

## Magnesium's Role in Fighting Type II Diabetes

Clinical studies show that magnesium can improve glycemic control and insulin sensitivity in those at risk for or with type II diabetes.

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Roughly **half** of all adults in the U.S. do not get enough **magnesium**.<sup>1,2</sup>

And **25%** of Americans are thought to be magnesium-deficient.<sup>3</sup>

That's a major problem.

Magnesium deficiency is a contributor to metabolic disease, including **type II diabetes**.<sup>4,6</sup>

Systematic review of clinical studies suggest that oral **magnesium** supplementation could have favorable effects on **glycemic control** in type II diabetics.<sup>7</sup>

In people with **type II diabetes** or in those at **high risk** of developing it, several clinical trials have demonstrated that supplemental magnesium can:

- Improve glucose/A1C control,<sup>9-11</sup>
- Enhance **insulin sensitivity**,<sup>9,12</sup>
- Correct metabolic imbalances.<sup>8</sup>

These actions may reduce damage inflicted by type II diabetes *and* help delay its development.

### A Vital Mineral

**Magnesium** is one of the most abundant minerals in the body. It is a required **cofactor** ("helper molecule") for hundreds of essential enzymatic processes within cells.<sup>4,5</sup>

These enzymes include many that are involved in cell **metabolism** and **energy** production. Deficiency of magnesium negatively impacts these functions.

Magnesium also interacts in a critical way with other nutrients. For example, magnesium is *required* for the activation of **vitamin D** in the body.<sup>13</sup> If you are taking vitamin D but your magnesium levels are low, the vitamin D can't deliver all its benefits.

### The Type II Diabetes Link

Many of the enzymes and proteins that rely on magnesium play a vital role in **insulin** function and the metabolism of **blood glucose**.<sup>4,5,8</sup>

As a result, the impact that magnesium deficiency has on metabolic health is profound. It directly contributes to diseases such as **type II diabetes**, metabolic syndrome, and osteoporosis.<sup>1,4</sup> Magnesium deficiency also increases risk for other chronic diseases, especially **cardiovascular disease**.<sup>14,15</sup>

Observational studies show that the *lower* the dietary magnesium intake, the *higher* the prevalence of diabetes.<sup>4,5</sup>

Additionally, individuals who *already* have a diagnosis of **type II diabetes** often have *lower* magnesium levels than healthy individuals.<sup>5,16</sup>

The connection between magnesium and diabetes is so strong because magnesium affects *multiple* aspects of metabolism.



Magnesium is crucial at practically every step of insulin function and sugar metabolism, including:<sup>4,5</sup>

- **Insulin secretion.** After a meal, the hormone **insulin** is secreted by the pancreas to help tissues take up and process blood sugar. With magnesium *deficiency*, the mechanism that leads to insulin secretion is impaired, leaving blood **glucose** levels elevated.<sup>17</sup>
- **Glucose metabolism.** Many of the enzymes involved in the metabolism of glucose and other nutrients rely on magnesium to function. Low magnesium impairs cells' ability to process nutrients and extract energy from them.
- **Insulin sensitivity.** Magnesium deficiency contributes to **insulin resistance**. This drop in insulin sensitivity is central to type II diabetes and metabolic syndrome.<sup>9,18</sup> Studies have found that *higher* magnesium levels correlate with *higher* insulin sensitivity. <sup>18,19</sup>

Defects in insulin function and glucose metabolism lead to **insulin resistance** and **high blood sugar**. High blood sugar eventually results in complications of diabetes, including **kidney** disease, eye disease, **cognitive decline**, and nerve damage.

By preventing or countering these defects, magnesium has shown potential to help prevent or control type II diabetes.<sup>20</sup>

## WHAT YOU NEED TO KNOW

### How Magnesium May Counter Type II Diabetes

- The mineral **magnesium** is required for the function of hundreds of essential enzymatic processes within cells.
- Over **25%** of Americans are believed to be magnesium-deficient, while it is estimated that roughly **50%** consume inadequate levels of this essential mineral. Low magnesium levels are tied to risk for several chronic diseases, especially **type II diabetes**.
- Human studies show that oral supplementation with magnesium can improve **insulin sensitivity** and **blood glucose control** in those with type II diabetes, which may help control the disease and prevent complications.
- Magnesium can also improve insulin sensitivity and blood glucose control in **non-diabetic** adults who are **overweight** or have insulin resistance, which may prevent diabetes from developing.

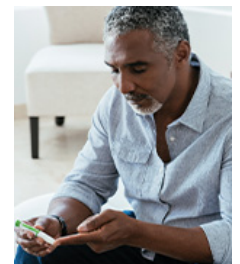


## What Human Trials Reveal

Several clinical trials have shown that oral **magnesium** supplementation improves control of blood glucose and insulin sensitivity in people with **type II diabetes**.<sup>9,11,20</sup>

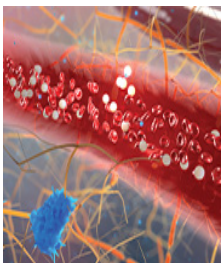
Other studies have shown that magnesium can be beneficial in those **at risk** for type II diabetes who do not yet have a diagnosis.

For example, in **non-diabetic** adults who have insulin resistance or are overweight, supplemental magnesium has been shown to improve metabolism, insulin sensitivity, and blood glucose control.<sup>8,12,21,22</sup>



This indicates that increased magnesium intake, specifically with oral supplements, may not only be useful for those already suffering from diabetes, but may also help in preventing progression to type II diabetes in high-risk people.

## Summary



Roughly **half** of all adults in the U.S. do not get enough **magnesium**. .

Lower magnesium intake increases the risk for metabolic disease, including **type II diabetes**. Higher magnesium levels correlate with better insulin sensitivity.

Human trials have found that supplementation with oral magnesium can improve metabolism, increase **insulin sensitivity** and improve **blood sugar control** in type II diabetics *and* those at

risk for it.

If you have any questions on the scientific content of this article, please call a **Life Extension** Wellness Specialist at 1-866-864-3027.

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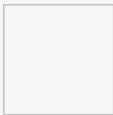
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