



## Antioxidants Intake can Improve Diabetes Mellitus and its Complications

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### Description

Diabetes, a chronic metabolic disorder characterized by elevated blood glucose levels, presents a multifaceted challenge to health due to its association with oxidative stress. Oxidative stress arises from an imbalance between the production of Reactive Oxygen Species (ROS) and the body's ability to neutralize them with antioxidants. In diabetes, this balance is disrupted, leading to increased oxidative damage to cells and tissues. Antioxidants play a crucial role in mitigating this damage and offering therapeutic potential in the management of diabetes.

### Mechanisms of action

At the core of their functionality, antioxidants neutralize harmful free radicals, which are by products of normal metabolic processes but can become overly abundant in conditions like diabetes. Excessive free radicals lead to oxidative stress, causing cellular damage and inflammation, thereby exacerbating insulin resistance and impairing pancreatic beta-cell function. Antioxidants intercept these free radicals, preventing them from wreaking havoc on cells and tissues, thereby alleviating oxidative stress and its detrimental effects. Antioxidants help preserve mitochondrial function by scavenging ROS, maintaining membrane integrity, and preventing mitochondrial DNA damage. By safeguarding mitochondrial health, antioxidants ensure efficient energy production and reduce the risk of mitochondrial dysfunction-associated complications in diabetes.

### Types of antioxidants

Antioxidants are diverse in nature, ranging from vitamins and minerals to phytochemicals found in plant-based foods. Some common types include:

**Vitamin C:** Abundant in fruits like oranges, strawber-

ries, and kiwi, vitamin C scavenges free radicals and regenerates other antioxidants like vitamin E, bolstering the body's defense against oxidative stress.

**Vitamin E:** Found in nuts, seeds, and vegetable oils, vitamin E protects cell membranes from oxidative damage and has been linked to improved insulin sensitivity.

**Selenium:** This mineral, present in Brazil nuts, fish, and whole grains, is a crucial component of antioxidant enzymes, helping to neutralize free radicals and reduce inflammation.

**Flavonoids:** These plant-based compounds, abundant in colorful fruits, vegetables, and teas, exhibit potent antioxidant and anti-inflammatory properties, contributing to better glycemic control and vascular health in diabetes.

**Alpha-Lipoic Acid (ALA):** ALA found in spinach, broccoli, and organ meats, functions as a powerful antioxidant and regenerates other antioxidants like vitamins C and E, making it particularly beneficial in diabetes-related nerve damage.

### Benefits for diabetes management

The incorporation of antioxidants into the diet or as supplements offers a multitude of benefits for individuals with diabetes:

**Improved glycemic control:** Antioxidants help mitigate insulin resistance and enhance pancreatic beta-cell function, leading to better blood glucose regulation and reduced risk of hyperglycemia.

**Protection against complications:** By combating oxidative stress and inflammation, antioxidants mitigate the risk of diabetic complications such as neuropathy, nephropathy, and cardiovascular disease, thereby improving overall health outcomes.

**Enhanced antioxidant defense:** Antioxidants reinforce the body's antioxidant defense system, bolstering its ability to neutralize free radicals and counteract oxidative damage.

**Anti-inflammatory effects:** Many antioxidants exhibit potent anti-inflammatory properties, reducing systemic inflammation associated with diabetes and its complications.

**Cardiovascular health:** Antioxidants support vascular health by reducing oxidative stress and inflammation, thereby lowering the risk of cardiovascular events—a prevalent concern in individuals with diabetes.

In the complex landscape of diabetes management, an-

tioxidants emerge as valuable allies in the fight against oxidative stress and its deleterious effects. By understanding their mechanisms of action, diverse types, and myriad benefits, healthcare professionals can optimize therapeutic strategies to better support individuals with diabetes. Incorporating antioxidant-rich foods and supplements into dietary and lifestyle interventions holds immense promise for improving glycemic control, mitigating complications, and enhancing overall well-being in diabetes management. By targeting the root cause of diabetic complications oxidative stress antioxidants offer a therapeutic avenue to ameliorate symptoms, prevent disease progression, and enhance quality of life for individuals living with diabetes.