

## **MAND Lab Handout #2: Amino Acid Profile Testing**

IMPORTANT DISCLAIMER: These handouts are based on emerging research and mechanistic reasoning from animal models and cell studies — no MAND-specific clinical testing guidelines currently exist. The metabolic framework is hypothetical but grounded in published molecular data. Results need to be interpreted by providers familiar with both MAND and metabolic medicine.

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### Understanding Amino Acid Testing for MAND

What is this testing for?

Amino acids are the building blocks of protein and play many roles in the body — they help make energy, brain chemicals, antioxidants, and more. In MAND, the way the body uses amino acids can be altered because of changes in energy metabolism and increased demand for certain protective molecules like glutathione.

This blood test measures the levels of many different amino acids to see if any are too high or too low.

Key amino acids to watch in MAND:

- Alanine: May be low because the body is using up pyruvate (alanine's building block) too quickly in the mitochondria.
- Glutamic acid (glutamate): May be low because the body is using it up to make glutathione (a protective antioxidant) or to feed the energy cycle.
- Glycine and serine: These are also used to make glutathione. Low levels may indicate the body is using them faster than they are being replaced.
- Lysine: May be low. Lysine is an essential amino acid (must come from food) and can be broken down for energy when the body is under metabolic stress.
- Histidine: May be low. The body can break down histidine to make glutamate, which may be happening at a higher rate in MAND.

- Branched-chain amino acids (leucine, isoleucine, valine): These are important for muscle and energy. Changes may reflect how the energy cycle is functioning.
- Methionine, homocysteine, cysteine, cystathionine: These are part of the "transsulfuration pathway" that makes glutathione. Elevated cystathionine may indicate the body is trying hard to make more glutathione.
- Tryptophan: Used to make serotonin (a mood chemical) and NAD<sup>+</sup> (an energy molecule). If tryptophan is being diverted away from serotonin toward NAD<sup>+</sup> production, it could affect mood and sleep.
- Proline and hydroxyproline: Related to collagen (connective tissue). Elevated hydroxyproline may indicate increased tissue breakdown.

What do the results mean?

A pattern of LOW alanine, LOW glutamate, LOW lysine, and LOW histidine — with ELEVATED cystathionine — would suggest:

- The energy system is consuming amino acids faster than normal
- The body is under oxidative/reductive stress and trying to make more glutathione
- Dietary protein intake may need to be assessed and potentially increased

These results can help guide decisions about protein intake, specific amino acid supplementation, and other nutritional strategies.

How to prepare:

- Fasting for at least 4 hours is usually required
- Blood is drawn from a vein (standard blood draw)
- Bring a list of all current supplements, as some can affect amino acid levels

References:

- Meguro-Horike M, et al. "Haploinsufficiency of MBD5 and MBD6 Impairs Mitochondrial Respiration Through Chromatin-Mediated

Gene Regulation." *Biochemical and Biophysical Research Communications*. 2026;800:153288.

- Bjørklund G, et al. "The Role of Glutathione Redox Imbalance in Autism Spectrum Disorder: A Review." *Free Radical Biology Medicine*. 2020;160:149-162.