Vitamins, Minerals, and Defective Genes

Dr. JP Saleeby

Dr. Kristina Carman

FLCCC® ALLIANCE

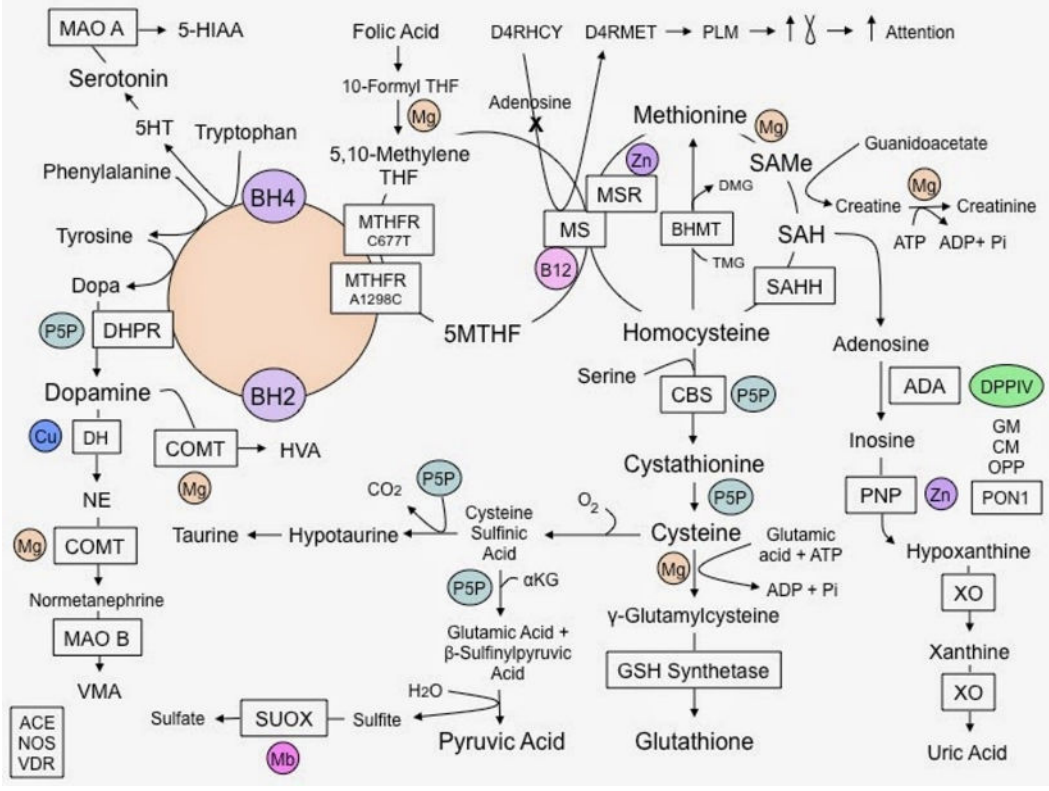
MTHFR: the enzyme and the gene

- Stands for Methylenetetrahydrofolate reductase
- An enzyme and a gene
- Enzyme breaks down the amino acid homocysteine
- Gene reflects the function of the methylation pathway

FLCCC ALLIANCE

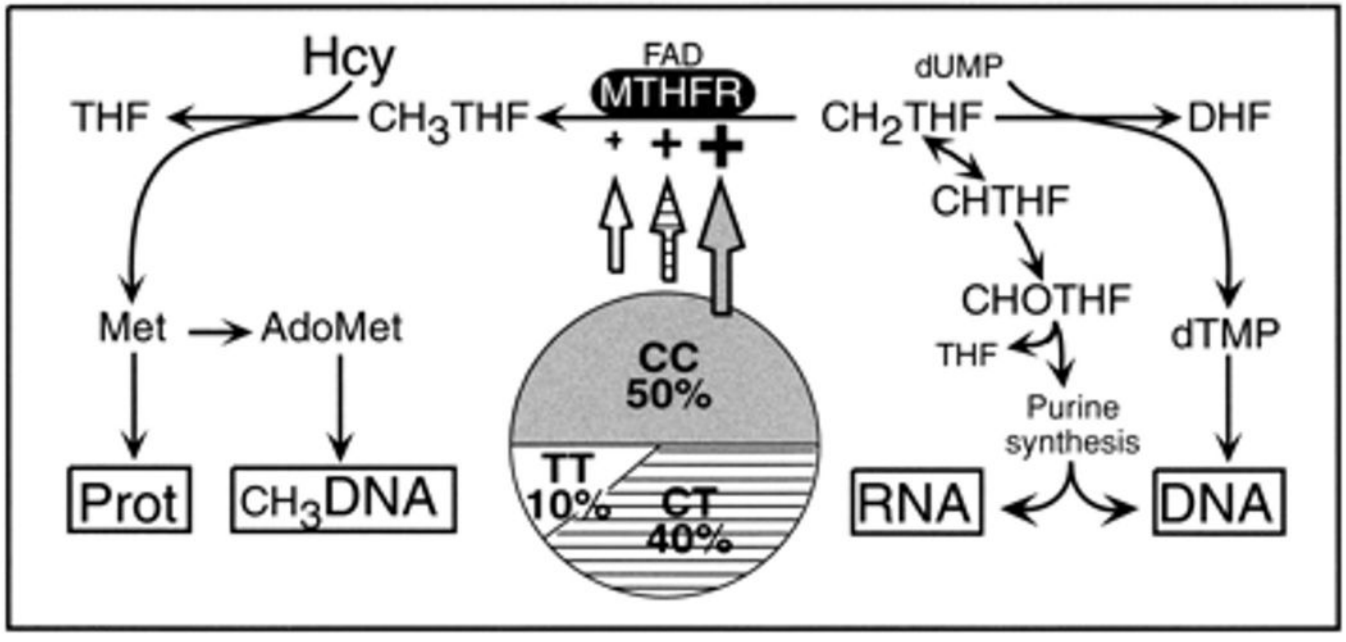
What is the Methylation pathway?

- A biochemical process that plays a crucial role in various functions:
  - DNA synthesis
  - Detoxification
  - Neurotransmitter production
  - Gene expression regulation



A common mutation

- People have two MTHFR genes, one from their mother and one from their father. Mutations can affect one (heterozygous) or both (homozygous) of these genes.
- If the MTHFR gene mutates, it can lead to a variety of health conditions, including some cancers
- The mutation is fairly common – **affecting 30% to 40% of Americans**



FLCCC ALLIANCE

Other genes in the methyl pathway

- **MTHFR is not alone (despite popular belief or assumptions)**
  - **CBS** (cystathionine beta-synthase): converts homocysteine into cysteine. Interacts with MTHFR, and mutations in either gene can affect overall methylation capacity.
  - **COMT** (catechol-O-methyltransferase): responsible for breaking down and regulating neurotransmitters like dopamine, norepinephrine, and epinephrine. Indirectly affects methylation by influencing the availability of methyl groups in the body.
  - **DHPR** (dihydropteridine reductase) synthesis of dopa, and tyrosine
  - **MSR** (methionine synthase reductase) helps convert homocysteine to methionine.
  - **MTR** (methionine synthase): helps convert homocysteine into methionine, utilizing vitamin B12 as a cofactor.

Why does all this matter?

- Overall Health and Disease Risk
- Detoxification
- Hormone Regulation

FLCCC ALLIANCE

Specific Disorders

- Occlusive vascular disease
- Neural tube defects (Spina bifida) & Anencephaly
- Alzheimer’s disease and other forms of dementia
- Colon cancer
- Acute Leukemia
- Mental health disorders (Bipolar)
- Kidney Disease; T2DM
- Macular degeneration
- Homocystinuria
- Age-related hearing loss
- Alopecia areata
- Clotting disorders

To B (vitamins) or Not to B (vitamins)

- B12, B6, and B9 (folate) play crucial roles in the methylation pathway.
- Serve as helpers for enzymes like MTHFR and MTR
- convert homocysteine to methionine and supporting methylation reactions
- Too high serum homocysteine (HCY) levels **are harmful**

FLCCC ALLIANCE

B Vitamin Facts

- **Vitamin B12** – fish, meat, eggs, and dairy (microbes in the gut)
- **Vitamin B9 (Folate)** – dark green leafy veggies, beans, nuts
- **Vitamin B6** – fish, organ meats, veggies, and fruit
- **DMG Dimethylglycine** – beans, grains, pumpkin seeds, and liver
- **TMG Trimethylglycine (Betaine)** – wheat bran, spinach quinoa, and beets

FLCCC ALLIANCE

Folate (B9) Facts

- Found in nature but in inactive form
- Several forms of folate are known to exist
- Found in dark green leafy veggies, beans and nuts
- Needs MTHFR to convert to active form

FLCCC ALLIANCE

Folate (B9) Facts

- **Folate and Methylation:** Adequate levels of 5-MTHF support proper methylation, which is crucial for gene expression regulation, detoxification processes, hormone metabolism, and overall cellular function.

- **Folate and Neural Tube Defects:** Adequate folate levels help support proper neural tube development, emphasizing the importance of folate supplementation or consumption of folate-rich foods for women who are planning to become pregnant or are already pregnant.

- **Folate and Cardiovascular Health:** Folate helps regulate homocysteine levels in the blood, an amino acid that, when elevated, is associated with an increased risk of cardiovascular disease.
  - **Adequate folate intake, along with other B vitamins like B12 and B6, supports the conversion of homocysteine into methionine, thereby helping to reduce the risk of cardiovascular problems.**

FLCCC ALLIANCE

Other important facts

- **Methyl Donors**
  - Compounds that provide methyl groups for methylation reactions
  - Certain nutrients, such as choline, betaine, and methionine, serve as methyl donors.
- **Food sources:** eggs, organ meats, fish, cruciferous vegetables, and legumes

FLCCC ALLIANCE

Important Minerals in Methylation Pathway

- **Copper:** grains, beans, nuts organ meets; older home with Cu pipes
- **Magnesium:** beans and nuts, whole grains, green leafy veggies
- **Molybdenum:** peas and lima beans, whole grains, veggies, dairy, meat
- **Zinc:** grains, quinoa, rice, legumes

Other things to consider

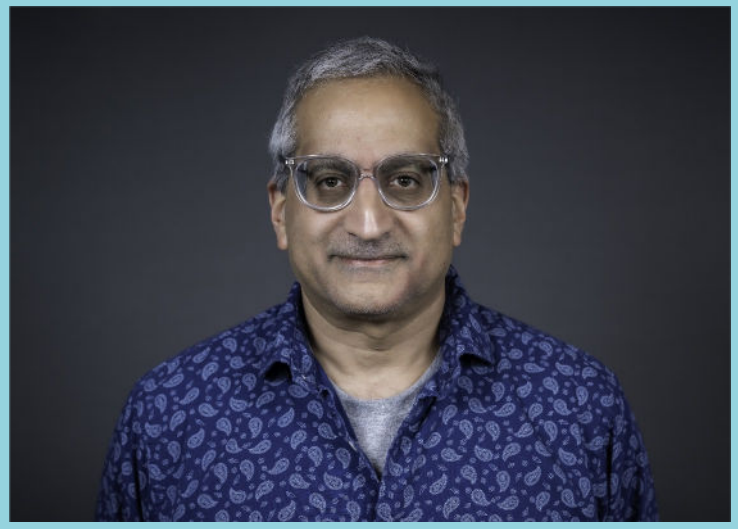
- **Avoiding Toxins:** Heavy metals, pesticides, and certain chemicals, can disrupt methylation processes. Choose organic if possible.

- **Stress Management:** Chronic stress can negatively impact methylation processes. Engaging in stress management techniques, such as mindfulness practices, exercise, and adequate sleep, can help reduce stress and support healthy methylation.

- **Regular Physical Activity:** Exercise has been shown to have positive effects on methylation and overall health. Engaging in regular physical activity, including both aerobic exercise and strength training, can support optimal methylation.

FLCCC ALLIANCE

Thank you!



- **Dr. JP Saleeby**
- Carolina Holistic Medicine
- carolinaholisticmedicine.com
- (800) 965-8482

- **Dr. Kristina Carman**
- Tiny Fish Functional Nutrition
- www.tinyfishco.com
- kristina.carman@tinyfishco.com

FLCCC ALLIANCE