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Opinion Article

Prevention of Depression through Diet Interventions

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ABOUT THE STUDY

A multifaceted disease like major depression has a complex aetiology, and the metabolome represents this interaction between the genome and exposome at the molecular level. We used circulating metabolites and ultra-high performance liquid chromatography/tandem accurate mass spectrometry (UHPLC/MS/MS) based Metabolon platform to conduct a metabolome-wide association study in 13,596 participants from five European population-based datasets defined for depression. We investigated the relationship between 806 metabolites, which span a wide range of metabolic activities, and depression. These processes included those related to lipid, amino-acid, energy, carbohydrate, xenobiotic, and vitamin metabolism. We found 8 metabolites, including 6 novel ones that were substantially related with depression in a conservative model that controlled for lifestyle variables, cardiovascular disease, and antidepressant prescription use.

The most prevalent psychiatric disorder, with a lifetime prevalence of 11%–15%, is depression. The recent COVID-19 pandemic has been associated with a substantial rise in the incidence of depression globally, and as the pandemic's impacts continue to spread, this prevalence is expected to rise even more. The molecular causes of depression are still unknown. There are 87 genetic variations known to be related with depression, with the heritability being estimated to be approximately 40%. Other environmental risk factors for morbidity include smoking, poor diet, and low education. There is more and more proof that nutrition affects mood. Along with other neuro-psychiatric illnesses, depression frequently co-occurs with systemic diseases such arthritis, diabetes, and cardiometabolic disease.

Although depression is typically thought of as a brain condition, it is linked to metabolic abnormalities in blood circulation that may be explained by changes in nutrition, weight gain or loss, or changed gut metabolism. Studies of depression using metabolomics, which capture the post-genomic, post-lifestyle, post-pathology, and post-medication impacts, are gaining more and more attention. The gut-brain axis, or the bidirectional signalling between the gut, its microbiota, and the brain, is a fresh explanation for why circulating metabolites may be involved in depression.

Studies on depression using metabolomics have been modest, and results have not always been reliable. Nevertheless, a growing body of evidence suggests that depression is linked to elevated levels of glutamate, lactate, alanine, isobutyrate, and sorbitol and decreased levels of kynurenine, gamma aminobutyric acid, phenylalanine, tyrosine, creatinine, hypoxanthine, leucine, tryptophan, N-methylnicotinamide, β-aminoisobuty A proton nuclear magnetic resonance metabolomics platform was used in our investigation of 5,283 depressed patients and 10,145 healthy controls from nine Dutch cohorts to identify 21 cardiometabolic metabolites that are strongly associated with depression. An unfavourable spectrum of metabolites linked to cardiometabolic morbidity and mortality falls under this category, including apolipoprotein A1 and B, very-low-density and high-density lipoprotein cholesterol, di- and triglycerides, unsaturated fatty acids, fatty acid chain length, acetate, glycoprotein acetyls, tyrosine, and isoleucine.

The majority of these 53 metabolites, including those in the monoamine and neurotransmitter pathways (serotonin, kynurenate, and glutamate), were explained by the use of antidepressants. We found six metabolites to have novel relationships with depression, including retinol (vitamin A), 4-hydroxycoumarin, 2-aminooctanoate, 10-undecenoate (11:1n1), 1-palmitoyl-2-palmitoleoyl-GPC (16:0/16:1), and 1-linoleoyl-GPA (18:2). We also confirmed the relationships between hippurate and mannitol/sorbito We discovered that there may be a causal link between hippurate and depression and that the antidepressant escitalopram can change hippurate levels. In the UKB study, when the main dietary sources of these metabolites were analysed, it was discovered that depressed people consumed much less fresh fruit, which is a key source of hippurate, and significantly more retinol (vitamin A), compared to those who were not depressed.

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