

Biology



**ASSIGN
BUSTER**

Biology What is Spina bifida? Why spina bifida is considered as a multifactorial trait? Spina bifida is a condition of the spinal cord in which there is incomplete closure of the neural tube in the embryo. This closure actually occurs at the 28th day of embryonic development. Hence this disorder is known as a neural tube defect, in which the spinal cord does not completely close because of the decreased development of the vertebral column. Spina bifida is considered to be a multifactorial trait because this disorder is led to by both genetic and the environmental factors. The environmental factor is considered to play a role in the expression of the disorder. The genetic component occurs because of the combined effect of mutated genes. The environmental factor is the lack of vitamins particularly folate during early pregnancy.

2. What is the role of checkpoints in a cell cycle? How does the tumor suppresser genes and proto-oncogene control these points?

Checkpoints in a cell cycle are meant for the regulation for the proliferation of the cells. These checkpoints are basically present in the G1 and S phase of the cell cycle. The role of these checkpoints is to check for any DNA damage or other problem in the cell before proceeding in to the cell cycle. The reason behind this is to either correct the DNA damage or if it cannot be repaired to move the cell towards apoptosis. The tumor suppressor genes code for proteins which are involved in the repair of the damaged DNA in the cell cycle and initiation of apoptosis if the damaged DNA cannot be repaired to prevent the formation of abnormal cells. The proto-oncogenes act by stimulating the cell cycle by the formation of transcriptions factors which are responsible for the function of genes and by forming signal transducers which are responsible for the stimulus responsible for the initiation of the cell

cycle.

3. What is signal transduction and how it is related to cancer?

Signal transduction is involved in the passing of signals to the nucleus of the cell for essential processes which include replication and transcription. Signal transduction occurs by the binding of a molecule to a receptor which may be located on the cell membrane or within the cell. This molecule carries signals and activates the receptor and brings about changes in the cell by sending signals which may lead to transcription. Increased signal transduction can result from mutations in genes that code for systems involved in carrying out signal transduction. This can lead to cancer because if signal transduction increases, the cells replicate and transcribe at a higher rate and are not under the normal regulatory control.

4. What is relationship between Down syndrome and leukemia/

Children suffering from Down syndrome have very high chances of developing leukemia. Also patients who have leukemia along with Down syndrome have a higher cure rate and better prognosis as compared to patients who are only suffering from leukemia. This is seen because myeloblasts in a patient suffering from Down syndrome are more responsive to the chemotherapeutic agents employed to cure leukemia. This occurs as a result of the higher level of expression of the genes on the 21st chromosome because of the presence of an additional chromosome. This accounts for the increased expression of certain enzymes such as superoxide dismutase which change the reactions and hence the sensitivity of myeloblasts.

5. How malaria and sickle cell anemia are related?

Sickle cell anemia is a disease in which the red blood cells become sickle shaped and lose their flexibility which is required for their movement within

the blood vessels. If the disease is homozygous it is fully expressed and is known as sickle cell anemia whereas if the patient is heterozygous the disease is partially expressed and is known as sickle cell trait. Malaria is a disease which is caused by female anopheles mosquito which has a phase in the erythrocytes. As people with sickle cell anemia and sickle cell trait do not possess normal red blood cells, the erythrocytic phase of malaria cannot be completed and this makes patients suffering from these conditions resistant to malaria. This applies more for the people suffering from sickle cell trait because patients with full blown sickle cell disease have lower rates of survival.

Bibliography:

Kumar, Vinay, Abul K. Abbas, Nelson Fausto, Stanley L. Robbins, and Ramzi S. Cotran. Robbins and Cotran Pathologic Basis of Disease. Philadelphia: Elsevier Saunders, 2005.