**Nucleic acid metabolism**

1. **Nucleotide digestion**
* Draw a scheme of the digestion of nucleoproteins in the gastrointestinal tract (write in which part each stage takes place, which enzymes are involved, which bonds they destroy, which products are formed).
* Complete the table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Digestive Enzyme** | **Source Organ** | **Site of Action** | **Substrate and Product** | **Optimal pH** |
| Deoxyribonuclease (DNAse)  |  |  |  |  |
| Ribonuclease (RNAse)  |  |  |  |  |
| Nucleotidases  |  |  |  |  |
| Nucleosidases  |  |  |  |  |

1. **Nucleotide synthesis de novo**
* Where are purines and pyrimidines are primarily produced?
* What substrates are needed for nucleotide synthesis?
* What is the activated form of the pentose?

Draw the reaction for the PRPP formation. Name the enzyme and the necessary substances for this reaction.

* What substrates are needed for synthesis of bases?

Sign in the figures below the names of the substances involved in the synthesis of purine and pyrimidine bases.

 

* Draw a scheme of the synthesis of purine and pyrimidine nucleotides. What different in the synthesis purines and pyrimidines?
* What is the end product of purine biosynthesis? How are di- and triphosphates formed?
* Why is folic acid needed for nucleotide synthesis?
* How nucleotide synthesis is regulated? Complete the table:

|  |  |  |
| --- | --- | --- |
|  | Purine nucleotides | Pyrimidine nucleotides |
| Activator |  |  |
| Inhibitor |  |  |

1. **Degradation of nucleotides**
* How are purines degraded? What is the final product of purine degradation in humans?

Draw degradation of AMP to uric acid.

* What are the end product of pyrimidine catabolism?

Draw a scheme of the catabolism of pyrimidine nucleotides.

1. **Salvage**
* What is salvage pathway? What substances are used for the formation of nucleotides in the salvage pathway?
* What does an enzyme phosphoribosyltransferase (APRT) do?
* What does an enzyme hypoxanthine-guanine phosphoribosyltransferase (HGPRT) do?
1. **Pathology**
* What leads to overproduction of purines?
* What causes an overproduction of uric acid?
* What are the disorders of purine metabolism?
* What is the main cause of gout? What are the 10 foods that trigger gout? What drugs raise uric acid levels? What is used to treat gout?
* What violations can be in the path of salvation? What is Lesch-Nyhan Syndrome?
* What is orotic aciduria? What causes orotic aciduria? What is used to treat orotic aciduria?
* For the treatment of what diseases you need to modulate of purine and pyrimidine metabolism?
1. **Situational tasks**
2. Allopurinol is a drug that used in the treatment of gout. How does allopurinol work?
3. Leflunomide, a specific inhibitor of enzyme dihydroorotate dehydrogenase. How does leflunomide affect the immune system?
4. Methotrexate is often used as a chemotherapeutic agent to treat patients with leukemia. How does methotrexate work in leukemia? What are the long term effects of methotrexate?