

HISTOPATHOLOGY

1

NUTRITIONAL DISEASES



Sawa University

College of health and medical techniques

Department of Medical Laboratories

Third Stage

جامعة ساوة الاهلية

كلية التقنيات الصحية والطبية

قسم تقنيات المختبرات الطبية

المرحلة الثالثة

محاضرة رقم 9

Lecture No. 9

الجانب النظري

Theoretical

تدريسي المادة : م.د. قاسم عباس محمد

OBJECTIVE

- ❖ To explain the major types of nutritional diseases.
- ❖ To describe the clinical manifestations associated with inadequate or excessive nutrient intake.
- ❖ To correlate nutritional disorders with their key histopathological changes at the tissue and cellular levels.
- ❖ The principles of diagnosis, prevention, and management of nutritional diseases.

Introduction

- ❖ **Nutritional diseases** are disorders caused by deficiencies, excesses, or imbalances in the intake, absorption, or utilization of nutrients.
- ❖ These conditions can affect every organ system and may result in significant morbidity and mortality if untreated.
- ❖ **Nutritional diseases are broadly classified into:**
 - Undernutrition
 - Overnutrition (Obesity-related disorders)
 - Specific nutrient deficiencies (Vitamins, minerals, proteins)
 - Metabolic disorders related to nutrition

Classification of Nutritional Diseases

A. Protein-Energy Malnutrition (PEM) : results from inadequate intake of protein and calories, common in children.

1. Marasmus : Caused by calorie deficiency, Body uses fat and muscle proteins for energy and the weight is <60% of expected.

Clinical Features

A. Severe wasting, muscle loss

B. No edema

C. Old-man facies

D. Loss of subcutaneous fat

E. Normal serum albumin

Histopathological Changes

- ❑ **Muscle fiber atrophy**
- ❑ **Reduced size of hepatocytes**
- ❑ **Thymic atrophy with lymphocyte depletion**

2. Kwashiorkor : Caused by protein deficiency with adequate calories and
Hypoalbuminemia leads to edema.

Clinical Features

- A. Edema (puffy appearance).
- B. Enlarged fatty liver.
- C. Hair changes (flag sign).
- D. Skin hyperpigmentation and desquamation

Histopathological Changes

- ❑ **Fatty liver: macro vesicular steatosis**
- ❑ **Mucosal atrophy of small intestine**
- ❑ **Pancreatic atrophy**
- ❑ **Loss of lymphoid tissues**

Kwashiorkor



Marasmus



B. Obesity and Overnutrition : results from excess caloric intake, decreased physical activity, or hormonal imbalance; Associated with increased leptin resistance, chronic inflammation, and insulin resistance.

Complications

Type 2 diabetes

Non-alcoholic fatty liver disease (NAFLD)

Atherosclerosis

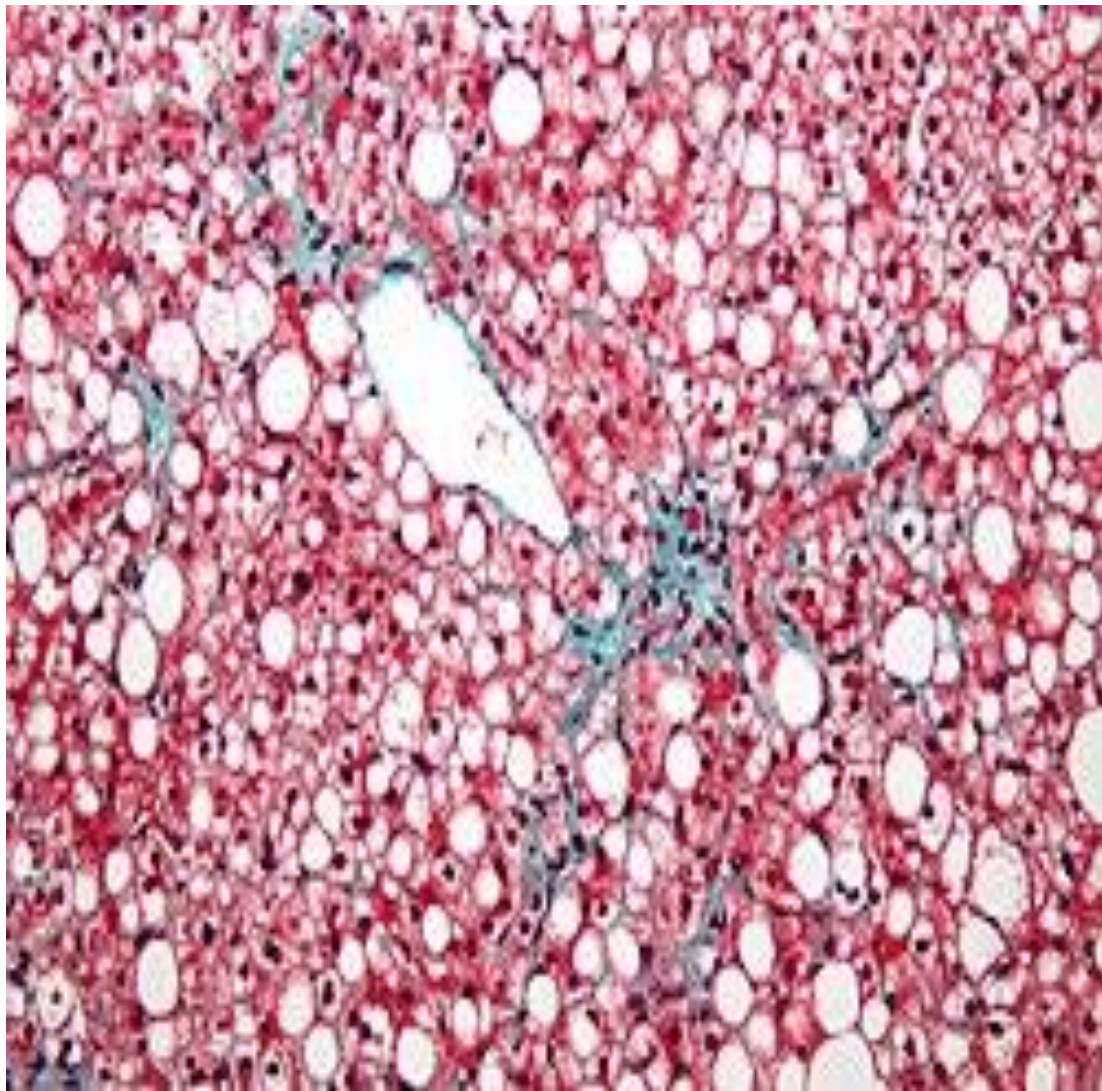
Hypertension

Osteoarthritis

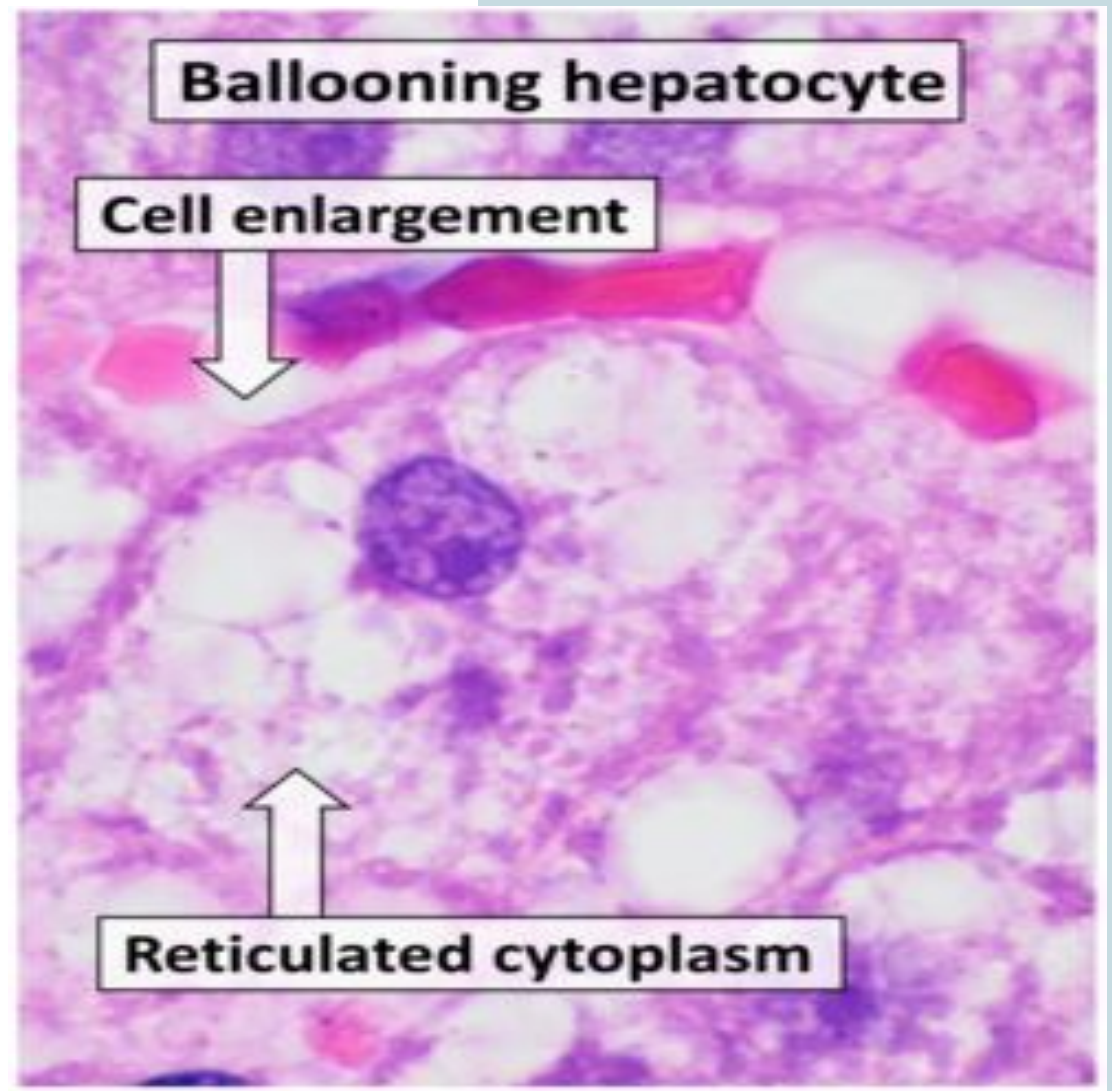
Certain cancers (colon, breast)

Histopathological Changes

- ❑ **Adipocyte hypertrophy**
- ❑ **Fatty infiltration of organs**
- ❑ **Liver: steatosis, ballooning degeneration**
- ❑ **Chronic low-grade inflammation with macrophage infiltration**



Liver steatosis



Ballooning degeneration of Liver

C. Vitamin Deficiencies

1. Vitamin A Deficiency : Functions: vision (rhodopsin), epithelial integrity, immunity.

Clinical

Night blindness

Xerophthalmia

Squamous metaplasia of respiratory and urinary tract

Immune deficiency

Histopathological Changes

- ❑ Keratinization of conjunctiva
- ❑ Squamous metaplasia of columnar epithelium
- ❑ Follicular hyperkeratosis of skin

2. Vitamin D Deficiency : Leads to defective mineralization of bone.

Diseases

- ❑ **Rickets** in children
- ❑ Osteomalacia in adults

Histopathological Changes

- ❑ **Wide osteoid seams**
- ❑ **Delayed mineralization**
- ❑ **Irregular growth plates**

3. Vitamin C Deficiency (Scurvy) : Essential for collagen synthesis.

Clinical

Bleeding gums

Poor wound healing

Petechiae and ecchymosis

Histopathological Changes

- ❑ Weak collagen fibers
- ❑ Hemorrhage in gingiva and bone
- ❑ Subperiosteal bleeding

4. Vitamin K Deficiency : Leads to impaired clotting.

Clinical

Bleeding tendency

Hemorrhages

Prolonged PT

Histopathological Changes

- ❑ Hemorrhage in tissues
- ❑ No specific structural change

D. Mineral Deficiencies

1. Iron Deficiency : Causes microcytic hypochromic anemia.

Histopathological Changes

- ❑ Small, pale RBCs
- ❑ Reduced ferritin stores in bone marrow

2. Iodine Deficiency : Causes goiter and hypothyroidism.

Histopathological Changes

- ❑ Thyroid follicular cell hyperplasia
- ❑ Colloid depletion

3. Zinc Deficiency : Leads to poor wound healing, dermatitis, immune dysfunction.

Metabolic Nutritional Disorders

A. Metabolic Syndrome : A group of risk factors including:

- ☐ Central obesity
- ☐ Insulin resistance
- ☐ Hyperlipidemia
- ☐ Hypertension
- ☐ Leads to increased risk of type 2 diabetes and cardiovascular diseases.

B. Non-Alcoholic Fatty Liver Disease (NAFLD)

- Ranges from simple steatosis → NASH → cirrhosis.

Histopathological Changes

- ❑ **Macrovesicular steatosis**
- ❑ **Inflammation**
- ❑ **Ballooning of hepatocytes**
- ❑ **Fibrosis in advanced cases**

Laboratory Diagnosis

- ❑ Serum proteins (albumin, total protein)
- ❑ CBC for anemia
- ❑ Vitamin levels (A, D, B12, folate)
- ❑ Liver function tests
- ❑ Lipid profile
- ❑ Thyroid function tests
- ❑ BMI and anthropometric measurements

References

1. Kumar, V., Abbas, A. K., & Aster, J. C. (2023). Robbins & Cotran Pathologic Basis of Disease (11th ed.). Elsevier.
2. Mitchell, R. N. (2023). Basic Pathology. Elsevier.

Any questions?

*Thank
You*