**Scientific Evidence Based Truth about Methylcobalamin**

**Q) Is methylcobalamin Natural?**

**A) NO**  –  Commercialized methylcobalamin that is used in the dietary supplement is synthesized by bacteria. Naturally found methylcobalamin is from foods of animal source, such as beef, poultry, etc. Adenosylcobalamin is, however, more abundant in foods than methylcobalamin since about 70% of natural form of cobalamin is adenosyl cobalamin.

**Q) Is supplemental methylcobalamin (M-B12) directly used as a cofactor of methionine synthase (MS) by donating methyl-group to convert homocysteine to methionine?**

**A) NO.**  WHY? – See below for further explanation.

- Like all other cobalamin forms, M-B12 has to go through “de-alkylation” to dissociate the “methyl (CH₃)” ligand from the basic cobalamin ring (Co(I)B₁₂ - called “corrin ring”) via binding to a protein, called MMACHC protein in the cytoplasm of the cell.
- The corrin ring will go through “re-methylation” in the cytoplasm of the cell by receiving methyl group from methyl-tetra-hydro-folate (MTHF = CH₃FH₄). In this case, M-B12 is a product of MS, and MTHF is a “methyl-donor”. This is the 1ˢᵗ step catalyzed by MS.
- The re-methylated cobalamin (M-B12) will donate the methyl-group (CH₃) to make methionine from homocysteine. In this case, M-B12 is a methyl-donor, and this is the 2ⁿᵈ step catalyzed by MS.
- Therefore, M-B12 is a “transient” form during the process of making methionine by receiving Methyl group from folate and then donating the methyl group to homocysteine to make methionine, which is catalyzed by MS in the cytoplasm.

- There is ONE MORE bioactive form of B12, called adenosylcobalamin, which is NOT made from M-B12, but from basic corrin ring (Co(I)B₁₂) in the presence of ATP and “cobalamin adenosyl transferase” in the mitochondria. The “ligand-free” cobalamin (Co(I)B₁₂) enters mitochondria and “adenosylation” occurs in the mitochondria to make an active cofactor to aid “methyl-malonyl-CoA-mutase” to make Succinyl CoA from methyl-malonyl-CoA. This process is further progressed to make the “myelin sheath” of neurons to protect neuron.