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BCH308 Cellular Biochemistry Assignment

**Question 1**

What do you understand by primary obesity?

**Answer**

Primary obesity is a medical condition in which excess body fat has accumulated to an extent that it may have a negative effect on health. People are generally considered obese when their body mass index (BMI), a measurement obtained by dividing a person's weight by the square of the person's height, is over 30 kg/m2; the range 25–30 kg/m2 is defined as overweight. It is not associated with clinical conditions. It is characterized by a normal or increased growth rate with an acceleration of bone age maturation and a reduced growth hormone secretion evaluated by standard provocative tests, the administration of growth hormone releasing hormone or spontaneous 24-hour secretion. It is also associated with high insulin and insulin like growth factor I levels which may interfere in the complex endocrine interactions.

Causes of primary obesity may include

* Physical inactivity: sedentary people burn fewer than people who are active. A strong correlation has been shown between physical inactivity and weight gain in both sexes.
* Overeating: overeating leads to weight gain especially is the diet is high in fat. Epidemiologic studies have shown that diets high in fat contribute to weight gain.
* Genetics: a person is more likely to develop obesity if one or both parents are obese. Genetics also affects hormones involved in fat regulation i.e. leptin.
* Psychological factors: for some people, emotions influence eating habits. Many people eat excessively in response to emotions such as boredom, sadness, stress, or anger.
* Diseases such as hypothyroidism, insulin resistance, polycystic ovary syndrome and Cushing’s syndrome are also contributors to obesity.
* Hormones: women tend to gain weight especially during certain events such as pregnancy, menopause, and in some cases, with the use of oral contraceptives.

Other factors associated with obesity include: ethnicity, childhood weight, social issues, medications, frequency of eating etc.

People with obesity are more likely to develop a number of potentially serious health problems including; heart disease and strokes, type 2 diabetes, certain cancers, digestive problems, gynecological or sexual problems and so on.

**Question 2**

How does drug therapy and congenital syndrome affect secondary obesity?

**Answer**

**How Secondary Obesity Is Affected by Drug Therapy**

Drug therapy plays an important complementary role in an integrated strategy for managingobesity**.** Various pharmacologic agents, referred to as anorectic drugs, are used as adjuncts to behavioral 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. Phenylpropanolamine (Dexatrim), a sympathomimetic drug and a synthetic derivative of ephedrine, is available as an over-the-counter appetite suppressant and decongestant. In studies lasting 14 weeks, the subjects who took phenylpropanolamine had a greater weight loss than those who took placebo, although the difference was minimal.
* **The Serotonergic Drugs** partially inhibit the reuptake of serotonin and release serotonin into the synaptic cleft, thus acting on the hypothalamus to decrease satiety. Fluoxetine (Prozac) is a highly selective serotonin reuptake inhibitor (SSRI) that has been studied in the treatment of obesity. Fluoxetine may increase energy expenditure by raising basal body temperature; however, weight loss has not been consistent among subjects in clinical trials. In a three-month study, fluoxetine did not significantly reduce weight when compared with placebo. In a longer clinical trial, significantly greater weight loss was achieved in the subjects taking fluoxetine at 20 weeks, compared with the subjects taking placebo. However, after one year, weight loss was not different in the two groups.
* **Adrenergic/Serotonergic Agents:** Sibutramine (Meridia) is an adrenergic/serotonergic agent recently labeled by the FDA for use in the management of obesity. Sibutramine and its metabolite inhibit monoamine uptake, suppressing appetite in a fashion similar to SSRIs. Sibutramine may also stimulate thermogenesis by activating the beta3-system in brown adipose tissue. Initially tested for its antidepressant activity, Sibutramine was found to cause weight loss 1 to 2 kg (2.2 to 4.4 lbs.) in healthy and depressed patients. In six-month studies, weight loss in subjects taking Sibutramine, although modest, was found to be significantly greater than the loss in subjects taking placebo, and weight loss increased with increasing dosages. In a continued, open-label, 96-week extension study, weight was regained even in subjects taking high-dose sibutramine.

Sibutramine is indicated for the management of obesity, including weight loss and maintenance of weight loss, and should be used in conjunction with a reduced calorie diet. It is recommended for obese patients with an initial BMI of greater than 30 kg per m2, or greater than 27 kg per m2 in the presence of other risk factors (e.g., hypertension, diabetes, hyperlipidemia).

**How Congenital Syndromes Affect Secondary Obesity**

Syndromic obesity corresponds to severe obesity associated with additional phenotypes (mental retardation, dysmorphic features, and organ speciﬁc developmental abnormalities). Prader-Willi (PWS) and Bardet Biedl (BBS) syndromes are the 2 syndromes most frequently linked to obesity, but more than 100 syndromes are now associated with obesity.

* Prader-Willi syndrome: Some clinical features of this syndrome associated with obesity include; neonatal hypotonia, mental retardation, hyperphagia, facial dysmorphy, hypogonadism, short stature and so on.
* Bardet- Biedl syndrome: Some clinical features of this syndrome associated with obesity include; mental retardation, renal dystrophy or pigmentary retinopathy, dysmorphic extremities, hypogonadism, kidney anomalies and so on.

**Question 3**

Discuss the etiology of cancer

**Answer**

Cancer, known medically as a malignant neoplasm, is a broad group of various diseases, all involving unregulated cell growth. In cancer, cells divide uncontrollably forming malignant tumors and invade nearby parts of the body. The cancer may also spread to distant parts through the lymph or blood. Cancer is mostly caused by accumulated damage to genes. Such changes may be due to chance or to exposure to a cancer causing substance.

The substances that cause cancer are called carcinogens. A carcinogen may be a chemical substance, such as certain molecules in tobacco smoke. The cause of cancer may be environmental agents, viral or genetic factors. It is important to note, though, that in the majority of cancer cases the disease cannot be attributed to a single cause.

The causes of cancer can be categorized into the following:

1. Biological factors

* Inherited genetic defects: a number of specific cancers have been linked to human genes and are as follows: breast cancer, ovarian, colorectal, prostrate, skin, and melanoma cancers
* Viruses and bacteria: human papillomavirus (HPV), EBV or Epstein-Barr virus, hepatitis viruses’ B and C, Kaposi’s sarcoma-associated herpes virus (KSHV), Merkel cell polyomavirus, Schistosoma spp., and Heliobacter pylori; other bacteria are being researched as possible agents.

2. Chemical factors: some substances cause cancer primarily through their physical, rather than chemical, effects on the cells. Examples are:

* Aflatoxin B
* Nickel
* Tobacco smoke
* Industrial pollutants

3. Physical factors such as;

* UV Ray's
* X-rays
* Beta and gamma rays.

Are carcinogenic, if received in sufficient doses. Prolonged exposure to ultraviolet radiations from the sun can lead to melanoma and other skin malignancies.

**Molecular Basis of Cancer**

It is a multi-step process that requires the accumulation of many genetic changes over time. These genetic alterations involve activation of proto-oncogenes to oncogenes, deregulation of tumor suppressor genes and DNA repair genes and ‘immortalization’.