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**Matric No.:** 17/MHS01/018.

**Department:** MBBS.

**Level:** 300.

**Course Title:** Biochemistry.

**Course Code:** BCH 313.

**Questions:**

1. What do you 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.

**Question 1:**

 Primary/Simple obesity is the type of obesity that is not associated with clinical condition. This means that it is not as a result of anything related to a medical condition. It is simply caused when an individual’s caloric intake exceeds his/her energy expenditure, basically when a person overeats but doesn’t work out to avoid accumulation of excess body fat.

**Question 2:**

1. **Drug Therapy:**

 There are certain prescription medications, not all, such as those used to treat diabetes, high blood pressure, mood disorders, seizures and even migraines which can actually cause weight gain – even up to several pounds a month.

 Sometimes it is not the drug itself causing weight gain; however, it is the side-effects from the drug. Some drugs stimulate your appetite, and as a result, you eat more. Others may affect how your body absorbs and stores glucose, which can lead to fat deposits in the midsection of your body. Some cause calories to be burned slower by changing your body’s metabolism. Others cause shortness of breath and fatigue, making it difficult for people to exercise. And there are some drugs which can cause you to retain water which adds weight but not necessarily fat.

 How much weight is gained varies from person-to-person and drug-to-drug. Some people may gain a few pounds over the course of a year, while other people can gain 10, 20 or more pounds in just a few months. Because many of these drugs are taken for chronic conditions, you may use them for several years with their use contributing to significant weight gain throughout time.

 Some medications that may cause weight gain include:

1. **Tricyclic Antidepressants (TCAs):** such as:
* Citalopram
* Fluoxetine
* Fluvoxamine
* Mirtazapine
* Paroxetine
* Sertraline

 These drugs boost the amount of certain “feel good” chemicals in your brain. Some of those chemicals also control your appetite and how your body breaks down calories. You might eat but not feel full or you might lay down more fat even if you’re not eating more. Some antidepressants may cause you to gain as much as 24 pounds in a year. Depression itself can affect appetite and eating habits.

1. **Mood Stabilizers:** such as:
* Clozapine
* Olanzapine
* Quetiapine
* Risperidone

 These drugs help treat mental health conditions like bipolar disorder or schizophrenia. They directly affect your brain and affect both metabolism and weight. Mood stabilizers cause your appetite to turn on and stay on. Some may cause as much as an 11-pound weight gain in 10 weeks and people taking them for a long time may gain more.

1. **Diabetes Medicines:** such as:
* Insulin
* Glyburide
* Glipizide
* Glimepiride
* Pioglitazone
* Repaglinide

 Diabetes medications control blood sugar levels in different ways. Some make you more sensitive to insulin, others cause your body to release more insulin before or after meals.

1. **Corticosteroids:** such as:
* Methylprednisolone
* Prednisolone
* Prednisone

 Corticosteroids reduce pain and inflammation. They also affect metabolism, hence taking them for a long time may give you a bigger appetite and cause your body to hold on to more fat, especially around the abdomen region.

1. **Drugs that Prevent Seizures and Migraines:** such as:
* Amitriptyline
* Nortriptyline
* Valproic acid

 These medicines affect hormones that control hunger and make it harder for your body to sense when it’s full. They can raise appetite, lower metabolism and make the body retain extra fluids.

1. **Beta Blocker Heart Medicines:** such as:
* Acebutolol
* Atenolol
* Metoprolol
* Propranolol

 Beta blockers ease stress on the heart by slowing its rate and lowering blood pressure. But that decreases the body’s reaction to exercise so you won’t be able to burn as many calories or any at all as energy to work out is lacking.

1. **Congenital Syndrome:**

 Science shows that genetics plays a role in obesity. Genes can directly cause obesity in some specific orders. Congenital obesity is the excessive accumulation and storage of fat in the body that is present during infancy and/or childhood. Mutations in only a few genes controlling appetite and metabolism are known to cause the development of severe obesity in early childhood. Congenital syndromes that are associated with childhood obesity include:

* Prader-Willi syndrome
* Pseudohypoparathyroidism
* Bardet-Biedl syndrome
* Cohen syndrome
* Congenital leptin deficiency
* Congenital leptin receptor deficiency
* Down syndrome
* Turner syndrome
* Alstrom syndrome
* Albright hereditary osteodystrophy

**Question 3:**

**Aetiology of Cancer:**

 Cancer refers to any one of a large number of diseases characterized by the development of abnormal cells that divide uncontrollably and have the ability to infiltrate and destroy normal body tissue. There are over 200 types of cancer. Anything that may cause a normal body cell to develop abnormally potentially can cause cancer.

**Symptoms:**

 Signs and symptoms caused by cancer will vary depending on what part of the body is affected. Some general signs and symptoms associated with, but not specific to cancer include:

* Fatigue
* Lump or area of thickening that can be felt under the skin
* Weight changes, including unintended loss or gain
* Skin changes, such as yellowing, darkening or redness of the skin or sores that won’t heal
* Changes in bowel or bladder habits
* Difficulty in swallowing
* Hoarseness
* Unexplained bleeding or bruising
* Persistent, unexplained fevers or night sweats
* Persistent, unexplained muscle or joint pain

**Causes:**

 Cancer is caused by changes (mutations) to the DNA within cells. The DNA inside a cell is packaged into a large number of individual genes, each of which contains a set of instructions telling the cell what functions to perform, as well as how to grow and divide. Errors in the instructions can cause the cell to stop its normal function and may allow a cell to become cancerous.

 A gene mutation can instruct a healthy cell to allow rapid growth, hence creating many new cells that all have that same mutation. It can also fail to stop uncontrolled cell growth, hence allowing the mutated cells to continue growing and accumulating. Gene mutations in a DNA repair gene may mean that other errors are not corrected, leading cells to become cancerous.

 Substances that cause cancer are called **Carcinogens**. A carcinogen may be a chemical substance, such as molecules in tobacco smoke. The cause of cancer may also be environmental agents, viral or genetic factors. Cancer risk factors can be divided into the following:

1. **Biological or Internal Factors:** such as age, gender, inherited genetic defects and skin type.
2. **Environmental Exposure:** for example, exposure to radon and UV radiation.
3. **Occupational Risk Factors:** including carcinogens such as many chemicals, radioactive materials and asbestos.
4. **Lifestyle-related Factors:** including smoking (tobacco), drinking (alcohol), UV radiation in sunlight, and some food-related factors (such as nitrites and polyaromatic hydrocarbons generated by barbecuing food).

**Molecular Basis of Cancer:**

 Cancer is a group of diseases characterized by an autonomous proliferation of neoplastic cells which have a number of alterations, including mutations and genetic instability. Cellular functions are controlled by proteins, and because these proteins are encoded by DNA organized into genes, molecular studies have shown that cancer is a paradigm of acquired genetic disease.

 The process of protein production involves a cascade of several different steps, each with its attendant enzymes, which are also encoded by DNA and regulated by other proteins. Most steps in the process can be affected, eventually leading to an alteration in the amount or structure of proteins, which in turn affects cellular function. However, whereas cellular function may be altered by disturbance of one gene, malignant transformation is thought to require two or more abnormalities occurring in the same cell.

 Although there are mechanisms responsible for DNA maintenance and repair, the basic structure of DNA and the order of the nucleotide bases can be mutated. These mutations can be inherited or can occur sporadically, and can be present in all cells or only in the tumor cells. At the nucleotide level, these mutations can be substitutions, additions or deletions.