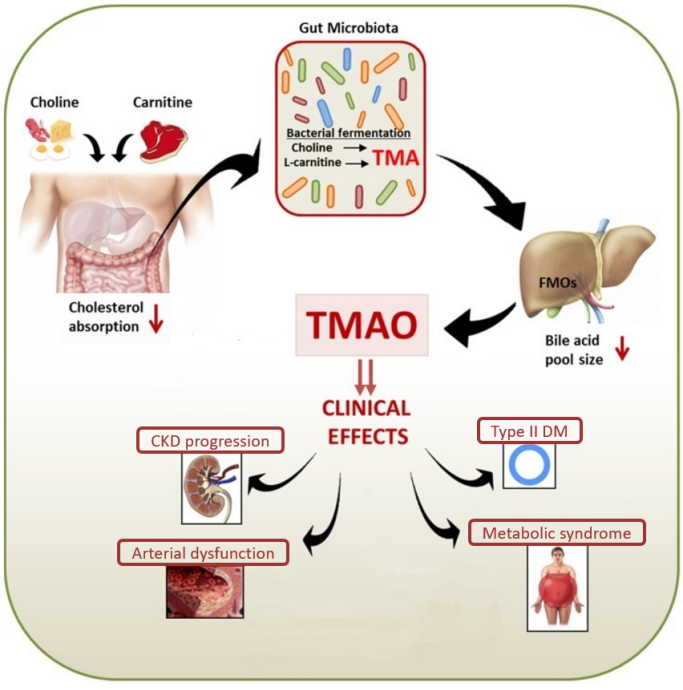
BOSTON HEART DIAGNOSTICS
TMAO TESTING

Boston Heart Diagnostics offers quantification of trimethylamine N-oxide (TMAO) levels in blood using reverse phase liquid chromatography-mass spectrometry (LC-MS/MS) to help clinicians optimize wellness and longevity related to the interaction between diet and intestinal bacteria.

Dietary Changes Reduce TMAO Levels Within Weeks

TMAO CAN BE OPTIMIZED TO MAINTAIN HEALTH AND WELLNESS

- Human intestinal bacteria play a role in health and well-being. They can amplify the negative effects of unhealthy dietary patterns.[1-17]
- Blood levels of TMAO reflect the relationship between dietary patterns, intestinal bacteria, and health.
- TMAO is associated with longevity and mortality. Lower blood levels of TMAO are more favorable than higher levels.[1]
- Animal studies suggest elevated TMAO has a deleterious effect on cholesterol, sterol, and bile acid metabolism.[9-13]



Mechanisms linking diet, bacteria, TMAO, and health (adapted from Velasquez[21])

Meat, Dairy, & Egg Yolks are Key TMAO Sources

- Dietary precursors such as carnitine, phosphatidylcholine (lecithin), choline, and betaine, which are all found in animal products, are metabolized by certain intestinal bacteria into trimethlyamine (TMA) gas, which is absorbed into the bloodstream and oxidized into TMAO by liver enzymes, primarily flavin monooxigenase 3 (FMO3). [1-17]
- Differences in TMAO levels between and within individuals are attributable to differences in dietary intake, intestinal bacteria, and liver metabolism.
- Fish and shellfish contain TMAO, and can raise blood levels for 24 hours,[12, 18] however this source of TMAO is not from human intestinal bacteria, and fish intake has health benefits.[19] We recommend not consuming fish or shellfish for 24 hours before checking TMAO blood levels.

Dietary Changes Reduce TMAO Levels

- Chronic consumption of red meat, egg yolks, dairy, and/or supplements high in carnitine or choline increases TMAO levels.
- Discontinuation of the above dietary sources substantially reduces TMAO within several weeks. [14-17]
- Longstanding dietary improvements may potentially improve the intestinal microbial ecosystem, reduce dysbiosis and decrease bacteria that produce TMAO. [7-14]

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ORDERING, TESTING, REPORTING, AND SAMPLE INFORMATION

Ordering Information

- The order code is: 630
- This test is not billed to insurance.

Testing Methodology

- Boston Heart uses LC-MS/MS because it is more sensitive than NMR[20] and allows accurate measurements of changes in TMAO even within the normal range.

Report Interpretations and Considerations

Reportable Result	Interpretation	Consideration
<5.0 µmol/L	TMAO (trimethylamine N-oxide) is a factor associated with increased mortality and is related to consumption of red meat, egg yolks, and high-fat dairy products.	The TMAO level is in the normal range.
5.0-7.9 µmol/L	TMAO (trimethylamine N-oxide) is a factor associated with increased mortality and is related to consumption of red meat, egg yolks, and high-fat dairy products. Fish and shellfish can elevate TMAO up to 24 hrs. post consumption, but this is not associated with health risk.	To reduce TMAO levels, consider minimizing red meat, and limiting egg yolks and dairy. Supplements containing lecithin (phosphatidylcholine), choline, or carnitine may increase TMAO.
>7.9 µmol/L	TMAO (trimethylamine N-oxide) is a factor associated with increased mortality and is related to consumption of red meat, egg yolks, and high-fat dairy products. Fish and shellfish can elevate TMAO up to 24 hrs. post consumption, but this is not associated with health risk.	To reduce TMAO levels, consider minimizing red meat, and limiting egg yolks and dairy. Supplements containing lecithin (phosphatidylcholine), choline, or carnitine may increase TMAO.

Specimen Requirements

- Requires 200 ul of fasting (8hr) serum
- Fish and shellfish should be avoided for 24 hours before testing.
- Stability: Room temp - 2 days; Refrigerated - 7 days.

References

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