

Sweet and sour consciousness

By Mike McInnes

Are Refined Sugars Degrading Human Consciousness?

Yes, they are doing so at breakneck speed. Modern humans are consuming excess refined sugars which block the energetic integration of sensory information that provides the intellectual content of human consciousness. We may describe this as Sour Consciousness.

What is Sweet Consciousness?

Sweet Consciousness is Honey provision of energy that binds, integrates, and encodes the sensory information that is the ground of human intellectual consciousness.

What is Consciousness?

Consciousness is the sentience or awareness of internal and external existence. We know that we have it, but we do not know what it is, or what it is made of. We believe animals may have it, or at least a limited form of it, and that living vegetable matter such as fungi, flowers and trees, probably does not. We are reasonably confident that non-living matter, such as mountains, rocks, and rivers, do not have it. Beyond that we are baffled. We associate it with the brain and the nervous system, and we have the vague notion that brain cells and other neural machinery, including neurotransmitters and synapses are involved in its transmission, and that electricity is also involved in some way.

Although we associate it exclusively with the brain, we know that the body must be involved, because without the body we could not be conscious. It has become fashionable for retired scientists and philosophers to speculate on what consciousness is, and how we get it, but none have so far come up with a reasonable explanation. Our species, *Homo sapiens*, seems to have developed a level of consciousness that is more advanced than other life forms, such as viruses, bacteria, ants, jelly fish, other fish, frogs, monkeys, elephants, and whales. We express higher levels of cognition, communication, and language. Although we have little understanding of what consciousness is, we do know what the effects are if we lose it. Sleep involves reduction of some levels of consciousness, a special state during which our sensory inputs of hearing, seeing, smell, taste, and touch are diminished. Anaesthesia is another deeper

state whereby consciousness is more profoundly inhibited, and this allows surgical interventions to be conducted free of pain. Coma is an even deeper state of unconsciousness, whereby a subject is unable to feel, speak or move.

Energy and Consciousness.

We are aware that energy and consciousness are profoundly interrelated because hypoglycaemia (a drop in blood glucose energy concentration) deprives the brain of energy, leads to rapid loss of consciousness, and if not reversed, will result in a coma, and may lead to death. Therefore, we may conclude that full human consciousness is an energetic awareness of the environment via sensory input, indeed one leading thinker claims that consciousness and sensory perception are one and the same entity. If this is correct, we may also reasonably conclude that we are losing sensory consciousness as a species.

Why?

It seems that we have lost the ability to combine sensory information input with the energy required to process and integrate it.

Energy and Information.

After the big bang subatomic particles meet and interact, exchange energy and information, and aggregate into atoms, atoms aggregate into molecules, and these in turn aggregate into matter and materials – stuff. Stuff consists of planets, stars and galaxies, and their contents, including earth.

Life is no different. All living organisms consist of information/energy systems that depend on that energy to process the information that they exchange with their environment, consistent with survival.

The human organism is perhaps the most complex of all living organisms, and our species, *Homo sapiens*, has taken information/energy exchange to a new level of organisation, including advanced cognition, communication, and language.

Humans possess two basic information systems – brain and body, each of which interchange energy/information internally, and externally with the environment, in a variety of ways. In the brain and nervous system energy/information is largely transmitted via electrical signals and neurotransmitters. The brain extends into the body via the spinal cord and its extended nervous system, whereby energy/information is transmitted to, from, and between organs and tissues. Information is also transmitted via the

circulation, in which blood borne hormones add to the information matrix by coupling with receptors on cell membranes.

Humans process and integrate environmental information via their 5 senses:

- Sight.
- Sound.
- Touch.
- Taste.
- Smell.

Maxwell's Demon.

Energy and information are inseparable. The Scottish physicist James Clerk Maxwell articulated that in the 19th century when he invented his famous 'demon' in a thought experiment. Maxwell's demon controlled a door between two compartments containing gas. As the molecules approach the door the demon opened it to allow fast hot molecules to pass one way and cold the other – resulting in one chamber heating up – and therefore creating a store of energy, at no cost. This seemed to violate the second Law of Thermodynamics, and caused something of a sensation among scientists, until the physicist Leo Szilard pointed out that the 'demon' would need knowledge to measure the speed of the molecules, and knowledge acquisition requires energy expenditure. There was no violation of the Second Law, and this led to the development of the science of Information Theory, the quantification, storage, and communication of information.

The First Condition of Life: Energy Homeostasis (balance).

We know how dangerous it is to be exposed to excess provision of energy from the sun in the desert, or to extreme low temperature in the polar regions – we die. The first condition of all life on earth is that of energy homeostasis, or balancing energy income with output. All life requires energy to generate, proliferate and survive, and provision of that energy requires the burning of combustible and inflammable hydrocarbon fuels in living cells. The trick of living organisms (including humans) is that this combustion takes place under highly sophisticated and exquisitely controlled step by step conditions, that enables the delicate machinery of life to continue. Lack of energy income (starvation) is incompatible with continuation of life, and excess energy income (obesity) is incompatible with healthy life – the American Medical Association states that chronic obesity reduces lifespan by 13 years.

The Second Condition of Life: Integration of Sensory Information.

The second condition of life is successful integration of environmental information. Any living organism, including humans, must be able to secure the energy and nutrients consistent with survival. 500 million years ago, in the Cambrian seas, small comb jelly organisms (ctenophores) developed embryonic nervous systems that eventually developed into the complex and sophisticated brains and nervous systems of modern humans. The brain enables humans to navigate around a dangerous environment and to secure the necessary food, energy, and nutrients they need, via sensory information gathering, information that is encoded and integrated, of vision, hearing, smell, taste, and touch, without which survival would be compromised.

The Human Brain's Fuel Pump: Glutamine Synthetase.

The enzyme that couples/binds energy with environmental information in humans is glutamine synthetase, an ancient enzyme in the evolution of cognition, and which in humans, functions as the brain's fuel pump. In 1993 a Japanese study published in the journal *Proceedings of the National Academy of Sciences, USA*, that established glutamine synthetase gene as one of the oldest genes in the evolution of species:

"...GS is a key enzyme of nitrogen metabolism found in all extant life forms andGS genes are one of the oldest existing and functioning genes in the history of gene evolution....."

In June 1994 Luc Pellerin and Pierre J. Magistretti at the University of Lusanne, published an historic paper that describes glutamine synthetase as the energy pump that transports glucose across the blood/brain barrier and into the human brain: *"...The stoichiometry of this process is such that for one glutamate molecule taken up... one glucose molecule enters an astrocyte, two ATP molecules are produced.....one ATP molecule fuels one 'turn of the pump' while the other provides the energy needed to convert glutamate to glutamine by glutamine synthase....."*

Therefore, long before complex bodies with sophisticated organs and more advanced brains evolved, this ancient enzyme was regulating energy income and output such that each organism, at each stage, was enabled to successfully couple/bind the energy/information consistent with survival. This is the trick of life – to metabolise (burn) combustible fuels in tiny incremental steps that protect the organism from the toxic process of combustion. Since the human

brain has no energy store, and its prodigious energy demand far exceeds that of the body (the brain is 2% by weight but consumes 20% of total energy income) the problem has been elegantly solved by basing its income exclusively on demand. Every molecule/nanogram of glucose that enters the brain is immediately oxidised and the mechanism for this is the glutamate/glutamine cycle in glial cells. The enzyme glutamine synthetase converts toxic glutamate to benign glutamine, each turn of the cycle pumps a glucose molecule into the glia, and this is demand based. No excess glucose enters the healthy brain. The glia forward glucose by splitting it into two lactate molecules onto neurones for further oxidative metabolism.

Homo Sapiens and Glutamine Synthetase: A Modern Tragedy.

Homo sapiens is around 200,000 years old, and for that period has successfully maintained energy homeostasis, and therefore the facility to combine the energy and sensory environmental information required for survival. If energy reserves were low during a period of famine, ketones were used to fuel the brain, an emergency system that fuelled the brain from fat reserves. During prehistory, and for most of our history, finding sufficient food and energy income was the most important daily activity for humans. This changed with farming grains and the later discovery of sugar. Industrial refining of sugars increased consumption, and from the 1970s, when the Senate McGovern Committee on Health and Nutrition adopted the notion that fats are bad and sugars good, sugars became a major portions of food energy income for most of the population. This is compounded by the success of the food/sugar lobby in cynically manipulating science in favour of refined sugars over the previous 5 decades, and in securing government subsidies to the tune of billions of pounds/dollars/euros.

The Result?

This resulted in an explosion of energy deregulation diseases, obesity, diabetes type 2 and Alzheimer's disease, and continues to this day. Alzheimer's disease is now referred to by researchers as diabetes type 3. Autism has been viewed as a condition of heterogeneous (various) causation, but that view is coming under increasing scrutiny as new studies emerge, and excess sugars (hyperglycaemia) in the maternal circulation, is emerging as a significant influence. Each of these conditions express impaired cerebral energy metabolism, disruptions of the glutamate/glutamine cycle and alterations in cerebral volume.

Suppressing the Human Brain's Fuel Pump.

The key to understanding modern impaired energy regulation diseases involves hyperglycaemia, insulin resistance, and hyperinsulinism which negatively influence the enzyme glutamine synthetase. Only recently (since the 1970s) has our species, *Homo sapiens*, been subject to excess energy in the form of high levels of circulating sugars, which if transported into the brain, would cause an oxidative and inflammable catastrophe. Hyperglycaemia in endothelial cells reduces glucose transport into the brain by suppressing glutamine synthetase, a neuroprotective measure that avoids acute cerebral hyperglycaemia.

However, if refined carbohydrates and sugars intake becomes chronic, glutamine synthetase is chronically suppressed, the brain is deprived of vital energy. Stress and appetite hormones are released, and the cycle repeats. This is the mechanism that drives obesity, diabetes type 2 and influences Alzheimer's disease.

In the case of autism, the same mechanisms influence the maternal circulation, and excess sugar consumption is emerging as a significant influence. Hyperinsulinism and excess sugar in the maternal circulation have been identified as causal. We have known since 1980, when Norbert Freinkel published his "Fuel Induced Teratogenesis" theory, that excess circulating sugars in the maternal circulation are teratogenic. Indeed, it may be said that excess systemic maternal sugars are more teratogenic than thalidomide – this drug targeted the growing limbs – maternal hyperglycaemia specifically targets the developing brain.

Why Honey?

Most dieticians and nutritionists describe Honey as simply a type of refined sugar, and by adding up the calorific values of the various sugars, they arrive at the erroneous conclusion that consuming Honey is not different to consuming equivalent quantity of sucrose or other refined sugars, such as high fructose corn syrup. This is incorrect and profoundly unscientific. Not only is Honey an ancient, lovely, and natural sweetener, honey is metabolised differently to refined sugars. Honey exerts important glucose regulating activity, and honey may be one of the most potent antidiabetic foods known to man.

Honey and its Bioactivity.

Honey is a sweet, viscous food made by honeybees. The many ingredients of honey are sourced from plant nectar, from pollen collected by bees as food, and from the nutrient secretions of bees. Honey is formed by complex enzymatic transformation and evaporation of water, and it is stored by the bees in specialised wax honeycombs. Bees use Honey as a fuel that they store in a special organ to provide them energy for flight during foraging. Humans have collected and used Honey as a food and sweetener for thousands of years. Honey may be collected from wild honeybee colonies, or from domesticated bees, which are housed in hives.

Honey is antibacterial, antimicrobial, and antiviral, and is widely used in wound dressings, as an antibiotic, as cough medicine, and is emerging as a potent and significant antidiabetic adjuvant. The antidiabetic influences of Honey relate to its numerous nutrient ingredients, a veritable army of glucose modulating principles that positively affect energy and glucose regulation.

The two major sugars in Honey are free glucose and free fructose. The total amount of sugars in Honey is up to 80% of the weight, with fructose around 40% and glucose around 35%. Other carbohydrates constitute the additional 5%. These may be monosaccharides, disaccharides, or oligosaccharides. These include disaccharides such as, sucrose, maltose, and isomaltose.

Honey is rich in amino acids, including lysine, histidine, arginine, threonine, serine, glutamine, proline, glycine, alanine, cystine, valine, methionine, isoleucine, tyrosine, and phenylalanine. Some of these are known to exert glucose modulating bioactivity.

Minerals in Honey include phosphorus, iron, magnesium, manganese, calcium, chlorine, copper, sulphur, potassium, sodium, aluminium, beryllium, boron, bismuth, barium, vanadium, germanium, gallium, gold, cobalt, lithium, and molybdenum.

Vitamins found in Honey are: Vitamin B1 (thiamine), Vitamin B2 (riboflavin), Vitamin B3 (niacin), Vitamin B6 (pyridoxine), folic acid, Vitamin H (biotin), Vitamin K (phylloquinone), Vitamin C (ascorbic acid), Vitamin E (tocopherol), and Vitamin A (carotene).

Other natural bioactive ingredients in Honey are flavones and polyphenols, which are recognised as potent antioxidants.

Honey and Energy Homeostasis.

The popular notion that Honey is simply a more natural version of refined sugar, and is metabolised in the same fashion, and which is widely believed throughout the health professions, is perhaps one of the most unfortunate modern myths that inform the public. Indeed, this unscientific narrative is one that aids the food/sugar industry, because if the public switched its allegiance from refined sugars to Honey, the health and cognitive benefits would be significant. Furthermore, Honey is highly viscous and has a strong flavour, such that it cannot be hidden in foods and drinks, unlike refined sugars which are tasteless and highly soluble, and easily secreted into processed foods and sweet drinks.

Honey exerts positive influence on glycaemia in the gut, the liver, the pancreas, the circulation, and most importantly at the blood/brain barrier where energy homeostasis is regulated via the action of glutamine synthetase, and its influence on brain uptake of glucose is exclusively controlled by demand and not supply. If circulating sugars are high (hyperglycaemia) glutamine synthetase is disengaged as a neuroprotective measure, if circulating sugars are low (hypoglycaemia) glutamine synthetase is upgraded via stress hormones, and extra glucose is pumped into glial cells to supply the brain. The absolute and overriding index is brain demand for fuel, and brain energy homeostasis is the critical influence, such that resulting stress and appetite modulation is the downstream outcome.

Upstream.

Indeed, it is this upstream mechanism that governs all energy regulation, such that each of the other interventions (medical or surgical) are secondary to brain regulation, and this explains why decades of medical and pharmaceutical influences have singularly failed to stem the increasing tide of sugar driven syndromes.

Fructose.

Excess fructose consumption in refined and processed foods is recognised as highly toxic. However, fructose in balance with glucose, and in moderate quantity in Honey and in addition its many constituents, seems to exert positive influence in prebiotically improving gut microbiota, facilitating liver

glycogen consolidation, positively influencing islet function and insulin metabolism in the pancreas, and reducing blood glucose concentrations, the major modulating influence on glutamine synthetase activity.

These benefits are directly opposite to those associated with refined carbohydrates and sugars (such as high fructose corn syrup), and therefore would have significant positive influences on all the major energy deregulating diseases of the late 20th century and 21st century metabolic diseases of homeostasis loss, of chronic brain energy depletion and of impaired cognition, communication, and language.

The Honey Switch.

The very simple hypothesis underpinning the project Honey Switch is that a social movement based on the global beekeeping community may become the international vehicle for engineering a conscious awareness of the difference between refined sugars and honey, a transition from Sour Consciousness to Sweet Consciousness. It may begin anywhere on planet earth, and thereafter gather momentum. It simply requires that the beekeeper population grasp the scientific principles involved, and that they become active agents in the dissemination of that science.

Modern Homo sapiens is sugar enslaved, in a similar fashion to alcoholics or drug addicts. Alcoholics and drug addicts already know that they are victims of their addiction – informing them, and constantly repeating the diatribe ‘just say no’ is a fruitless enterprise, a negative strategy. In the case of refined sugars, there is a beautiful and delightfully *positive* strategy. Switch from Sour Consciousness to Sweet Consciousness.

The Honey Switch can be an effective and beatific strategy to reverse the decline in human sensory consciousness and recover our advanced cognition, communication, and language.

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