

1)		<b>Reference range</b>
	S.Calcium = 7.8 mg/dl	(8.6-10.2 mg/dL)
	S.Albumin= 2.9 gm/dl	(3.5-5.2 gm/dL)
	S.Total Protein=5.6 gm/dL	(2.3-4.4 gm/dL)

Calculate corrected calcium. [Formula=measured total calcium(mg/dl) +0.8 (4.0- Serum albumin(gm/dl))]

What is the significance of corrected calcium ?

2) 20 year old patient of diabetic ketoacidosis is admitted in hospital in unconscious state. On Examination, patient has severe dehydration with rapid and shallow breathing.- Physician has started insulin intravenously.

**Following are the lab reports.**

Random blood sugar= 870 mg/dL	(<200mg/dL)
S. Sodium= 136 mmol/L	(136-145 mmol/L)
S. potassium= 5.65 mmol/L	(3.5-5.1 mmol/L)

**Arterial Blood Gas analysis report**

PH= 6.8	(7.38-7.42)
pCO2=15.8 mmHg	(35-45 mmHg)
pO2=95 mmHg	(75-100 mmHg)

1) What can be the reason of unconsciousness in this patient?

2)What can be the reason of low PH & pCO2 ?

3) 20 year old patient of diabetic ketoacidosis is admitted in hospital in unconscious state. On Examination, patient has severe dehydration with rapid and shallow breathing.- Physician has started insulin intravenously.

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pO2=95 mmHg	(75-100 mmHg)

1) What can be the reason of rapid and shallow breathing?

2) What can be the reason of high potassium level?

4) 20 year old patient of diabetic ketoacidosis is admitted in hospital in unconscious state. On Examination, patient has severe dehydration with rapid and shallow breathing.- Physician has started insulin intravenously.

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pCO <sub>2</sub> =15.8 mmHg	(35-45 mmHg)
pO <sub>2</sub> =95 mmHg	(75-100 mmHg)

**After 6 hour of insulin therapy,**

S. potassium= 2.9 mmol/L	(3.5-5.1 mmol/L)
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- 1) What can be the reason of dehydration?
- 2) What can be the reason of low potassium after insulin therapy?

5) 27 year old female patient is having acute pain in right side of abdomen with vomiting. Patient has complain of passing sticky stool. In ultrasonography, Gall stone was found between gall bladder and common bile duct. Patient is diagnosed as acute pancreatitis.

**Following are the lab reports.**

S. Amylase= 2000 U/L	(28-100 U/L)
S. Lipase= 130 U/L	(0-5 U/L)
S. ALT(Alanin transaminase)=150	(< 45 U/L)
S. Cholesterol= 198 mg/dL	(<200 mg/dL)
S. Triglyceride= 400 mg/dL	(<150 mg/dL)

**Surgery was planned to remove stone.**

Injection Vitamin K was given before surgery.

- 1) How high Triglyceride can cause acute pancreatitis?
- 2) What alteration occurs in lipid digestion and absorption in case of acute pancreatitis?

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- 1)What can be the reason of high Amylase and Lipase level?
- 2) High Lipase level is more specific for diagnosis of acute pancreatitis than Amylase.Why?

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Injection Vitamin K was given before surgery.

- 1) What can be the reason of high ALT level?
- 2) Why injection vitamin K was given before surgery in this patient?

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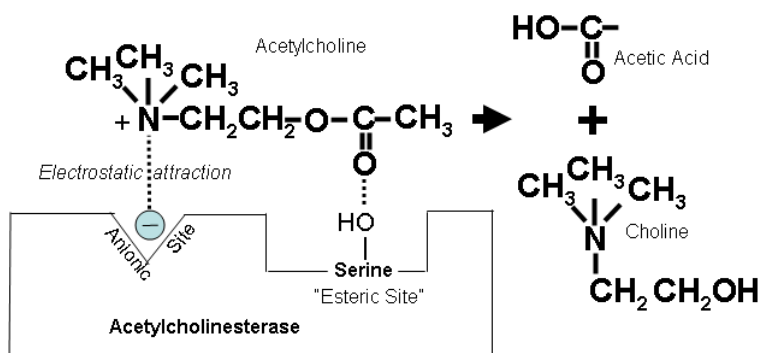
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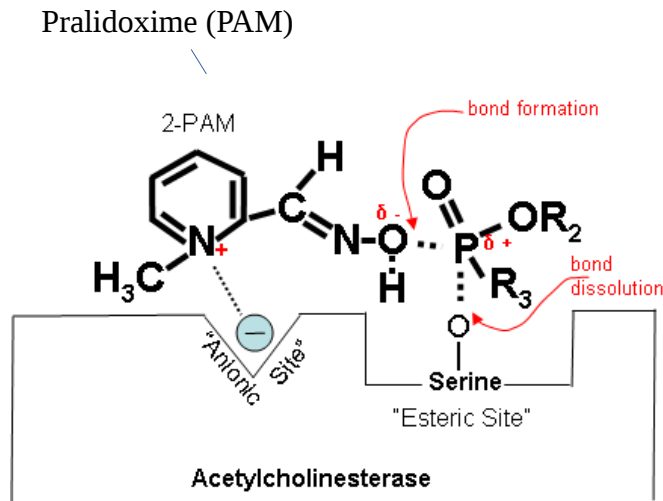
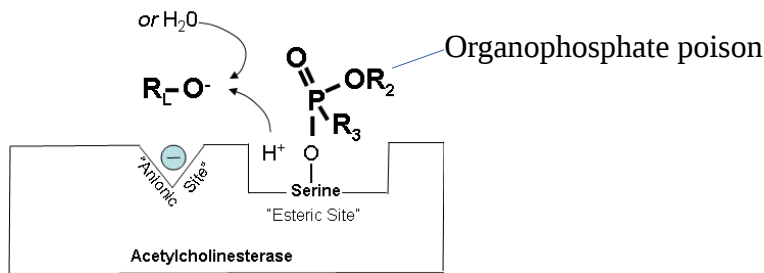
Injection Vitamin K was given before surgery.

- 1) What can be the reason of passing sticky stool in this patient?
- 2) What alteration occurs in carbohydrate digestion and absorption in case of acute pancreatitis?

9) In below figure organophosphate poison bind with acetylcholinesterase enzyme.



At physiological condition, when acetylcholine binds with acetylcholinesterase enzyme.



- 1) Explain which type of enzyme inhibition is done by organophosphate poison?
- 2) Explain role of PAM in OP poison.

10) 45 year old chronic alcoholic patient was brought to the hospital with complaint of yellowish discoloration of skin and sclera with dark yellowing urine and clay-sticky stool. On Laboratory investigation,

Serum Total bilirubin	15.0 mg/dl ( 0- 2.0 mg/dl)
Serum Direct bilirubin	14.0 mg/dl ( 0-0.2 mg/dl)
Serum indirect bilirubin	1.0 mg/dl ( 0-2.0 mg/dl )
Urine Bile pigment and Bile salt	Positive
Urine Urobilinogen	Negative

- 1) What is reason for Clay-sticky stool and dark yellowish urine ?
- 2) What can be the reason of positive bile pigment and bile salt in Urine?

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Urine Bile pigment and Bile salt	Positive
Urine Urobilinogen	Negative

- 1) What can be the reason of absence of urobilinogen in urine?
- 2) Direct bilirubin is high, while indirect bilirubin level is normal. Why?

12) 50 year old patient undergone for routine body check up.

**Following are biochemical test results.**

S. Total Cholesterol= 270 mg/dL ( $<200$  mg/dL)  
 S. Triglyceride= 180 mg/dl ( $<150$  mg/dl)  
 HDL Cholesterol= 45 mg/dl ( $>40$  mg/dl)

Physician advised him to do exercise and modification in food intake. Physician also advised him low dose of aspirin (75 mg) and Atorvastatin 10mg(Statine group of drug).

- 1) What is the role of statin in this patient?
- 2) What type of modification in food is required in this patient?

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- 1) Calculate VLDL and LDL.
- 2) Explain mechanism of action of aspirin.

14) A 5 year old girl presented to hospital with history of 2-3 times watery diarrhea and vomiting. So Doctor advice to give home remedy of Glucose + Salt + Lemon + Water

- 1) What is biochemical reason for giving Salt & Glucose with Water to prevent dehydration?
- 2) What metabolic changes occur in this patient due to diarrhea and vomiting?

15) 45 year old male patient is having complain of nausea, vomiting and fever since 8-10 days. She also has complain of pain in chest and abdomen, decrease urine output and increase frequency of urination. On examination, patient has high blood pressure and oedema over lower limbs were noted. Physician diagnosed him as chronic renal failure and advised him to avoid fruit juice.

Following are biochemistry lab reports

Hb= 8.6 gm/dl	(13.5-17.5 gm/dl)
S. creatinine= 10.1 mg/dl	(0.8-1.3 mg/dl)
S.Urea= 280 mg/dl	(10-50 mg/dl)
S.Calcium= 7.8 mg/dl	(8.6-10.2 mg/dl)
S.Phosphate= 8.4 mg/dl	(2.5-4.5 mg/dl)
S.Sodium= 124.9 mmol/L	(136-145 mmol/L)
S.Potassium= 4.5 mmol/L	(3.5-5.1 mmol/L)
CK-MB= 30 U/L	(0-40 U/L)
Parathyroid hormone=130 pg/ml	(10-65 pg/ml )

- 1) Why fruit juice cannot be given to patients of renal failure?
- 2) What is difference in creatine, creatinine & creatinine kinase?

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- 1) Why creatinine & creatinine clearance test is considered better diagnostic indicator than urea & urea clearance test?
- 2) What homeostasis changes can occur Calcium, Vitamin D & Parathyroid hormone in case of chronic renal failure?

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- 1) Why hemoglobin level decreases in case of chronic renal failure?
- 2) What are the isoforms of creatinine kinase-its function, location and diagnostic significance?

18) 45 year old male patient is having complain of nausea, vomiting and fever since 8-10 days. She also has complain of pain in chest and abdomen, decrease urine output and increase frequency of urination. On examination, patient has high blood pressure (hypertension) and oedema over lower

limbs were noted. Physician diagnosed him as chronic renal failure and advised him to avoid fruit juice.

Following are biochemistry lab reports

Hb= 8.6 gm/dl	(13.5-17.5 gm/dl)
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- 1) Why hypertension and lower limb oedema develop in case of renal failure?
- 2) What can be the reason of high phosphate level?

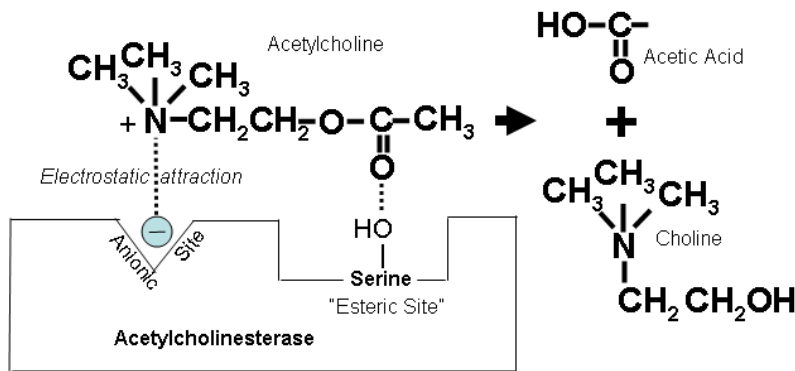
19) 35 year woman become severely depressed after sudden death of her husband. One month later, she was brought to emergency department by her friend because of extreme weakness and lethargy. She appeared thin and pale. On history, she had not eaten for several weeks.

Analysis of plasma sample indicates high level of acetoacetate, beta hydroxybutyrate and low glucose (55 mg%). She was hospitalized and treatment given.

- 1) What can be the reason of having high level of acetoacetate and beta hydroxybutyrate?
- 2) How was the patient obtaining energy during the time when she was not eating?

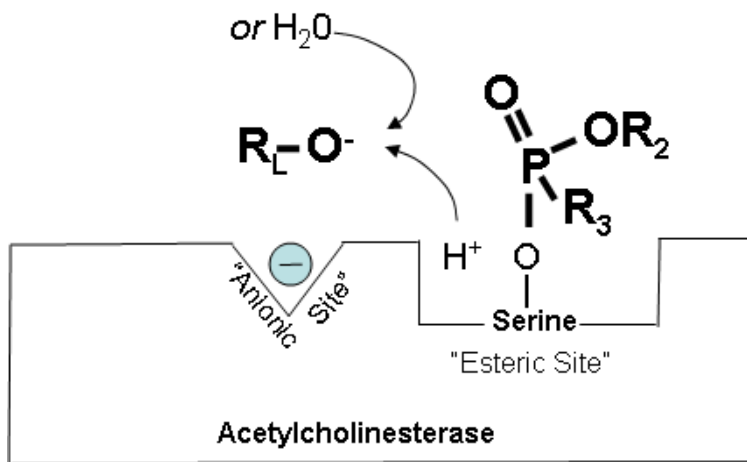
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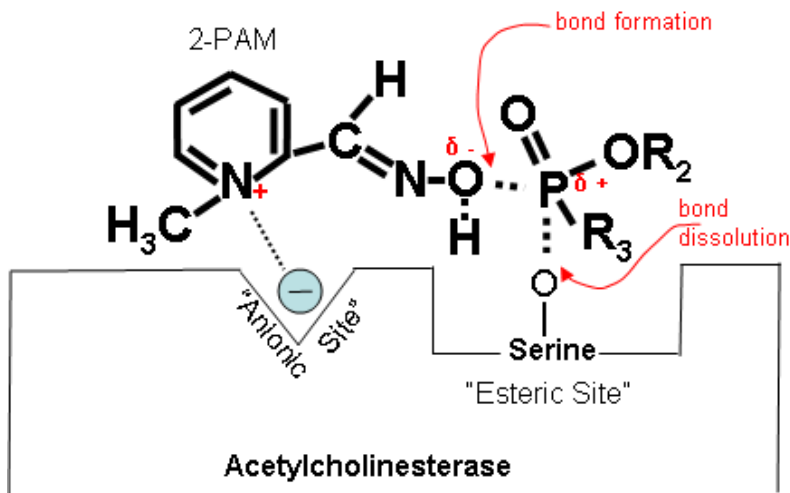
**Figure A**

At physiological condition, when acetylcholine binds with acetylcholinesterase enzyme.



**Figure B**

In organophosphate poisoning, interaction of OP poison with Acetylcholinesterase enzyme



**Figure C**

Interaction of PAM (Pralidoxime) with Acetylcholinesterase enzyme in OP poisoning

- 1) Explain which type of enzyme inhibition is done by organophosphate poison?
- 2) Explain role of PAM in OP poison.

- 1) Explain interaction of acetylcholine with acetylcholinesterase enzyme. (Figure A)
- 2) In OP poison, Acetylcholine is not binding with Acetylcholinesterase even though binding site of acetylcholine is empty. Why?