

# Vitamin B12 and Autism

# Functional Importance

- Brain and nervous system
- Blood formation
- DNA synthesis and regulation
- Energy production

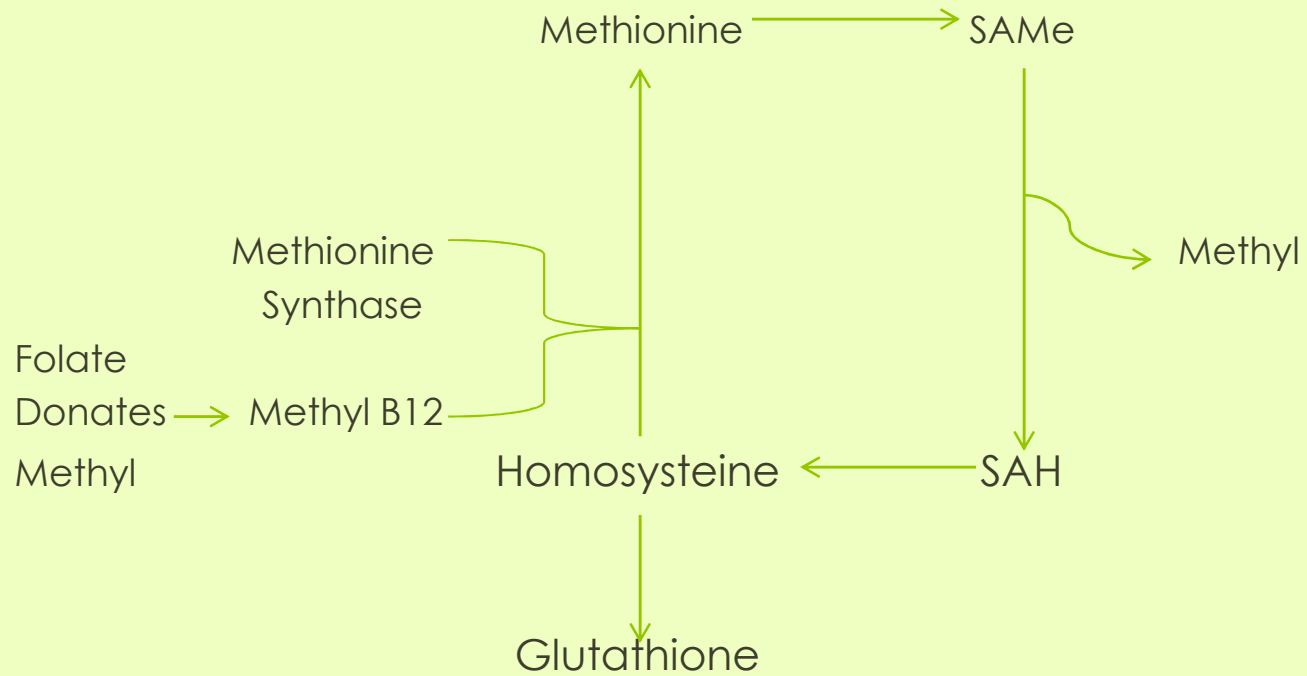
# Characteristics

- Water soluble
- Largest and most complicated vitamin
- Synthesized by bacteria and algae
- Contains cobalt

# Forms

- Hydroxocobalamin- natural form produced by bacteria
- Cyanocobalamin- commercial synthetic form
- Methyl cobalamin- used in methylation
- Adenosyl cobalamin

# Methylation



# Methylation

- Production of neurotransmitters
- Cell membrane fluidity in brain
- Metabolism of glutamate
- DNA and RNA synthesis
- T-cell synthesis in immune system
- DNA regulation to silence viruses
- Nerve myelination

# B12 Absorption

- Stomach Acid
- Intrinsic factor secreted in stomach
- Absorption in ileum (last section of small intestine)

# Vitamin B12 Deficiency

- Fatigue
- Depression
- Poor memory
- Pernicious anemia
- Impaired sensations(neuropathy)- touch, pressure, vibration, balance
- Weakness
- Mental disorders- irritability, decreased focus



# B12 in Food

- Meat- especially liver
- Fish- especially shellfish
- Eggs
- Milk/dairy
- Fortified foods

# Causes of B12 Deficiency

- Low intake
- Low stomach acid
- Low absorption
- Genetic mutation in MTHFR

# B12 Deficiency- Treatment Options

- Oral
- Sublingual
- Nasal spray
- Lollipop, gum
- Subcutaneous injection
- IM(Intramuscular) injection

# Methyl B12 in Autism Study

## James Neubrandner, MD

- 500 children with Autism
- Methyl B12 given subcutaneously every 3 days
- Extensive questionnaire filled out by parents
- 6 weeks
- Vitamin B12 blood levels were normal in most children

# Other Routes of Administration

- Oral- affected by bowel inflammation
- Sublingual- difficult for children, pulsatile effect
- Transdermal- clinically less effective
- Nasal spray- difficult for children

# Methylation Study

Jill James, PhD

- Decreased methionine, S-AdoMet, homocysteine, and reduced-glutathione in children with Autism
- Increased oxidized-glutathione
- Gave folinic acid and TMG for 3 months-brought methylation up to normal
- Then gave MB12 injections for 1 month-brought reduced-glutathione up to normal

## 2 Reasons for Methyl B12 Injections

- Stimulate methylation pathway
- Increase production of glutathione

# Results

- Executive function- awareness, cognition, appropriateness, eye contact- 94% of children improved
- Speech and language- 80% improved
- Socialization, interactive play- 70% improved



# Side Effects- 30%

## **Tolerable- usually resolve in 2-6 months**

- Increased level of activity
- Stimming
- Sleep disturbances
- Mouthing

## **Intolerable- MB12 dose needs to be lowered**

- Aggression
- Classroom disruptions

- 10% of children- MB12 discontinued due to intolerable side effects or lack of efficacy
- 90%- MB12 injections are continued at least 18-24 months
- Maximum improvement occurs over months or years