

# DIABETES

## Vitamin B12

Deficiency common in diabetics because metformin depletes B12.<sup>1,2</sup>

## Vitamin B3

Preserves B-cell function in type 1 diabetics; Part of GTF (glucose tolerance factor) which facilitates insulin binding.<sup>3,4,5</sup>

## Vitamin D

Lowers risk of type 1 and 2 diabetes; Suppresses inflammation of pancreatic B-cells; Vitamin D receptor gene linked to diabetes.<sup>6,7,8</sup>

## Vitamin E

Confers protection against diabetes by protecting pancreatic B-cells from oxidative stress induced damage; May prevent progression of type 1 diabetes.<sup>6,9</sup>

## 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 2 diabetics.<sup>36,37,38</sup>

## Vitamin C

Lowers glycosylated hemoglobin (HbA1c) and fasting and post-meal glucose levels and in type 2 diabetics.<sup>10,11,12</sup>

## Biotin

Stimulates glucose-induced insulin secretion in pancreatic B-cells; High dose biotin can improve glycemic control in diabetics.<sup>33,34,35</sup>

## Inositol

Evidence suggests that inositol may be effective in treating diabetic neuropathy.<sup>13,14</sup>

## Magnesium

Deficiency reduces insulin sensitivity; Low magnesium exacerbates foot ulcers in diabetics.<sup>31,32</sup>

## Carnitine

Reduces and even prevents pain from diabetic neuropathy; Improves insulin sensitivity by increasing glucose uptake and storage.<sup>15,16,17,18</sup>

## Zinc

Needed in the synthesis, storage and secretion of insulin; Protects pancreatic B-cells from damage; Affects the expression of genes linked to diabetes.<sup>29,30</sup>

## Lipoic Acid

Enhances glucose uptake in skeletal muscle tissue; Improves glucose tolerance in type 2 diabetics; Very effective treatment for diabetic neuropathy.<sup>26,27,28</sup>

## 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.<sup>23,24,25</sup>

## Glutamine

Stimulates a hormone called GLP-1 (glucagon-like peptide 1) that regulates insulin secretion after meals; Improves insulin signaling and sensitivity.<sup>19,20</sup>

## Coenzyme Q10

Protects kidney from diabetes related damage; Improves glycemic control in type 2 diabetics.<sup>21,22</sup>