

DEPRESSION: A DISEASE OF ENERGY PRODUCTION

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

The incidence of depression in Australia has often be underrated. According to a report by the Australian Bureau of Statistics of 21 April 2004, over 18% - that is one in nearly five adults - of all Australian adults had experienced a mental disorder during the preceding year.

The prevalence of mental disorder was similar for men and women, but there were differences in the types of disorder suffered: 12% of women and 7% of men had anxiety disorders, while 7% of women and 4% of men had affective disorders (which include depression). Some 11% of men and 4% of women had substance use disorders (such as drug or alcohol dependence).

Standard treatment for depression is usually by either antidepressant medications such as Selective Serotonin Reuptake Inhibitors (SSRIs) and/or psychotherapy.

A study in January 2006 by TR [Insel](#) showed that only about 40% of patients have some benefits from AD medication as per quote here:

“For each of these interventions, one can say with some confidence that at least 40% of a cohort with depression will show statistically significant reductions in unbiased ratings of depression. This information, while entirely commendable in the world of research, is far from satisfactory in the world of practice where an individual clinician needs to make treatment decisions to help an individual patient.”

Of course, it should be realized that drugs - even though they benefit some patients - do not address the the biological causes of depression which may leave them taking drugs on a long term basis..

This would leave about 60% of depressed with ‘treatment resistant’ depression. Conventional treatment would suggest that depression is ‘really’ a mental problem on the assumption that the ‘mind is at all time in control of the body’. If indeed depression is mainly due to an underlying biological disorder, meaning it is endogenous, then one could not expect that talk therapy will cure what is after all a biochemical disorder. With the inevitable side effects of drugs it does not provide an optimistic future. Thus according to the drug and/or psychotherapy model, depression is incurable. The problem appears to be that so far medicine has not come up with a treatment program that would not involve the use of drugs.

Depression is often considered complex problem, but mainstream medicine and psychology often overlook and ignore the nutritional aspects of depression. One wonders why, because it is well known that the precursors to the neurotransmitters in the brain, their enzymes and coenzymes (vitamins and minerals) all derive from the food we eat.

The alternative is to look and investigate an alternative model that relies less on the drug/psychotherapy model. The psycho-nutritional model aims to look at the causes of depression from both a nutritional and biochemical point of view.

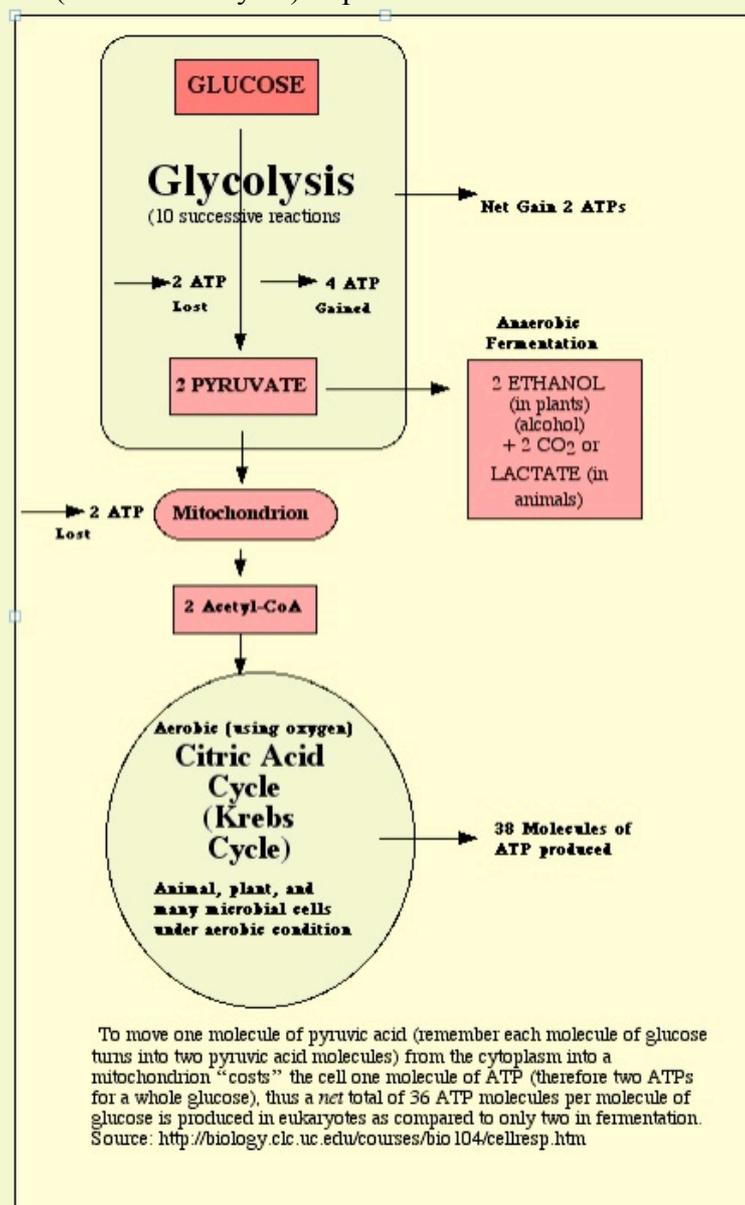
We could start off with the idea that all biochemical machinery in our body - including brain cells - is driven along by energy. The molecule of energy is called adenosine triphosphate ([ATP](#)), that could be

compared to a biological battery. An active cell in the body may use up as much as 2 million molecules of ATP per second, and hence biological energy is very important to us. When it gives up its energy it becomes adenosine diphosphate (ADP). The only way to recharge that battery is through nutrition.

The source of all energy is ultimately glucose found in food sources, that is then converted along a biochemical pathway - called [glycolysis](#) - by 10 biochemical reactions to form first pyruvate and then ATP. At each step proteins, enzymes, coenzymes, all derived from food, are necessary to complete the biochemical conversion to the next step. Thus there may be many biochemical reasons why the body has problems manufacturing its energy sources, to produce for instance serotonin - our happy hormone. And without energy we become depressed!

For example, if we have an imbalance between zinc and copper, zinc deficiency can cause a blockage in the glycolytic pathway, although blood sugar levels may appear to be normal.

The following illustration shows a simplified version of how one molecule of glucose is converted to two molecules of pyruvate, then converted to two molecules of Acetyl-CoA, which then enters the Krebs cycle (Citric Acid Cycle) to produce 38 molecules of ATP.



Thus one molecule of glucose can produce a net total of 30 molecules of ATP via glycolysis and the Krebs Cycle. [Source](#). This all takes place in the [mitochondria](#) of cells. It takes place in the twinkling of an eye.

Please note that alcohol (ethanol) can be anaerobically fermented from pyruvate from plant sources. People addicted to alcohol may have an obstruction in glycolysis and resort to alcohol as a source of energy. See: [Alcoholism is a Treatable Disease](#).

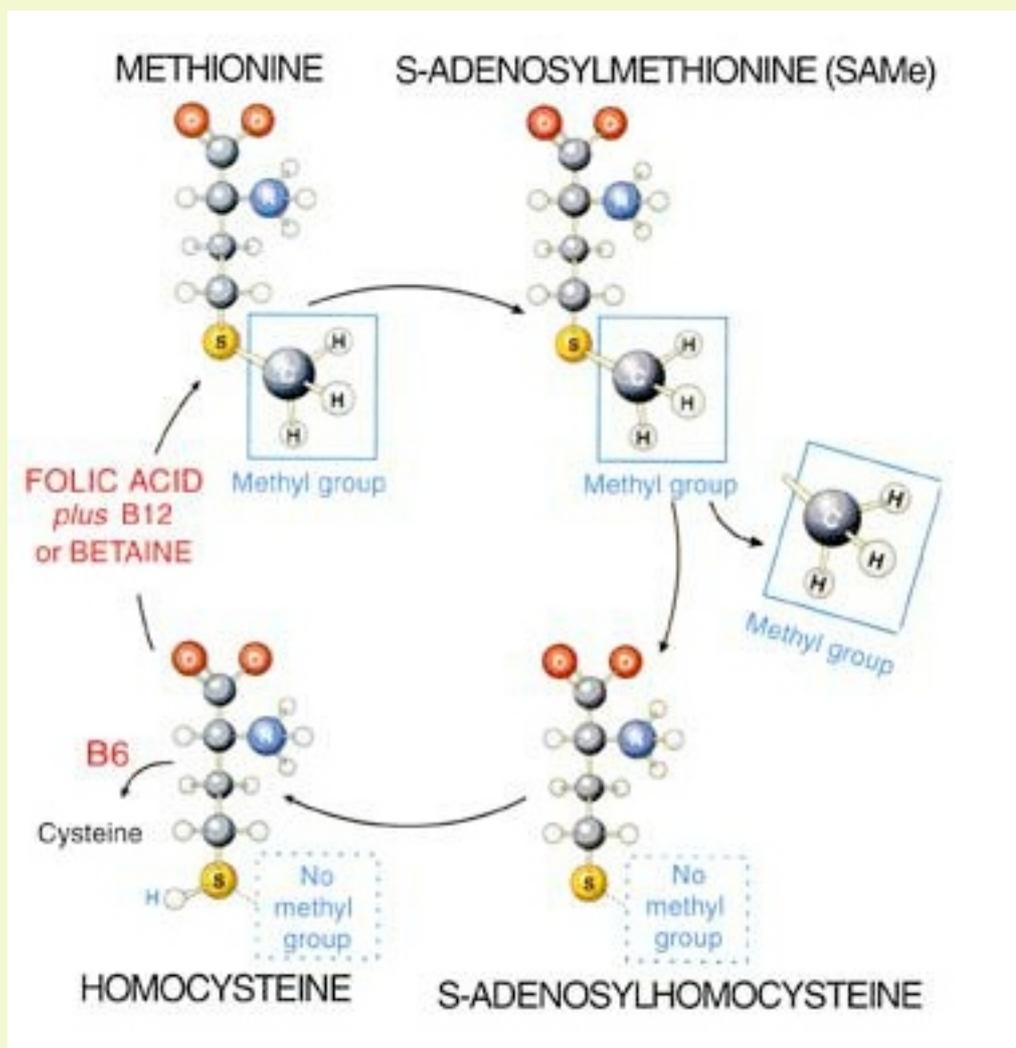
Biological energy is required to produce the feel good [neurotransmitters](#), such as [serotonin](#) and others. This is clearly demonstrated when we study how SAM-e (S-Adenosylmethionine) can act as an antidepressant nutrient. It provides an insight as to how nutritional therapy can be useful. SAM-e is found in every cell of the body.

The body makes SAM-e from the combination of a molecule of methionine and ATP.

Thus;

Methionine + ATP = SAM-e

This is illustrated in the following diagram:



It shows that SAM-e contains a methyl group (CH₃). When it donates this methyl group to another molecule, it will change its shape, size and function and this is how SAM-e helps to form and reform molecules and is instrumental in the formation of serotonin and many other neurotransmitters. The process is called [methylation](#).

After methylation, SAM-e becomes S-Adenosylhomocysteine, which is then converted to homocysteine, which is a toxic waste products. It is said to be responsible for cardiovascular and other degenerative diseases. However homocysteine can be converted to cysteine under the influence of vitamin B6 (Pyridoxine). Cysteine is an important chemical forming part of glutathione peroxidase which helps to detoxify the body.

Homocysteine can also be converted back into methionine with the help of folic acid and vitamin B12 or [Betaine](#) (trimethylglycine).

Because SAM-e formation depends on biological energy, people with insulin resistance (hypoglycemia) are likely to be inadequate in SAM-e concentrations, and this could be responsible for depression and other forms of mental illness.

Of course it should be realized that SAM-e alone cannot produce the feel good brain chemicals. If the body is deficient in [tryptophan](#) from which serotonin is made, it cannot methylate the feel good neurotransmitter. Nor can SAM-e do so, if the body lacks vitamin B6, B3 (niacin), magnesium, zinc, chromium and a host of other nutrients that are necessary in the production of serotonin. We need total nutritional support, that can be supplied with the [Hypoglycemic Diet](#).

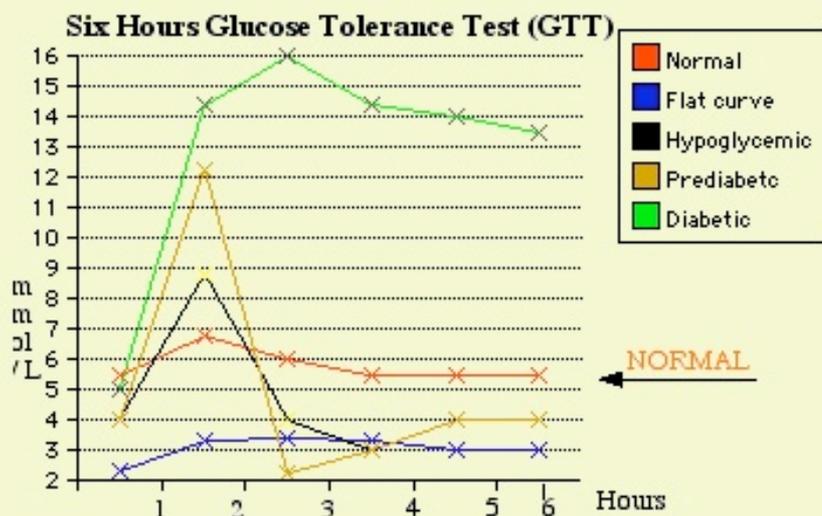
See also: [Hit or Miss Supplements for Depression](#).

Glucose ingestion

The universal source of biological energy is derived from the sugars we eat in our food. These sugars are converted to glucose, which enters the glycolytic pathway to form pyruvate. Pyruvate enters the Krebs Cycle to create energy in the form of ATP. Many other nutrients, such as amino acids and fatty acids can be converted to pyruvate thus contributing to the generation of biological energy.

If we have an abnormality in the absorption and metabolism of glucose - such as [insulin resistance](#) and hypoglycemia - then we cannot produce SAM-e and other chemicals involved in methylation.

The following illustration shows how insulin resistance causes unstable blood sugar levels and thereby interfering with energy production.



Please note that when receptors for insulin fail to respond to insulin, blood sugar levels initially tend to rise above the normal, called [hyperglycemia](#). This triggers the release of more insulin, [hyperinsulinism](#), which is usually followed by a sudden crash in glucose concentrations, called [hypoglycemia](#). The brain senses these hypoglycemic dips as a threat to its glucose supply on which it entirely depends as its only source of energy. Although only two per cent of the body by weight, the brain requires about 60-70 per cent of all available glucose in the body to energize the brain biochemistry, whether asleep or awake!

When the brain is threatened with energy starvation it will send a hormonal message to the [adrenal glands](#) to pour adrenaline into the system. Adrenaline is a hormone that converts [glycogen](#) - strings of glucose molecules stored in the body - back into glucose, so as to feed the brain again. Again this happens as quick as a flash.

These adrenergic reactions are considered the cause of most symptoms of 'mental' illnesses, from anxiety attacks, depression, insomnia, addiction (alcohol, drugs), compulsive behaviours and thoughts.

The hypoglycemic syndrome can develop into full-blown [diabetes](#) if no steps are taken to prevent it. We owe it to Dr George Samra, of Kogarah, Australia, that doctors have a diagnostic test for hypoglycemia and prediabetes. Doctors are thus able to assess the risk of a person developing diabetes, well before it is too late for proper treatment. See:

[Test for Hypoglycemia.](#)

The good news is that depression and many other forms of 'mental' illness can be treated without recourse to drugs by the adoption of the [Hypoglycemic Diet](#).

This model also makes it clear that the idea that depression is caused by some malfunctioning in the brain itself is a misconception. The molecules of emotions - adrenaline, ATP, serotonin, dopamine, acetylcholine and so on are produced throughout the body, starting from the digestive system, and controlled by the liver, adrenal glands, pancreas, pituitary and hypothalamus.

Thus anywhere along the glycolytic pathway, digestive illnesses can interfere with the production of biological energy and cause depression.

And if this sounds all very complicated we can reduce it to a simple formula which says:

HYPOGLYCEMIC DIET + PSYCHOTHERAPY = RECOVERY FROM MENTAL ILLNESS.

A good book with a similar theme is

Pert, Candace B (1988), MOLECULES OF EMOTIONS: Why you feel the way you feel, London: Simon & Schuster

The body runs the brain!!

Reference

Insel, TR (2006), Beyond Efficacy: [The STAR*D Trial](#), Am J Psychiatry 163:5-7, January 2006

Depression Research Evidence:

[Depression and Insulin resistance](#)

[Depression and Genes](#)

[Diabetic gene](#)

[Glucose/ATP requirement of the brain](#)

[Glycerine](#)

[Hypoglycemia, Diabetes & Depression](#)

[Insomnia and Hypoglycemia and Melatonin](#)

[Seasonal Affective Disorder \(SAD\)](#)

[Obesity references](#)

[Post Traumatic Stress Disorder \(PTSD\)](#)

[Zinc and picolinic acid, tryptophan](#)

See also:

[Depression is a Nutritional Disorder](#)

[The Hypoglycemic Diet](#)

[What is Hypoglycemia?](#)

[The Serotonin Connection](#)

[PTSD & Hypoglycemia](#)

[Psychotherapy](#)

[Why alcoholics choose alcohol](#)

[Alcoholism is a Treatable Disease](#)

[Hypoglycemia: is it a cure-all for mental illness?](#)

[Articles index](#)

[Back to main](#)

[Website disclaimer](#)

Last updated 4 December 2007