



Physiology



Sheet 16

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correction

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In the previous lecture we talked about the types of Diabetes.

****Quick Recap:**

❖ **Type 1:** insulin dependent diabetes mellitus/juvenile diabetes.
This type is genetic.

❖ **Type 2:** non-insulin dependent diabetes mellitus /maturity onset diabetes.

***Remember:** Insulin is a must for type 1 diabetes, while in type 2 diabetes, it is the final choice.

-Type 2 diabetes is treated with exercise, diet, and weight loss.

- The duration of the treatment depends on the will of the person. If he returns to normal weight, then insulin will function normally again.

-But if none of these mentioned treatments worked, the patient will take drugs. These drugs are of many types:

✓ Either to increase secretion of insulin by affecting the pancreas.

✓ Or increasing the function of insulin in the tissues, such as:
increasing the sensitivity for insulin in the liver, or the peripheral tissues, or other drugs to increase the absorption of carbohydrates.

- If again also none of these drugs worked, the only option left is the injection of insulin.

****If diabetes is untreated, it leads to:**

-Renal failure

-Erectile dysfunction

-Blindness

-Coronary arterial diseases

-Increased risk of cancer

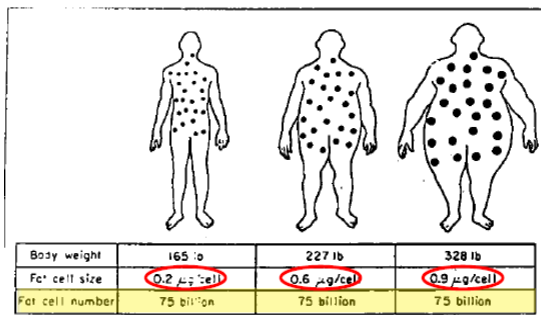
-Cardiovascular diseases: most prominent. For example, more than 65% of people with diabetes die from heart diseases.

****In fact, adults with diabetes have heart diseases and death rate is about 2-4 times higher than adults without diabetes.**

***Also stroke accounts for approximately 20% of diabetes related to death and risk for stroke is also 2-4 times higher among people with diabetes.**

❖ **Obesity:**

-As we mentioned before, most people with obesity have diabetes (type II) but not always.



-Obesity is caused by increasing the SIZE of the fat cell and not the number.

-How can you know if you are overweight or underweight?

1) The relationship between Height and Weight:

Your height minus 100= your normal weight. For example, if someone is 170 cm tall then we subtract it by 100 then his weight should be 70 kg.

2) Measuring the waist: It must be less than half of your height.

3) BMI (Body mass index):

$$\text{BMI} = \frac{(\text{weight in kilograms})}{\text{height in meters}^2}$$



-In obese people, their abdominal fat retains the Vitamin D and doesn't release it. Therefore, these obese individuals are exposed to many problems such as heart problems.

-Recall the hormonal interactions:

-Permissive hormonal interaction: In order for hormones to function normally, they need the action of another hormone.

Ex: Adrenaline needs the thyroxine to function normally on lipids.

-Synergism: When many hormones function together, they complement each other.

-Antagonism: When a hormone opposes the action of another hormone.

Ex: Glucagon and Insulin. Insulin **decreases** blood glucose level while glucagon **increases** blood glucose level.

-Another example, Calcitonin and PTH. PTH **increases** blood calcium level, while calcitonin **decreases** blood calcium level.

❖ **Glucagon:**

-It is the other major pancreatic islet hormone that is involved in the regulation of body fuel metabolism.

- Ingestion of PROTEIN appears to be the major stimulus to the secretion of glucagon.

- Glucagon's major target tissue is the **liver**.

-Like insulin, glucagon is secreted first into the portal blood and is therefore anatomically well-positioned to regulate hepatic metabolism, although the amino acids are released by the digestion of protein meal appeared to be the major glucagon secretagogue (means increase the secretion).

-Main action on the liver appears to involve the regulation of carbohydrate and lipid metabolism.

- So we can conclude that glucagon functions on carbohydrates, lipids, and proteins.

- Glucagon is particularly important in stimulating glycogenolysis which needs the action of cortisol. (permissive)

- Glucagon also stimulates gluconeogenesis, and ketogenesis.

- Glucagon doesn't act solely on the liver, but also has glycogenolytic action on cardiac and skeletal muscle and lipolytic action on adipose tissue, and it promotes the breakdown of proteins by several tissues. However, these effects on protein tissue breakdown appear to be more prominent when tissues are exposed to pharmacological concentrations of glucagon. At more physiological concentrations, the liver appears to be the major target tissue.