

How does cystic
fibrosis affect the gas
exchange system
digestive system and
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Every cell in the body needs different proteins for specific functions. DNA determines the structure of the protein. If DNA or RNA changes the structure of the protein, used for a particular function, due to wrong transcription or translation of protein synthesis, mutations occur.

These mutations can lead to genetics disorders or genetic diseases. Cystic Fibrosis is one of the most common genetic diseases caused due to an abnormality in Cystic Fibrosis Transmembrane Regulatory (CFTR) protein. CFTR controls the osmosis of water and salts in and out of mucus (indirectly). Fault in CFTR protein results in making the mucus viscous.

This thickened mucus can affect many body systems including the three main body systems: * Gas Exchange System (by affecting lungs) * Digestive System (by affecting pancreas, liver, gall bladder and intestines) * Reproductive System (by clogging the ducts used for the carriage of sperms and eggs) This essay aims to look at how Cystic Fibrosis affects the respiratory (gas exchange) system, digestive system and reproductive system. The Effect Of CF On Gas Exchange System: The main organs involved in gas exchange system are nose, trachea, bronchi, lungs and alveoli. Air from the atmosphere enters the body through nose and goes through trachea and then finally to the lungs where the most important gas exchange organs (alveoli) are present. The gas exchange system works on the principle of diffusion of oxygen from air to alveoli and carbon dioxide from alveoli to air, which is then exhaled.

In the walls of the airways some specialised cells, called goblet cells, are present which produce mucus. Mucus is normally thin and can easily be

removed by airways by the beating of hair like structures called cilia, found in the epithelial cells lining the airways, into the back of mouth cavity where it is either coughed out or swallowed. With CF, the mucus becomes thick and sticky and results in the blockage of airways as the cilia are unable to move sticky mucus out of the body. The sticky mucus has two major effects on the gas exchange system: 1. It increases the risk of chest and lungs infection.

2. It makes the gas exchange system less effective. The main function of mucus is to trap the disease causing bacteria, called pathogens, and then with the constant beating on cilia expel those bacteria out of the body. With CF, the mucus becomes sticky the cilia become unable to remove that mucus containing pathogens out of the body.

Mucus is still produced in the same amount as it would in a normal lung. Therefore, the airways are blocked with sticky mucus. As oxygen from the air cannot diffuse easily through the mucus and as in CF epithelial cells use more oxygen, therefore, the pathogens respire anaerobically producing lactic acid, which causes CF patients to feel tired. CF also affects the efficiency of the gas exchange system.

Normally, oxygen is diffused into the walls of alveoli to the blood stream due to the fine structure of the gas exchange system. In CF, the airways (mainly bronchioles) are blocked which prevents the passage of oxygen below the blockage and thus reduces the number of alveoli providing the surface area for the gas exchange. This damages the elasticity of the lungs and thus making gas exchange system less effective. The Effect Of CF On The Digestive System: CF affects the chemical digestion of food i. e.

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conversion of large insoluble molecules to small and soluble molecules. CF sufferers do not have good metabolic rate and they need 120%-140% more daily energy intake than a normal person. In chemical digestion, enzymes play a very vital role. There are many different types of enzymes that help in digestion and are secreted by different organs of the body like pancreas, gall bladder and duodenum (1st part of the small intestine). In the digestive system, CF mainly affects the pancreas.

The pancreas is an organ that secretes pancreatic juice that contains enzymes which helps in digestion and controls the blood sugar level. The pancreatic juice contains amylase, protease and lipase. The functions of the pancreatic enzymes are as follows: 1. Pancreatic amylase converts starch into maltose.

2. Pancreatic lipase converts fats to glycerol. 3. Trypsin converts proteins to peptides. In CF, due to the fault in CFTR protein the secretion from the pancreas become thick and leads to the blockage of pancreatic duct.

This obstruction in the duct leads to the decrease in the amount of juice being conducted to the duodenum. The lower concentration of digestive enzymes within the intestine reduces the rate of reaction. Therefore, CF patients have difficulty in digesting starch, proteins and lipids that leads to the elimination of essential constituents of food. The lost of energy due to partial absorption of nutrients in the food is called malabsorption syndrome.

This causes the CF patients to be weak and small. The blockage can become so severe that the hormone cells in the pancreas that produce insulin and glycogen can be damaged. The damage of the hormone producing cells can <https://assignbuster.com/how-does-cystic-fibrosis-affect-the-gas-exchange-system-digestive-system-and-reproductive-system-essay/>

cause diabetes. The Effect Of CF On Reproductive System: CF causes severe problems in reproductive systems as well. In females having CF, mucus plug develops in the cervix and thus it reduces her chances of becoming pregnant.

The plug that is formed in the cervix stops the sperm from reaching the egg. In male, CF can affect the development of the sperm-carrying duct called vas deferens. The tube can become blocked with mucus as a result of the disease. Sperm are still produced, but they are not released as part of ejaculation. This results in an inability to reproduce (infertility).