Review:
Spintronic characteristics of self-assembled neurotransmitter acetylcholine molecular complexes enable quantum information processing in neural networks and brain. Arvydas Tamulis, Kristina Majauskaite , Visvaldas Kairys , Krzysztof Zborowski , Kapil Adhikari , Sarunas Krisciukaitis; Chem. Phys. Lett., 660 (2016) 189

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The limitations of medical and physical science must be overcome. Those limits hold fast the intractable difficulties of the human animal, pathologies concerning memory, and muscular and cellular activational processes, some of which are based in nicotinic and muscarinic receptors, corresponding ligands and second messenger cascades. Acetylcholine is a fundamental systemic component deeply interdigitated with the most basic cellular processes, autonomic and central nervous function and memory. *Myasthenia gravis* and *Alzheimer's* are just two disorders that plague the human animal which may be ameliorated through a more complete and basic understanding of the formative mechanisms which yield healthy and pathological symptomatic manifestations. In order to advance past the current limits of our neuroscientific understanding, a new approach is required.

The aforementioned necessity for a new approach is to be answered within the burgeoning connectivity of our supposedly separate scientific disciplines. To answer a problem in a vital and new way, we must understand and make use of the intraconnections within the single human scientific endeavor. Biology is based in chemistry, and as Feynman did so often remind us, chemistry is based in physics. To understand the next level of depth within biology and cognition, we must turn to the deeper level of formative understanding available to us: that of theoretical quantum physics. Work such as: *Spintronic characteristics of self-assembled neurotransmitter acetylcholine molecular complexes enable quantum information processing in neural networks and brain*, accomplishes just this vital aim.

Spintronic type control of the neural mechanics of the synapse is proposed. Information and quantum processes are clearly spelled out as mediating neural systemic expression, in a detailed stepwise model. Electron phonon interactions remain to be fully explored, and are ripe for future work which may benefit medical science, with a deeper view. The paper under review offers ample sophistication and particular theory to open the tantalizing door to a new approach to synaptic processes which includes quantum aspects and informational mediation. This author [R.N.] has also found substantial and convincing evidence of quantum information mediating systemic expression, even within fundamental morphology itself [1].

Theory is only so good as the factual experimental evidence determines. Breaking of the

neutral radical ACh molecule C(8)-O(1) bond was predicted by the new model, and experimentally confirmed. Spatially localized electronic spin density of the ACh neutral radical molecule as related to the group $-N-(CH_3)_3$, is shown to represent one qubit of information. A stable dimer is implied as associated with the neutral radical ACh molecules. A new idea of clear import concerning interactions of spin dipoles is spelled out: Liquid State Quantum Information Processing (lsQIP). Here we see quantum molecular spintronic type arrays mediating neurotransmission itself, within neural networks.

To create new solutions to important problems in medicine and neuroscience, we must turn to physics, for physics is what underlies chemistry and biology. Underneath physics itself, Wheeler long has noted—is information. It is this fundamental informational process basis which must be understood, if we are to advance further, toward the goal of human knowledge, health and understanding.

Reference:

Norman, R.L., Dunning-Davies, J., Heredia-Rojas, J.A. and Foletti, A. (2016) Quantum Information Medicine: Bit as It—The Future Direction of Medical Science: Antimicrobial and Other Potential Nontoxic Treatments. World Journal of Neuroscience, 6, 193-207. http://dx.doi.org/10.4236/wjns.2016.63024