



# Vitamin C supplementation reconstitutes polyfunctional T cells in streptozotocin-induced diabetic rats

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## Abstract:

**BACKGROUND:** Studies have demonstrated that vitamin C supplementation enhances the immune system, prevents DNA damage, and decreases the risk of a wide range of diseases. Other study reported that leukocyte vitamin C level was low in diabetic individuals compared with nondiabetic controls. **AIM OF THE WORK:** To study the effect of vitamin C on oxidative stress, blood lipid profile, and T-cell responsiveness during streptozotocin (STZ)-induced type I diabetes mellitus. **METHODS:** Thirty male Sprague-Dawley rats were randomly split into three groups. The first served as a control group (n = 10) in which rats were injected with the vehicle alone. The second (n = 10) and the third groups (n = 10) were rendered diabetic by intraperitoneal (i.p.) injection of single doses of STZ (60 mg/kg body weight). The third group was supplemented with vitamin C (100 mg/kg body weight) for 2 months. **RESULTS:** T lymphocytes from the diabetic rats were found to be in a stunned state, with a decreased surface expression of the CD28 costimulatory molecule, low levels of phosphorylated AKT, altered actin polymerization, diminished proliferation and cytokine production, and, eventually, a marked decrease in abundance in the periphery. Vitamin C was found to significantly decrease the elevated levels of blood hydroperoxide, glucose, cholesterol, triglycerides and low-density lipoprotein (LDL) in diabetic rats. Furthermore, it was found to restore CD28 expression, AKT phosphorylation, actin polymerization, and polyfunctional T cells (IFN- $\gamma$ - and IL-2-producing cells that exhibit a high proliferation capacity). **CONCLUSION:** Vitamin C treatment restores and reconstitutes polyfunctional, long-lived T cells in diabetic rats.

## Published In:

Eur J Nutr. , ,