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Editorial

On the impact of quantum biology and relativistic time dilation in autism

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Abstract: This Editorial elaborates on innovative concepts presented at the 2nd European Conference of Biomedical Research and Treatments for autism held in Bari, Italy, in November 2017. We discuss the recent publication of a paper describing how relativistic time dilation at the DNA level can lead to novel approaches in disease prevention and cure, and we elaborate on the role of the human microbiota in restoring quantum entanglement at the DNA level. According to this hypothesis, microbial degradation of a glycosaminoglycan, chondroitin sulfate, leads to restauration of gene expression, induces general and sequence-specific relativistic time dilation, restores DNA quantum entanglement, and improves the ability of DNA to retain, process and transmit information both at the biochemical and the quantum levels. It can be argued that these processes played a role in the evolution of the human brain and consciousness. Fermented aliments that today would be defined as "probiotics" were the first processed foods eaten by early humans, and it is conceivable that the effects of the microbes in those aliments on the chondroitin sulfate, coming from cartilage of animals hunted or scavenged, may have led to the biochemical, relativistic and quantum effects responsible for human evolution. Finally, we discuss the implications in the field of autism where the theory of consciousness based on quantum biology presents exciting and innovative perspectives for prevention and cure.

Keywords: autism; consciousness; DNA

This Editorial elaborates on some of the innovative concepts presented at the 2nd European Conference of Biomedical Research and Treatments for autism held in Bari, Italy, in November 2017. Some of the concepts presented at the conference were subsequently published in the peer-reviewed Journal of Neurology and Stroke; here the effects of relativistic time dilation were discussed, arriving at the conclusion that "slowing down the passing of time at the level of DNA will enable cells to repair

mutations and/or alterations of the epigenome exploiting the repair mechanisms that evolved over the course of millions of years, thus preventing the onset and development of diseases and aging" [1].

The concept of relativistic time dilation at the DNA level is based on another recent paper published in the peer-reviewed journal, Bio Accent Open Access HIV. In that paper, a novel procedure is described for improving the efficacy of DNA vaccines in areas as diverse as Alzheimer's disease, HIV infection and cancer [2].

Relativistic time dilation is the consequence of non-covalent binding of highly charged molecules to genomic DNA. As described in the article in the Journal of Neurology and Stroke [1], the molecular mass and the electromagnetic fields generated by the movement of highly charged macromolecules at 37 °C are responsible for gravitational effects on time. The formula for the molecular mass described in [1] contains a core of chondroitin sulfate as the molecule intended to bind DNA and induce relativistic time dilation, and phosphatidylcholine as the outer shell intended to favor internalization of the glycosaminoglycan into the cells. Here we describe how the introduction of microbes pertaining to the human microbiota may further improve the efficacy of molecular binding to DNA and the resulting relativistic time dilation, and restore quantum entanglement at the DNA level.

It is well accepted that the microbiota performs an extraordinary number of functions in human physiology with far reaching implications that border metaphysics as described in a recent paper [3]. An interesting feature of the relationship between the microbiota and its human host is represented by the quality of being recursive, that is, of having repetitions necessary for certain results. The microbiota modifies molecules endowed with informational content, and these modified molecules in turn influence the function of the microbiota (recursivity). Chondroitin sulfate, a glycosaminoglycan widely used in medical and nutraceutical formulas and a component of a novel supplement [4], represents a prime example of such recursivity. In the past few years, it has been demonstrated that microbes of the gut microbiota are able to metabolize chondroitin sulfate leading to formation of small oligosaccharides, and that these oligosaccharides in turn influence the function of the microbiota with profound effects on human physiology [5,6]. For example, a recent paper demonstrates that chondroitin sulfate disaccharides significantly reduce blood lipopolysaccharides in mice experiencing exhaustive exercise stress, restore short-chain fatty acid production, have a profound impact on gut microbial composition; they also reduce the prevalence of inflammatory Proteobacteria, and increase the intestinal Bacteroides acidifaciens population, thus exerting immunomodulatory effects [6]. Based on these observation, we developed concepts and formulas containing microbial strains known to produce enzymes capable of metabolizing chondroitin sulfate with the goal of exploiting these features of the glycosaminoglycan molecule [7]. We describe how such a combination of microbial strains and chondroitin sulfate leads to quantum effects at the DNA level.

First of all, it should be recognized that small oligosaccharides, derived from the degradation of glycosaminoglycans, are internalized in cells and bind DNA through electrostatic interactions with histones and other DNA-binding proteins [1,8,9]. For the sake of clarity, we shall limit our description to disaccharides of chondroitin sulfate, each one composed of glucuronic acid and N-acetylgalactosamine as in the classic alternating chain. Glucuronic acid, once in proximity of DNA, may bind, via electrostatic interactions and without the need of enzymatic catalysis, to the lysine within the N-terminal tail protruding from the histone core of the nucleosome in a manner similar to what happens with acetylation. Ionic interactions between chondroitin-6-sulfate and lysine-containing polypeptides have been studied by NMR spectroscopy since 1998 [10]. It can be envisaged that glucuronic acid binds to

those lysine residues that are not acetylated; in this manner, the DNA, where glucuronic acid is bound, changes its conformation, becomes more accessible to site-specific DNA-binding proteins that regulate gene. As DNA-binding proteins are basic, their interaction with DNA in the regions where glucuronic acid is bound is strengthened by the concomitant acid/base interaction with glucuronic acid. In other words, glucuronic acid enhances gene expression by making DNA more accessible to transcriptional factors and by reinforcing the interaction between these factors and DNA. At the same time, the other component of the disaccharide, N-acetylgalactosamine, being basic, binds to the acidic moiety of DNA, the deoxyribonucleic acid, further stabilizing the complex. It is worth noticing that the DNA-sequence specificity here is due to glucuronic acid and not to N-acetylgalactosamine. Glucuronic acid can interact only with those lysine residues that are not acetylated, whereas N-acetylgalactosamine can interact with any region of DNA. In terms of information theory, we could say that glucuronic acid searches for those regions of DNA where gene expression is deficient because of poor acetylation. Glucuronic acid could then exert a direct regulatory effect on gene expression leading to the same results observed with histone deacetylase inhibitors that are compounds with a long record of successes in psychiatry, neurology, cancer and inflammatory diseases [11]. This hypothesis concerning the combined effects of glucuronic acid and N-acetylgalactosamine is corroborated by the observation that glycosaminoglycans composed of these molecules indeed regulate gene expression [12,13].

An interesting observation arising from the specific binding of glucuronic acid to poorly-expressed regions of DNA, is the introduction of sequence-(or site)-specific relativistic time dilation that would complement the general concept described in [1]. Thus, the presence of pairs of highly charged molecules—i.e., the chondroitin sulfate disaccharides—in a string, induces relativistic time dilation in a specific site of DNA according to the principles described in [1]. This would give extra time to that specific region of DNA to regulate gene expression. In the field of autism as well as in other neurological and neurodegenerative diseases, it can be envisaged that such a type of epigenetic restauration would substitute for the need of using histone deacetylase inhibitors.

Interaction of chondroitin sulfate disaccharides with DNA leads to other interesting consequences in the field of quantum biology. It is well assessed that quantum effects are at work in biological processes as human consciousness, photosynthesis and avian navigation, processes which are based on the exchange of information between molecules [14–16]. Not surprisingly, quantum entanglement between the electron clouds of nucleic acids in DNA underlies the ability of DNA to retain, process and transmit information [17]. Therefore, addition of highly charged molecules with their electron clouds, to the superstructure formed by DNA and proteins, modifies the quantum properties of DNA. Here, when we refer to the ability of DNA to transmit information, we are not only referring to the classical information theory of molecular biology where the biological information in DNA is transcribed in RNA and then translated in proteins, we are highlighting the recently described feature of DNA that functions as a fractal antenna [18], able to send and receive information under the form of electromagnetic waves where, by definition, quantum processes are at work.

In short, microbial degradation of chondroitin sulfate leads to restauration of gene expression, induces general and sequence-specific relativistic time dilation, restores DNA quantum entanglement and improves the ability of DNA to retain, process and transmit information both at the biochemical and the quantum levels. It is arguable that these processes have played a role in the evolution of the human brain and consciousness. Fermented aliments that today would be defined as “probiotics” were the first processed foods eaten by early humans [7], and it is conceivable that the effects of the microbes in those

aliments on the chondroitin sulfate, coming from cartilage of animals hunted or scavenged, may have led to the biochemical, relativistic and quantum effects responsible for human evolution.

The issues of self-consciousness and consciousness of the external world are central to the understanding of autism, as the very noun that defines the syndrome implies. The first use of the word "autismus" (in German) dates back to 1912 when Swiss psychiatrist Paul Bleuler coined the word from the Greek word autos, meaning "self", and from the suffix "-ismos", meaning "action or of state", and when combined, intending to mean "morbid self-absorption". As far as quantum biology is concerned, and according to Hameroff and Penrose [19]:

(1) "Consciousness implies awareness: Subjective, phenomenal experience of internal and external worlds. Consciousness also implies a sense of self, feelings, choice, control of voluntary behavior, memory, thought, language, and (e.g., when we close our eyes, or meditate) internally-generated images and geometric patterns. But what consciousness actually is remains unknown. Our views of reality, of the universe, of ourselves depend on consciousness. Consciousness defines our existence".

(2) "Consciousness depends on biologically 'orchestrated' coherent quantum processes in collections of microtubules within brain neurons".

(3) "These quantum processes correlate with, and regulate, neuronal synaptic and membrane activity".

(4) "Conscious experience is intrinsically connected to the fine-scale structure of space–time geometry, and consciousness could be deeply related to the operation of the laws of the universe".

Hameroff and Penrose emphasize the role of neuronal microtubules and tubulin as the physical substrates responsible for the quantum effects that put "the phenomenon of consciousness at a very central place in the physical nature of our universe, whether or not this 'universe' includes aeons other than just our own" [19]. In particular, they highlight the role of resonance of microtubules, and it was recently demonstrated by Hameroff et al. as well as by our research group, that ultrasounds in the megahertz range, that is in the range of resonance of microtubules, modify mental states, possibly through quantum interference [20,21]. It is known that chondroitin sulfate proteoglycans in the extracellular matrix rearrange microtubules within growth cones [22], and this could represent an indirect interference of the glycosaminoglycan on the quantum effects associated with microtubule resonance and, thus, with consciousness. More intriguing, however, from the point of view of quantum signaling, are the two following scenarios that we present here:

(1) Post-translational modifications of tubulin in neuronal microtubules mediated by interaction with chondroitin sulfated disaccharides.

(2) Transmission of quantum signals from DNA to microtubules mediated by phenomena of resonance based on the features of DNA to function as a fractal antenna.

The first scenario is similar, in principle, to what is described for the interaction between chondroitin sulfated disaccharides and DNA; the binding of glucuronic acid to tubulin represents a post-translational modification analogous to acetylation, a mechanism known to regulate microtubule function [23]. Since microtubules are assembled in a spatial conformation that resembles the double helix of DNA, it is conceivable that quantum entanglement between the electron clouds of the constituents of microtubules plays a role in the flow of information inside the microtubules. Therefore, addition of highly charged molecules such as glucuronic acid and N-acetylgalactosamine would modify the quantum entanglement and, hence, the flow of information.

The second scenario implies a transfer of information between DNA and microtubules mediated by electromagnetic waves in that spectrum of resonance that is common to DNA and microtubules. Also in

this case, the presence of glucuronic acid and N-acetylgalactosamine integrated in the superstructure of DNA would modify the content of the information.

In conclusion, as we have announced at the 2nd European Conference of Biomedical Research and Treatments for autism, application of the principles of relativistic time dilation and quantum signaling through the procedures described in [1,2], and in this paper, has the potential to revolutionize every field of medicine with consequences that we are only beginning to imagine.

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Conflict of interest

Marco Ruggiero is the founder and CEO of Silver Spring, a Swiss research and development company in the field of supplements and probiotics. Stefania Pacini is a consultant for Silver Spring Sagl. No product of Silver Spring is mentioned in this study. Marco Ruggiero is the inventor of the immune stimulating molecule designated Rerum® mentioned in reference n. 4.

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