

Adipose Tissue

● Definition

“Adipose tissue, also known as body fat, is a connective tissue primarily composed of adipocytes or fat cells found throughout the body. It stores energy, insulates the body, cushions organs and produces hormones”

● Characteristics

- A type of specialized connective tissue
- Has adipocytes found in isolated groups within loose CT matrix
- Adipose CT/fat makes up:
 - 15-20% of male weight
 - 20-25% of female weight

● Function

- Adipocytes release hormones (a major endocrine + signaling tissue)

- fills up spaces
- Keeps organs in place
- A shock absorber
- Subcutaneous fatty layer → shape surfaces of the body

● Classification

- 1) White Adipose Tissue
- 2) Brown Adipose Tissue

● White Adipose Tissue / Unilocular Adipose Tissue / Adult Fat

“White adipose tissue (WAT) is a type of adipose tissue primarily involved in storing energy as triglycerides”

→ It is also involved in insulation, cushioning and hormone regulation

» Characteristics of WAT Adipocytes:

- Type: Unilocular → contain a single large lipid droplet in the middle

- Appearance: Signet ring → nucleus pushed to the periphery
- Cytoplasm: A thin peripheral ring of cytoplasm
- Nucleus: Flattened
- ER: Less developed
- Blood Supply: ↓
- Colour: Due to large lipid droplets composed of triglycerides

» Hormonal Function: Leptin

- Endocrine activity of white adipose tissue is to secrete "leptin"
- Leptin signals brain about the amount of fat stored in the body
- More leptin → less appetite → more energy expenditure (and vice versa)

» Location

- Sub-cutaneous fat
- Visceral fat

» Medical Significance

- Benign tumor of unilocular adipocytes → lipomas
- Malignant tumor of unilocular adipocytes → liposarcomas

● Brown Adipose Tissue / Multilocular Adipose Tissue

“Brown adipose tissue (BAT) is a type of fat tissue specialized in generating heat to help regulate body temperature”

» Characteristics of BAT Adipocytes

- Type: Multilocular → cytoplasm has multiple lipid droplets
- Appearance: Polygonal
- Cytoplasm: Granular → due to many lipid droplets
- Nucleus: Spherical + central
- ER: Highly developed
- Blood supply: ↑ (to deliver oxygen)

- Colour: Brown due to increased number of mitochondria (have coloured cytochromes)

» Role: Temperature Regulation

- Function: Heat generation through non-shivering thermogenesis
- Mechanism: Richly supplied with blood vessels to deliver oxygen for mitochondrial activity
- Mitochondria: Contain uncoupling protein I (UCPI) which uncouples ATP production and generates heat

» Location

> Adults

- Cervical fat
- Supraclavicular fat
- Paravertebral fat

> Infants

- Interscapular fat
- Peri-renal fat

» Medical Significance:

- “Non-shivering thermogenesis”