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**BIOCHEMISTRY ASSIGNMENT**

**ASSIGNMENT TITLE: DIABETES, OBESITY AND CANCER**

**COURSE CODE: BCH 313**

**Question**

1. What do understand by primary or simple obesity
2. How does congenital syndrome and drug therapy affect obesity
3. Outline the Aetiology of cancer and its molecular basis
4. Obesity is a nutritional disorder in which excess fat is accumulated. It is classified into primary or secondary obesity

Primary Obesity: when this happens it is not associated with clinical conditions. Obesity can be classified as a primary disease since the adiposopathy (sick fat) determines the dysregulation of the metabolic pathways. Metabolic diseases most associated with primary obesity contribute to atherosclerosis, hypertension, dyslipidaemia, type II diabetes mellitus, hyper-androgenemia in women and hyper=estrogenemia in men.

1. A congenital disorder is a medical condition that is present at or birth. These conditions also referred to as birth defects can be acquired during the foetal stage of development or from the genetic make-up of the parents.

An example is the Prader-Willi syndrome which is a complex neurodevelopmental disorder due to errors in genomic imprinting with loss of imprinted genes that are paternally expressed from the chromosome 15q11-q13 region. Approximately 70% of individuals with PWS have a de novo deletion of the paternally derived 15q11-q13 region in which there are two subtypes(i.e larger type I or smaller type II), maternal disomy 15 (both 15s from the mother) in about 25% of cases, and the remaining subjects have either defects in the imprinting center controlling the activity of imprinted genes or due to other chromosome 15 rearrangements. PWS is characterized by a particular facial appearance, infantile hypotonia, a poor suck or feeding difficulties, hypogonadism, hypogenitalism in both sexes, short stature and small hands and feet due to growth hormone deficiency, mild learning and behavioural patterns(e.g: skin picking, temper tantrums) and hperphagia leading to early childhood obesity. Obesity is a significant health problem, if uncontrolled. PWS is considered the most common known genetic cause of morbid obesity in children.

Obesity also affects children and adolescents with congenital heart disease. In this population, factors inherent to the heart disease can be added to other traditional risk factors for the development of ischemic heart disease in the future. Changes in the lifestyle are necessary to change these risk factors and its comorbidities in the adult life of these people who are living longer.

Not all congenital disorders cause obesity or has obesity as a characteristics. Hence, congenital defects determined by obesity occurs as a result of the nature of the disorder.

Drug therapy, also called pharmacotherapy, is a general term for using medication to treat diseases. Drugs interact with receptors or enzymes in cells to promote healthy functioning and reduce or cure illness.

Drug therapy affects obesity depending on the drugs taken. Some drugs and their effects are stated below:

1. Appetite suppressants: Various pharmacologic agents, referred to as anorectic drugs, are used as adjuncts to behavioural therapy in weight reduction programs. The two classes of anorectic drugs currently available are the noradrenergic and the serotonergic agents.

Noradrenergic drugs affect weight loss through action in the appetite center.

The serotonergic drugs partially inhibit the reuptake of serotonin and release serotonin into the synaptic cleft, thus acting on the hypothalamus to decrease satiety.

1. Digestive inhibitors: these have a role in creating the negative energy balance necessary for subsequent weight loss. Gastric and pancreatic lipases aid in the digestion of dietary triglycerides by forming them into free fatty acids that are then absorbed at the brush border of the small intestine. Inhibition of these enzymes leads to inhibition of the digestion of dietary triglycerides and decreased cholesterol absorption, and may decrease absorption of lipid-soluble vitamins.
2. Fat substitutes: the goal of fat substitutes is to decrease caloric value from fat while maintaining the creaminess and richness derived from fat.

3. Cancer is a disease of uncontrolled growth and proliferation whereby cells have escaped the body’s normal growth control mechanisms and have gained the ability to divide indefinitely. It is a multi – step process that requires the accumulation of many genetic changes over time. These genetic alterations involve activation of proto – oncogenes, deregulation of tumor suppressor genes and immortalisation.

Aetiology

Cancer arises from factors within the cells and entangled factors within the environment, for example inherited mutation. Thus the aetiology of cancer is multifactorial i.e physical, hormonal, metabolic, environmental factors all have a role to play in the generation of cancer as they cause mutation of genes. Thus, carcinogens are mutagens and vice versa. In summary, carcinogens whether chemical or physical cause DNA damage which in turn leads to mutation which causes cancer. Every normal cell has 2 DNA gene repair mechanisms that correct defects during replication. Carcinogens and hereditary mutations affect the repaired genes and hence cancer results. About 50% of human cancer is as a result of mutation or destruction of onco suppressed genes. The causes of cancer are as follows:

1. Carcinogens: physical carcinogens include x-rays, UV light and gamma rays, etc. chemical carcinogens include tobacco, alcohol, food additives, colouring agents, etc.
2. Hormones: some hormones like steroid hormones are cancerous.
3. Hereditary: mutated genes causing cancer have chances of being passed down to the other offspring.

HUMAN TUMOR VIRSES

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| VIRUS (GROUP) | ASSOCIATED HUMAN CANCER |
| * DNA VIRUSES |  |
| Human papilloma virus(HPV) | Genital tumors, squamous cell carcinoma |
| Herpes Virus family  Human herpes virus 8(HHV8)  Epstein-Barr virus(EBV) | Kaposi sarcoma  Burkitt’s lymphoma, Hodgkin’s disease  Nasopharyngeal carcinoma |
| Hepadnavirus family  Hepatitis B virus | Hepatocellular carcinoma |
| * RNA VIRUSES |  |
| Retrovirus family  Human T-cells leukaemia virus  Human immunodeficiency virus | Adult T-cell leukaemia  AIDS-related malignancies |
| Flavivirus family  Hepatitis C virus | Hepatocellular carcinoma |