

Multiple Choice Questions- Chemistry and Metabolism of nucleotides (Solved)

1- Which statement best describes Xanthine ?

- a) It is a direct precursor of Guanine
- b) It covalently binds to Allopurinol
- c) It is oxidized to form Uric acid
- d) It is oxidized to form Hypoxanthine
- e) It is a substrate rather than a product of the enzyme Xanthine oxidase

2- Methylated heterocyclic bases of plants include all except-

- a) Caffeine
- b) Theophylline
- c) Theobromine
- d) Thymine
- e) Dimethyl Xanthine

3- Which out of the following is not an anticancer drug ?

- a) 5-fluorouracil
- b) 5-iodouracil,
- c) 3-deoxyuridine,
- d) 6-thioguanine
- e) Pseudouridine

4- Feedback inhibition of pyrimidine nucleotide synthesis can occur by which of the following ?

- a) Increased activity of Carbamoyl phosphate synthetase
- b) Increased activity of Aspartate transcarbamoylase
- c) CTP allosteric effects
- d) UMP competitive inhibition
- e) TTP allosteric effects

5- Which base derivative can serve as a precursor for the synthesis of two of the other pyrimidine base derivatives ?

- a) Cytidine triphosphate
- b) Uridine mono phosphate
- c) Adenosine mono phosphate
- d) deoxy thymidine mono phosphate
- e) deoxy Adenosine mono phosphate

6- Purine nucleotide biosynthesis can be inhibited by which of the followings ?

- a) Guanosine triphosphate
- b) Uridine mono phosphate
- c) Adenosine mono phosphate
- d) Adenosine tri phosphate
- e) Inosine diphosphate

7- Which of the following contributes nitrogen atoms to both purine and pyrimidine rings ?

- a) Aspartate
- b) Carbamoyl phosphate
- c) Carbon dioxide
- d) Glutamate
- e) Tetrahydrofolate

8- Which out of the following conditions is associated with hypouricemia ?

- a) Lesch Nyhan syndrome
- b) Adenosine deaminase deficiency
- c) Over activity of PRPP synthetase
- d) Over activity of amido transferase
- e) Von Gierke's disease

9- In patients with Lesch Nyhan Syndrome, purine nucleotides are overproduced and over excreted. The hypoxanthine analogue Allopurinol, which effectively treats gout , has no effect on the severe neurological symptoms of Lesch- Nyhan patients because it does not-

- a) Decrease de novo purine synthesis
- b) Decrease denovo pyrimidine bio synthesis
- c) Decrease urate synthesis
- d) Increase PRPP levels(Phosphoribosyl pyrophosphate)
- e) Inhibit xanthine oxidase

10- A 4- year old presents to a pediatric clinic with megaloblastic anemia and failure to thrive. Blood biochemistry reveals "Orotic aciduria". Enzyme measurement of the white blood cells reveals a deficiency of pyrimidine biosynthesis enzyme Orotate Phospho ribose

transferase and abnormally high activity of the enzyme Aspartate transcarbamoylase. Which of the following treatment will reverse all symptoms ?

- a) Blood transfusion
- b) Dietary supplementation of PRPP
- c) Oral thymidine
- d) Oral Uridine
- e) Plasmapheresis

11)- Which of the following is a required substrate for purine biosynthesis ?

- a) 5- methyl thymidine
- b) Ara -C
- c) Ribose phosphate
- d) PRPP
- e) 5-Fluoro uracil

12)- Which of the following is an analogue of hypoxanthine ?

- a) Ara C
- b) Allopurinol
- c) Ribose phosphate
- d) PRPP
- e) 5-FU

13)-A Pentose with a 5' phosphate group, a 2' OH group and 1' pyrimidine group describes which of the following structures ?

- a) Cytosine
- b) Thymidine
- c) Thymidylate
- d) Cytidylate
- e) Guanosine

14) Which is the rate limiting step of pyrimidine synthesis that exhibits allosteric inhibition by cytidine triphosphate-

- a) Aspartate transcarbamoylase
- b) Hypoxanthine Guanine phosphoribosyl Transferase
- c) Thymidylate synthase
- d) Xanthine oxidase
- e) PRPP synthetase

15)- The conversion of Inosine mono phosphate-

- a) To Adenosine mono phosphate (AMP) is inhibited by Guanosine mono phosphate(GMP)
- b) To AMP requires uridine mono phosphate (UMP)
- c) To GMP requires GMP kinase
- d) To GMP requires Glutamine
- e) To Guanosine di phosphate (GDP) requires ribonucleotide reductase

16)- A 56-year -old diabetic with end stage renal disease receives a kidney transplant from his son. His nephrologist is concerned for the possibility of transplant rejection and puts the patient on mycophenolic acid, that inhibits which of the following enzyme in the synthesis of nucleotides ?

- a) PRPP synthetase
- b) IMP dehydrogenase
- c) Adenylo succinate synthetase
- d) Ribonucleotide reductase
- e) Adenylosuccinase

17- A physician evaluates a 32-year-old patient for fatigue. The patient is found to have an elevated white blood cell count and an enlarged spleen. A referral to an oncologist results in a diagnosis of chronic myelogenous leukemia. Treatment with hydroxyurea, a ribonucleotide reductase inhibitor is begun. The normal functioning of this enzyme is to do which of the followings ?

- a) Converts xanthine to uric acid
- b) Converts ribonucleotides to deoxy ribonucleotides
- c) Degrades guanine to xanthine
- d) Degrades AMP to IMP
- e) Converts PRPP to phosphoribosylamine

18- A child is noted to have recurrent respiratory infections that necessitate hospitalization. His lab tests demonstrate a decrease in T cells, B cells , natural killer cells and decreased antibodies. He is found to have severe combined immuno deficiency . The enzyme that is defective in this disorder is important in which of the following processes ?

- a) Conversion of ribonucleotides to deoxy ribonucleotides
- b) Formation of AMP
- c) Synthesis of UMP
- d) Conversion of dUMP to dTMP
- e) Conversion of adenosine to inosine

19- A 7-year-old boy suffers from mental retardation and self mutilation and has an increased levels of serum uric acid. These symptoms are characteristic of Lesch Nyhan syndrome, which is due to defective-

- a) Salvage pathway for pyrimidine biosynthesis
- b) Denovo synthesis of pyrimidines
- c) Xanthine oxidase
- d) HGPRT (Hypoxanthine Guanine Phospho Ribosyl Transferase)
- e) Formyl transferase

20- A 58-year-old man is awoken by a throbbing ach in his great toe. He had a similar attack earlier also, after indulging in a rich meal. On examination, he is noted to have an angry inflamed great toe and several nodules on the antihelix of his ear. Inhibition of which of the following enzymes might prevent the occurrence of such symptoms ?

- a) Amido transferase
- b) PRPP synthetase
- c) Xanthine oxidase
- d) Orotate phosphoribosyl transferase
- e) Carbamoyl phosphate synthetase-II

Key to answers- 1)- c, 2)-d, 3)-c, 4)-c, 5)- b, 6)- c, 7)-a, 8)- b, 9)- a, 10)- a, 11)-d, 12)- b, 13)- d, 14)- a, 15)- d, 16)- b, 17)- b, 18)- e, 19)- d, 20)- c