

METABOLIC SYNDROME, OBESITY AND VITAMIN D DEFICIENCY

FUNDAMENTAL METABOLIC LINK RECENTLY DISCOVERED

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]!

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