

## 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 Krebs 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.

### **Enteritis**

[Enter-small-intestine](#)

Biotin deficiency can cause nonspecific enteritis.