Intracellular magnesium and insulin resistance.

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BACKGROUND: Magnesium, the second most abundant intracellular divalent cation, is a cofactor of many enzymes involved in glucose metabolism. Magnesium has an important role in insulin action, and insulin stimulates magnesium uptake in insulin-sensitive tissues. Impaired biological responses to insulin is referred to as insulin resistance.

FINDINGS: This review was designed to reach a better understanding of the mechanism involved in the correlation between magnesium and insulin resistance. Intracellular magnesium concentration is low in type 2 diabetes mellitus and in hypertensive patients. In patients with type 2 diabetes an inverse association exists between the plasma magnesium and insulin resistance due to intracellular changes. The suppressed intracellular magnesium concentration may result in defective tyrosine kinase activity and modify insulin sensitivity by influencing receptor activity after binding or by influencing intracellular signaling and processing. Intracellular magnesium deficiency may affect the development of insulin resistance and alter the glucose entry into the cell.

CONCLUSIONS: Magnesium is required for both proper glucose utilization and insulin signaling. Metabolic alterations in cellular magnesium, which may play the role of a second messenger for insulin action, contribute to insulin resistance.

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