UNIT IV- METABOLISM OF NUCLEIC ACIDS, VITAMINS AND MINERALS

Metabolism of fat soluble and water-soluble vitamins

Vitamin A

Absorption

Vitamin A is absorbed in the small intestine, specifically in the duodenum. The absorption process involves several steps:

1. Deconjugation: Vitamin A is deconjugated from its protein-bound form to its free form.

2. Transport: Vitamin A is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Vitamin A is taken up by the liver and other tissues.

Transport and Storage

Vitamin A is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50-80% of the body's total vitamin A content.

Metabolism

Vitamin A is metabolized in the liver and other tissues to its active form, retinoic acid. Retinoic acid is then converted to various other forms, including:

1. Retinoic acid: Retinoic acid is the active form of vitamin A and is involved in various biochemical reactions.

2. Retinol: Retinol is a derivative of retinoic acid and is involved in various biochemical reactions.

3. Retinyl esters: Retinyl esters are derivatives of retinol and are involved in various biochemical reactions.

Excretion

Vitamin A is excreted in the feces, primarily as retinol and its metabolites.

Regulation

Vitamin A metabolism is regulated by various factors, including:

1. Dietary intake: Vitamin A intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in vitamin A metabolism, such as retinol dehydrogenase, regulate the conversion of vitamin A to its active form.

3. Hormonal regulation: Hormones, such as thyroid hormone and cortisol, regulate vitamin A metabolism.

Functions

Vitamin A plays a crucial role in various biochemical reactions, including:

1. Vision: Vitamin A is essential for the health of the retina and is involved in the regeneration of rhodopsin.

2. Immune function: Vitamin A is involved in the regulation of immune function, including the production of white blood cells.

3. Skin health: Vitamin A is involved in the maintenance of healthy skin, including the regulation of keratinization.

Deficiency

Vitamin A deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of vitamin A can lead to deficiency.

2. Malabsorption: Malabsorption of vitamin A can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for vitamin A during pregnancy, lactation, or rapid growth can lead to deficiency.

Vitamin D

Absorption

Vitamin D is absorbed in the small intestine, specifically in the duodenum. The absorption process involves several steps:

1. Deconjugation: Vitamin D is deconjugated from its protein-bound form to its free form.

2. Transport: Vitamin D is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Vitamin D is taken up by the liver and other tissues.

Transport and Storage

Vitamin D is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50-80% of the body's total vitamin D content.

Metabolism

Vitamin D is metabolized in the liver and other tissues to its active form, calcitriol (1,25-dihydroxyvitamin D). Calcitriol is then converted to various other forms, including:

1. Calcitriol (1,25-dihydroxyvitamin D): Calcitriol is the active form of vitamin D and is involved in various biochemical reactions.

2. 24,25-Dihydroxyvitamin D: This is a metabolite of calcitriol and is involved in various biochemical reactions.

Excretion

Vitamin D is excreted in the feces, primarily as calcitriol and its metabolites.

Regulation

Vitamin D metabolism is regulated by various factors, including:

1. Dietary intake: Vitamin D intake affects the body's stores and metabolism.

2. Sunlight exposure: Sunlight exposure stimulates the production of vitamin D in the skin.

3. Enzyme activity: Enzymes involved in vitamin D metabolism, such as 1-alpha-hydroxylase, regulate the conversion of vitamin D to its active form.

Functions

Vitamin D plays a crucial role in various biochemical reactions, including:

1. Bone health: Vitamin D is essential for the maintenance of healthy bones, including the regulation of calcium and phosphorus metabolism.

2. Immune function: Vitamin D is involved in the regulation of immune function, including the production of white blood cells.

3. Cell growth and differentiation: Vitamin D is involved in the regulation of cell growth and differentiation.

Deficiency

Vitamin D deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of vitamin D can lead to deficiency.

2. Limited sunlight exposure: Limited sunlight exposure can lead to deficiency.

3. Malabsorption: Malabsorption of vitamin D can occur due to various gastrointestinal disorders.

Vitamin E

Absorption

Vitamin E is absorbed in the small intestine, specifically in the jejunum. The absorption process involves several steps:

1. Deconjugation: Vitamin E is deconjugated from its protein-bound form to its free form.

2. Transport: Vitamin E is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Vitamin E is taken up by the liver and other tissues.

Transport and Storage

Vitamin E is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50-80% of the body's total vitamin E content.

Metabolism

Vitamin E is metabolized in the liver and other tissues to its active form, alpha-tocopherol. Alpha-tocopherol is then converted to various other forms, including:

1. Alpha-tocopherol: Alpha-tocopherol is the active form of vitamin E and is involved in various biochemical reactions.

2. Gamma-tocopherol: Gamma-tocopherol is a metabolite of alpha-tocopherol and is involved in various biochemical reactions.

Excretion

Vitamin E is excreted in the feces, primarily as alpha-tocopherol and its metabolites.

Regulation

Vitamin E metabolism is regulated by various factors, including:

1. Dietary intake: Vitamin E intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in vitamin E metabolism, such as alpha-tocopherol transfer protein, regulate the conversion of vitamin E to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate vitamin E metabolism.

Functions

Vitamin E plays a crucial role in various biochemical reactions, including:

1. Antioxidant function: Vitamin E acts as an antioxidant, protecting cells from damage caused by free radicals.

2. Immune function: Vitamin E is involved in the regulation of immune function, including the production of white blood cells.

3. Skin health: Vitamin E is involved in the maintenance of healthy skin, including the regulation of skin cell growth and differentiation.

Deficiency

Vitamin E deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of vitamin E can lead to deficiency.

2. Malabsorption: Malabsorption of vitamin E can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for vitamin E during pregnancy, lactation, or rapid growth can lead to deficiency.

Vitamin K

Absorption

Vitamin K is absorbed in the small intestine, specifically in the jejunum. The absorption process involves several steps:

1. Deconjugation: Vitamin K is deconjugated from its protein-bound form to its free form.

2. Transport: Vitamin K is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Vitamin K is taken up by the liver and other tissues.

Transport and Storage

Vitamin K is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50-80% of the body's total vitamin K content.

Metabolism

Vitamin K is metabolized in the liver and other tissues to its active form, vitamin K hydroquinone. Vitamin K hydroquinone is then converted to various other forms, including:

1. Vitamin K hydroquinone: Vitamin K hydroquinone is the active form of vitamin K and is involved in various biochemical reactions.

2. Vitamin K epoxide: Vitamin K epoxide is a metabolite of vitamin K hydroquinone and is involved in various biochemical reactions.

Excretion

Vitamin K is excreted in the feces, primarily as vitamin K hydroquinone and its metabolites.

Regulation

Vitamin K metabolism is regulated by various factors, including:

1. Dietary intake: Vitamin K intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in vitamin K metabolism, such as vitamin K epoxide reductase, regulate the conversion of vitamin K to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate vitamin K metabolism.

Functions

Vitamin K plays a crucial role in various biochemical reactions, including:

1. Blood clotting: Vitamin K is essential for the production of clotting factors, including prothrombin and factors VII, IX, and X.

2. Bone health: Vitamin K is involved in the regulation of bone mineralization and density.

3. Cardiovascular health: Vitamin K is involved in the regulation of cardiovascular health, including the prevention of arterial calcification.

Deficiency

Vitamin K deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of vitamin K can lead to deficiency.

2. Malabsorption: Malabsorption of vitamin K can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for vitamin K during pregnancy, lactation, or rapid growth can lead to deficiency.

Water-Soluble Vitamins

Vitamin C

Absorption

Vitamin C is absorbed in the small intestine, specifically in the jejunum. The absorption process involves several steps:

1. Deconjugation: Vitamin C is deconjugated from its protein-bound form to its free form.

2. Transport: Vitamin C is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Vitamin C is taken up by the liver and other tissues.

Transport and Storage

Vitamin C is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50% of the body's total vitamin C content.

Metabolism

Vitamin C is metabolized in the liver and other tissues to its active form, ascorbic acid. Ascorbic acid is then converted to various other forms, including:

1. Ascorbic acid: Ascorbic acid is the active form of vitamin C and is involved in various biochemical reactions.

2. Dehydroascorbic acid (DHAA): DHAA is a derivative of ascorbic acid and is involved in various biochemical reactions.

Excretion

Vitamin C is excreted in the urine, primarily as ascorbic acid and its metabolites.

Regulation

Vitamin C metabolism is regulated by various factors, including:

1. Dietary intake: Vitamin C intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in vitamin C metabolism, such as ascorbic acid oxidase, regulate the conversion of vitamin C to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate vitamin C metabolism.

Functions

Vitamin C plays a crucial role in various biochemical reactions, including:

1. Collagen synthesis: Vitamin C is involved in the synthesis of collagen, a protein essential for healthy skin, bones, and connective tissue.

2. Antioxidant function: Vitamin C acts as an antioxidant, protecting cells from damage caused by free radicals.

3. Immune function: Vitamin C is involved in the regulation of immune function, including the production of white blood cells.

Deficiency

Vitamin C deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of vitamin C can lead to deficiency.

2. Malabsorption: Malabsorption of vitamin C can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for vitamin C during pregnancy, lactation, or rapid growth can lead to deficiency.

Thiamin (Vitamin B1)

Absorption

Thiamin is absorbed in the small intestine, specifically in the duodenum. The absorption process involves several steps:

1. Deconjugation: Thiamin is deconjugated from its protein-bound form to its free form.

2. Transport: Thiamin is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Thiamin is taken up by the liver and other tissues.

Transport and Storage

Thiamin is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50% of the body's total thiamin content.

Metabolism

Thiamin is metabolized in the liver and other tissues to its active form, thiamin pyrophosphate (TPP). TPP is then converted to various other forms, including:

1. Thiamin pyrophosphate (TPP): TPP is the active form of thiamin and is involved in various biochemical reactions.

2. Thiamin monophosphate (TMP): TMP is a derivative of TPP and is involved in various biochemical reactions.

Excretion

Thiamin is excreted in the urine, primarily as thiamin and its metabolites.

Regulation

Thiamin metabolism is regulated by various factors, including:

1. Dietary intake: Thiamin intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in thiamin metabolism, such as thiamin pyrophosphokinase, regulate the conversion of thiamin to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate thiamin metabolism.

Functions

Thiamin plays a crucial role in various biochemical reactions, including:

1. Carbohydrate metabolism: Thiamin is involved in the metabolism of carbohydrates, including glycolysis and the pentose phosphate pathway.

2. Energy production: Thiamin is involved in the production of energy from carbohydrates, fats, and proteins.

3. Nervous system function: Thiamin is involved in the synthesis of neurotransmitters and the maintenance of healthy nerve cells.

Deficiency

Thiamin deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of thiamin can lead to deficiency.

2. Malabsorption: Malabsorption of thiamin can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for thiamin during pregnancy, lactation, or rapid growth can lead to deficiency.

Riboflavin (Vitamin B2)

Absorption

Riboflavin is absorbed in the small intestine, specifically in the jejunum. The absorption process involves several steps:

1. Deconjugation: Riboflavin is deconjugated from its protein-bound form to its free form.

2. Transport: Riboflavin is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Riboflavin is taken up by the liver and other tissues.

Transport and Storage

Riboflavin is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50% of the body's total riboflavin content.

Metabolism

Riboflavin is metabolized in the liver and other tissues to its active form, flavin adenine dinucleotide (FAD). FAD is then converted to various other forms, including:

1. Flavin adenine dinucleotide (FAD): FAD is the active form of riboflavin and is involved in various biochemical reactions.

2. Flavin mononucleotide (FMN): FMN is a derivative of FAD and is involved in various biochemical reactions.

Excretion

Riboflavin is excreted in the urine, primarily as riboflavin and its metabolites.

Regulation

Riboflavin metabolism is regulated by various factors, including:

1. Dietary intake: Riboflavin intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in riboflavin metabolism, such as riboflavin kinase, regulate the conversion of riboflavin to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate riboflavin metabolism.

Functions

Riboflavin plays a crucial role in various biochemical reactions, including:

1. Energy production: Riboflavin is involved in the production of energy from carbohydrates, fats, and proteins.

2. Redox reactions: Riboflavin is involved in various redox reactions, including the reduction of oxidized glutathione.

3. Fatty acid synthesis: Riboflavin is involved in the synthesis of fatty acids.

Deficiency

Riboflavin deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of riboflavin can lead to deficiency.

2. Malabsorption: Malabsorption of riboflavin can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for riboflavin during pregnancy, lactation, or rapid growth can lead to deficiency.

Niacin (Vitamin B3)

Absorption

Niacin is absorbed in the small intestine, specifically in the jejunum. The absorption process involves several steps:

1. Deconjugation: Niacin is deconjugated from its protein-bound form to its free form.

2. Transport: Niacin is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Niacin is taken up by the liver and other tissues.

Transport and Storage

Niacin is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50% of the body's total niacin content.

Metabolism

Niacin is metabolized in the liver and other tissues to its active form, nicotinamide adenine dinucleotide (NAD+). NAD+ is then converted to various other forms, including:

1. Nicotinamide adenine dinucleotide (NAD+): NAD+ is the active form of niacin and is involved in various biochemical reactions.

2. Nicotinamide adenine dinucleotide phosphate (NADP+): NADP+ is a derivative of NAD+ and is involved in various biochemical reactions.

Excretion

Niacin is excreted in the urine, primarily as niacin and its metabolites.

Regulation

Niacin metabolism is regulated by various factors, including:

1. Dietary intake: Niacin intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in niacin metabolism, such as nicotinamide adenine dinucleotide synthetase, regulate the conversion of niacin to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate niacin metabolism.

Functions

Niacin plays a crucial role in various biochemical reactions, including:

1. Energy production: Niacin is involved in the production of energy from carbohydrates, fats, and proteins.

2. Redox reactions: Niacin is involved in various redox reactions, including the reduction of oxidized glutathione.

3. Cholesterol synthesis: Niacin is involved in the synthesis of cholesterol.

Deficiency

Niacin deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of niacin can lead to deficiency.

2. Malabsorption: Malabsorption of niacin can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for niacin during pregnancy, lactation, or rapid growth can lead to deficiency.

Pantothenic acid (Vitamin B5)

Absorption

Pantothenic acid is absorbed in the small intestine, specifically in the jejunum. The absorption process involves several steps:

1. Deconjugation: Pantothenic acid is deconjugated from its protein-bound form to its free form.

2. Transport: Pantothenic acid is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Pantothenic acid is taken up by the liver and other tissues.

Transport and Storage

Pantothenic acid is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50% of the body's total pantothenic acid content.

Metabolism

Pantothenic acid is metabolized in the liver and other tissues to its active form, coenzyme A (CoA). CoA is then converted to various other forms, including:

1. Coenzyme A (CoA): CoA is the active form of pantothenic acid and is involved in various biochemical reactions.

2. Acetyl-CoA: Acetyl-CoA is a derivative of CoA and is involved in the synthesis of fatty acids and cholesterol.

3. Succinyl-CoA: Succinyl-CoA is a derivative of CoA and is involved in the citric acid cycle.

Excretion

Pantothenic acid is excreted in the urine, primarily as pantothenic acid and its metabolites.

Regulation

Pantothenic acid metabolism is regulated by various factors, including:

1. Dietary intake: Pantothenic acid intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in pantothenic acid metabolism, such as pantothenate kinase, regulate the conversion of pantothenic acid to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate pantothenic acid metabolism.

Functions

Pantothenic acid plays a crucial role in various biochemical reactions, including:

1. Fatty acid synthesis: Pantothenic acid is involved in the synthesis of fatty acids and cholesterol.

2. Energy production: Pantothenic acid is involved in the production of energy from carbohydrates, fats, and proteins.

3. Neurotransmitter synthesis: Pantothenic acid is involved in the synthesis of neurotransmitters, such as acetylcholine.

Deficiency

Pantothenic acid deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of pantothenic acid can lead to deficiency.

2. Malabsorption: Malabsorption of pantothenic acid can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for pantothenic acid during pregnancy, lactation, or rapid growth can lead to deficiency.

Vitamin B6

Absorption

Vitamin B6 is absorbed in the small intestine, specifically in the jejunum. The absorption process involves several steps:

1. Deconjugation: Vitamin B6 is deconjugated from its protein-bound form to its free form.

2. Transport: Vitamin B6 is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Vitamin B6 is taken up by the liver and other tissues.

Transport and Storage

Vitamin B6 is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50% of the body's total vitamin B6 content.

Metabolism

Vitamin B6 is metabolized in the liver and other tissues to its active form, pyridoxal phosphate (PLP). PLP is then converted to various other forms, including:

1. Pyridoxal phosphate (PLP): PLP is the active form of vitamin B6 and is involved in various biochemical reactions.

2. Pyridoxal (PL): PL is a derivative of PLP and is excreted in the urine.

3. 4-Pyridoxic acid (4-PA): 4-PA is a metabolite of PLP and is excreted in the urine.

Excretion

Vitamin B6 is excreted in the urine, primarily as 4-PA.

Regulation

Vitamin B6 metabolism is regulated by various factors, including:

1. Dietary intake: Vitamin B6 intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in vitamin B6 metabolism, such as pyridoxal kinase, regulate the conversion of vitamin B6 to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate vitamin B6 metabolism.

Functions

Vitamin B6 plays a crucial role in various biochemical reactions, including:

1. Amino acid metabolism: Vitamin B6 is involved in the metabolism of amino acids, including transamination and decarboxylation reactions.

2. Neurotransmitter synthesis: Vitamin B6 is involved in the synthesis of neurotransmitters, such as serotonin and dopamine.

3. Immune function: Vitamin B6 is involved in the regulation of immune function.

Deficiency

Vitamin B6 deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of vitamin B6 can lead to deficiency.

2. Malabsorption: Malabsorption of vitamin B6 can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for vitamin B6 during pregnancy, lactation, or rapid growth can lead to deficiency.

Biotin

Absorption

Biotin is absorbed in the small intestine, specifically in the jejunum. The absorption process involves several steps:

1. Deconjugation: Biotin is deconjugated from its protein-bound form to its free form.

2. Transport: Biotin is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Uptake: Biotin is taken up by the liver and other tissues.

Transport and Storage

Biotin is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50% of the body's total biotin content.

Metabolism

Biotin is metabolized in the liver and other tissues to its active form, biotinyl-CoA. Biotinyl-CoA is then converted to various other forms, including:

1. Biotinyl-CoA: Biotinyl-CoA is the active form of biotin and is involved in various biochemical reactions.

2. Biotin sulfone: Biotin sulfone is a derivative of biotin and is excreted in the urine.

Excretion

Biotin is excreted in the urine, primarily as biotin sulfone.

Regulation

Biotin metabolism is regulated by various factors, including:

1. Dietary intake: Biotin intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in biotin metabolism, such as biotinidase, regulate the conversion of biotin to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate biotin metabolism.

Functions

Biotin plays a crucial role in various biochemical reactions, including:

1. Carbohydrate metabolism: Biotin is involved in the metabolism of carbohydrates, including gluconeogenesis and glycogen synthesis.

2. Fatty acid synthesis: Biotin is involved in the synthesis of fatty acids.

3. Amino acid metabolism: Biotin is involved in the metabolism of certain amino acids, including leucine and isoleucine.

Deficiency

Biotin deficiency can occur due to various factors, including:

1. Dietary deficiency: Inadequate dietary intake of biotin can lead to deficiency.

2. Malabsorption: Malabsorption of biotin can occur due to various gastrointestinal disorders.

3. Increased requirement: Increased requirement for biotin during pregnancy, lactation, or rapid growth can lead to deficiency.

Folic acid (Vitamin B9)

Absorption

Folic acid is absorbed in the small intestine, specifically in the jejunum. The absorption process involves several steps:

1. Deconjugation: Folic acid is deconjugated to its active form, tetrahydrofolate (THF).

2. Transport: THF is transported across the intestinal epithelial cells via a carrier-mediated process.

3. Reduction: THF is reduced to its active form, dihydrofolate (DHF).

Transport and Storage

Folic acid is transported to the liver via the bloodstream, where it is stored. The liver stores approximately 50% of the body's total folate content.

Metabolism

Folic acid is metabolized in the liver and other tissues to its active form, THF. THF is then converted to various other forms, including:

1. Dihydrofolate (DHF): DHF is converted to THF via the enzyme dihydrofolate reductase.

2. Tetrahydrofolate (THF): THF is the active form of folic acid and is involved in various biochemical reactions.

3. Methylenetetrahydrofolate (MTHF): MTHF is a derivative of THF and is involved in the conversion of homocysteine to methionine.

Excretion

Folic acid is excreted in the urine, primarily as the inactive form, pteroylglutamic acid.

Regulation

Folic acid metabolism is regulated by various factors, including:

1. Dietary intake: Folic acid intake affects the body's stores and metabolism.

2. Enzyme activity: Enzymes involved in folic acid metabolism, such as dihydrofolate reductase, regulate the conversion of folic acid to its active form.

3. Hormonal regulation: Hormones, such as insulin and glucagon, regulate folic acid metabolism.