

# The respiratory system



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## System's development during the embryonic life

The respiratory system begins to develop at the fourth week of gestation. It is necessary to point out here that the respiratory system consists of two main parts or regions. The upper respiratory tract, which is composed of the nose, nasal cavity and pharynx and the lower respiratory tract consisting of the larynx, trachea, bronchi and the lungs. Development of this system is incomplete until the last week of gestation which explains the respiratory difficulties experienced in premature babies. . (West, John, 1993)

Growth factors are crucial aspects that contribute to the development of the lungs. Fibroblast Growth Factor 10 (FGF-10) is thought to stimulate the proliferation of cells expressing FGF receptor sites. The laryngotracheal groove develops into a primitive lung bud which then quickly grows and elongates into the splanchnic mesoderm. It then divides to make the left and the right bronchial lungs. Successive branching in these primitive lungs forms structures such as the lining of the larynx, trachea, bronchus and the alveoli. . (West et al, 1993)

Respiratory system changes from intra-uterine to extra uterine.

There occur some physiological changes in the respiratory system bearing in mind that when the child is in the uterus, gaseous exchange occurs through the placenta. The lung walls also strengthen to accommodate the pressure from the inhaled gases into the lungs. The lung muscles must develop the steady expansion and contraction to improve breathing. The respiratory tube also adapts by developing hairs to trap impurities like dust particles from the inhaled air. (West et al, 1993)

Changes with maturity.

Much of the physiological changes experienced in this system upon maturation may be experienced at extra-uterine stage. (West et al, 1993)

Changes with aging.

The aging process impacts physiological changes to the respiratory system. In general, aging affects ventilation, compliance, gas exchange and the system's defense mechanism. The elasticity of tissues that are responsible for contraction and dilation of the lungs deteriorates thus reducing the effectiveness of their functions. The movement of the rib cage is delimited due to the arthritic changes that occur due to the aging process. A cumulative effect of these two phenomena results to reduced chest movement and, therefore, limited respiratory capacity. (West et al, 1993)

Problems associated with respiratory system.

There are many problems associated with the respiratory system. The most common one is asthma. This is hypersensitivity to allergens associated with airways. This condition leads to blockage of the airways hence difficulty in breathing. Bronchitis, which could be chronic or acute is associated with inflammation of the bronchial tubes, and is another serious problem associated with this system. Emphysema is another problem that may also be attributed to aging, and it results to the loss of elasticity of the walls of the air sacs. There are also malignant tumors, which result to lung cancer, as well as a condition known as pleurisy associated with inflammation of the pleural membrane. Other minor problems that are associated with the

respiratory system include influenza, sinusitis and the common cold. These are milder infections that are caused by viruses. Influenza is caused by influenza virus while the common cold is caused by a virus of rhabdovirus family. Sinusitis is a mild inflammation of the sinus cavities. (West et al, 1993).

#### Section B.

1. a) Only one sperm cell is allowed to penetrate the oocyte because if more than one sperm penetrated the oocyte, there would be more chromosomes in the fertilized egg and, therefore, there would be no development of the embryo. (Pinon, 2006)

b) Several hundred or thousands of sperms are required for the final stage as they assist in digesting the jelly covering the ovum through the enzymatic effects associated with these sperms. (Pinon, 2006)

c) Polyspermy describes a situation where an egg is fertilized by more than one sperm. This results to a situation whereby the zygote formed has more than two copies of each chromosome one from the female and two or more from each sperm that fertilized the egg. Such a zygote is referred to as an inviable zygote. (Pinon, 2006) It is noteworthy that genes control the process of cell division and differentiation so that proliferation of the cell is regulated and controlled. This prevents growth of tumors which is the case experienced when the cells proliferate uncontrollably. (Pinon, 2006) When corpus luteum dies it degenerates to form fibrous scar tissue called corpus albicans. (Pinon, 2006) When the sperm and the egg fuse during fertilization, the diploid nature of the organism is restored since the zygote inherits a pair

of chromosomes from the parents each from one parent. The organism's sex is determined through the sex chromosomes inherited from each parent. The female egg has X sex chromosome while the male has X and Y sex chromosome. If the organism gets X from the father, it will be a female (XX) and, if it gets Y sex chromosome, it becomes a male (XY). The organism also inherits different characteristics from the genes of the parents thus variability. Under-nutrition reduces the number of glial cells which means the person may show signs of reduced intellectual capacity.

Myelination is delayed significantly when the fetus is under nourished. This slows down the process of brain development of the individual.

Growth of axonal and dendritic processes is also delayed or rather slowed down by under-nutrition which retards the person's brain development.

Under-nutrition is seen to deficit synapses per neuron and, therefore, motor co-ordination is reduced in the individual. (Pinon, 2006).