

Lithium and Brain

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Abstract

Lithium has been used for more than 50 years as a mood stabilizer in manic depression. During last years Lithium has been studied intensively and found that it can be used also in treatment of schizophrenia and many other brain disorders. The effectiveness of Lithium is however difficult to understand in the standard framework of biology. In TGD framework organism-environment pair of standard biology is replaced with the triplet magnetic body - organism -environment. Magnetic body uses biological body as sensory receptor and motor instrument. This suggests that the re-establishment of communications of brain with some level of the magnetic body is how lithium causes its positive effects. Magnetic body does not receive information about brain and cannot control it since dark Lithium ions and corresponding cyclotron radiation are not present. The disorders caused by the lack Lithium and other biologically important ions would therefore be something totally new from the perspective of standard neuroscience.

1 Introduction

My friend Samppa told about positive effects of lithium on brain. I have proposed years ago that these effects could be explained by cyclotron frequency hypothesis and I decided to search for web about the recent situation. Lithium has been used for more than 50 years as a mood stabilizer in manic depression. During last years Lithium has been studied intensively and found that it can be used also in treatment of schizophrenia and many other brain disorders. The popular and somewhat hypeish article “Lithium promotes longevity-mood and love” at <http://tinyurl.com/ns9ksms> tells about various applications of lithium. Even statistical evidence that lithium reduces violent crime is represented. To my view the importance of these apparently rather specific effect is that it lends support for the notion of magnetic body.

1. Lithium is found to increase the volume of grey matter (see the article “Lithium-induced increase in human brain grey matter” at <http://tinyurl.com/gu2s4ps>) and it is accumulated in white matter (axons) (see the article “Lithium in brain” at <http://tinyurl.com/zm9a4gm>). Lithium also enhances axonal growth and myelination.
2. The higher concentration of lithium in drinking water is found to reduce mortality and suicide rate. It has been also found that higher lithium concentration increases the life span of bacteria (see <http://tinyurl.com/z73ayq4>).
3. Lithium might also help in Alzheimer’s disease and other neurodegenerative diseases such as Parkinson’s and Huntington’s disease. Lithium is found to inhibit neuro-apoptosis (death of neurons). Lithium’s neuroprotection may result from its inhibition of protein GSK3, which in turn prevents neuroapoptosis regulating survival and differentiation.
4. Lithium is found to increase neurogenesis helping the healing of brain injuries (see article “Inactivation of Glycogen Synthase Kinase 3 Promotes Axonal Growth and Recovery in the CNS” at <http://tinyurl.com/hlfbkvz>). Lithium has also positive effect on memory. Lithium affects various signalling proteins and pathways. Indeed, lithium has been claimed to serve as “brain food” (see <http://tinyurl.com/zhe5ckf>).

5. Disruption in the blood-brain barrier is proposed to be a missing link between brain and body inflammation in bipolar disorder [J1] (see <http://www.hindawi.com/journals/np/2015/708306/>). According to the abstract of the article:

The blood-brain barrier (BBB) regulates the transport of micro- and macromolecules between the peripheral blood and the central nervous system (CNS) in order to maintain optimal levels of essential nutrients and neurotransmitters in the brain. In addition, the BBB plays a critical role protecting the CNS against neurotoxins. There has been growing evidence that BBB disruption is associated with brain inflammatory conditions such as Alzheimers disease and multiple sclerosis. Considering the increasing role of inflammation and oxidative stress in the pathophysiology of bipolar disorder (BD), here we propose a novel model wherein transient or persistent disruption of BBB integrity is associated with decreased CNS protection and increased permeability of proinflammatory (e.g., cytokines, reactive oxygen species) substances from the peripheral blood into the brain. These events would trigger the activation of microglial cells and promote localized damage to oligodendrocytes and the myelin sheath, ultimately compromising myelination and the integrity of neural circuits. The potential implications for research in this area and directions for future studies are discussed.

2 TGD view about mechanism of lithium-brain interaction

The mechanism of lithium-brain interaction is still unknown: mechanisms like altered mitochondrial function, inflammation, dysregulated dopaminergic/glutamatergic systems have been proposed. It is said that lithium helps to cure multisystem disorder rather than disease (reader can try to figure out what this might mean!). In any case, the effect of lithium seems to be on gene expression and it would seem that lithium only makes possible natural healing mechanisms to operate rather than providing single healing mechanism.

In TGD framework organism-environment pair of standard biology is replaced with the triplet magnetic body - organism -environment [K6, K5, K4]. Magnetic body uses biological body as sensory receptor and motor instrument. This suggests that the re-establishment of communications of brain with some level of the magnetic body is how lithium causes its positive effects. The disorders caused by the lack Lithium and other biologically important ions would be something totally new from the perspective of standard neuroscience. The standard idea that some kind of neuronal receptors or some information molecules are underrepresented or over-represented would not be enough. Magnetic body would take care of healing in much more effective manner than more or less random tinkering of bio-molecular concentrations.

1. The basic hypothesis is that communications between biological body and magnetic body correspond to sending sensory input from the cell membrane to magnetic body as generalized Josephson radiation and receiving control command from magnetic body controlling gene expression as cyclotron radiation [K2, K3, K1].

The control commands from magnetic body would rely on signals having carrier waves with cyclotron frequencies associated with dark variants of biologically important ions and assignable to dark magnetic bodies forming an onionlike scale hierarchy with sizes of order cyclotron frequency in endogenous magnetic field $B = 2B_E/5$, where $B_E = .5$ Gauss is the nominal value of the Earth's magnetic field. The size scale assignable to 10 Hz frequency would be of order Earth size.

The sensory communications to magnetic body from cell membrane based on generalized Josephson frequencies associated with cell membrane regarded as generalized Josephson junction. The frequencies of radiated dark photons would be differences of cyclotron frequencies at the two sides of the junction plus relatively small contribution corresponding to the ordinary Josephson frequency determined by the membrane potential. Nerve pulse activity would thus induce frequency modulations of the carrier wave: kind of whale's song (or human speech) would be in question. Also amplitude modulation and even modulation of the polarization of radiation can be considered.

The value of Planck constant is large and EEG frequencies correspond to energies in the energy range of biophotons assumed to result in the transformation of dark photons to

ordinary ones visible and UV photons. These energies correspond to excitation energies of biomolecules so that magnetic body could induce chemical reactions.

The gravitational Planck constant $h_{gr} = GMm/v_0$ (here M and m denote masses connected by magnetic flux tubes carrying dark gravitons and $v_0/c < 1$ defines a velocity parameter - some natural velocity in the system) introduced originally by Nottale [E1] is identified with the effective Planck constant $h_{eff} = n \times h$ emerging in TGD framework from the fractal hierarchy of isomorphic sub-algebras of super-conformal algebras of various kinds (generalizations of ordinary conformal algebras) serving as symmetries of quantum TGD [K7].

If M corresponds to large central mass and m to a mass of charged particle (elementary particle, ion, molecular ion,...), one obtains that cyclotron energies proportional to h_{eff}/m do not depend on mass number at all so that cyclotron energy spectrum is universal (and corresponds to that of bio-photons in visible and UV where also molecular transition energies are). The additional prediction is that each charged dark particle is at its "personal" dark magnetic flux tube. Instead of being a random chemical soup, dark living matter is highly organized, somewhat like library containing each book at its own self! It is difficult to exaggerate the importances of this implication.

2. The most important biologically important ions include H^+ , Li^+ , Na^+ , Cl^- , K^+ , Ca^{++} , Mg^{++} . If some of these ions are absent, the communications to the corresponding layer of the magnetic are not possible and this part of magnetic body cannot control the corresponding parts of brain. The generation of these ions could be based on charge separation causing also the formation of exclusion zones (EZs) of Pollack [I1] as protons are transformed to dark protons at dark flux tubes outside EZ.

It is known that lithium ions accompanying lithium carbonate Li_2CO_3 dose interfere with ion transport processes (sodium pump) pumping Na^+ ions from cell interior (see https://en.wikipedia.org/wiki/Lithium_carbonate). This suggests that also Li ions give rise to dark generalized Josephson currents through the cell membrane.

3. Electron corresponds to 6×10^5 Hz, proton to 300 Hz, and lithium cyclotron frequency is 50 Hz and could be assigned to the limbic brain. Mg^{++} corresponds to 26 Hz, Ca^{++} to 15 Hz, Na^+ to 13 Hz, Cl^- to 8.5 Hz, K^+ to 7.5 Hz, etc... Iron and Cobalt would have cyclotron frequencies near 10 Hz of alpha band.

Also higher harmonics of cyclotron frequencies are present and I have proposed that the magnetic field strength has spectrum, which corresponds apart from scaling to the frequency spectrum of biophotons, so that this picture is oversimplified. For instance, in retina 80 Hz frequency appears and would require stronger magnetic field unless it corresponds to higher harmonic.

4. Magnetic fields oscillating at 50 Hz frequency are known to have biological effects [K2]. The size of the corresponding magnetic body part would be obtained from the wavelength $\lambda = 2\pi R$ (R denotes the radius of Earth) of the lowest Schumann frequency 7.8 Hz as $L = (7.8/50) \times R = .98 \times R$. This suggests that dark magnetic flux tubes assignable with Earth are involved: not however that the field strength is $2B_E/5$.

The naive guess is that EEG amplitude at 50 Hz is enhanced. It is found that the increase of lithium carbonate level for patients increases EEG delta and theta intensities and slow down alpha frequency (see <http://tinyurl.com/z88okg7>): unfortunately there is no mention about 50 Hz. The simplest interpretation is that improved communications at 50 Hz induce healing and indirectly improve communications also at lower frequencies. The slow down of alpha frequency remains to be understood. The precise values of cyclotron frequencies are controlled by magnetic body by varying flux tube thickness (flux quantization and conservation implies correlation of field strength with the thickness of the flux tube). Typical variation is about 10 per cent.

5. A naive dimensional guess is that the size scale of the part of the magnetic body corresponding to particular part of brain is proportional to its size. The naive scaling argument would suggest that lithium scale is few centimeters. One must of course take this kind of estimates with extreme caution. The most primitive parts of CNS such as spinal chord and brain stem

would correspond to highest frequencies in EEG and also above it, and the most advanced parts such as cortex or its sub-structures to the lowest frequencies such as at 10 Hz alpha frequency: lower frequencies would not correlate directly with our conscious experience but could correspond to large structures giving rise to collective levels of consciousness.

To sum up, lithium could help by re-establishing the connection to the lithium part of the magnetic body so that it could fix the part of brain involved. This would take place by control commands controlling gene expression.

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