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LETTER TO THE EDITOR: THE ROLE OF NUTRITIONAL THERAPY AND NUTRIENTS IN THE TREATMENT OF MENTAL DISORDERS – A FUNCTIONAL MEDICINE PERSPECTIVE

DEAR EDITOR,

Mental disorders represent an increasingly complex public health challenge. While psychopharmacology and psychotherapy remain the cornerstones of treatment, these approaches often leave significant residual symptoms or fail to achieve full remission. Over the past two decades, I have witnessed a growing need for complementary strategies that address not only the symptoms, but also the underlying biochemical imbalances that can contribute to psychiatric conditions. Functional medicine offers a framework for such an approach. It is a systems-based, individualized model of care that uses laboratory testing, genetic analysis and targeted nutritional interventions to address root causes. Although more discussed and applied in other medical fields, its integration into psychiatry remains limited—particularly in Finland—despite an expanding body of evidence supporting its use as an adjunct to conventional treatment.

INTRODUCTION

The European Council has stated that all EU citizens are entitled to quality nutritional care (1), a principle supported by the WHO, ESPEN (2) and the Finnish National Nutrition Council. Micronutrient deficiencies remain common even in developed countries (3), affecting high-risk groups such as the elderly, people with obesity or low income, those with malabsorption disorders, smokers, heavy alcohol users and many patients with mental disorders (4). Stress, restrictive diets, medications and poor dental health further compromise nutritional status. In our Finnish study, 82% of patients with chronic pain and depression had nutrient deficiencies, and all had at least suboptimal levels (5).

Malnutrition disrupts body composition and physiological functions, impairs recovery and cannot be corrected by medication alone. Nutritional therapy—combining dietary changes with individualized supplementation—can accelerate recovery, improve quality of life and prevent chronic disease cost-effectively (2,6-8). Optimizing nutritional status should be prioritized alongside other therapeutic interventions (1-2,6-8). The WHO classifies nutritional disorders as a distinct disease group in the ICD-10. Among dietary approaches for depression, the Mediterranean diet has the strongest evidence (9-10), followed by the MIND diet and plant-based wholefood diets. Nutritional interventions are most effective when integrated with other pillars of lifestyle medicine, including physical activity, stress management, sleep optimization, substance abstinence and social connection (11).

WHY NUTRITION MATTERS FOR THE BRAIN

The human brain is metabolically demanding, requiring a constant supply of specific nutrients for optimal neurotransmitter production, energy metabolism and structural integrity. Even subclinical deficiencies—especially when combined with genetic vulnerabilities—can have profound effects on mood, cognition and resilience to stress. (6-8,12-13)

While general dietary advice is valuable for overall health, it rarely identifies or corrects individual nutrient deficiencies. Laboratory testing can reveal specific shortfalls in vitamins, minerals, fatty acids or amino acids, even when standard blood work appears “normal.” Moreover, genetic variants can impair nutrient utilization, increasing requirements beyond population averages. (6-8)

KEY NUTRIENTS IN MENTAL HEALTH

1. VITAMINS – NEUROTRANSMITTERS, ENERGY METABOLISM AND ANTIOXIDANT DEFENCE

Vitamins play a crucial role in supporting brain function and mental health (6-8,12-14). They are essential for neurotransmitter synthesis, methylation, energy metabolism and antioxidant defence (6-8,12-14). Subclinical deficiencies may increase the risk of mental health disorders, particularly when genetic variants (SNPs) impair metabolism (6,8,16-19). Pharmacological doses are often (e.g. when SNPs) required for therapeutic effect (8,17-19).

The most relevant vitamins are B3, B6, B9, B12 and D (6-8,12-15,19). Vitamin B3 (niacin) is a precursor to NAD, nicotinamide adenine dinucleotide (oxidized form) and NADH (reduced form), which is vital for mitochondrial energy production and neuronal function (6-8). Its deficiency has been associated with dementia, depression, bipolar disorder, schizophrenia and pellagra (6-8).

B6, B9 (folate) and B12 are essential for methylation and neurotransmitter synthesis; deficiencies are linked to depression, anxiety, sleep disorders and dementia (6-8,12-15). Vitamin D influences serotonin receptor activity and acts as a neurosteroid (6,13,19). Low levels are linked to depression, and calcitriol (1,25D) acts as a gene regulator (6,8,12-15,19).

2. MINERALS AS COFACTORS

Minerals are critical cofactors in neurochemical reactions (6-8,12-13). Deficiencies may disrupt neurotransmitter balance, energy metabolism and neural function (6-8,12-13,19). Magnesium, zinc and iron are among the most relevant minerals for mental health (6-8,12-13).

Magnesium participates in over 600 enzymatic reactions, modulates NMDA (N-methyl-D-aspartate) receptor activity, and has calming effects and supports stress resilience (6-8,12-13,19). Magnesium is often deficient in individuals with depression, anxiety and sleep disturbances (6-8,12,13,19).

Zinc is essential for synaptic plasticity and BDNF expression (13). Low zinc is linked with depression, anxiety, schizophrenia, autism and cognitive dysfunction (6,8,12-14,19).

Iron is required for dopamine and serotonin synthesis (6,14). Even without anaemia, iron deficiency may impair mood (6,8,12-13,19). Measuring functional markers, such as magnesium and zinc in red blood cells and transferrin saturation for iron, provides a more accurate assessment than relying solely on serum values (6,19).

3. AMINO ACIDS AND NEUROTRANSMITTERS

Amino acids are building blocks of neurotransmitters, and deficiencies can lead to significant mood disorders (12,19).

Key compounds include tryptophan, tyrosine, glycine, taurine, glutamine, SAMe (S-adenosyl methionine) and L-carnitine (12,13).

Tryptophan, a serotonin precursor, is associated with depression, insomnia and irritability when deficient (12,13). B6, magnesium and vitamin C are necessary cofactors (6). Tyrosine is a dopamine and norepinephrine precursor, and low dopamine is associated with apathy, inattention and withdrawal (8,12).

Glycine and taurine act as precursors for GABA and glutathione and have calming, neuroprotective effects (6,8,14). Glutamine supports gut barrier integrity and GABA synthesis, benefiting both intestinal and central nervous system function (6,8,19).

SAMe and L-carnitine are involved in methylation, mitochondrial energy and detoxification, and may relieve depressive symptoms (12,14,19). L-carnitine also supports serotonin receptor function (19).

4. OMEGA-3 FATTY ACIDS – EPA AND DHA

The brain's lipid-rich structure depends heavily on docosahexaenoic acid (DHA), which maintains membrane fluidity and neuronal integrity (6,8,20). Eicosapentaenoic acid (EPA) has potent anti-inflammatory properties and plays a key role in mood regulation (6,8,20). Strongest evidence exists for depression, some for perinatal/postnatal depression, and weak evidence for bipolar disease and ADHD. The 60/40 ratio of EPA/DHA is suggested by some studies but not definitively established as optimal for all these disorders (10,20). An optimal omega-3 to omega-6 ratio is essential, as the typical Western pattern of high omega-6 promotes neuroinflammation (4,6,8,10,20).

GENETIC POLYMORPHISMS AND MENTAL HEALTH

Single nucleotide polymorphisms (SNPs) may alter enzyme and protein function (6,8,19).

Certain SNPs affect nutrient metabolism and predispose to mental disorders (6,8,16-19).

Two of the most studied, and found in over 50% of Caucasians (6,21), are COMT (catechol-O-methyltransferase) and MTHFR (methylene tetrahydrofolate reductase) (16-17).

COMT Val158Met (rs4680) alters the breakdown of dopamine, epinephrine and norepinephrine in the prefrontal cortex (8,19, wikipedia). The Val/Val genotype degrades

catecholamines faster, potentially reducing dopamine and increasing anxiety, depression and amotivation (8,19, wikipedia). By contrast, the Met/Met genotype leads to slower degradation and reduced GABA, increasing vulnerability to stress, insomnia and mood disorders, and in some studies to violence and suicide in schizophrenia (8,16,19, wikipedia).

Tailored nutrition can diminish mental symptoms: Fast metabolizers may benefit from dopamine precursors (e.g. tyrosine, iron, B6, vitamin C), while slow metabolizers may need magnesium, zinc, SAMe and methylation support: B2, B6, 5-MTHF (active folate), methylcobalamin (active B12) (6-8,19,21).

MTHFR C677T (rs1801133) and A1298C (rs1801131) impact folate metabolism and methylation (17). These common polymorphisms have been associated with several psychiatric disorders, including major depression, schizophrenia, bipolar disorder, and, to a lesser extent, autism spectrum disorders and cognitive decline (17-19). Support includes 5-MTHF (not folic acid), methylcobalamin, B2, B6 and betaine (TMG) (6-8,18,19,21).

Laboratory markers to guide treatment include homocysteine, B12, folate, magnesium, zinc; or SNP testing (COMT, MTHFR) (6–8,18,19).

CLINICAL INTEGRATION

In my own practice, integrating functional and conventional approaches has transformed treatment outcomes, particularly in complex, treatment-resistant cases. Laboratory-guided nutritional interventions can complement or even replace pharmacotherapy, often reducing side effects, improving symptom control and enhancing patient quality of life.

A typical functional assessment includes evaluating nutrient status, inflammation markers, oxidative stress, and—when indicated—gut and genetic testing (8,19). Interventions are then tailored to the individual, addressing deficiencies, optimizing biochemical pathways, and restoring gut health when needed (6-8,19). This is not an alternative to psychiatric care but a complementary, evidence-informed strategy that aligns well with precision medicine principles (1-2,6-8,19).

A CALL TO THE PSYCHIATRIC COMMUNITY

Given the high burden of mental disorders and the limitations of current treatments, it is time to expand our clinical toolkit (12–14).

Nutritional therapy—particularly when guided by laboratory and genetic testing—offers a low-risk (6–8,15,19,22-27), potentially high-impact avenue for improving outcomes (9,10,12–15,18, 20,22-26).

The mechanisms are biologically plausible, the interventions are generally safe, (6-8, 19, 22-28) and the potential benefits extend beyond symptom relief to overall health and resilience (6–8,12–15,19, 22,24–26). The most common side effects are mild gastrointestinal symptoms. Excessive intake of vitamin B6 may cause neurological adverse effects, including sensory neuropathy (7).

Emerging evidence also suggests that integrative and functional medicine approaches are not necessarily more expensive but may be cost-effective compared to standard care by reducing symptom burden, lowering long-term medication and healthcare utilization, and improving quality of life (29-30). More research is needed.

My 21 years of experience in medical nutrition care, including the past 9 years integrating functional and conventional approaches, and working with approximately 800 patients (50% in 2 central hospitals and 50% in private clinics) with mental health problems, have convinced me of the value and cost-effectiveness of this model. I invite my colleagues in psychiatry to consider the role of targeted nutritional strategies—not as a replacement for established treatments, but as a complementary pathway to help more patients achieve recovery.

Sincerely,

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