
Hypovitaminosis D is associated with insulin resistance and beta cell dysfunction.

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BACKGROUND: Although the role of vitamin D in type 2 diabetes is well recognized, its relation to glucose metabolism is not well studied.

OBJECTIVE: We investigated the relation of 25-hydroxyvitamin D [25(OH)D] concentrations to insulin sensitivity and beta cell function.

DESIGN: We enrolled 126 healthy, glucose-tolerant subjects living in California. Insulin sensitivity index (ISI) and first- and second-phase insulin responses (1stIR and 2ndIR) were assessed by using a hyperglycemic clamp.

RESULTS: Univariate regression analyses showed that 25(OH)D concentration was positively correlated with ISI (P < 0.0001) and negatively correlated with 1stIR (P = 0.0045) and 2ndIR (P < 0.0001). Multiple regression analyses confirmed an independent correlation between 25(OH)D concentration and ISI (P = 0.0007). No independent correlation was observed between 25(OH)D concentration and 1stIR or 2ndIR. However, an independent negative relation of 25(OH)D concentration with plasma glucose concentration was observed at fasting (P = 0.0258), 60 min (P = 0.0011), 90 min (P = 0.0011), and 120 min (P = 0.0007) during the oral-glucose-tolerance test. Subjects with hypovitaminosis D (<20 ng/mL) had a greater prevalence of components of metabolic syndrome than did subjects without hypovitaminosis D (30% compared with 11%; P = 0.0076).

CONCLUSIONS: The data show a positive correlation of 25(OH)D concentration with insulin sensitivity and a negative effect of hypovitaminosis D on beta cell function. Subjects with hypovitaminosis D are at higher risk of insulin resistance and the metabolic syndrome. Further studies are required to explore the underlying mechanisms.

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