# Nutrition

| System | Nutritional Processes & Functions | Nutritional Deficiencies & Disorders |
|---|---|---|
| **General Nutrition** | - Macronutrients (carbohydrates, proteins, fats) - Micronutrients (vitamins, minerals) - Energy metabolism and caloric balance - Dietary guidelines and recommended daily allowances (RDAs) - Gut microbiome and nutrient absorption - Malnutrition assessment and biomarkers | - Protein-energy malnutrition (kwashiorkor, marasmus) - Vitamin deficiencies (A, B-complex, C, D, E, K) - Mineral deficiencies (iron, zinc, calcium, iodine, selenium) - Obesity and metabolic syndrome |
| **Hematopoietic & Lymphoreticular** | - Iron metabolism and erythropoiesis - Folate and vitamin B12 in red blood cell formation - Antioxidants and immune function | - Iron deficiency anemia - Pernicious anemia (B12 deficiency) - Folate deficiency anemia - Scurvy (vitamin C deficiency) |
| **Central & Peripheral Nervous** | - Role of B vitamins in neurotransmitter synthesis - Omega-3 fatty acids and brain health - Ketone metabolism and brain energy supply - Antioxidants and neuroprotection | - Wernicke-Korsakoff syndrome (thiamine deficiency) - Pellagra (niacin deficiency) - Neural tube defects (folate deficiency) - Parkinson's and Alzheimer's disease (oxidative stress) |
| **Skin & Connective Tissue** | - Vitamin C and collagen synthesis - Role of vitamin A in skin integrity - Zinc and wound healing - Essential fatty acids in skin function | - Scurvy (vitamin C deficiency) - Hyperkeratosis (vitamin A deficiency) - Dermatitis (essential fatty acid or zinc deficiency) - Albinism (tyrosine metabolism defect) |
| **Musculoskeletal** | - Calcium, vitamin D, and bone mineralization - Protein intake and muscle maintenance - Role of magnesium in muscle function | - Rickets (vitamin D deficiency) - Osteomalacia/osteoporosis (calcium, vitamin D deficiency) - Muscle wasting (protein-energy malnutrition) |
| **Respiratory** | - Antioxidants and lung health (vitamins C, E) - Omega-3 fatty acids and inflammation - Role of iron in oxygen transport | - Chronic obstructive pulmonary disease (COPD) and malnutrition - Iron-deficiency anemia (impaired oxygen transport) - Vitamin A deficiency (increased risk of lung infections) |
| **Cardiovascular** | - Omega-3 fatty acids and cardiovascular health - Sodium and blood pressure regulation - Role of fiber in cholesterol metabolism - Homocysteine metabolism (B6, B12, folate) | - Hypertension (high sodium intake) - Hypercholesterolemia (low fiber, high saturated fat) - Atherosclerosis (omega-3, antioxidant imbalance) - Beriberi (thiamine deficiency) |
| **Gastrointestinal** | - Digestion and absorption of macronutrients - Gut microbiota and fiber metabolism - Vitamin B12 and intrinsic factor - Role of bile acids in fat digestion | - Celiac disease (gluten intolerance) - Lactose intolerance - Malabsorption syndromes (fat-soluble vitamin deficiencies) - Alcoholic liver disease (thiamine, folate deficiency) |
| **Renal/Urinary** | - Fluid and electrolyte balance (sodium, potassium, chloride) - Acid-base homeostasis (bicarbonate) - Role of protein in kidney function | - Chronic kidney disease and protein metabolism - Electrolyte imbalances (hyper/hyponatremia, hyperkalemia) - Metabolic acidosis (impaired bicarbonate balance) |

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| **Reproductive** | - Folate in fetal development - Role of zinc in spermatogenesis - Iron and pregnancy - Essential fatty acids in hormonal balance | - Neural tube defects (folate deficiency) - Infertility (zinc, vitamin E deficiency) - Gestational anemia (iron deficiency) - Low birth weight and malnutrition |
| **Endocrine** | - Insulin and glucose metabolism - Thyroid function and iodine metabolism - Role of vitamin D in hormone regulation - Calcium and parathyroid hormone | - Diabetes mellitus (obesity, metabolic dysfunction) - Hypothyroidism (iodine deficiency) - Rickets (vitamin D deficiency) - Hyperparathyroidism (calcium imbalance) |