Nutritional Aspects of Depression: An Update

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By Jurriaan Plesman BA(Psych), Post Grad Dip Clin Nutr

Conventional treatment for depression or mental illness still revolves around either drug therapy psychotherapy or both. The two could well be in conflict. Drug therapy – that appears to treat symptoms only – indicates that we are dealing with a biochemical imbalance. Drug therapy has generally poor results, among those 40 percent of patients who do not appear to respond to medication.

“In one study of 96 antidepressant trials conducted between 1979 and 1996, no difference could be determined between the effects of antidepressants and sugar pills in some 52 percent of trials.” Kahn 2002, Kirsch I 2002. See also Effects of SSRIs

As an alternative, psychotherapists tend to assume that talk therapy can treat the negative thought processes in depression, when they believe these to be causes of depression, instead of symptom: illness is primarily a biological disease, talk therapy cannot be expected to cure endogenous depít as it cannot cure schizophrenics from their hallucinations, or diabetics from their insulin resistance. A brain disease is expected to result in unique ‘psychological experiences’ that should not be mistaken for the disease.

As a reflection of the general dissatisfaction of mainstream medicine, including treatment of mental illness, one study alone has estimated that in Australia about 57 percent of medical consumers have flocked to ‘complementary’ health practitioners (Bensoussan 1999). It is not clear how many are visiting ‘complementary’ mental health practitioners. For other studies see “Alternative Medicine” in the file.

Because of the narrow mainstream psychotherapeutic model, a person suffering from depression himself in a no-win situation, when he gains little benefit from drug- and/or psychotherapy. But if we extend this ‘mainstream’ narrow therapeutic model to include non-drug Clinical Nutrition, the outlook for treatment is radically more optimistic. The reason is that Clinical Nutrition targets directly the biochemical disorders without recourse to drugs. When this is combined with the drug/psychotherapy model the illusive ‘cure’ of this disease will fall within the grasp of all those with a ‘mental’ problem.

This article will attempt to explain how clinical nutrition can contribute to the treatment of mental illness. It is hoped that every therapist – medical, psychiatric or psychological – will be trained in this branch of psycho/medicine as part of their formal education and qualifications as we enter the twenty-first century.
Depression is a potentially life-threatening mood disorder that affects up to 10% of the population, or approximately 17.6 million Americans each year. In addition to considerable pain and suffering that interfere with individual functioning, depression affects those who care about the ill person, sometimes destroying family relationships or work dynamics between the patient and others. The economic cost of depressive illness is estimated at $30-44 billion a year in the United States alone. The human cost cannot be underestimated."

Symptoms of Depression
Most people may experience feelings of sadness and despondency, but when these feelings become intense and protracted we may well be considering pathological depression. This is especially so when no discernible external cause, such as bereavement or disappointment, can be related to the depression. This kind of depression is often called endogenous depression ("grown from within"), characterized by anguished (dysphoric) mood, anxiety, irritability, fear, worry, brooding, appetite and sleep disturbance, weight loss, lethargy, difficulty in concentrating and feelings of utter worthlessness. The causes of the disorder are multiple and complex and may involve biologic, psychologic, interpersonal and sociocultural factors. Traditional treatment includes the use of antidepressant drugs, rarely now-a-days electroconvulsive therapy (ECT), then followed by long-term psychotherapy. Major depression affects up to one sixth of the population. Over the course of a lifetime, depression occurs in approximately 20 percent of women compared with 10 percent of men (Doris). Here we will mainly concentrate on the possible connection between depression and nutrition.

Depression is often a symptom of other disorders, as in schizophrenia or manic-depressive reactions. In fact, any degenerative disease may have depression as a comorbid condition. Thus if we want to treat depression the first step is a visit to the doctor for a thorough medical check-up to exclude any possible medical condition that may contribute to depression. A diagnosis of hyper- or hypothyroidism, Ulcerative C, Crohn’s Disease, Coeliac Disease, Fibromyalgia, Multiple Sclerosis, Lupus, Arthritis, subclinical Parkinson’s Disease, or Alzheimer’s Disease, low levels of hydrochloric acid in the stomach (achlorhydria), rat zinc/copper levels, low DHEA, testosterone, pregnenalone, growth hormones and so on, can contribute to the development of depression.

The brain being extremely sensitive is usually the target organ of the body to suffer first in nutritional disorders. Depression may also be accompanied by other problems, such as phobias. Psychotic depression is characterized by more severe symptoms. Typically, sleep is disturbed, with problems of waking up in the morning. It may affect appetite and lead to anorexia (pathological loss of appetite) and decreased sex drive. Thus the causes are legion. IF DEPRESSION IS SEVERE SEEK IMMEDIATE MEDICAL HELP!

Psychological Aspects of Depression
If a person is always frustrated in achieving his objectives and continually thwarted in his ambition without saying that he may become depressed through sheer exhaustion. Although exhaustion is physical aspect, failure to reach one’s goals may be related to personality problems. Some studies shown that stress interferes with the synthesis of serotonin – our ‘feel-good’ neuro chemical in the brain (Research Evidence for Hypoglycemia –> Stress).

Some authors argue that the greater prevalence of women’s depression is due to the cultural limit placed on women in society, and that this is more pronounced among those women who have experienced gender discrimination within their family. (Bhatia). Constant failure to achieve one’s goal will lead to frustration and physical exhaustion. A person may not relate well with other people and find it difficult to co-operation. He may have a perfectionist streak in him – never happy with the results of his own work, even less with those of others. He may have communication problems either in sending messages to or receiving them from others. She may fail to be assertive in a way without upsetting other people or getting angry. Some unhealthy work environments contribute to depression.
A common feature in this psychopathology is a low self-esteem, which unwittingly puts a person on his defensive, provoking negative feedback from others. If the depression is seen as being caused by psychological aspects or personality problem, a course in psychotherapy would be the most appropriate step (See Psychotherapy). However, depression is caused by ill-health or some metabolic disorder.

The Genetic Influence on Depression.

When we speak of genes predisposing us to depression, we usually gain the impression of inevitability. In the Molecular Psychiatry, October 23, 2002, Norio Ozaki and colleagues found a mutation in the Serotonin Transporter Gene (hSERT) in a sample of families having various mental disorder such as phobias and Obsessive Compulsive Disorder (OCD). They write:

“6 of the 7 individuals with the mutation had OCD or OC personality disorder and some also had anorexia nervosa (AN), Asperger’s syndrome (AS), social phobia, tic disorder, and alcohol or other substance abuse/dependence. Researchers found an unusual cluster of OCD, AN, and AS/autism, disorders that have the mutation in approximately one percent of individuals with OCD.” A supplement of BCAA’s can benefit people with a rare form of autism

However a research team led by Caspi A, Moffitt T, found that the expression of the faulty Serotonin Transporter Gene would only occur following a long period of stress. Each person carry two copies of the serotonin transport gene (called by them 5-HTT gene). A short version of the gene carries with it a risk of depression. Those who had inherited two short versions of the gene were the most vulnerable to depression if exposed to a period of stress. They write:

“In the study, of 847 people, 17 percent (147 individuals) carried two short copies, the least protective option, while more than 31 percent (265 individuals) had the most protective possibility. Between these extremes, 51 percent (435 individuals) carried one stress-sensitive and one protective copy of the gene.”

“Among study subjects with at least one copy of the short, vulnerability-conferring variant of the 5-HTT gene, who had experienced multiple stressful life events, 33% became depressed. Among study subjects with two copies of the short variant with multiple stressful experiences, 43% became depressed. By contrast, among those with two copies of the protective, long variant, only 17% became depressed.”

In other words even those people with the least protective copies of the genes (two copies of the 5-HTT) did not develop depression despite a long period of stress.

Because studies have found an association between insulin resistance and depression, a diabetic gene may also be involved.

Although knowledge of genetic influences on mental illness is important, it may not provide us with practical means from a therapeutic point of view. The question remains how are you going to treat faulty genes.

What is important is that experiences of stress may trigger depression in those with a genetic predisposition to depression. But stressors are of two kinds: biological and psychological. Psychological stressors described in brief above.

Hypothyroidism as a factor in depression

The thyroid glands located at the base of the neck control the rate of metabolism and all chemical processes of the body slow down in hypothyroidism. Hence, it is often associated with overweight and obesity.

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But biological stressors are just as important, but these cannot be treated by psychological means to be treated by medico-nutritional means, at the root of one’s biochemistry and preferably without drugs.
thyroid function may also be an important factor in chronic fatigue and depression. The incidence of this disorder increases after the age of thirty and is 5 to 10 times more frequent in females (Bhatia). One way of testing hypothyroidism is to take your temperature in the morning before coming out of bed. If your temperature is consistently below 36.2°C or 97.6°F over a number of days, you could be suffering from hypothyroidism. Besides causing obesity other symptoms are; feeling cold when others feel warm, constipation, hoarseness, lethargy in the morning, depression, loss of hair, brittle nails, dry skin, palms and puffy eye-lids.

Incidentally, it is claimed that hypothyroidism may also be the cause of high cholesterol, blood circulation problems and heart disease (Barnes et al., 1976). It has also been associated with such disorders as hypoparathyroidism (underactivity of the parathyroid glands with decrease in serum calcium levels causing tetany), pernicious anemia (results from the inability of the bone marrow to produce normal red blood cells). This may also be due to a deficiency of B12 (‘cyanocobalamin’) and/or folic acid, vitiligo (defective skin pigmentation), rheumatoid arthritis, myasthenia gravis (fatigue of voluntary muscles, especially those of the eye) and chronic hepatitis. Hypoglycemia – or low blood sugar levels – may also result from hypothyroidism. We will return to this later.

Treatment of hypothyroidism

The doctor usually confirms the condition by a blood test, but most nutritional doctors believe that laboratory tests are not accurate enough to detect sub-clinical hypothyroidism and that low body temperature is a more reliable indicator, other causes of abnormal temperature being excluded. Hypothyroidism also occurs in Hashimoto’s disease, a rare disorder that is caused by an auto-immune destruction of the body’s thyroid by antibodies circulating in the blood. If there is a marked thyroid deficiency the doctor may prescribe thyroxine tablets. The dose needs to be carefully calibrated and can help the doctor by taking your temperatures in the morning. Thyroxine is only one of the hormones secreted by the thyroid gland. This drug may be considered a replacement for the natural compound produced in the body and should not give any side effects. Yet some people with angina problems cautioned when taking thyroid medication and should be carefully monitored.

Sometimes hypothyroidism is caused by a deficiency of the thyroid stimulating hormone (TSH) produced by the pituitary gland. Thus an accurate diagnosis by a qualified doctor is needed when dealing with hypothyroidism. Iodide in food is transported to, trapped in and concentrated by the thyroid cells. It combines with tyrosine (an amino acid derived from phenylalanine – protein source) to form thyroxine (T4) and triiodothyronine (T3) which is stored by the gland. High levels of T3 and T4 will suppress the secretion of thyroid stimulating hormone (TSH) from the pituitary gland. Thus a balance is maintained.

Nutritional aids in thyroid therapy

There is some doubt whether nutrition alone will help to overcome the problem of hypothyroidism. Nutritionally, thyroxine production depends on a complex range of nutrients. Iodine is one of the precursors of thyroxine. This is contained in kelp and iodized salt. It is said that vitamin A – retinol – and not the carotene form is essential in converting iodine into thyroxine. The liver can’t convert carotene to vitamin A in the absence of thyroxine or in hypothyroidism. Kirschmann, 14) Vitamins B2, 3 & 6 and C are required for absorption of iodine. A B1 (thiamine) deficiency alone can cause hypothyroidism. Vitamin B12 cannot be absorbed with a deficient thyroid gland. Copper is required for the production of TSH from the pituitary gland. Foods that interfere with the uptake of iodine are: cabbage, kale, Brussels sprout, cauliflower, broccoli, kohlrabi, turnips, rutabaga, rapeseed, brown (Indian), black, or white mustard, garden cress and radish, soybeans, skins of peanuts, almonds, and cashews. Thus when eating these foods frequently one should take extra iodine supplementation. The first choice should be kelp if it is tolerated. The following chemical substances inhibit iodine uptake; sulfa, anti diabetic drugs, prednisone, estrogen, smoking (thyocyanide inhibitor) and fluoride (thyro suppression).

Hypothyroidism and tyrosine deficiency

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It is interesting that tyrosine – a non-essential amino acid – is a precursor to thyroid, adrenocortical hormones and to dopamine. It is also a precursor of melanin – pigment found in hair, skin and the eye (Wintrobe, 615). Vitiligo is the disorder of melanin distribution on the skin and could be related to hypothyroidism. Deficiency of tyrosine may show up as having low body temperature, low blood pressure and ‘restless legs’. The body can produce tyrosine from an essential amino acid called phenylalanine; that is, humans derive the latter from the diet – mainly a high protein diet. (Rich & Deficiency of the latter lead to a variety of symptoms including bloodshot eyes, cataracts and behavioral changes. Phenylalanine is also the precursor (via tyrosine) of dopamine, then on to norepinephrine (epinephrine (adrenaline) – a deficiency of these may lead to depression – indicating that it affects in a fundamental way. Low levels of hydrochloric acid in the stomach (hypochlorhydria) may slow the digestive process of amino acids including phenylalanine. Sodium of bicarbonate is needed to alkalinize the duodenum for digestion of foods leaving the stomach. (Sodium bicarbonate should only be taken under the doctor’s supervision as it is counter indicated in some serious illnesses; GI ulcers, congestive heart failure, low blood volume (hypovolemia) and electrolyte imbalance).

Thyroid deficiency may be treated naturally with supplementation of phenylalanine or tyrosine. It could also be the treatment for depression, we are killing two birds with one stone. However, supplementation should be under the supervision of a doctor as excessive dosage may produce toxic effects. Animal studies have shown that when phenylalanine is taken in large doses – in excess of 3 percent of diet – an amino acid imbalance may cause tyrosine toxicity (Agric. Biology etc. 1982), however this is not a problem in the human diet. Phenylalanine can aggravate a preexisting pigmented melanoma (a type of skin cancer) (Pearson et al. 1982, 136). Some studies have suggested that schizophrenia may be due to an error in dopamine metabolism. As phenylalanine is a forerunner of tyrosine and then of dopamine, administration of L-Dopa (which passes the brain barrier, not dopamine) together with antioxidants may help some schizophrenics according to Pearson. (Pearson et al. 1982, 135 for more details)

Neither phenylalanine nor tyrosine should be supplemented in individuals taking monoamine oxidase (MAO) inhibitors, (Chaitow, 1985, 58).

Dosage: For depressive states 100mg to 500mg of L-phenylalanine per day. Results should show in a few days. Caution: hypertensive individuals should start from around 100mg daily and blood pressure should be checked. People suffering from phenylketonuria – a disease caused by a defective enzyme – phenylalanine hydroxylase – converting phenylalanine to tyrosine are accumulating phenylalanine at toxic levels and should avoid it at all cost. It is essential to consult a doctor when considering taking phenylalanine or individual nutrients.

I always prefer that nutritional supplements be provided from a natural diet. Supplements may not target nutritional deficiencies as explained in the article: “Hit or Miss Supplements for Depression.” Go to MAO inhibitors

MAO inhibitors

Monoamine oxidase (MAO) is an enzyme in the brain which degrades the monoamine neurotransmitters dopamine, norepinephrine (NE) and serotonin. This enzyme functions to maintain proper levels of these beneficial neurotransmitters contributing to our mental health. This enzyme increases in activity with age, lowering the levels of the neurotransmitters available to the brain. Hence older people are more depressed. When doctors prescribe MAO inhibitors – e.g., iproniazid, isocarboxazid, phenelzine and tranylcypromine – they attempt to inhibit this enzyme thereby increasing the concentration of the neurotransmitters.

However, these drugs need to be administered with caution. They can cause hypertensive crises (high blood pressure), interact with other depressants, or hypotensive drugs and they react with many foods and beverages such as cheese, protein extracts, soy sauce, pickled herrings, and red wine. People with cardiovascular disease and those with hepatic (liver) and renal (kidney) insufficiency are especially at risk with MAO inhibitors. Some side effects are insomnia, agitation, dizziness, low blood pressure when...
lying position (sleep), constipation, dry mouth, blurred vision, difficulty in urination to mention a few. Pearson and Shaw (1982, 184) reported that procaine – or the procaine compound Gerovital (GH3) developed by Dr Anna Aslan of Romania – is a mild reversible MAO inhibitor. Procaine – GH3 or K (Shering P/L) in Australia – does not seem to require the precautions of synthetic MAO inhibitors. Phenylalanine and KH3 may be a very effective natural anti-depressant. They reported that; “Phenylalanine was twice as effective as the current prescription ‘drug of choice’ for depression, imipramine, in clinical tests” (MacFarlane, 1975).

Natural sources of phenylalanine: soybeans, cottage cheese, fish (especially trout), meat, liver, lan almonds, Brazil nuts, pecans, pumpkins, sesame seeds, lima beans, chickpeas and lentils. (Chaitow 61). Note: soybeans and almonds are said to interfere with iodine uptake above.

Hypoglycemia

Much has been written and spoken of the much maligned and misunderstood hypoglycemic condition. Over 62% of people diagnosed as being hypoglycemic have been reported to suffer from depression and insomnia. (For association of hypoglycemia and depression go to Research file and look up <depression>). Thus hypoglycemia must be regarded as an important cause. The explanation is simple. When the blood sugar level drops below a certain level, the brain is starved of its source of energy – namely glucose. When the brain is suddenly starved of glucose, the pituitary gland sends an urgent message to the adrenal glands to pour into the blood stream. Adrenaline is a hormone that rapidly converts glycogen – or stored liver sugar – into glucose, thus raising the blood sugar level. However, adrenaline is the fight/flight hormone, readying the body for quick action in case of danger. Thus the sudden presence of adrenaline in the blood stream wakes up the poor sleeper – usually in the early morning. Psychiatrists and other orthodox psycho-oriented practitioners often interpret this by claiming that ‘the patient is the worrying type’. Thus depression and insomnia are often found together. Medical practitioners can diagnose the diagnosis of hypoglycemia by taking a four hour Glucose Tolerance Test.

One such a test has been designed by Dr George Samra. See: GTT. The nutritional doctor is not so interested in the low level of blood glucose, but rather in the rate of descent of blood sugar in response to insulin production by the pancreas. If the fall in blood glucose is over 2.6 mm/l in any one hour or 1.6 mm/l in any half hour, the brain is starved of glucose with all the pseudo-psychological consequences, including depression (Samra, 2004, 67).

Depression, as seen as a symptom of hypoglycemia, naturally suggests that a strict hypoglycemic diet is the main remedy against depression. Indeed this is the first step in the treatment of depression. The hypoglycemic diet consists of three hourly, high protein snacks, the avoidance of sugar, coffee, white bread and cakes, and should be supplemented with high potency B-complex vitamins and Vitamin C. The vitamins should also contain chromium and zinc. Sometimes some symptoms of hypoglycemia can be overcome by the taking of one table spoon of glycerine mixed in milk, fruit juice or even water with a dash of lemon juice. Glycerine is not recognized by the pancreas as sugar, so does not stimulate the over-production of insulin. Fructose has a similar biochemical pathway as glycerine but excess fructose may result in high triglyceride levels. If so, increase niacin and fish oil supplements. However, it is of little use to people who are allergic to either glycerine or fructose. Many people can obtain a peaceful night with glycerine. Others find that simply taking vitamin B1 (thiamine) involved in glucose metabolism gives them a peaceful night’s sleep. Some find help in vitamin B-5 (pantothenic acid) or magnesium. Nicotine, caffeine and alcohol cause the liver to produce drug antagonists – ie., stimulants – usual form of adrenaline. This destabilizes the blood glucose levels and consequently affects the energy the brain. Hence people suffering from depression are discouraged from taking these drugs, quite a host of other ill effects. References for Mood Disorders and Nutrition
Tryptophan and vitamin B6 (Pyridoxine)

Depression can also be caused by the body’s inability to produce a neurotransmitter called serotonin, which is normally synthesized in the body from other substances. Serotonin is a natural tranquilizer produced within the body from food. Tryptophan – an essential amino acid and building block of protein – forerunner of serotonin. See Figure 1. Thus a low protein diet, typical of hypoglycemics, causes a deficiency. Studies have shown beneficial effects in the treatment of depression by administering tryptophan, 4-6 gms daily. Protein should be avoided for 90 minutes before and after administration, uptake can be improved with – of all things – sugar. An alternative is 5-HTP, an intermediate in serotonin production, that can be taken any time. But see “Hit or Miss article”. Insulin improves absorption lowering levels of competing amino-acids.

![Figure 1](image)

Without sufficient tryptophan we cannot produce serotonin. Tryptophan is converted to serotonin – our natural calming agent – in the presence of vitamin B6 (Pyridoxine). When there is a deficiency of vitamin B6 tryptophan may be transformed into excessive xanthurenic acid which may cause cancer (bladder), attack the pancreas and cause diabetes. A B6 deficiency can cause sleepless nights. Now it happens to be that B6 (pyridoxine) is also involved in ridding the body of toxins. There is speculation that people with a vitamin B6 deficiency – as among drug addicts – cannot remember their dreams. Hence any drug or the presence of toxins will use up all our vitamin B6, so that we have none left to convert tryptophan to serotonin.
People on anti-psychotic drugs also need higher doses of vitamin B6. Detoxification is also aided by vitamin C. But when taking medications please discuss these supplements with your doctor as supplements can counteract the desired effects of drugs.

To complicate matters a little further, tryptophan is also the forerunner of vitamin B3 (niacin), which is so important that the body considers its production to be more important than that of serotonin. It requires 60 mg of tryptophan to produce 1 mg of niacin in case of dietary niacin deficiency. (Kirschmann, 36 & 42). If you want to avoid the harmless side effects of flushing when taking niacin, take aspirin. A safer alternative vitamin B3 is inositol hexanicinate, also called hexanicotinate or inositol nicotinate, which does not give a flush. (Head KA (2000))

It could explain why niacinamide supplementation (another form of niacin) to schizophrenics sometimes be helpful to liberate the production of serotonin from tryptophan. Vitamin B3 deficiency can cause insomnia, mood swings, bedwetting in children, crying spells, anxiety, depression and affect sight.

Furthermore, tryptophan is needed in the absorption of zinc. Zinc absorption across the intestinal membrane requires its combination with picolinic acid produced in the pancreas from tryptophan. Murray et al, p 482. In Figure 1 this is shown by the arrow pointing to picolinic acid resulting in zinc absorption.

Consequently, supplementation with niacin, zinc and/or vitamin B6 could theoretically, at least, increase the available tryptophan for conversion to serotonin, which can then be converted to melatonin, the sleeping hormone. Although this information is somewhat complex, the practical aspects are that we can help ourselves to have a more restful sleep by 1) having three hourly high-protein snacks during the day, 2) having a snack before bedtime, 3) making sure that the body has sufficient vitamin C and B-complex vitamins, especially B1 and B6, 4) taking a tablespoon of glycerine before bedtime if insomnia persists, 5) taking commercially available tryptophan tablets and 6) taking vitamin B3 (Niacinamide or hexanicotinate) which may liberate the available tryptophan in the body for the production of serotonin and melatonin. A natural way of helping you to fall asleep is explained in: Sleeping Tablets and its Alternative. However, tryptophan supplementation may have adverse reactions and should be administered under the supervision of a doctor. In 1990 it was reported that the pill L-tryptophan was associated with a rare disease, eosinophilia myalgia syndrome (EMS). However, in the New England Journal of Medicine 357-365 (1990) it was found that the manufacturing process of one manufacturer resulted in the ingestion of an unidentified chemical substance that was associated with the EMS. It is a pity that authorities have kept this supplement away from the market.

**Natural sources** of tryptophan: Soya protein, brown rice, cottage cheese, fish, beef, liver, lamb, pumpkin, sesame seeds and lentils. See Sources file. See also Tryptophan at Index. Milk and cheese contain tryptophan and this is why a glass of warm milk before bedtime sends many people to sleep. That is, if you are not allergic to milk products! Warm milk combined with a tablespoon of honey is an ideal sleeping agent. Bananas and dates also provide tryptophan. Other good sources of tryptophan are chlorella or other green or blue algae tablets taken at bedtime to induce sleep (via serotonin production). Some people respond positively when they take vitamin B1 (thiamine) before bedtime. However, if you take vitamins you should be warned that the taking of vitamins after six o’clock – vitamin C – may keep you awake. These vitamins are involved in the production of many body metabolites, of which adrenaline is one. A good indication of vitamin B6 deficiency is the inability to recall dreams upon waking in the morning. By taking vitamin B6 you should recall your dreams. If you take too much, you may suffer nightmares. But we should remember that taking nutritional supplements, considered as ‘silver bullets’ therapy, may miss the target!! See Hit Supplements

**The Melatonin connection**
Looking at Figure 1 it is shown that serotonin is also the precursor of melatonin, a hormone produced in the pineal gland. (Wintrobe, 574). When the eyes perceive dusk – or darkness – it signals the pineal gland to produce this hormone which is closely related to our diurnal cycles of sleep and wakefulness. It has qualities that help reduce anxiety, panic disorders and migraines as well as induce sleep. Melatonin is a powerful antioxidant and is known to eliminate free radicals toxic to DNA. Thus sleeping restores immune system. Melatonin inhibits release of oestrogen thereby reduces risk of breast cancer. (JA Dec 1998, 31). It seems that a disturbance in the diurnal melatonin production causes depression, rather than the amount of melatonin in the body at a certain time. Studies have shown that exposure to early morning sunlight (between 7.00AM and 9.00 AM) for at least fifteen minutes is perhaps the powerful signal that “sets” the biological clock, thereby washing away depression. (The Burton Group, Also Google search <Light Therapy>.

There is some evidence that when people are exposed to artificial light – that is, light lacking the full spectrum sun light – the body cannot absorb certain nutrients and this contributes to fatigue, too depression, hostility, suppressed immune function, hair loss, alcoholism and drug addiction and cancer. (Ott, Roos). Studies have shown that students in classrooms with full-spectrum lights had lower absenteeism, higher academic achievements, diminished hyperactivity, compared with classes using ordinary fluorescent lighting. (The Burton Group, 322). It is claimed that taurine levels rises in the pituitary gland through exposure to full spectrum daylight. Lack of taurine may lead to mental impairment and depression. (Chaitow, 38)

The GABA connection

Minor tranquilisers known as benzodiazepines occupy special receptors in the synapses (junctions) of nerve cells. This can affect the function of a natural neurotransmitter called GABA or 4 amino-butyric acid. This is essentially a inhibiting neurotransmitter. Neurotransmitters are hormone-like chemicals controlling messages between neurons in the brain. The function of GABA is explained in 2.

Figure 2

GABA is produced by specialized cells. It fits neatly into receptor molecules of other cells and then to inhibit and control the release of dopamine from dopamine cells. Dopamine causes intense feelings of pleasure. Thus GABA regulate the release of dopamine which influences other cells to experience (or satisify). It is said that severely depressed people cannot experience pleasure and hence it is important to get some understanding from the relation between GABA and dopamine. Excess dopamine produces intense pleasurable rewards – produces addiction to substances that causes excess dopamine secretion. Cocaine addiction, the reabsorption of dopamine is blocked by dopamine cells, resulting in excess dopamine. This leads to intense pleasure and results in cravings for the same substance.
Nicotine, as an addictive substance, acts by occupying the GABA receptor sites on dopamine cells, thus causing increased dopamine production and addiction. It is plausible that ongoing dopamine synthesis causes dopaminergic exhaustion. Scientists from the Department of Chemistry, Brookhaven National Laboratory, Upton, NY 11973 carried out experiments with gamma-vinyl GABA – an inhibitor of GABA transaminase – to reduce production of dopamine even after administration of heroin or cocaine (Gerasimov). A new drug (acamprosate) appears to have a similar action, that stops craving for alcohol in alcoholism. This opens a new way for the treatment of drug addiction. I am not aware of any studies that have used tyrosine or phenylalanine supplementation in drug withdrawal programmes. As was shown before, the amino acids phenylalanine and/or tyrosine are precursor of dopamine. The conversion from dopa to dopamine is dependent on vitamin B6, again showing that a B6 deficiency causes depression. Studies are needed to show whether supplementation of phenylalanine, tyrosine will benefit people withdrawing from addictive drugs, including nicotine.

It is interesting that inositol and vitamin B3 (niacinamide) are said to occupy the same receptors and may explain why some people feel relaxed and sleepy when taking these nutrients (Pearson et al. 1982, 282). The body produces GABA from glutamic acid in the presence of vitamin B6 (pyridoxine). Glutamic acid cannot pass the lipid layer of the brain cell unless in the form of glutamine. When glutamine enters the brain cell it is converted to glutamic acid. In this form it can either 1) combine with ammonia – a highly toxic end-product of protein – to form glutamine, to be carried to the liver and then excreted as urea in the urine or, 2) combine with vitamin B6 to form GABA. Glutamic acid itself is an excitatory substance. Thus if there is deficiency of vitamin B6 there may be an excess of glutamic acid causing anxiety and restlessness; an excess of vitamin B6, too much GABA is produced causing one to feel tired and depressed (Vayda). Glutamine supplementation has been known to stop alcohol sugar craving (Rogers, 1957). However, some controversy about the use of glutamine has recently been reported, and it is best to only supplement with glutamine only under doctor’s supervision. (For further details, please Google search <glutamine site:www.mercola.com> for articles on this controversy.

It is important to realise that minor tranquilisers dispensed by doctors will ultimately aggravate the symptoms for which they were prescribed. Although drug therapy may have short term benefits in some instances, it is better to experiment with natural nutrients to achieve the same ends without the side effects.

**Toxic Metals**

Related to hypoglycemia is heavy metal intoxication. High levels of lead, mercury and cadmium interfere with the enzymes breaking down glucose into energy within the mitochondrion of cells that carry aerobic respiration and where the Krebs cycle is located. Heavy metals are said to replace zinc, a co-enzyme required in about 300 enzymes (Source). The result is symptoms that are practically indistinguishable from hypoglycemia – fatigue, insomnia and depression, even in the presence of normal blood levels. Dr Samra calls this “Cerebral Hypoglycia”.

Zinc deficiency also interferes with the conversion of vitamin B6 (pyridoxine) into its active form, pyridoxine-5-phosphate. (See Notes)

Often this can be prevented in our polluted environment by increasing zinc intake to prevent heavy metals from occupying substrate molecules in enzymes. Sunflower seeds, oysters and crustaceans are said to have a high zinc content. Foodstuffs containing mercaptan groups or sulphur containing compounds – onions, garlic and eggs – have the ability to claw out heavy metals from the body over a period of time. The amino acid methionine plus vitamin B6 is perhaps the most effective and natural way of detoxifying the body of heavy metals (1985, 55).
Anti-oxidant supplementation with vitamins A, E, C and selenium is also helpful. Toxic metals in the body are known to increase free radicals, which have been associated with cancer and against which antioxidants provide protection. Also zinc and copper intake should be in balance. A high copper levels in relation to zinc (about 3:1) may affect those enzyme requiring zinc. High zinc absorption can decrease copper absorption and vice versa, and both are essential minerals in nutrition and for general health. Werbach,, 1991, 315.

Allergies

Foods may cause mental and behavioural symptoms by a variety of mechanisms including cerebral food addiction, caffeinism, hypersensitivity to chemical food additives and reactions to amines in the subject of allergies remains controversial among the medical profession. The body’s unique o to a substance – foreign or not, internal or environmental, organic or chemical – causes stress which time will lead to exhaustion and overt illness, including depression. If allergy is a factor in the treatment of depression, then avoidance of the source of allergy is the most important treatment technique. There are several treatment approaches: avoidance, reduction of total load, rotary diet, desensitization, nutritional supplements etc. If you want to find your allergies as a home exercise by means of a daily food diary please read “Finding your Allergies”. Also Dr George Samra, The Allergy Connection, 2004.

Prostaglandins in allergies and disease

Much has been written about the role of prostaglandins in the mechanism of the immune system allergies. Prostaglandins – very active organic compounds derived from essential fatty acids – cause physiological effects in animal tissues. They act at very low concentrations to cause the contractile smooth muscles. Prostaglandins may have antagonistic effects on blood circulation: thromboxane A2 causes blood clotting while prostacyclin causes blood vessels to dilate. Both thromboxane A2 and prostacyclin derive from series 2 prostaglandins (2PGE) from arachidonic acid, usually rich in animal food sources. The series 2 prostaglandins have been associated with many ‘degenerative’ diseases such as arthritis and allergies.

The more beneficial prostaglandins – the series 1 prostaglandins or PGE1 – are known to prevent adhesiveness, inhibit inflammatory reactions, dilate blood vessels thereby improving blood circulation, control blood pressure, help in weight reduction, improve the effects of insulin, activate T lymph inhibit abnormal cell proliferation (Davies & Stewart, 1987, 113). Allergic people have low PGE1 as reason is that they may be deficient in cis-linoleic acid in the diet from which it is manufactured. Safflower oil contains 70 percent of linoleic acid and is therefore a rich source along with poppy seeds, sunflower, soybean corn etc.

An enzyme, delta-6-desaturase converts cis linoleic acid (cLA) to gamma linolenic acid (GLA) requiring the following vitamins and minerals; pyridoxine (B6), zinc, magnesium, B-complex vitamins and vitamin E (as an anti-oxidant). It is thought that some people have a deficient D6D enzyme and if this is so then Evening Primrose oil as this contain about 10 percent of GLA. Other plant sources borage (Borago officinalis) and blackcurrant (Ribes nigra). These are all forerunners of the series 1 prostaglandins. It is hoped that supplementation with the omega-6 essential fatty acids will bring order into the erratic behaviour of the immune system.

The Omega-3 Phenomenon

However, other authors (Rudin & Felix, 1987), have warned against bringing about an imbalance between omega 6 and omega 3 essential fatty acids, all precursors of prostaglandins, especially in relation to ‘psychological and psychiatric disorders’. They argue that because of the heart attack scare and the need to avoid fat, manufacturers have produced alternatives in the form of vegetable oils as in margarine production. It is doubtful whether this has reduced the incidence of cardiovascular diseases. The consumption of essential fatty acids has shifted towards warm climate oils (omega-6) such as safflower, sunflower, corn, almond oils and so on, and
from the cold climate oils (omega-3) such as linseed, salmon, walnut, wheat germ and soybean. The difference is that cold climate oils are even more unsaturated and that the body need these to produce beneficial prostaglandins. Fish oils contain two additional types of omega-3 fatty acids, made from acid: DHA or docosahexaenoic acid, and EPA or eicosapentaenoic acid. They keep the blood thin, platelet stickiness and are especially recommended to prevent cardiovascular diseases. Fish produce these from plankton in the sea.

Flaxseed (Linseed) oil contains 60 percent omega-3 and 20 percent omega-6 essential fatty acid and Rudin recommends the use of Flaxseed oil as the source of alpha linolenic acid, from which the body can make various prostaglandins. Alternatives are fish oils and MaxEPA capsules. Omega-3 fatty acids found in fish oil play an important role in depression.

Candidiasis and parasites as a source of depression

Internal parasites and fungi, especially for those people with hypochlorhydria – producing low levels of hydrochloric acid, a natural defence barrier to internal parasites – interfere with the absorption of gut. This may produce irritable bowel symptoms, diarrhea, fatigue, depression, urticaria (rashes), pain in joints, uveitis (inflammation of the pigmented part of the eye) and generally malabsorption of carbohydrates, fats, proteins, vitamins and minerals. Most doctors are now aware of the pervasive health of candidiasis or thrush – the mould disease. This often follows a long period of medication with antibiotics, which tend to kill off ‘friendly flora’ inside the intestines. Patients following a regimen of antibiotics should consume generous amounts of Lactobacillus Acidophilus present in yogurt or including perhaps tablets of L. acidophilus to reestablish the friendly intestinal flora. Friendly intestinal bacteria produce most of the required vitamins and will make up for any deficiency in the diet. Apples and bananas tend to absorb unfavorable bacteria while promoting the growth of beneficial organisms.

Individual nutrient deficiencies and depression

The following individual nutrient deficiencies have been reported to be associated with patients suffering from depression.

**Vitamins**

- biotin
- folic acid
- pyridoxine
- riboflavin
- thiamine
- vitamin B12
- vitamin C

**Minerals**

- calcium
- iron
- magnesium
- potassium

Conversely, abnormal levels of magnesium (hypo- and hyper-levels) and vanadium have also been associated with depression. (Werbach, Chapter on Depression))

**Herbal remedies**

Most people would be aware by now of the antidepressant effects of *St John's Wort* (*Hypericum*
perforatum), which has similar action as the SSRI drugs. It inhibits the reuptake of serotonin in the treatment of mild to moderate depression. (Werbach, 1994, 135) In Germany doctors prescribe remedies routinely and St John’s Wort (standardized to contain 0.3% hypericin, taken 3 times a day) is more popular than the conventional drugs such as Prozac and Zoloft. Hypericum has also been found useful in conditions associated with anxiety, stress, premenstrual syndrome, fibromyalgia or chronic pain. But they do interact with a number of drugs: it decreases bioavailability of digoxin, theophylline (asthma), cyclosporin (immunosuppressant), and phenprocoumon (anticoagulant), potentiate with MAO inhibitors and SSRI (Erocap, Luvox) at Research file.

Also fair-skinned people are advised to avoid prolonged exposure to sunlight, because of heightened sensitivity to the sun. It takes some time – about four weeks – before the herb becomes effective. Where cerebrovascular insufficiency is a contributing factor of depression, the use of Ginkgo biloba (Standardized to contain 24% ginkgolavoneglycosides) in animal studies have been shown to be effective in reducing anxiety and depression. (Werbach, 1994, 135).

If toxaemia (toxic overload) is seen as contributing to depression, perhaps Milk Thistle (Silybum marianum) will help the liver to accelerate detoxification. Using herbs like drugs for depression may miss the target responsible for depression. Hit or Miss.

For a general reference to an index for Nutritional and Herbal remedies for mood disorders go to Research Index.

Conclusion

It is clear from the above that the treatment for depression by clinical nutrition is very unlike the way whereby a doctor – usually a psychiatrist – prescribes a drug for a ‘psychiatric’ symptom. Tricyclic antidepressants are potent anti-histamines and this property may help to explain their effectiveness in psychiatric symptoms associated with allergic reactions. But it is obvious that the patient is not ‘cured’, in fact he may be made to feel worse through the actions of side-effects, for which other drugs are usually prescribed. The effects of side effects can often be overcome by special nutritional supplements; 1) case of Tardive Dyskinesia (the trembling disease of anti-psychotic drugs) Vitamin B3, B6, C, E and manganese, 2) Lithium medication – for manic-depression – should be accompanied with safflower oil, or GLA. Also lithium carbonate may cause a folic acid deficiency. (Werbach MR, 81)

Evening Primrose oil is an excellent source of GLA. See also “Nutritional Aspects of Schizophrenia” in our Hypo Newsletter June 2001 at page 7 in PDF format.

A more patient-friendly group of new drugs are the SSRI (Specific Serotonin Reuptake Inhibitors) that aim to bring about a more natural remedy. They block the reuptake of serotonin. However, a long-lasting increase in the availability of serotonin neurotransmitter at a synaptic receptor site results in a decrease in the number of receptors on the cell surface (so-called down regulation).

Thus, a better understanding of the relation between nutrition and depression would usher in a more natural treatment of depression.

Clinical nutrition can be effective once it is understood that each person is a biochemical individual. No two persons are the same! Similar disease syndromes may and usually derive from a set of divergent factors. To understand the disease we need to study the individual patient. Depression is not treated, but a depressed person is! We can’t treat alcoholism, but we can treat a person suffering from alcoholism, including his or her psychological make-up.

The treatment of depression by clinical nutrition – as is the case with all medical/health problem personal history taking by the practitioner, a thorough biochemical investigation of the individual leading to the diagnosis and treatment program. Often if the program does not work, a further investigation needs to be carried out and a new diagnosis generated. This all depend on the scientific mind of the practitioner, his knowledge of medicine, biochemistry and nutrition and above all his creative ‘detective-like’ imagination leading to new hypotheses explaining the symptoms. Often the more successful...
practitioner is a member of a health team who pool their resources in this complex world of ‘alternative medicine’. In the end the individual patient and society – in particular the tax paying society – are going to benefit from this form of preventative medicine.

A popular motto in Clinical Nutrition is that ‘the body runs the brain’.

Please discuss this article with your health care worker, doctor or nutritional doctor or therapist.

Related Articles:
- What is Hypoglycemia?
- The Serotonin Connection
- The Hypoglycemic Diet
- Beating Anxiety
- Anxiety, Gambling and Phobias

PSYCHOTHERAPY

Also read:
- Index to Specific Topics and Research
- References to Mood Disorders and Nutrition

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