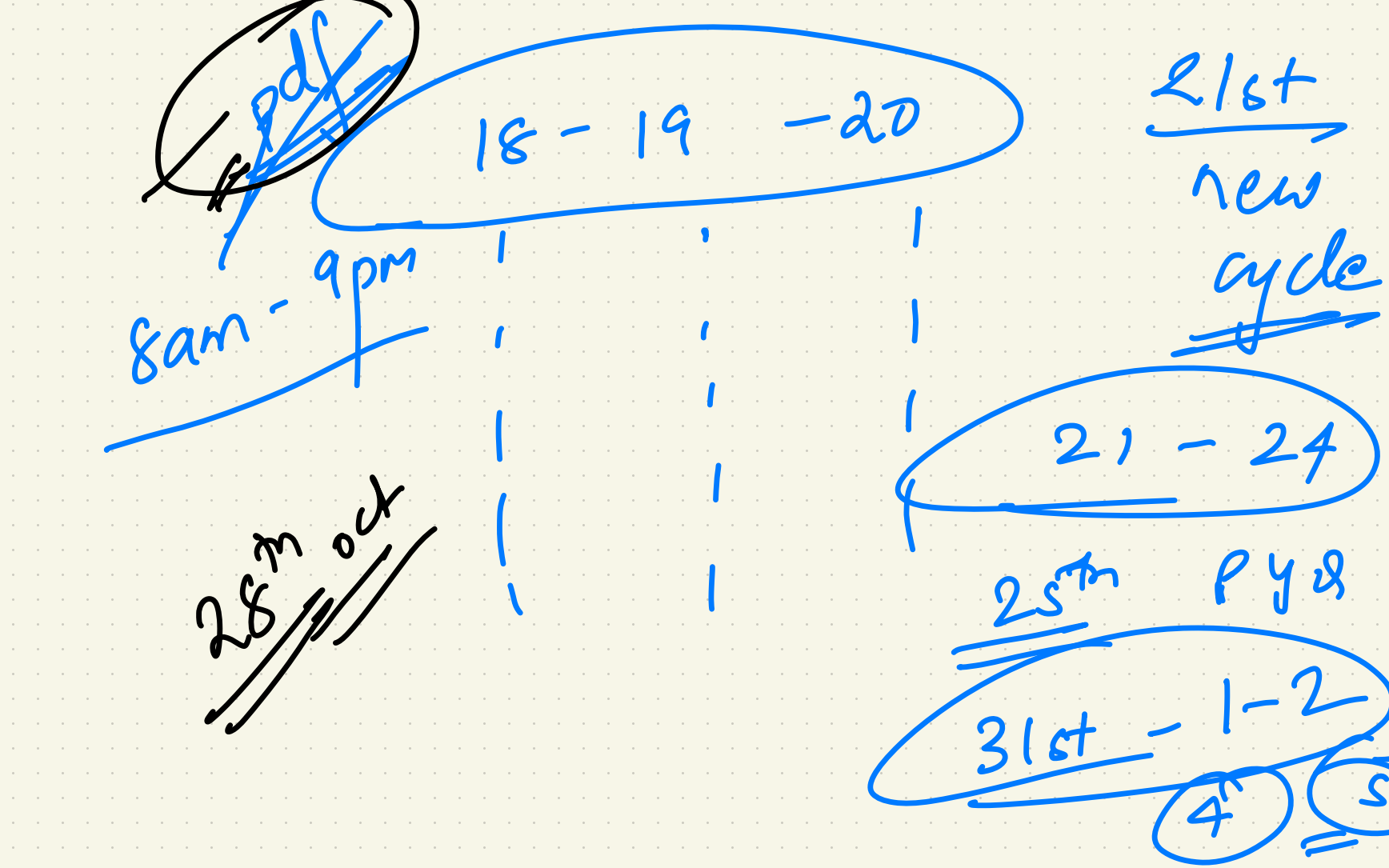
pdf
18 - 19 -20
21st
new
cycle
8am - 9pm
21 - 24
28th oct
25th
31st - 1-2
4