NutriPATH
INTEGRATIVE PATHOLOGY SERVICES

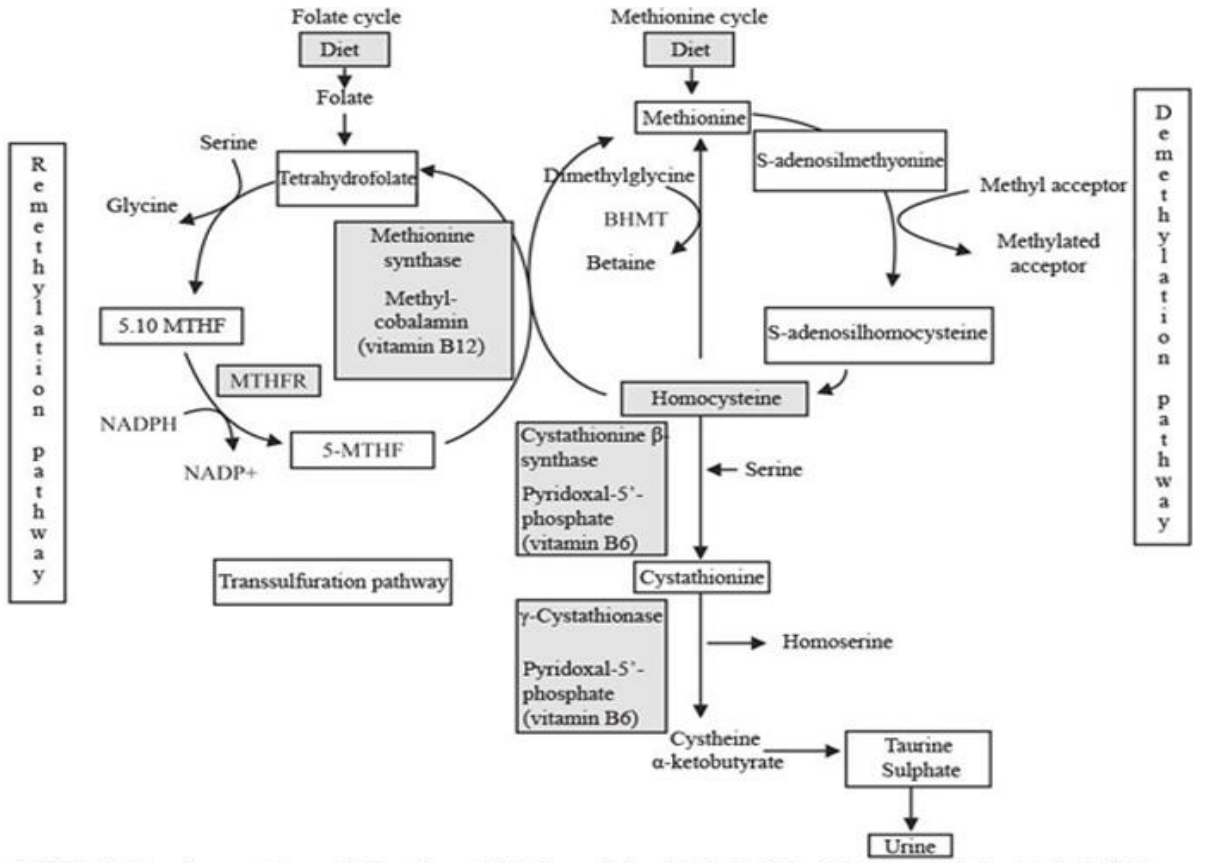
Testing Methylation Pathways

Methylation is a process where certain nutrients called 'methyl donors' are added to specific elements of DNA, our gene markers and proteins that keep them physiologically active. Methylation is a major pathway to focus on in understanding autoimmune and neurological diseases such as multiple sclerosis, seizure disorders, dementia, chronic fatigue syndrome, lupus, depression, anxiety and autism spectrum disorders. Methylation is responsible for making, maintaining and repairing DNA.

Though this highly intricate process occurs within each cell as well as in the fluid supplying the brain and within the liver, it is responsible for the most vital undertakings throughout body chemistry.

The Methylation Cycle is a biochemical pathway that manages or contributes to a wide range of biochemical functions: detoxification, supporting DNA (turning genes on and off), producing energy, reducing inflammation, synthesising neurotransmitters, homocysteine metabolism, protein methylation, phase 2 liver detoxification and supporting immune function. Inadequate methylation capacity can lead to birth defects, depression, cognitive decline, and cancer. Impaired methylation has even been associated with autism. Support of methylation markers has been associated with rapid return of speech, improvement of behaviour in ADD and ADHD spectrums.

Conditions associated with impaired methylation	
Allergies	Diabetes
Autism	High folate supplementation
Cancer	Infertility, Pre-conception care
Chronic Fatigue Syndrome	Mental health disorders
Cognitive decline	Oestrogen dominance
Cardiovascular disease	Schizophrenia



BHMT = betaine-homocysteine methyltransferase; MTHF = methylenetetrahydrofolate; MTHFR - Methylenetetrahydrofolate reductase; NADPH - Nicotinamide adenine dinucleotide phosphate reduced form; NADP+ - Nicotinamide adenine dinucleotide phosphate

Figure 2 - Schematic representation of homocysteine's metabolization pathways.[12]

Significant Markers of Methylation assessment:

- **MTHFR –** Genetic variants in MTHFR can affect susceptibility to neural tube defects, occlusive vascular disease, acute leukemia, and colon cancer. This genetic test can reveal a variation that affects the MTHFR enzyme and can ultimately impair methylation
- **Homocysteine** - an amino acid associated with atherosclerosis that can become elevated when there is need for folate, vitamin B6 and/or vitamin B12.
- **Formiminoglutamate** (FIGLU)—a functional marker of folate need.
- **Methylmalonate** (MMA)—a functional marker of vitamin B12 need.
- **THF -** The metabolically active form of folate is tetrahydrofolate, which is formed from folate in two successive NADPH-dependent reductions, both catalysed by the same enzyme, namely, dihydrofolate reductase.
- **S-Adenosyl Homocysteine** – amino acid derivative and modulator of the activated methyl cycle and cysteine biosynthesis and product of S-adenosyl methionine dependant methylation of biological molecules, including DNA, RNA, histones and other proteins.

Other testing may include:

- **Amino Acids** - precursors for methylation; plus, many amino acids undergo methylation during metabolism.
- **Estrogen Metabolites** - evaluates the ability to methylate estrogens.

METHYLATION TESTING PANELS AVAILABLE		Test kit
Methylation Profile **NEW**	S-adenosyl methionine (SAMe), S-adenosyl homocysteine (SAH), SAMe:SAH ratio, Folinic acid, 5-methyl tetrahydrofolate (5MTHF), Tetrahydrofolate (THF)	Lithium Heparin (Fasting)
Folate Metabolism Profile **NEW**	Folinic acid, 5-methyl tetrahydrofolate (5MTHF), Tetrahydrofolate (THF), Vitamin B12, red cell Folate, Homocysteine	Lithium Heparin EDTA, Serum, Homocysteine (Fasting)
Methionine Metabolism Profile **NEW**	S-adenosyl methionine (SAMe), S-adenosyl homocysteine (SAH), SAMe:SAH ratio; Vitamin B12, red cell Folate, Homocysteine; Methionine	Lithium Heparin EDTA, Serum, Homocysteine (Fasting)
MTHFR	MTHFR (Methylenetetrahydrofolate reductase) gene mutation	EDTA
Glutathione, Reduced	Glutathione (reduced)	Lithium Heparin (Fasting)
Glutathione, Oxidised	Glutathione (oxidised)	Lithium Heparin (Fasting)
Vitamin B6	Vitamin B6	EDTA
Vitamin B12 & Red Cell Folate	Vitamin B12, red cell Folate	EDTA & Serum
Ammonia **NEW**	Ammonia	EDTA (Fasting)
Homocysteine	Homocysteine	EDTA
Organic Acids – Methylation Cofactors	Formiminoglutamic acid (FIGLU), Methylmalonic acid (MMA)	Spot Urine
Histamine	Histamine	Lithium Heparin

Test Preparation

All of the new methylation panels require transport to laboratory on dry ice. Please see Collection Instructions for further information.

Please collect blood sample on **Monday or Tuesday ONLY** in order to reach the lab within days.

NutriPATH
Integrative Pathology Services

Phone 1300 688 522 for further details

www.nutripath.com.au