MCM Practice Questions: Lecture Day 7

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Lecture 19 & 20: Purine & Pyrimidine Metabolism

1) Which of the following is a Nucleoside?

(A) Uracil

(B) Uracil Monophosphate

(C) Uracil Diphosphate

(D) Uracil Triphosphate

2) Which of the following is *NOT* a cardioprotective characteristic of Adenosine?

(A) Cardiac Muscle Contraction

(B) Coronary Artery Vasodilation

(C) Decreased Heart Rate

(D) Central Neuron Excitation Inhibition

3) Your liver has been synthesizing Purines for sometime now you have a suitable level of AMP. Which enzyme(s) will be regulated by negative feedback given the current AMP levels?

i PRPP Synthetase

ii GPA

iii IMP Dehydrogenase

iv Adenylosuccinate Synthetase

(A) i

(B) iii

(C) iv

(D) i, ii

(E) iii, iv

(F) i, ii, iii, iv

4) A 15 month old infant has been frequently brought to a pediatric ED due to frequent illnesses by organisms like S. *pyogenes* and C. *albicans*- common opportunistic pathogens. Blood and immune cell tests are administered and results show the infant has very low T-cell count. Genetic testing further shows that the infant has an autosoml recessive deficiency in a metabolic enzyme. Which enzyme is the most likely cause of this pathology?

(A) HGPRT

(B) AMP Deaminase

(C) Adenosine Deaminase

(D) PNP

5) A 4 year old girl is noted by her physician to be missing many developmental and behavioral milestones. She also exhibits bouts of self-mutilation. Genetic testing reveals she has Lesch-Nyhan Syndrome. What enzyme is she deficient in?

(A) HGPRT

(B) AMP Deaminase

(C) PNP

(D) APRT

6) The deficiency of the enzyme ADA1 leads to Severe Combined Immunodeficiency Disease (SCID). This deficiency leads to the loss of the affected individuals immune system, specifically a lack of B and T-cells. Why does SCID disproportionately affect lymphocytes?

(A) Lymphocytes can no longer generate purines De Novo

(B) An extreme build up of uric acid leads to gout which will inhibit lymphoyte proliferation

(C) Lymphocytes can no longer effectively utilize the purine salvage pathway which will inhibit their proliferation

(D) It inhibits the synthesis of immunoglobulins by lymphocytes

7) A med student wants to get in shape and starts a HIIT workout regimen. This workout regimen is characterized by strenuous anaerobic exercises. The student notices they are getting tired too easily. They go to a clinical geneticist to get tests done because they suspect an enzymatic deficiency is causing this issue. Testing shows the autosomal recessive deficiency of an enzyme that synthesizes a metabolite that activates regulated steps in both glycolytic and glyogenolytic pathways. Which enzyme is the most likely cause for this pathology?

(A) Adenylosuccinase

(B) AMP Deaminase

(C) AS synthetase

(D) Fumarase

8) The regulated step of Pyrimidine Synthesis is activated by what?

(A) CPS I

(B) UTP

(C) MAP-Kinase

(D) PRPP

9) Deficiency of Ornithine Transcarbamoylase can lead to which of the following conditions?

(A) Orotic Aciduria

(B) Phenylketonuria

(C) Arginosuccinate Aciduria

(D) Hypoglycemia

10) A middle aged woman is referred to a rheumatologist and is subsequently diagnosed with Rheumatoid Arthritis. She is prescribed methotrexate. What is its mechanism of action of inhibiting lymphocyte proliferation?

(A) Inhibition of thymidylate synthase arresting cell division

(B) Inhibition of dihydrofolate reductase inhibiting lymphocyte purine/pyrimidine synthesis

(C) Inhibition of PRPP synthetase arresting De Novo Purine synthesis in all cells

(D) Inhibition of Nucleoside kinases preventing generation of nucleotides

11) The enzyme ribonucleotide reductase has two allosteric sites, one of which controls the enzymes activity. What molecule will inhibit the enzyme?

(A) dATP

(B) ATP

(C) NADPH

(D) Thioredoxin

12) An individual presents to the ED with severe bilateral subcostal pain that radiates to the lower abdominal and groin area. A blood and urine test is run. It is revealed that blood uric acid is low and urine xanthine is elevated. The Emergency physician elects to conduct an ultrasound and kidney stones are visualized. What is the most likely etiology for this pathology?

(A) G-6-Phosphatase deficiency

(B) PRPP Synthetase overactivity

(C) Xanthine Dehydrogenase deficiency

(D) Xanthine Oxidase overactivity

13) Which of the following is *not* a factor that contributes to Hyperuricemia?

(A) Being Female

(B) Being obese

(C) Alcoholism

(D) Genetic Mutations

14) Which of the following is an appropriate way to treat or prevent a gout attack?

(A) Administration of Xanthine supplementation

(B) Vitamin supplementation

(C) Addition fish and bean to diet

(D) Administration of Uricosuric medications