



# Methylation Panel

## Key Clinical Messages

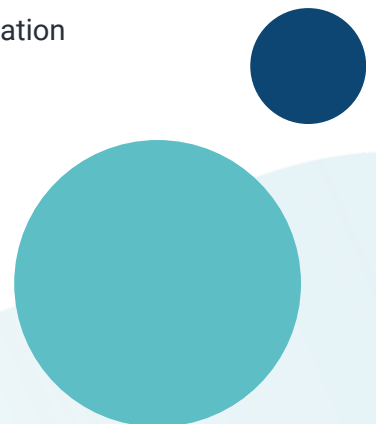
### What is Methylation?

During methylation, also referred to as "1-Carbon metabolism", one methyl group (CH<sub>3</sub>) is transferred or donated between molecules.

- The donor of the methyl group is often S-adenosylmethionine (SAM), which is converted to S-adenosylhomocysteine (SAH) in the process of transferring or "demethylating" the methyl group.
- Methylation is generally associated with "switching off" or inhibition of a gene, while demethylation is associated with "switching on" or activation of a gene.

### Methylation is imperative to many biochemical processes in the body including:

- Hormone, heavy metal, and chemical detoxification
- Nitric oxide production & vascular health
- Neurotransmitter metabolism
- Histamine metabolism
- Glutathione production
- DNA and RNA synthesis
- Cell membrane repair
- Epigenetic modification
- Immunomodulation
- ATP synthesis
- Myelination
- And more





## Why Order The Methylation Panel Test?

To tailor lifestyle and dietary plans using an individual's clinically relevant genetics and methylation status as measured by:

- **Single Nucleotide Polymorphisms (SNPs)** – SNPs are genetic variations that can affect the methylation pathway and represent an individual's genotype or predisposition for enzyme function.
- **Functional methylation markers** – These serum biomarkers represent an individual's phenotype or measurable expression of their genetic SNPs and serve as an assessment of overall methylation status.

## What Markers Are Included On The Methylation Panel?

### SNPs:

- MTHFR (677)
- MTHFR (1298)
- COMT rs4680 (Val158Met)
- COMT rs4633
- MTRR rs1801394 (A66G)
- MTRR rs162036
- MAT1A rs3851059
- SHMT1 rs1979277
- GNMT rs10948059\*
- BHMT rs3733890\*
- MTR rs1805087\*
- NOS3 rs1799983

### Functional Methylation

#### Markers:

- Homocysteine (marker of impaired methylation status)
- Folate (methyl donor)
- Vitamin B12 (methyl donor)

*\*Upregulating SNPs (all other SNPs downregulate enzyme function)*

## Which Patients Benefit From This Test?

Conditions, Signs, and Risks associated with poor methylation:

- Hyperhomocysteinemia (MTR, MTRR, BHMT)
- Cardiovascular disease (MAT1A, MTHFR)
- Psychological and mood disorders (COMT, MTHFR, hyperhomocysteinemia)
- Migraine headaches (COMT)
- Fibromyalgia (COMT)
- Parkinson's Disease (hyperhomocysteinemia)
- Alzheimer's Disease (hyperhomocysteinemia)
- Impaired detoxification (GNMT, COMT)
- Increased breast cancer risk (COMT\*)
- Inflammatory bowel disease (hyperhomocysteinemia)
- Colorectal cancer (MTRR\*, hyperhomocysteinemia)
- Eating disorders (COMT)

*\*Research inconsistent*

## Why Vibrant?

### Lab Methodology

Vibrant America utilizes a variety of the most reliable, FDA-approved methodologies to measure genes and biomarkers for the Methylation Panel.

**Enzymatic Assay for the measurement of homocysteine with advantages that include:**

- High specificity
- Quick runtime

**Electrochemiluminescence immunoassay (ECLIA) for serum markers folate and B12 with advantages that include:**

- Quicker than ELISA
- Broad dynamic range
- High sensitivity

**Real-time PCR for SNPs with advantages that include:**

- Limited likelihood of contamination compared to standard PCR
- No need for post-PCR analysis

**Vibrant is a CLIA certified and CAP accredited lab.**



## What Tests Pair Well With The Methylation Panel?

- **Total Tox Burden (Environmental toxin, mycotoxin and heavy metal tests)** - Methylation status can impair or influence detoxification pathways which impacts toxin burden in the body.
- **Neurotransmitters** – Methylation status can impact mood disorders via effects on neurotransmitter production and metabolism.
- **Gut Zoomer** - Tests for microbiome and estrobolome epigenetic influences on methylation status such as bacterial folate production, consumption, and more
- **NutriPro** – Provides testing on methylation nutrient cofactors with serum and intracellular nutrient levels plus specific, nutrition related genetic SNPs.
- **Urinary Hormones** – Evaluates epigenetic influences on methylation, such as estrogen metabolism and oxidative stress.
- **Neural Zoomer Plus** – The Methylation Panel assesses for hyperhomocysteinemia which has been associated with Parkinson’s disease and Alzheimer’s disease, both of which may be further assessed for using neural autoimmunity markers available on Neural Zoomer Plus.

## Test Preparation

- **Fasting:** Not required
- **Collection:** 1 SST Tube, 1 EDTA (Lavender) Tube
- **Supplements:** There are no dietary supplement restrictions required before taking the Methylation Panel test. However, some ordering providers may recommend discontinuing vitamin B12 and/or folate supplements 7-14 days before testing to assess "baseline" (normal) levels. Some ordering providers may prefer to test B12 and folate levels while taking these dietary supplements to assess how well they are being absorbed.

## Reference Ranges

### SNPs

The report will display the SNP name, rs number, and either a normal or elevated risk with the individual’s genotype represented by pairs of **blue negative** signs (2 wild type alleles/normal risk), **red positive** signs (2 variant alleles/elevated risk), or one of each. These genotypes have varying degrees of associated risks and are interpreted as:

**Homozygous wild (negative-, negative-)**

**Homozygous variant (positive+, positive+)**

**Heterozygous (one negative-, one positive+)**

\*See example to the right

MTHFR (677C>T)	rs1801133	Normal	— —	Homozygous wild
MTHFR(1298A>C)	rs1801131	Elevated	— +	Heterozygous
MAT1A	rs3851059	Elevated	+ +	Homozygous variant

### Functional Methylation Markers

Serum Marker	In Control Range	Moderate Range	High Risk Range
Homocysteine (µmol/L)	≤9	10-14	≥15
Folate (ng/mL)	≥4.6		≤4.5
Vitamin B12 (pg/mL)	232-1245		≤231, ≥1246