

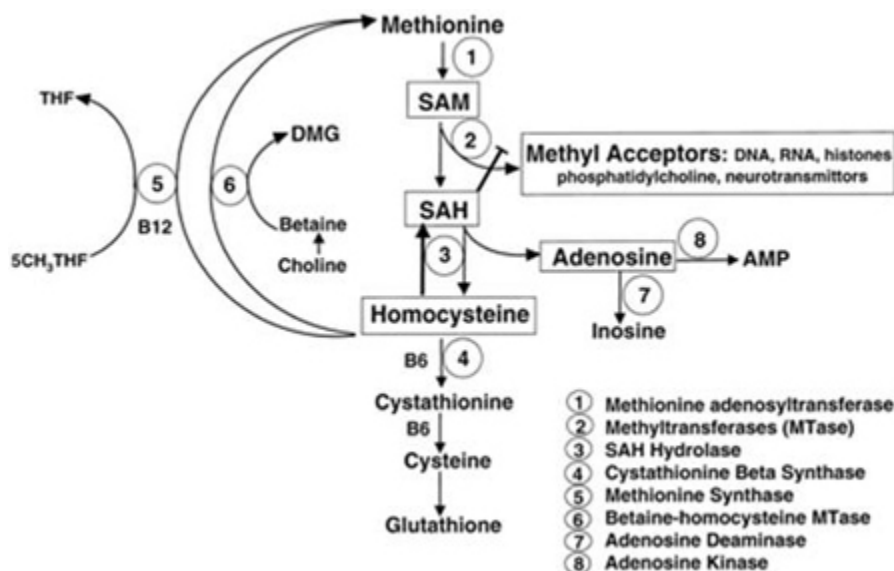


# AUTISM RECOVERY SYSTEM



## Understanding the Methylation Cycle

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(Chart Created/Provided by Jill James, Ph.D.)

Methylation is an important biochemical process in our body that helps to regulate chemical reactions for attention, focusing, awareness, language development, detoxification, sleep, immune support and much more. The methylation cycle is a key area of research in autism, and it is important to have a basic understanding of this system when trying to understand the biomedical application for individuals on the autism spectrum. The graph above is a representation of the methylation cycle, and an additional biochemical process called transsulfuration.

### Definitions:

**Re-Methylation (or methylation)** - this pathway involves the conversion of homocysteine to methionine. Production of methionine, an amino acid, is the rate-limiting step for the conversion of other necessary proteins that affect the heart and blood vessels, muscle tissue, immune and nervous systems. The conversion of homocysteine to methionine can occur by direct transference of a methyl (CH<sub>3</sub>) group from methylcobalamin (B12) or betaine (trimethylglycine or TMG).



**Trans-Sulfuration** - this pathway involves converting homocysteine to two different amino acids - taurine and cysteine. Taurine is most commonly known for heart and liver support, detoxification, bile acid formation and cholesterol excretion. Cysteine has direct influence on glutathione production. Glutathione is a potent anti-oxidant and has protective effects against DNA/RNA damage, as well as being involved in heavy metal and chemical detoxification and immune function. Many ASD children have dysfunctions with regards to taurine and cysteine production.

Look at the chart above. Homocysteine sits at the junction between glutathione and methionine. Imagine a grandfather clock. Homocysteine sits at 6 o'clock and methionine at 12 o'clock. Glutathione is the tail weight that swings back and forth. If the weight swings faster it will pull on homocysteine to maintain glutathione levels. If it swings slower more homocysteine is allowed to be pulled upward to methionine.

Homocysteine sits at a junction of two different biochemical reactions. Because of its position in this biochemical matrix it has the capacity to impact all methylation and sulfur group transference processes in the body. The most recognized impact of homocysteine is increased risk for cardiovascular disease. However, in children with autism a faulty methylation system affects other functions as well particularly cognitive abilities including concentration, attention, language development and processing, environmental awareness and sociability.

Certain other chemicals will impact this system at specific points. If any one of these intermediary steps is blocked, then the clock slows down causing biochemical imbalance. This causes a backlog of chemical information that has deleterious effects on other dependent systems, i.e. immune, hormone, detoxification, and DNA structure and function.

Methylcobolamin (MB-12), Folic Acid, and Betaine (TMG) are responsible for taking homocysteine from 6 o'clock to methionine at 12 o'clock. SAME (s-adenosylmethionine) the body's "universal methyl donor" helps take methionine from 12 o'clock to homocysteine at 6 o'clock.

The issue with many ASD children is that this system does not operate properly. This has an enormous negative impact on their health such as increased susceptibility to chronic infections, inability to detoxify chemicals and heavy metals, and neuro-cognitive problems such as language processing, attention, and concentration. Genetic susceptibility certainly plays a role. However, for many the problem does not manifest until a child's system is negatively impacted by nutritional deficiencies, digestive problems from yeast, bacteria, parasites, malabsorption from digestive inflammation, chemical pollutants, and heavy metal toxins from vaccines or environmental exposures.



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