Biotin (Vitamin B7)

Biotin deficiency typically presents with alopecia, dermatitis and non-specific enteritis. Biotin is an essential cofactor in carboxylation reactions which are synthetic reactions used in fatty acid and amino acid synthesis. Classic causes of biotin deficiency are long-term antibiotic use as well as ingestion of raw eggs. Raw eggs contain a compound called avidin which binds the biotin and inactivates it.



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Mechanism

Carboxylation Reaction
Cardboard-box-lace
A carboxylation reaction is a chemical reaction in which a carboxylic acid group is added to a substrate. This type of reaction is seen in the synthesis of amino acids and fatty acids.

Pyruvate Carboxylation to Oxaloacetate
Pie-root to Ox-aloe
Biotin is essential for a key reaction in gluconeogenesis when pyruvate undergoes carboxylation to be converted to oxaloacetate.

Propionyl-CoA Carboxylation to Methylmalonyl-CoA
Propane Coin-A through Cardboard-box-lace to become Methyl Melon Coin-A
Biotin is an essential coenzyme for the carboxylation of propionyl-CoA to methylmalonyl-CoA, which allows carbons to enter the Kreb cycle downstream.

Acetyl-CoA Carboxylation to Malonyl CoA
A-seagull Coin-A becoming Melon Coin-A
Biotin is an essential coenzyme for a key reaction in the synthesis of fatty acids when acetyl CoA undergoes carboxylation to be converted to malonyl CoA.

Deficiency Causes

Antibiotic Use
ABX-guy
Chronic antibiotic use can cause biotin deficiency by depleting the body of the necessary bacteria that convert biotin to its active form.

Ingestion of Raw Eggs
Raw Eggs
Raw eggs contain a compound, avidin, which actively binds to biotin and disables activity. Ingestion of an excessive amount of raw eggs can cause a biotin deficiency.

Signs & Symptoms

Alopecia
Aloe-plant on Bald-head
Hair growth also requires this diverse vitamin, and a Biotin deficiency can present as hair loss.

Dermatitis
Dermatologist Examining Rash
Biotin deficiency can present as a nonspecific skin rash characterized by erythema and irritation.

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Enteritis

Enter-small-intestine

Biotin deficiency can cause nonspecific enteritis.

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