An Educational Resource from Diagnostic Solutions Laboratory

Diagnostic Solutions laboratory

RESEARCH. TECHNOLOGY. RESULTS.

Make the Gut-Brain Connection

Markers on the GI-MAP®, the Stool*OMX*™ add-on to GI-MAP, the OAp™ Organic Acids Profile, and the OMX™ Organic Metabolomics Profile can reveal patterns and root causes contributing to your patients' mental health concerns.

Patterns Associated With Mental Health Conditions

TEST/SPECIMEN TYPE	ANALYTES INCREASED	ANALYTES DECREASED
GI-MAP® GI Microbial Assay Plus **Specimen Type** STOOL GI-MAP Add-on Panel **Stool*OMX*™** ADVANCED BILE ACID TESTING AND SHORT CHAIN FATTY ACID EVALUATION	**Gut Microbes** • *Escherichia coli* • *Akkermansia muciniphila* • *Klebsiella* spp. • *Morganella* spp. • Hydrogen Sulfide Producers: » *Bacteroides fragilis, Escherichia* spp., *Enterobacter* spp., *Desulfovibrio* spp., *Morganella* spp., *Pseudomonas aeruginosa, Staphylococcus aureus, Citrobacter* spp., *Citrobacter freundii, Klebsiella* spp., *Klebsiella pneumoniae, Proteus* spp., *Proteus mirabilis, Fusobacterium* spp. **Stool Chemistries** • Calprotectin • Zonulin **Stool*OMX*™** • Bile acid: Lithocholic acid (LCA) • Short chain fatty acids (SCFA): propionate, valerate	**Total Commensal Microbes** • *Faecalibacterium prausnitzii* • *Roseburia* spp. • *Bifidobacterium* spp. • *Lactobacillus* spp. **Stool*OMX*™** • Bile Acids • Chenodeoxycholic acid (CDCA) • Total SCFAs
OAP™ ORGANIC ACIDS PROFILE **Specimen Type** URINE	**Mitochondrial Health Metabolites** • *cis*-Aconitic Acid, α-Ketoglutaric Acid, Succinic Acid **Nutrient Insufficiency Metabolites** • Methylmalonic Acid (MMA) (Vitamin B12) • Formiminoglutamic Acid (FIGLU) • Xanthurenic Acid (Vitamin B6) **Neurotransmitter Metabolites** • Homovanillic Acid and/or Vannilylmandelic Acid • Quinolinic Acid, QA/KA Ratio **Stress and Poor Detox Metabolites** • Cortisol/Cortisone Ratio • 8-Hydroxy-2'-Deoxyguanosine (8-OHdG) • Pyroglutamic Acid	**Nutrient Insufficiency Metabolites** • Pyridoxic Acid **Neurotransmitter Metabolites** • Homovanillic Acid and/or Vannilylmandelic Acid • 5-Hydroxyindoleacetic Acid **Microbial Metabolites** • Indoleacetic Acid • Phenylacetic Acid
OMX® ORGANIC METABOLOMICS **Specimen Type** URINE BLOOD	**All OAp Metabolites + Amino Acids** • KT Ratio (Kynurenine/Tryptophan) • Branched-Chain Amino Acids • Glutamic Acid • Proline	**OAp Metabolites + Amino Acids** • Phenylalanine • Tyrosine • Tryptophan • Cystine

References

1. Chen X, Xu D, Yu J, Song XJ, Li X, Cui YL. Tryptophan Metabolism Disorder-Triggered Diseases, Mechanisms, and Therapeutic Strategies: A Scientometric Review. *Nutrients*. 2024 Oct 4;16(19):3380.

2. Saade MC, Clark AJ, Parikh SM. States of quinolinic acid excess in urine: A systematic review of human studies. *Front Nutr.* 2022 Dec 16;9:1070435.

3. Zhao M, Ren Z, Zhao A, Tang Y, Kuang J, Li M, Chen T, Wang S, Wang J, Zhang H, Wang J, Zhang T, Zeng J, Liu X, Xie G, Liu P, Sun N, Bao T, Nie T, Lin J, Liu P, Zheng Y, Zheng X, Liu T, Jia W. Gut bacteria-driven homovanillic acid alleviates depression by modulating synaptic integrity. *Cell Metab*. 2024 May 7;36(5):1000-1012.e6.

4. Paprotny Ł, Celejewska A, Frajberg M, Wianowska D. Development and validation of GC-MS/MS method useful in diagnosing intestinal dysbiosis. *J Chromatogr B Analyt Technol Biomed Life Sci.* 2019 Nov 1;1130-1131:121822.

5. Zheng P, Chen JJ, Huang T, Wang MJ, Wang Y, Dong MX, Huang YJ, Zhou LK, Xie P. A novel urinary metabolite signature for diagnosing major depressive disorder. *J Proteome Res.* 2013 Dec 6;12(12):5904-11.

6. Valles-Colomer M, Falony G, Darzi Y, Tigchelaar EF, Wang J, Tito RY, Schiweck C, Kurilshikov A, Joossens M, Wijmenga C, Claes S, Van Oudenhove L, Zhernakova A, Vieira-Silva S, Raes J. The neuroactive potential of the human gut microbiota in quality of life and depression. *Nat Microbiol.* 2019 Apr;4(4):623-632.

7. J.R. Lenchner; C.Santos. Biochemistry, 5-Hydroxyindolacetic acid. *StatPearls* (internet). 5.1.2023. PMID: 31869148.

8. Mishima Y, Ishihara S. Enteric Microbiota-Mediated Serotonergic Signaling in Pathogenesis of Irritable Bowel Syndrome. *Int J Mol Sci.* 2021 Sep 23;22(19):10235.

9. Mahdavifar B, Hosseinzadeh M, Salehi-Abargouei A, Mirzaei M, Vafa M. Dietary intake of B vitamins and their association with depression, anxiety, and stress symptoms: A cross-sectional, population-based survey. *J Affect Disord.* 2021 Jun 1;288:92-98.

10. Chen JJ, Bai SJ, Li WW, Zhou CJ, Zheng P, Fang L, Wang HY, Liu YY, Xie P. Urinary biomarker panel for diagnosing patients with depression and anxiety disorders. *Transl Psychiatry.* 2018 Sep 19;8(1):192