

# Folic Acid: Function, Sources, Requirements, Deficiency, and Excess

NOTES BY  
SUNAINA GUPTA

## **Folic Acid: Function, Sources, Requirements, Deficiency, and Excess**

**Introduction:** Folic acid, also known as vitamin B9, is a vital water-soluble vitamin essential for various physiological functions. It is particularly important during periods of rapid cell division and growth.

---

### **1. Function**

#### **Cell Division and DNA Synthesis:**

- **DNA Synthesis:** Folic acid is crucial for the synthesis and repair of DNA, which is necessary for cell division and growth.
- **Red Blood Cell Formation:** It plays a significant role in the formation of red blood cells, helping prevent anemia by ensuring the production of healthy red blood cells.

#### **Neural Tube Development:**

- **Fetal Development:** During pregnancy, folic acid is vital for the proper development of the neural tube, which forms the baby's brain and spinal cord. Adequate levels help prevent neural tube defects such as spina bifida and anencephaly.

#### **Homocysteine Metabolism:**

- **Heart Health:** Folic acid helps in the metabolism of homocysteine, an amino acid that, at high levels, is associated with an increased risk of cardiovascular disease.

**Example:** Adequate folic acid intake is essential for women of childbearing age to reduce the risk of birth defects and support overall health.

---

### **2. Sources**

#### **Natural Sources:**

1. **Leafy Greens:** Spinach, kale, and romaine lettuce are rich in folate (the natural form of folic acid).
2. **Legumes:** Beans, lentils, and chickpeas are excellent sources.
3. **Fruits:** Citrus fruits, bananas, and avocados contain folate.
4. **Nuts and Seeds:** Almonds and sunflower seeds provide folate.

#### **Fortified Sources:**

1. **Fortified Foods:** Many grain products, such as cereals, bread, and pasta, are fortified with folic acid.
2. **Supplements:** Folic acid supplements are commonly used to ensure adequate intake, especially during pregnancy or in individuals with specific health conditions.

**Example:** Breakfast cereals fortified with folic acid can help meet daily folate requirements.

---

### 3. Requirements

#### Daily Recommended Intake:

- **Adults:** 400 µg (micrograms) of dietary folate equivalents (DFE) per day.
- **Pregnant Women:** 600 µg DFE per day to support fetal development and reduce the risk of neural tube defects.
- **Lactating Women:** 500 µg DFE per day.
- **Children:** Varies by age, generally 150-300 µg DFE per day.

**Example:** A pregnant woman should aim to consume 600 µg of folate daily through a combination of diet and supplements to support healthy fetal development.

---

### 4. Deficiency

#### Symptoms:

- **Anemia:** Folic acid deficiency can lead to megaloblastic anemia, characterized by the production of abnormally large red blood cells and a reduced number of red blood cells.
- **Fatigue and Weakness:** Deficiency can cause general fatigue, weakness, and pallor.
- **Neural Tube Defects:** In pregnant women, a lack of folic acid can result in serious birth defects, such as spina bifida and anencephaly.
- **Glossitis and Mouth Sores:** Inflammation of the tongue and mouth sores can occur.

#### Causes:

- **Inadequate Dietary Intake:** Poor dietary intake or absorption issues can lead to deficiency.
- **Increased Requirements:** Pregnancy, certain medical conditions, and medications can increase the need for folic acid.

**Example:** Women who are planning to become pregnant should start taking folic acid supplements before conception to ensure adequate levels and reduce the risk of neural tube defects.

---

### 5. Excess

#### Symptoms:

- **Masking of Vitamin B12 Deficiency:** Excessive folic acid can mask symptoms of vitamin B12 deficiency, potentially delaying diagnosis and treatment.
- **Potential Side Effects:** High doses of folic acid supplements can lead to gastrointestinal issues such as nausea and bloating.

#### Upper Limit:

- **Supplemental Intake:** The tolerable upper intake level (UL) for folic acid from supplements is set at 1,000 µg per day for adults. This limit helps avoid potential adverse effects and interactions with other nutrients.

**Example:** While folic acid is beneficial, consuming it in excessively high amounts through supplements can interfere with the absorption of other B vitamins, particularly vitamin B12.

---

**Conclusion:**

Folic acid is a crucial vitamin with essential roles in cell division, red blood cell formation, and neural tube development. Adequate intake from dietary sources and supplements is vital for overall health, especially during pregnancy. While deficiency can lead to significant health issues, excessive intake should be managed carefully to avoid adverse effects and ensure a balanced intake of other nutrients.