DIABETES

**Chromium**
Helps insulin attach to cell’s receptors increasing glucose uptake into cell; Deficiency can cause insulin resistance; Supplementation trials show dose-dependent benefits for type II diabetics.\(^{36,37,38}\)

**Biotin**
Stimulates glucose-induced insulin secretion in pancreatic B-cells; High dose biotin can improve glycemic control in diabetics.\(^{33,34,35}\)

**Magnesium**
Deficiency reduces insulin sensitivity; Low magnesium exacerbates foot ulcers in diabetics.\(^{31,32}\)

**Zinc**
Needed in the synthesis, storage and secretion of insulin; Protects pancreatic B-cells from damage; Affects the expression of genes linked to diabetes.\(^{29,30}\)

**Vitamin B12**
Deficiency common in diabetics because metformin depletes B12.\(^{1,2}\)

**Vitamin B3**
Preserves B-cell function in type I diabetics; Part of GTF (glucose tolerance factor) which facilitates insulin binding.\(^{3,4,5}\)

**Vitamin B5**
Lowers risk of type I and 2 diabetes; Supresses inflammation of pancreatic B-cells; Vitamin D receptor gene linked to diabetes.\(^{6,7,8}\)

**Vitamin D**
Confers protection against diabetes by protecting pancreatic B-cells from oxidative stress induced damage; May prevent progression of type I diabetes.\(^{6,9}\)

**Vitamin C**
Lowers glycolysated hemoglobin (HbA1c) and fasting and post-meal glucose levels and in type 2 diabetics.\(^{10,11,12}\)

**Vitamin E**
Confers protection against diabetes by protecting pancreatic B-cells from oxidative stress induced damage; May prevent progression of type I diabetes.\(^{6,9}\)

**Inositol**
Evidence suggests that inositol may be effective in treating diabetic neuropathy.\(^{13,14}\)

**Carnitine**
Reduces and even prevents pain from diabetic neuropathy; Improves insulin sensitivity by increasing glucose uptake and storage.\(^{15,16,17,18}\)

**Glutamine**
Stimulates a hormone called GLP-1 (glucagon-like peptide 1) that regulates insulin secretion after meals; Improves insulin signaling and sensitivity.\(^{19,20}\)

**Glutathione & Cysteine**
Glutathione-containing enzymes protect B-cells which are particularly sensitive to oxidative stress; Type 2 diabetics have abnormal antioxidant status; Supplementation with the glutathione precursor cysteine restores antioxidant status.\(^{23,24,25}\)

**Coenzyme Q10**
Protects kidney from diabetes related damage; Improves glycemic control in type 2 diabetics.\(^{21,22}\)
REFERENCES


Additional references at http://www.spectracell.com/online-library-mnt-diabetes-abstract/