



# GLUCOSE METABOLISM CAN BENEFIT FROM MICRONUTRIENT SYNERGY

Diabetes, which is characterized by elevated blood glucose levels, is the fastest growing non-communicable disease in the world today. In the last two decades, the number of people suffering from diabetes has skyrocketed and it is projected to increase from 171 million in 2000 to 438 million in 2030. Approximately 6000 Americans are diagnosed with diabetes. Type II diabetes has been considered by many as a disease affecting older and overweight people; however, it is now more frequently diagnosed in children and young adults under 25 years of age, as well as in individuals that are not necessarily overweight. Sustained high blood sugar levels can lead to serious diabetic complications including atherosclerosis, stroke, kidney failure, neuropathy, impaired wound healing, and cataracts, and it can lead to long-term disability.

Although diabetes is a disease of impaired glucose metabolism, glucose itself is a crucial source of energy for every cell in our body. Appropriate absorption, transport and utilization of dietary glucose by the cells is dependent on the hormone insulin which is secreted by the pancreas, and proper function of specific insulin receptors present on the cells. Various micronutrients are involved in glucose metabolism. For example, The **B group of vitamins** are critical for conversion of sugar molecules to bio-energy to be used by each cell. They work in synergy with other micronutrients to improve the efficiency of the liver and pancreas, the important organs in sugar metabolism. Vitamin C plays a crucial role in diabetes due to its structural similarity to sugar molecules. Increased blood glucose levels promote **vitamin C** deficiency inside the cells by competing with vitamin C for its intracellular entry. **Vitamin D** not only helps in calcium absorption, it also helps to improve immunity and to prevent infection and inflammation in diabetes patients thereby reducing sugar-related complications in other organs. Moreover, **minerals** like calcium and



magnesium are important for optimum function of the muscles and nerves, blood glucose, blood pressure control, and bioenergy production in the heart. Chromium and other minerals help to maintain the glucose levels within normal limits. Chromium helps facilitate the cell response to insulin and appropriate utilization of glucose in the blood eventually lowering insulin requirements.

In a recent study conducted at the Dr. Rath Research Institute, we investigated different nutritional supplements and their effect on glucose uptake and regulation by skeletal muscle cells.\* Three different types of nutritional supplements were used: formula A contained a comprehensive combination of essential micronutrients including vitamins and minerals and amino acids, formula B contained only selected micronutrients important for glucose metabolism and formula C contained only the B group of vitamins. We did a comparative and a combination study using these formulas. The results showed that the combination of formulas A, B and C had the maximum effect resulting in an increased glucose uptake by the cells up to 370% over the control. A specific enzyme, protein kinase (Akt), is important for glucose transportation within the cells. Our study showed that while formulas A and B had stimulatory effect on a process called Akt phosphorylation, the highest effect (240% increase) was observed when all three formulas were combined. This combination was much higher than any of the formulas given individually.

This study shows that various micronutrient combinations affect glucose metabolism in muscle cells and their maximum benefits rely on synergistic cooperation of micronutrients. Our study also sends a message to the consumers of nutritional supplements to base their purchasing decision on the scientifically proven efficacy of the product, not on attractive but often misleading advertising slogans. Trust the companies that invest in natural health research not in marketing only!

\* M. Chatterjee et al., *J Cell Med Nat Hlth*, May 2019

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The ground-breaking nature of this research poses a threat to the multi-billion dollar pharmaceutical "business with disease". It is no surprise that over the years the drug lobby has attacked Dr. Rath and his research team in an attempt to silence this message. To no avail. During this battle, Dr. Rath has become an internationally renowned advocate for natural health. Says he: "Never in the history of medicine have researchers been so ferociously attacked for their discoveries. It reminds us that health is not given to us voluntarily, but we need to fight for it."

This information is based on scientific research results. It is not intended to substitute for medical advice to treat, cure, or prevent any disease.  
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