The first article mentioning such a link has been published in May 2004 by the *American Journal of Clinical Nutrition* [1]. The study had enrolled 126 healthy, glucose-tolerant subjects and results have shown that 25-hydroxy-vitamin D levels were positively correlated with insulin sensitivity index, leading to the following conclusion: “Subjects with hypovitaminosis D are at higher risk of insulin resistance and the metabolic syndrome” [1]. Data have quickly accumulated and an article published in May 2005 by the *European Journal of Clinical Investigation* tells us how clinical trials and observational studies demonstrate that calcium and vitamin D deficiencies increase the risk of malignancies, of chronic inflammatory and autoimmune diseases, and of metabolic disorders such as hypertension and metabolic syndrome [2].

Since 2007, multiple articles have flourished about vitamin D deficiency, metabolic syndrome, obesity and diabetes type 2. Vitamin D and calcium insufficiency may negatively influence glycemia [3]. 25-hydroxy-vitamin D level is inversely associated with 10-year risk of hyperglycemia, with insulin resistance and with metabolic syndrome [4]. Low-circulating vitamin D concentrations may be associated with an increased prevalence of metabolic syndrome [5]: this last study also suggests a link between an increased risk of metabolic syndrome and elevated parathormone levels in older men [5].

A specific study has been carried out to evaluate the increased prevalence of vitamin D deficiency among morbidly obese patients (body mass index of 40+) and it shows that 61 % of morbidly obese patients presenting a metabolic syndrome suffer from vitamin D deficiency compared to 33 % of those who did not achieve the criteria for metabolic syndrome [6]. Another study concerned 217 obese children where 25-hydroxy-vitamin D levels correlated negatively with body mass index; more than half of the obese children were vitamin D insufficient and almost half of the insufficient group suffered from severely low vitamin D levels (≤ 10 ng/ml) [7]. Identical findings have been made among middle-aged and elderly Chinese individuals: low vitamin D levels are significantly associated with metabolic syndrome or insulin resistance [8].

Not surprisingly, as the relationship may be mediated - at least partially - through incident diabetes type 2, low serum concentrations of vitamin D have been associated with increased risk for cardiac events [9]. Recent prospective cohort studies suggest that 25-hydroxy-vitamin D deficiency is associated with cardiovascular diseases and with mortality over follow-up [10]. This has been confirmed through another study published in April 2009 by the *Saudi Medical Journal* showing a strong link between vitamin D deficiency and increased highly sensitive C-reactive protein (p = 0.009) [11].

On the practical side, correcting calcium and vitamin D deficiencies seems promising as combined supplementation with both nutrients appears to be beneficial in optimizing glucose metabolism [3]. Some authors even suggest that it would be possible to reverse the increasing epidemics of obesity by improving the vitamin D status [12], as they consider that the metabolic syndrome represents the expression of a “winter metabolism” leading to the accumulation of fat mass [12]. Indeed, a Chinese team has recently found that supplementing 1,25-dihydroxy-vitamin D improved the insulin resistance in muscle cells [13], so we have to agree with one of the above-mentioned articles’ title, i.e. “Let the sunshine in” [9]!


