## **MEDICAL BIOLOGY**

Adipose Tissue

### **ADIPOSE TISSUE**

- is a specialized connective tissue consisting of lipid-rich cells called adipocytes.
- As it comprises about 15-20 % of total body weight in men; slightly more in women
- the main function of adipose tissue is to store energy in the form of fat (triglycerides).

### STRUCTURE AND LOCATION

- Adipose tissue is distributed within two compartments of the human body:
- • Parietal or subcutaneous fat, which is embedded in the connective tissue under the skin
- • **Visceral fat**, which surrounds the internal organs.

adipose tissue consists of cells and extracellular matrix

### **Adipose Tissue**



### **ADIPOCYTES**

- Adipocytes (adipose cells, fat cells) are the building blocks of adipose tissue. There are three types of adipocytes that constitute two different types of adipose tissue:
- • White adipocytes main cells of the white adipose tissue
- • Brown adipocytes chief cells of the brown adipose tissue
- Beige adipocytes a recently discovered type, found dispersed within white fat tissue

the origin of 3 types of adipocytes is from *undifferentiated mesenchymal cells* that give rise to *preadipocytes*.



# Fat Cells (Adipocytes or Adipose Cells)



# Adipocyte Adipocyte Adipocyte (White) (Brown) (Beige)

# **Adipose Tissue**

\* 1 FAT DROPLET \* FEW ORGANELLES \* MOST ABUNDANT

> \* SCATTERED AMONG WHITE ADIPOCYTES \* SOMETIMES GENERATES HEAT

1-1

\* MANY FAT DROPLETS \* MANY MITOCHONDRIA \* GENERATES HEAT

#### WHITE ADIPOSE TISSUE (made up of white & beige adipocytes)



#### \* PREDOMINANT TYPE of FAT in BODY

- \* LOCATED: under SKIN, around INTERNAL ORGANS, in CENTRAL CAVITIES of BONES
- \* MAIN FUNCTION: STORE ENERGY

#### **BROWN ADIPOSE TISSUE**

(made up of brown adipocytes)



\* MORE in FETAL LIFE and INFANCY \* LOCATED: UPPER BACK, above CLAVICLES, around VERTEBRAE

\* MAIN FUNCTION: GENERATE HEAT

### WHITE ADIPOSE TISSUE



### **BROWN ADIPOSE TISSUE**



Brown adipose tissue

White adipose tissue

### FUNCTION

- energy storage
- endocrine organ
- Different localizations of the adipose tissue have different roles in the human body
- **abdominal fat = metabolic profile** influence in inducing insulin resistance.
- Parietal fat = thermoregulation.
- visceral fat = cushion-like support for internal organs.
- • During reduced caloric intake, the amount of parietal adipose tissue decreases, while the visceral fat remains undiminished.
- • brown adipose tissue transforms chemical energy into heat. That way it prevents obesity, other metabolic disorders, and hypothermia.

### **MEDICAL APPLICATION**

- Unilocular adipocytes can generate benign tumors called lipomas that are relatively common, while malignant adipose tumors called liposarcomas are uncommon.
- In most obese individuals, adipocytes produce excess amount of leptin but target cells are not responsive due to insufficient or defective receptor.



### **Classifications of Obesity**

- Hypertrophic (adultonset) obesity:
  - A normal number of fat cells, which are twice as large as those of a non-obese person.
- Hyperplastic (juvenile-onset) obesity:
  - A higher number of enlarged fat cells.



# THANK YOU