

Model Answer

Department of Biochemistry, Faculty of Pharmacy, Tanta University
Midterm Exam in Clinical Biochemistry
Credit Hours System, Second Semester, March 2019

Midterm Exam in Clinical Biochemistry

Student Name: Roll No: Student Marks: 10

QUESTION ONE

(10x0.5= 5 Marks)

10 x 0.5 =

Answer each of the following questions as directed:

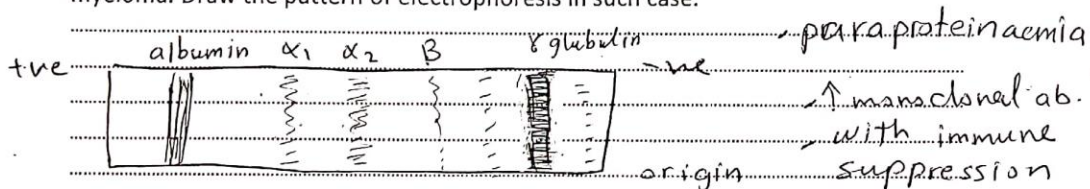
1. The kidneys serve endocrine functions. What are the hormones synthesized by the kidneys and what are their functions?
- 1- Renin: catalyze formation of (Ang.I) from angiotensinogen → stimulate aldosterone synthesis.
 - 2- Erythropoietin: promotes hemoglobin synthesis.
 - 3- synthesis of 1,25-dihydroxycholecalciferol (calcitriol) → regulate Ca^{++} absorption by the gut.
2. Increased ratio of BUN/creatinine may indicate any of the following disorders:
- increased ratio & normal creatinine: pre-renal uremia, ↑ protein intake
gastrintestinal bleeding
- ② increased ratio with increased creatinine: post-renal obstruction
3. Both Gilbert's syndrome and Crigler-Najjar syndrome are hereditary disorders associated with hyperbilirubinemia, but the genetic cause is different. Explain.
- * Gilbert's: ↓ bilirubin transport into the hepatocytes.
 - * Crigler-Najjar syndrome: deficiency of U-D-P-G-transferase
↓ uridyldiphosphate glucosyl transferase
4. The acute phase protein response is an adaptive response to disease. Give examples.
- ↑ CRP and complement will eliminate infection.
 - ↑ coagulation factors will prevent blood loss.
 - protease inhibitors will prevent the spread of tissue necrosis when lysosomal enzymes are released by damaged cells at site¹ of injury.

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5. Measurement of level of some proteins (e.g. haptoglobin, ferritin, or caeruloplasmin) is recommended in specified conditions. Explain.

- Haptoglobin: reduced in haemolytic conditions
- Ferritin: gives indication of body iron stores
- Caeruloplasmin: ↓ in Wilson's disease

6. Serum protein electrophoresis is recommended to confirm diagnosis of multiple myeloma. Draw the pattern of electrophoresis in such case.



7. Apolipoproteins serve important functions. What are the physiological functions of apo-AI and apo-CII?

Apo-AI: activates LCAT - structural in HDL

Apo-CII: activate LPL "Lipoprotein lipase"

8. Uptake of LDL particles by (apoB/E) receptors helps transport of cholesterol to inside the cell. When intracellular cholesterol is sufficient, it serves 3 functions for regulation of its level; these are:

- ① the synthesis of receptor is down-regulated
- ② ↑ esterification of cholesterol by ↑ (ACAT) *
- ③ inhibit H.M.G-CoA reductase "rate limiting step in cholesterol synthesis"

9. Some diseases may precipitate secondary hyperlipidemia. Enumerate.

- obesity - ↑ alcohol intake - D.M. (diabetes)
- hypothyroidism - nephrotic syndrome - CRF,
- cholestasis

* ACAT: Acyl coA; cholesterol Acyl transferase

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10. Hepatic encephalopathy occurs when liver is not functioning properly leading to elevation of plasma levels of ammonia. Causes of liver dysfunction in such cases include:

Reye's syndrome, inherited deficiency of urea cycle enzymes, cirrhosis, drug toxicity, liver tumor, excessive protein turnover from gastrointestinal bleeding

QUESTION TWO

(5x1= 5 Marks)

Give reasons for each of the following:

1. Although urea is an endogenous substance synthesized by the liver, it is not appropriate for calculating GFR. *it is affected by many factors:*

- Urea has a significant renal reabsorption, so, it is not completely secreted:*
- ① BUN ↑ by ↑ protein intake, catabolic state, gastrointestinal bleeding
 - ② BUN ↓ with ↓ *n* & some liver disease
 - ③ ↑ tubular reabsorption at ↓ rates of urine flow (fluid depletion)

2. Infants with bilirubin levels greater than 10 mg/dL should be exposed to phototherapy.

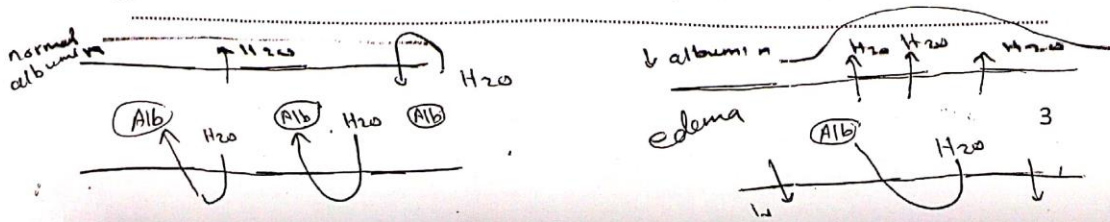
→ phototherapy is the ttt of choice since kernicterus may occur at 20 mg/dL

→ light (450 nm) diffuses through layers of skin & breaks UCB into stable excreted form. "babies eyes must be protected"

3. Hypoalbuminemia causes pitting edema.

→ Albumin makes (80%) of plasma colloid osmotic pressure "osmotic pressure due to proteins and important for distribution of ECF between intravascular & extravascular components"

→ ↓ albumin → ↓ plasma oncotic pressure → the fluid accumulate in interstitial spaces & cause edema



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4. Elevated level of Lp(a) in plasma is associated with an increased risk of coronary heart disease.

Lipoprotein(a) is nearly identical to LDL particle but having additional apo(a). Apo(a) is highly homologous to plasminogen (precursor of blood protease w/ degrades fibrin & blood clots). ↑ Lp(a) compete w/ plasminogen for binding of plasminogen activators - slowing breakdown of blood clots

5. Hypertriglyceridemia of type I and type IV hyperlipidemia can be differentiated by plasma appearance test. ↓
heart attacks



Type I: Familial Hyperchylomicronemia ↑ TG
creamy layer, infranate clear or slightly turbid

Type IV: Familial endogenous hypertriglyceridemia
↑ VLDL



turbid to opaque

GOOD LUCK

