



National Student Team Contest (first stage)

Task 5. Blood-brain barrier

The maintenance of the normal brain function is impossible without constant brain supply with O₂, H₂O, and necessary nutrients. Besides, it is also important to prevent penetration of many chemicals, bacteria and viruses into the brain tissue. Blood-brain barrier (BBB) acts as a highly efficient and selective filter allowing penetration of the desired molecules and blocking the entrance of the unwanted ones.

1. What are the components of the blood-brain barrier. What proteins are involved in the building of the BBB? **(0.5 points)**
2. Which chemicals can pass the barrier and which chemicals are stopped? **(0.5 points)**
3. What kind of diseases affect blood-brain barrier leading to the increase in its permeability to molecules with high molecular weight? **(0.5 points)**
4. Describe the methods that are used to study permeability of the blood-brain barrier and the function of its cellular components in general. **(2 points)**
5. Propose, how gold nanoparticles can be used to study blood-brain barrier function? Why are gold nanoparticles better than silver ones? Enumerate the possible artifacts that can arise from the use of nanoparticles in blood-brain barrier studies. **(1.5 points)**

Total – 5 points