**UNIVERSITY OF AGRONOMIC SCIENCES AND VETERINARY MEDICINE**
**FACULTY OF VETERINARY MEDICINE**
**Splaiul Independenţei 105, sector 5, 050097, BUCHAREST, ROMANIA**
**Tel.: + + 4021 318 0469; Fax:+ + 40 21 318 0498**
**www.fmvb.ro, e-mail: info@fmvb.ro**

**DEPARTMENT: PRECLINICAL SCIENCES**

**DISCIPLINE: PHYSIOLOGY**

**Course teacher: Assoc. Prof. Iuliana CODREANU DVM PhD**

## THEMATIC AND BIBLIOGRAPHY

*1. Sistemul digestiv, pag. 271-293*
*2. Homeostazia energetică, pag. 347-370*

**Bibliography**

N. Dojană – *Fiziologia animalelor domestice*, București, Printech, 2010.

## QUESTIONNAIRE

**100 questions with five appropriate possible answers**
**(Of these five answers only one is correct)**

1. The absorption of phosphorus takes place in:
   a. the entire digestive tract
   b. stomach
   c. colon
   d. jejunum
   e. duodenum

2. The absorption of phosphorus is optimal at the Ca/P ratio of:
   a. 2/3
   b. 2/4
   c. 2/1
   d. 1/2
   e. 1/1

3. In youth, the plasma concentrations of phosphorus are:
   a. higher than in adults
   b. lower than in adults
   c. equal to that of the adults

d. a well-defined correlation does not exist
e. all the answers are valid

4. The Ca/P ratio in birds is found between:
   a. 1/4 – 1/1
   b. 1/1 – 1/2
   c. 1/2 - 1/4
   d. 3/1 – 3.5/1
   e. 1/3 – 1.5/3

5. One of the roles that phosphorus does NOT play in the body is:
   a. enters the composition of the bones
   b. enters the composition of the teeth
   c. contributes to maintaining the acid-basic balance of the blood
   d. contributes to maintaining the acid-basic balance of the urine
   e. contributes to the nervous influx formation

6. In regulating the phosphorus concentration in the blood, the parathyroid hormone has hyperphosphatemia effect through:
   a. reduction of renal elimination of phosphates
   b. alteration of the Ca/P ratio
   c. stimulation of the phosphates absorption
   d. stimulation of the renal elimination of phosphates
   e. phosphates mobilization from bones

7. The absorption of iron is stimulated by:
   a. hydrochloric acid
   b. trypsin
   c. chymotrypsin
   d. the presence of phosphates
   e. the presence of fats

8. Through its enzymes (salivary amylase), saliva triggers the digestion of certain food substrates such as:
   a. glucose
   b. amino-acids
   c. triglycerides
   d. starch
   e. the saliva doesn't contain enzymes

9. The excretion of iron is done by:
   a. renal pathway
   b. respiratory pathway
   c. digestive pathway
   d. iron is not excreted, being completely recovered from the catabolism products

e. both urinary and digestive pathways

10. Blood phosphorus is:
    a. only inorganic phosphorus
    b. only organic phosphorus
    c. inorganic and organic phosphorus
    d. none of the answers is valid
    e. all of the answers are valid

11. The hydrochloric acid in the gastric juice is produced by:
    a. the main cells of the gastric glands
    b. the parietal cells of the gastric glands
    c. the intermediate cells of the gastric glands
    d. the mucous cells of the gastric glands
    e. the generating cells of the gastric glands

12. The two ions of HCl are produced by:
    a. the same cell
    b. different cells
    c. an oxyntic cell and a parietal cell
    d. two oxyntic cells
    e. all types of cells from the gastric glands structure

13. In the synthesis of HCl by the gastric glands, the hydrogen ions in the HCl structure come from:
    a. lactic acid dissociation
    b. water dissociation
    c. $CO_2$ intracellular dissociation
    d. carbonic acid intracellular dissociation
    e. inorganic phosphates intracellular dissociation

14. Carbonic acid is synthesized in the parietal cells of the gastric glands under the control of:
    a. xanthine oxidase
    b. carbonic anhydrase
    c. isomerases
    d. glycolytic enzymes
    e. pepsin

15. The species that has the most alkaline pH of the saliva along with a higher bicarbonate and phosphate concentration than that of the blood serum at this level is:
    a. equine
    b. feline
    c. ruminants
    d. swine
    e. none of the above

16. The hydrochloric acid in the gastric juice has digestive roles. Among its roles DOES NOT count:
    a. transformation of pepsinogen into pepsin
    b. reduction of $Fe^{3+}$ to $Fe^{2+}$
    c. activation of trypsinogen to trypsin
    d. inhibition of the gastric secretion
    e. stimulation of the secretin release

17. The hydrochloric acid in the gastric juice has digestive roles. Among its roles DOES NOT count:
    a. transformation of pepsinogen into pepsin
    b. reduction of $Fe^{3+}$ to $Fe^{2+}$
    c. activation of chymotrypsinogen to chymotrypsin
    d. inhibition of the gastric secretion
    e. stimulation of the secretin release

18. The activation of pepsinogen in pepsin occurs:
    a. into the secretory gastric cells
    b. into the intestinal lumen
    c. on contact with the acidic gastric contents
    d. anywhere in the compartments and structures mentioned above
    e. the stomach does not produce pepsinogen but pepsin

19. The activation of pepsinogen consist of:
    a. binding the pepsinogen with the protons ($H^+$)
    b. addition of a peptide residue to the pepsinogen molecule
    c. cleavage of the pepsinogen molecule to active pepsin and removal of an inhibitory peptide residue
    d. removal of an inhibitory inorganic radical from the pepsinogen molecule
    e. none of the answers is correct

20. Under the general name of zymogens are known:
    a. the digestive enzymes in general
    b. the digestive proenzymes activated in the lumen of the digestive tract
    c. the gastric juice enzymes
    d. the intestinal juice enzymes
    e. the digestive enzymes released in their active form

21. The HCl secretion is stimulated by:
    a. somatostatin
    b. secretin
    c. prostaglandins
    d. acetylcholine
    e. epidermal growth factor

22. The HCl secretion is stimulated by:
    a. somatostatin
    b. secretin
    c. prostaglandins
    d. gastrin
    e. epidermal growth factor

23. Parietal cells from the gastric glands secrete:
    a. hydrochloric acid
    b. pepsin
    c. pepsinogen
    d. carbonic anhydrase
    e. bicarbonate

24. The amount of gastric juice produced daily in the horse can reach:
    a. 30 L
    b. 1 L
    c. 0.5 L
    d. 100 L
    e. 0.1 L

25. The pyloric glands secrete the hormone called:
    a. inhibin
    b. gastrin
    c. pepsinogen
    d. insulin
    e. adrenaline

26. Intragastric coagulation of milk is produced by:
    a. pepsin in adult animals, lab ferment in infants
    b. lipase
    c. amylase
    d. trypsin
    e. chymotrypsin

27. The specificity of pepsin lies in the fact that it:
    a. hydrolyses the peptide chains of the aromatic amino acids
    b. hydrolyses the peptide chains of the carboxylic amino acids
    c. hydrolyses the peptide chains of the basic amino acids
    d. has no specificity, hydrolysing all proteins
    e. answers a and b are valid

28. The optimal pH of action for pepsin is:
    a. weak acidic (5.5 – 6)

b. neutral
c. alkaline
d. unimportant
e. very acidic (1.5 – 3)

29. Renin from the gastric juice participates in:
    a. proteins digestion in infant animals
    b. lipid digestion in infant animals
    c. carbohydrates digestion in infant animals
    d. trypsinogen activation
    e. all the answers are correct

30. Renin from the gastric juice is a:
    a. endopeptidase
    b. exopeptidase
    c. lipase
    d. amylase
    e. carboxypeptidase

31. The main hormone that contributes to the regulation of gastric juice secretion in the gastric phase is:
    a. secretin
    b. cholecystokinin
    c. gastrin
    d. bombesin
    e. adrenaline

32. The main hormone that contributes to the regulation of gastric juice secretion in the cephalic phase is:
    a. secretin
    b. cholecystokinin
    c. gastrin
    d. bombesin
    e. adrenaline

33. Gastrin is a hormone produced by the:
    a. G cells from the gastric mucosa
    b. I cells from the duodenal epithelium
    c. oxyntic cells from the gastric glands
    d. main cells of the gastric glands
    e. gastric epithelium

34. In the digestive secretions, the role of the gastrin consist of:
    a. stimulation of the hydrochloric acid
    b. inhibition of the gastric glands secretion

c. stimulation of the pancreatic secretion
d. stimulation of the intestinal secretion
e. inhibition of the intestinal secretion

35. Gastrin secretion is inhibited by:
    a. alkaline pH
    b. acidic pH
    c. neutral pH
    d. CCK
    e. Secretin

36. Enterokinase has the following role:
    a. catalyses the transformation of trypsinogen into trypsin
    b. catalyses the transformation of pepsinogen into pepsin
    c. catalyses the transformation of chymotrypsinogen into chymotrypsin
    d. stimulates the synthesis of pancreatic enzymes
    e. inhibits the synthesis of pancreatic enzymes

37. The secretion of the Brunner glands has the following qualities, except the fact that it is:
    a. a secretion rich in digestive enzymes
    b. a mucous secretion
    c. a secretion devoid of digestive enzymes
    d. a secretion rich in bicarbonate
    e. a secretion with a role in protecting the intestinal epithelium

38. Enterokinase is produced by:
    a. the liver
    b. the Brunner cells
    c. the Liberkuhn cells
    d. the gastric glands
    e. the pancreas

39. Which are the three gastric secretion phases?
    a. cephalic phase, gastric phase, intestinal phase
    b. cephalic phase, intestinal phase, digestive phase
    c. gastric phase, intestinal phase, excretion phase
    d. first gastric phase, second gastric phase, third gastric phase
    e. digestive phase, absorption phase, excretion phase

40. The presence of maltase is a characteristic of:
    a. all digestive secretions
    b. the salivary secretion
    c. the pancreatic secretion
    d. the intestinal secretion
    e. the gastric secretion

41. Aminopeptidases have as a specific substrate:
    a. lipids
    b. starch
    c. glycogen
    d. proteins in general
    e. peptides

42. Carboxypeptidases have as a specific substrate:
    a. lipids
    b. starch
    c. glycogen
    d. proteins in general
    e. peptides

43. Trypsinogen:
    a. represents the active form of trypsin
    b. is a gastric enzyme
    c. represents the inactive form of trypsin
    d. activates the chymotrypsinogen
    e. is activated by chymotrypsinogen

44. Most intestinal enzymes exert their action within:
    a. exodigestion
    b. luminal digestion
    c. membrane digestion
    d. intraluminal digestion
    e. a specific indication does not exist

45. In species with a small capacity gallbladder, it has only role in:
    a. the water absorption from the bile fluid
    b. the passage of the bile
    c. regulator organ of the exhaust pressure
    d. bicarbonate synthesis
    e. excretion of the hem catabolism products

46. During the period of digestive absorption, the liver and peripheral tissues metabolic processes are directed predominantly towards:
    a. the liver acts in anabolic way and the peripheral tissues are directed towards consumption
    b. catabolism of the nutrients from the intake
    c. during this period, the liver and the peripheral tissues are over-agglomerated and have a high metabolic activity without any specific target
    d. releasing towards the tissues the excess of nutrients absorbed in order to cover the energy requirements

e. storage of the nutrients from the intake

47. During the period of digestive absorption, the liver:
    a. retains the triglycerides and converts them into glucose and glycogen that is stored in the liver
    b. retains the excess of blood glucose and converts it into glycogen and triglycerides
    c. releases the glucose because it is necessary for the peripheral tissues and its uptake by the liver is not controlled by the insulin
    d. retains the triglycerides that are stored in the liver determining „fatty infiltration of the liver"
    e. none of the answers is correct

48. At a pH between 6 – 8, the activation process of the trypsinogen:
    a. stops
    b. becomes autocatalytic
    c. starts
    d. decrease
    e. none of the above

49. The pancreatic enzyme for digesting carbohydrates is pancreatic amylase, which hydrolyses:
    a. starch
    b. glycogen
    c. cellulose
    d. amino acids
    e. answers a and b are correct

50. Chylomicrons and low-density lipoproteins in the blood release fatty acids into the peripheral tissues, the process being controlled by:
    a. thyroxine
    b. adrenaline
    c. insulin
    d. glucagon
    e. cortisol

51. The total amount of glycogen that can be stored in the liver is limited to:
    a. maximum 5% of the liver's weight
    b. maximum 20% of the liver's weight
    c. maximum 2% of the liver's weight
    d. the liver doesn't store glycogen, it has a metabolic role of synthesis of different energetic substances
    e. maximum 10% of the liver's weight

52. The liver cannot take over and store the entire amount of glucose absorbed in the form of glycogen. That is why the body also possesses other mechanisms for taking over glucose excess. Such a mechanism is:

a. the synthesis of fatty acids
b. the synthesis of vitamins with a glucose – based structure
c. the synthesis of proteins
d. the synthesis of nucleic acids, those having carbohydrates in their structure
e. the excess of glucose is eliminated through urine, which is known as glycosuria

53. The bile pigments, bilirubin and biliverdin:
    a. don't have digestive functions
    b. have a role in the starch digestion
    c. have a role in the cellulose digestion
    d. are excreted by the pancreatic acinar cells
    e. have important digestion functions

54. Of the total amount of amino acids absorbed, reached from the portal circulation into the liver, pass into the systemic circulation about:
    a. 23%
    b. 10%
    c. zero, the liver retaining the entire amount of amino acids reached at this level for the synthesis of plasma proteins (albumins)
    d. widely variable percentages depending on the physiological status
    e. 45%

55. Serum proteins fulfil many functions. One of the functions that is NOT fulfilled by these proteins is:
    a. transport of the fatty acids
    b. constitutes source of amino acids for the synthesis of extrahepatic proteins
    c. role in creating the oncotic pressure of the plasma
    d. transport vehicle for different hormones
    e. transport vehicle for different vitamins

56. The most important stimulus for causing the gallbladder contractions is the hormone:
    a. pepsin
    b. insulin
    c. parathormone
    d. cholecystokinin
    e. bilirubin

57. The primary function of the small intestine is to:
    a. absorb nutrients and their digestive products into the blood
    b. excrete nutrients and their digestive products into the blood
    c. increase the amount of nutrients in the body
    d. reduce the absorption rate of the nutrients
    e. digest and excrete the nutrients

58. The key hormone that plays a role in initiating the mechanisms of conversion of amino acids that come from the digestive absorption into glucose is:
    a. hydrocortisone
    b. thyroxine
    c. cortisol, as a hormone that is released in stressful situations, which requires increased quantities of glucose
    d. insulin, because it is a hormone with hypoglycaemic role
    e. glucagon

59. In the case of a balanced intake of carbohydrates and proteins, increased aminoacidemia stimulates both insulin and glucagon secretion. Intense glucagon secretion plays the following role:
    a. decrease of the aminoacidemia
    b. counteracts the effects of a postprandial hyperinsulinemia by priming the gluconeogenic mechanisms
    c. contributes to maintaining glycaemia by inhibiting the peripheral glucose uptake
    d. regulates the serum lipids concentration by lipolysis effect
    e. none of the answers above is correct

60. One of the disadvantages of storing energy in the form of lipids is the fact that:
    a. the adipose tissue contains little water
    b. fats, being insoluble in water, require special forms of blood transport
    c. fatty acids are converted to glucose, decreasing the availability in case of intense energy demands
    d. lipids are highly reduced substances, which decreases their energy quality
    e. none of the answers above is correct

61. The bicarbonate ions from the intestinal mucus have an important role in:
    a. neutralizing the liver bile
    b. neutralizing the pancreatic secretion
    c. neutralizing the hydrochloric acid entering the duodenum from the stomach
    d. acidifying the intestinal content
    e. neutralizing the intestinal content that has a very acidic pH

62. The bile salts emulsifying function on the lipids is possible due to the fact that:
    a. the bile salts decrease the surface tension of the particles
    b. the bile salts contain lipase
    c. the bile salts are lipolytic enzymes
    d. the bile salts are proteolytic enzymes
    e. none of the answers above is correct

63. In the liver, glucagon:
    a. stimulates glycolysis
    b. stimulates glycogenolysis
    c. inhibits glycogenolysis

d. inhibits gluconeogenesis
e. stimulates glycogenogenesis

64. The mobilization of amino acids from the muscles is stimulated to a large extent by:
    a. protein catabolizing sex hormones
    b. thyroxine, released under energy demand conditions
    c. insulin
    d. absence of cortisol and insulin deficiency
    e. absence of insulin and presence of cortisol

65. Bile salts, by breaking down fat globules into smaller droplets in a process called emulsification, enhance the digestive action of:
    a. pepsin
    b. amylase
    c. lipase
    d. trypsin
    e. chymotrypsin

66. The proteolytic digestive enzymes when are first synthesized in the pancreatic cells, they are:
    a. in the inactive forms trypsinogen, chymotrypsinogen and procarboxypolypeptidase
    b. in the active forms trypsinogen, chymotrypsinogen and procarboxypolypeptidase
    c. in the inactive forms trypsin, chymotrypsin and carboxypolypeptidase
    d. in the active forms trypsin, chymotrypsin and carboxypolypeptidase
    e. the pancreatic juice does not contain proteolytic enzymes

67. The metabolic dominant of the adipose tissue in the post absorbent phase of digestion is:
    a. the adipose tissue does not present a metabolic dominant in this phase, this being a trap question
    b. retention of the plasma lipids in order to avoid the weight loss
    c. mobilization of fatty acids
    d. lipid synthesis
    e. de novo synthesis of fatty acids

68. The fatty acids released from the adipose tissue into the blood, in order to be transported:
    a. do not require the presence of the vehicle molecules
    b. are reversibly bound to gamma-globulins
    c. are reversibly bound to albumins
    d. are packed in low density lipoproteins
    e. are packed in chylomicrons

69. In order to be activated the pepsinogen must come in contact with:
    a. pepsin
    b. secretin.
    c. trypsin

d. hydrochloric acid
e. sodium bicarbonate

70. In long periods of undernutrition or in complete starvation, the body uses for the production of energy mainly:
    a. free fatty acids
    b. fatty acids and ketone bodies
    c. beta-oxidation of fatty acids
    d. high glycerol release
    e. lipids synthesis, in order to support this period characteristic energy degradation

71. The gastric enzymes are:
    a. pepsin, rennin and lipase
    b. pepsin, trypsin and lipase
    c. pepsin, trypsin and amylase
    d. trypsin, chymotrypsin and amylase
    e. amylase, lipase and pepsin

72. The gastric juice is secreted continuously. Control of the gastric secretion is achieved through:
    a. neuronal and humoral (hormonal) mechanisms
    b. only neuronal mechanism
    c. only humoral mechanism
    d. the secretion does not need control, the gastric juice continuously secreted
    e. neuronal and intrinsic mechanism

73. Propionate is an important glucose precursor in ruminants. In ruminants, propionate comes from:
    a. “de novo” endogenous synthesis
    b. ruminal absorption as volatile fatty acid
    c. catabolism of fatty acids
    d. catabolism of propionic acid
    e. intermediate glucose catabolism

74. Ruminants also ensure glucose storage by protecting its metabolic degradation by the fact that:
    a. fatty acids are synthesized from acetate
    b. fatty acids are synthesized from glucose
    c. do not produce fatty acids
    d. fatty acids are synthesized from amino acids
    e. answers a and d are correct

75. Ruminants are permanently in a potential state of deficiency of:
    a. glucose
    b. propionate

c. acetate
d. proteins
e. lipids

76. The cephalic phase of the gastric secretion occurs:
    a. when the food enters the stomach
    b. when the food enters the small intestine
    c. before the food enters the stomach
    d. only in ruminants
    e. only in carnivores

77. The pancreatic juice is mainly composed of:
    a. water, enzymes and hydrochloric acid
    b. enzymes and sodium bicarbonate
    c. enzymes, bile and mucus
    d. water, mucus and hydrochloric acid
    e. water, pepsin and hydrochloric acid

78. The ammonia resulting from amino acid deamination is eliminated from the body in the form of:
    a. ketone analogues
    b. urea
    c. urea ammonium
    d. alanine
    e. leucine

79. Muscle mass reacts to energy demands by:
    a. glucose synthesis to support the effort requirements
    b. amino acids synthesis
    c. glucose mobilisation
    d. lipids mobilisation
    e. amino acids mobilisation

80. The water requirement of farm animals is directly proportional with:
    a. the physiological state
    b. the degree of dehydration
    c. weight
    d. body surface
    e. age, being higher in old age

81. Water plays many roles in the body. One of the roles that it doesn't fulfil is:
    a. solvent for chemicals
    b. diffusion medium
    c. heat transport
    d. lubricant

e. solvent for ingested fats

82. The synthesis of most of the ketone bodies in the lipid metabolism is performed in:
    a. rumen
    b. intestine
    c. liver
    d. kidneys
    e. lungs

83. Regulating calcium metabolism involves controlling the movement of calcium between the extracellular fluid and the following body structures:
    a. intestine and bone
    b. bone, liver and gastrointestinal tract
    c. bone and kidneys
    d. bone, gastrointestinal tract and kidneys
    e. gastrointestinal tract

84. Increased blood calcium concentration by about 10% causes immediate increase of the secretion of:
    a. parathormone
    b. calcitonin
    c. cortisol
    d. androgen hormones
    e. estrogenic hormones

85. The hormone that stimulates osteoclast activity and the renal calcium reabsorption is:
    a. parathormone
    b. calcitonin
    c. insulin
    d. glucagon
    e. estrogens

86. The intestinal phase of gastric juice secretion regulation is triggered by:
    a. the food entering into the stomach
    b. the food entering into the duodenum
    c. the fodder ingestion
    d. immediately after the food prehension, mastication and deglutition
    e. in the cephalic phase

87. The main pancreatic enzyme involved in the digestion of the ingested fats is:
    a. amylase
    b. bile
    c. pepsin
    d. trypsin
    e. lipase

88. The inhibitory role of secretin on the secretion of gastric juice is exercised by:
    a. it acts directly on the main cells that secret gastric juice
    b. it acts on the G cells that secret gastrin
    c. it acts on the oxyntic cells by directly inhibiting the secretion of gastric juice overall
    d. answers a and b are correct
    e. secretin is not a hormone that plays a role in the regulation of the gastric juice secretion

89. One of the following hormones has no inhibitory effects on the gastric juice secretion:
    a. secretin
    b. cholecystokinin
    c. somatostatin
    d. enteroglucagon
    e. gastrin

90. In connection with the regulation of gastric juice secretion, atropine injection in dogs causes:
    a. stimulation of the gastric juice secretion
    b. it has no effect
    c. inhibition of the gastric juice secretion
    d. stimulation of the parasympathetic nervous system and, consequently, stimulation of the gastric juice secretion, the parasympathetic being known for having such effect
    e. stimulation of the sympathetic vegetative system and, consequently, the inductive inhibition of the parasympathetic system with the stimulation of the gastric juice secretion

91. The composition of the bile consists of:
    a. bile salts
    b. cholesterol
    c. biliary pigments
    d. fatty acids
    e. all the answers are correct

92. The enzyme that stimulates the carbonic acid synthesis required for the production of pancreatic sodium bicarbonate is:
    a. pepsin
    b. trypsin
    c. chymotrypsin
    d. carbonic anhydrase
    e. bicarbonic anhydrase

93. The pancreatic juice contains many proteases. One of the proteases that it does not contain is:
    a. trypsin
    b. chymotrypsin

c. carboxypeptidase
d. collagenase
e. pepsin

94. The notion of zymogen is synonymous with that of:
    a. proenzyme
    b. active enzyme, inactivated in the digestive lumen
    c. lipase
    d. glycolytic enzyme
    e. answers a and b are correct

95. Activation of trypsinogen in the pancreatic juice is accomplished by:
    a. trypsin
    b. autocatalytic
    c. enterokinase
    d. answers a, b and c are correct
    e. none of the answers is correct

96. The activation of chymotrypsinogen consists of:
    a. creating a slightly alkaline pH, optimal for activation
    b. removing some peptide fragments from its molecule structure
    c. providing the specific substrate is sufficient for activation
    d. chymotrypsinogen is an active enzyme, it does not require activation
    e. answers a and b are correct

97. Intra-intestinal coagulation of milk is accomplished by:
    a. pepsin
    b. trypsin
    c. chymotrypsin
    d. no enzyme in the intestine, milk coagulation takes place in the stomach
    e. answers b and c are correct

98. The regulation of bile secretion is done through a mechanism:
    a. positive feedback
    b. negative feedback
    c. feed forward
    d. push-pull
    e. none of the above, the bile secretion is continuous

99. The hormone with the main choleretic role is:
    a. gastrin
    b. cholecystokinin
    c. secretin
    d. motilin
    e. gastric inhibitory peptide

100. In which of the following digestive secretions the bicarbonate cannot be found:
    a. bile
    b. pancreatic juice
    c. gastric juice
    d. intestinal juice
    e. none of the above contains bicarbonate