

Vitamin B12 absorption is also affected after bariatric surgery (RYGB, SG, BPD, and DS), as it requires an acidic environment and the presence of an intrinsic factor produced by parietal cells in the stomach(446, 508, 902). In addition, the absorption of B12 requires an ideal ileal pH for absorption, which can also be altered after bariatric procedures. As vitamin B12 is stored in the liver, B12 stores can last for a long period of time. Consequently, continuous, long-term monitoring is recommended, since deficiency can appear years after the index surgery(508). This said, neurological manifestations of B12 deficiency can also sometimes present shortly after surgery(853).

Since vitamin B12 is necessary for both erythropoiesis and the nervous system, inadequate concentrations can lead to both megaloblastic anaemia and irreversible neuropathy – therefore, if there is any suspicion of deficiency, immediate treatment is recommended(508).

It is important to emphasize that measuring serum B12 levels is inadequate as a means to confirm deficiency, because of the low sensitivity and specificity of such measurements. In patients undergoing bariatric surgery, methylmalonic acid has been proposed as a more sensitive indicator, since it can help to diagnose this deficiency early. This is because vitamin B12 is a coenzyme that accelerates the conversion of methylmalonyl-coenzyme A to succinyl-coenzyme A. When there is insufficient vitamin B12 for this conversion to take place, methylmalonyl-coenzyme A accumulates and is converted to methylmalonic acid, which accumulates in the blood and ultimately is excreted in urine, elevating urine levels.

The absorption of folic acid, which occurs in the small intestine, also can be affected, especially after RYGB, BPD-DS, OAGB and SADI. This deficiency, however, may likewise occur after SG. It is believed that folic acid deficiency is more connected to reduced food intake and lack of adherence to supplementation, rather than to any decrease in absorption itself(508). One important point to consider is that the megaloblastic and macrocytic anaemia associated with vitamin B12 deficiency can be masked by folic acid(33, 508, 902, 903, 906).

Vitamin D, Calcium, and Parathyroid Hormone (PTH): Vitamin D, among other functions, is fundamental to skeletal muscle health and essential for calcium absorption and bone mineralization. The optimal concentrations of 25-OH vitamin D for maintaining bone health and preventing secondary hyperparathyroidism have not yet been determined among patients undergoing MBS. Consensus surveys of field experts and other, more methodologically robust