

# Biochemistry and Molecular Biology

## Final exam oral question list

### Dentists 2015/16.

#### *Starting Questions I.:*

#### **GIVE THE MOLECULAR EXPLANATION OF THE FOLLOWING CLINICAL PROBLEMS**

1. Laboratory examination of your patient shows anemia and the red blood cells have a sickle shape.
2. One of your patients receives long term coumarin derivative therapy and suddenly starts to bleed because of drug overdose.
3. As consequence of seemingly harmless drugs (such as antimalarials or sulfa antibiotics) acute hemolytic anemia develops.
4. A relatively healthy adult with much overweight comes to the office and asks the possible reason of being fat.
5. An unconscious patient; acetone is detectable in the breath.
6. Somebody takes too much aspirin to treat high fever for a couple of days and comes to the hospital with gastric bleeding.
7. A patient with fresh myocardial infarction; the cholesterol level is high and he tells that both his father and brother died in myocardial infarction in their mid-forties.
8. The blood test of the patient demonstrates megaloblastic anaemia. What can be the reasons for the development of this disease?
9. Give the possible explanation(s) - according to your biochemistry studies - of immunodeficient states.
10. A malignant tumor could be treated with gene therapy yielding p53 in the malignant cells.
11. Vitamin D deficiency syndrome (rickets) which can not be cured by the administration of vitamin D.
12. The ophthalmologist finds a retinoblastoma while examining a patient; there is no family history of similar cases.
13. What nutritional problems would you mention as a warning to your vegetarian friend?
14. A patient with hyperkeratosis who doesn't see properly at twilight.
15. A liver biopsy sample of a chronic alcoholic shows fatty liver and dying hepatocytes.
16. Major joints are dislocated, the skin easily bruises and is hyperextensible.
17. How do you explain that the lipid composition of the diet (eskimo diet) might affect the development of infarctus?
18. The patients' small joints suddenly become red, swollen and very painful. Which metabolic disorder might cause such problems? How it is cured?
19. Which vitamin deficiencies occur most frequently in alcoholics? Biochemical explanation of symptoms?
20. Your patient has icterus. Why can icterus develop?
21. Methotrexate a dihydrofolate reductase inhibitor is successfully used in the treatment of various tumors? How does it act?
22. Newborn in comatous state. The ammonia concentration is high in the blood.
23. Mentally retarded child. Phenylalanine levels are high in the urine.

24. Diarrhea appears after milk consumption.
25. C-Reactive protein (CRP) level is increased to hundred times than normal in the serum of a patient strong tooth pain.
26. Explain the biochemical reasons for plaque and caries formation.

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## **METABOLISM (these topics from metabolism are needed to know for answering the clinical questions)**

1. The citric acid cycle. concept
2. Terminal oxidation and oxidative phosphorylation. concept
3. Digestion and absorption of food carbohydrates.
4. The glycolytic pathway, regulation concept
5. Gluconeogenesis, Cori cycle, concept
6. Synthesis and degradation of glycogen, regulation concept
7. The pentose phosphate pathway and its metabolic significance concept
8. Metabolic effect of insulin. Biochemical aspects of diabetes mellitus.
9. Biochemical characterization of plasma lipoproteins. Describe their fate and function.
10. Oxidation of fatty acids. concept
11. Synthesis of fatty acids, regulation concept
12. Metabolic processes during carbohydrate-rich diet. concept
13. Metabolic processes in starvation. Synthesis and utilization of ketone bodies. concept
14. Synthesis of prostaglandins and leukotrienes and their functions.
15. Synthesis, transport and elimination of cholesterol in the human body concept
16. Deamination and transamination reactions concept
17. The urea cycle: concept.
18. C<sub>1</sub> transfer, transmethylation, link to the nucleotide synthesis. concept
19. Purine metabolism in a level to explain the development of gout
20. Nutritional biochemistry of vitamins, importance in oral health.
21. Inorganic compounds of foods: biochemical role, importance in oral health.

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### ***Starting Questions II.:***

### ***MOLECULAR BIOLOGY QUESTIONS***

1. Composition, structure and functions of DNA and RNA.
2. Describe the eukaryotic genome.
3. Describe the hierarchy of protein structures!
4. Describe briefly the principles of the Michaelis-Menten kinetic model!
5. Describe briefly the types of enzyme inhibition!
6. Summarize the characteristics of DNA replication
7. Summarize the principle and steps of PCR technique, give examples for its practical use in the field of medicine!

8. Steps of eukaryotic gene expression
9. Summarize the main processes of eukaryotic mRNA maturation!
10. Techniques which are suitable for mRNA detection and quantification
11. Describe the eukaryotic translation mechanism!
12. Briefly describe the Western blot method, including the principle of SDS polyacrylamide gel electrophoresis!
13. Antibody-based techniques in medical research
14. What is a recombinant protein? Their utilization in medicine.
15. Posttranslational modifications and their importance