DNA defines consciousness

Chun Yang, M.D. www.Energinity.com cyang_5@yahoo.com

Abstract:

To science, consciousness has been a difficult topic for researchers to study. For example, Francis Crick and many others spent several decades to address the mechanism and wrote books on consciousness, but eventually it was decided to leave consciousness issue to philosophers. [1] Current science books, such as standard college biology textbooks, do not have chapters for consciousness studies. I have discussed with numerous peers about scientific studies on consciousness. All of them told me that it is still too early for science to address consciousness topic. My recent work on scientific approaches of faith has led me to study consciousness, quiet unexpectedly. Consciousness of life defined biological consciousness in 2008. [2] Consciousness exists in all life forms. Consciousness is knowing, or awareness. Consciousness behaviors in simplest life forms such as a virus and simpler forms such as a cell have been described. Consciousness evolution was also concluded in the same essay that from virus to human, consciousness including mental consciousness all undergo evolution. Human evolution is mainly mental consciousness evolution, which is very different from virus. [3] To further elucidate the mechanism, I report my continuous studies on consciousness at the molecular regulatory level. Biological consciousness including mental consciousness applies the same mechanism, which I propose as DNA defines consciousness. In the case of RNA virus, RNAs define RNA virus consciousness. At molecular level, e.g., protein, RNA and DNA level, I propose RR principle, namely recording and relating. Recording means that the life form, a cell for example, can sense or detect the internal or external interactions. For example, internally, hormones or growth factors to bind receptors for regulations, such as autocrine, paracrine, and endocrine, and externally, antigens and their receptors (or antibodies) of immune cognition, sensation of neurons such as in a learning process, drugs and their receptors, all are recordings. Relating means that the life form, a cell for example, can integrate the sensed interactions within its molecular network to generate consequential course of actions - for example, cell differentiation and growth, immune response of generating antibodies against antigens, learning and memories, drug effects, and etc. At genome or DNA level, I propose stable and adjustable (adjustable can be variable) sequence regions, or "S and A" regions, that provide limited consciousness to each species. The DNA "A" regions, including SNPs (single nucleotide polymorphisms), in/dels (insertions or deletions), CNVs (common number variants), transposons (including DNA transposons, and also retrotransposons, which are composed of large portion of the genomes in many higher level organisms), alternative splicing, and etc., may define an individually varied consciousness in a spacetime manner. Virus genomes may be subjected to a process called replicon. Replicon formation is a step, after a virus entered the host cell, to short virus genomes before its replication. DNA rearrangement in the antibody production is a well-known example for DNA sequence changes before DNA replication. In fact, all differentiated cells experience DNA reorganizations with typical or atypical sequence changes before DNA

replication. DNA replication is also accompanying certain level of DNA sequence changes known as recombination. DNA defines mental consciousness. The most highly differentiated neurons may have unique DNA sequence changes before, during, or even after DNA replications. Action potentials through afferent nerve, a process that transmits sensations to the brain, must be accepted, or recorded by a neuron, which will integrate, or relate the signals to all related existing information. If one neuron defines one concept, this neuron must be spatially, temporally, or electronically specialized to relate to other neurons through synapse connections. If a synapse itself can generate differed potential signals from other synapses of the same neuron, a genetically modified synapse may also exist, which defines modifications post replication of genome DNA. Epigenetic process, which chemically modifies DNA without changing an actual DNA sequence to alter gene expression and protein function may also play a role in the DNA defining consciousness. And, regulatory RNAs or the RNA world may also play a role in defining consciousness. All of them take part through the modification of genetic information transfer from DNA to affect consciousness. Consciousness study may be more of a theoretical issue rather than an experimental matter at its current stage.

Reference

[1] Crick F and Koch C. A framework for consciousness. *Nature Neuroscience*. 6:119-126. 2003.

[2] Yang C. Consciousness of life. *Faith Science*. National Institute of Faith Science Initiatives. P81-83. 2009. Yang, Chun. Consciousness of Life. Available from Nature Precedings <http://hdl.handle.net/10101/npre.2008.2740.1> (2008)

[3] Yang C. Evolution update. Available from *Nature Precedings* <http://precedings.nature.com/documents/4097/version/1> (2009)

Submitted and communicated since December 30, 2010

Complement of Central Dogma of Molecular Biology

Chun Yang, M.D. www.Energinity.com cyang_5@yahoo.com

Abstract:

The central dogma of molecular biology is a defined principle for general genetic information transfer, from DNA to RNA to protein through a process of DNA replication, transcription from DNA to RNA, and translation from RNA to protein. James Watson thought the central dogma in 1952 even before the DNA structural model – the double helix was discovered. [1] Francis Crick enunciated the central dogma in 1958. [2] And it was further integrated in 1970 by both Watson and Crick. [3, 4] The central dogma also covered specific transfers of genetic information - from RNA to RNA, from RNA to DNA (a reverstranscription), and from DNA to protein. Crick concluded some general reasons against information transfers from protein to protein, protein to RNA, and protein to DNA, which he called "three unknown transfers". It has been generally accepted that, as Crick concluded, "once (sequential) information has passed into protein it cannot get out again" (quotation from ref 2). Crick also predicted that "On the other hand, the discovery of just one type of present day cell which could carry out any of the three unknown transfers would shake the whole intellectual basis of molecular biology" (quotation from ref 3). The discovery of prion, a model of protein-to-protein transfer, might have already shaken the intellectual world, though it was not a general but a specific transfer. The discovery of DNA to protein transfer was also a specific transfer. The recent studies of RNA world have prompted some voices to argue the possibility beyond the seemingly well-defined central dogma. The principle of recursive genomic function was proposed to amend the central dogma with the possibility of protein to DNA as feedback mechanism. It was illustrated as -

DNA>RNA>Protein>DNA>RNA>Protein…

This is a recursive pattern. [5] However, it did not address much on a critical issue, how protein information would transfer to DNA or change DNA sequence. My recent work on the definition of consciousness of life, [6] molecular mechanism of consciousness related to genome discoveries, [7] the principle of DNA transtruction - a major mechanism of genome DNA sequence arrangement before replication, [8] and a protein-to-RNA signal transfer [9] – a predictive mechanism based on the well documented principles and direct / indirect data such as well-documented results of protein–protein or ligand-receptor signal transduction, has led me to further propose a complementary theory of central dogma. We know that transcriptional factors or other DNA binding proteins may have trouble to locate short specific DNA sequence in precision, for example, in the well-documented signal transduction pathways from protein to DNA. To address such a mystery, I rationalize how RNA may also play a critical role in the

eventual recognition of specific DNA sequence. I, therefore, propose a complemented new model of central dogma as:

Protein – RNA – DNA – RNA – Protein.

the complemented process of central dogma is

Transduction – Transtruction – Replication – Transcription – Translation.

This complement of central dogma has apparent cyclic feature, namely cell cycle dependent. From phenotype, protein and or RNA type to genotype, genome is reorganized through each cell cycle.

Reference

1. Watson JD. The Double Helix. Simon & Shuster. P153-154. 1968.
2. Crick FHC. The Biological Replication of Macromolecules. In Symp. Coc. Exp. Biol. XII. 1958.
3. Watson JD. Molecular Biology of the Gene (2nd ed.). Published by Benjamin WA. 1970
4. Crick F. Central Dogma of Molecular Biology. Nature. 227:561-3. 1970.
5. Pellionise A. The Principle of Recursive Genomic Function. The Cerebellum. 7:348-359. 2008.
6. Yang C. Consciousness of life. Faith Science. ISBN 9780578011790. p81-83. 2009. Also available from Nature Precedings <http://hdl.handle.net/10101/npre.2008.2740.1> 2008
7. Yang C. DNA defines consciousness. <http://www.energinity.com/2010proceedings1.pdf>.2010 <http://precedings.nature.com/documents/5468/version/1>. 2010
8. Yang C. DNA transtruction a major mechanism of DNA reorganization before replication. <http://www.energinity.com/2010proceedings1.pdf>.2010 <http://precedings.nature.com/documents/5470/version/1>. 2010
9. Yang C. A new category of signal transduction protein to RNA. <http://www.energinity.com/2010proceedings1.pdf>.2010 <http://precedings.nature.com/documents/5469/version/1>. 2010

Submitted and communicated since December 30, 2010

A new category of signal transduction: Protein to RNA

Chun Yang, M.D. www.Energinity.com cyang_5@yahoo.com

Abstract:

Extrinsic and intrinsic environmental factors affect an organism primarily through receptive proteins. An organism adapts its ever-changing environment ultimately through modified proteins that may have better functions to keep in harmonies with its surroundings. The ligand, any molecules, such as a growth factor (a hormone), a drug, an antigen, and etc., interact with its receptor, triggers signal transduction pathways, primarily through protein – protein, or ligand – protein interacting cascades. Much details of its downstream signaling that eventually leads to regulate gene expression, RNA process, and protein modification have been well characterized over the past several decades. Here, I report my recent theoretical identification of a possible new category of signal transduction: protein to RNA signal delivery pathways. Often an organism will interact with a ligand that it has never met before. The selected new binding protein of a new ligand, or a receptor, initially may not be a perfect binding. The plasticity of the binding protein may adapt the ligand to form an altered protein-ligand binding conformation. If there is an altered imperfect binding, how this abnormal conformation is detected and processed? I propose that the imperfect binding complex or conformation of the ligand - receptor could be detected by an RNA sensor. RNA is known for its structural flexibility, which provides its capacities to adapt varied protein structures, including altered protein binding conformations. Therefore, the name RNA sensor is given. The RNA structure has the second property that it can also present the sequence combinations of the adapted RNA structure. The RNA sensor may have several downstream consequences, some of which was already summarized elsewhere, such as an RNA sensor, when it is mRNA, can directly function to silence mRNAs[1]. The third property of RNA is that RNA is known for transfer DNA code into protein sequence through mRNA, tRNA, rRNA, and etc. The first two properties of RNA structural flexibility and also RNA representing specific sequences provide the possibility that RNA may be able to transfer conformational information into DNA sequences. Here, I particularly propose the hypothetic models of how RNAs can modify DNA including DNA sequence to form a new protein or modified protein.

1. RNA sensor directly provides a sequence of protein, or
2. RNA sensor directly provides information for DNA rearrangement or recombination at protein sequence coding level, or
3. RNA sensor is interpreted by an additional group of RNA, called reverse messenger RNA, which derives the protein sequence from RNA sensor, or
4. RNA sensor is interpreted by a third group of RNA, which delivers the messenger to the regulatory DNA, or no protein coding DNA to reorganize or rearrange the protein coding

DNA.

5. Small RNAs may play a role of varied basic blocks to fit the protein conformations, and then the combined various blocks would define a whole new protein with better specificity.
6. Retrotransposons may play a role and transposons shuttle (in and out of nuclei, shuttle among various DNA regions and possible among cells etc.) may exist.

Protein – RNA signal transduction may play a general role in homeostasis. Specific binding to an outside or internal factor, like learning process, is not always perfect, and need to be improved. Protein – RNA signaling may be able to keep specific protein bindings in check. Some proteins or ligands may be able to trigger both protein – protein signal transduction and protein – RNA signal transduction. That some bindings are not perfect binding will be removed from the body. Some imperfect bindings may cause harm to the body. For example, extrinsic insulin in the treatment of diabetes, Epotin a modified erythropoietin (epo) in treatment of anemia, and MGDF (megakaryote growth and development factor for the production of platelets), a modified thrombopoietin (tpo) in clinical trial, in which a MGDF was administrated in normal volunteer subject for safety study, or in treatment of thrombocytopenia (a low platelet status), all of those extrinsic hormones are only slightly different from their internal normal versions. On one hand, they can bind to their respective receptors to deliver signal transduction. On the other hand, they can also be processed and presented to bind to receptors on immune cells for DNA rearrangement, and possibly through the speculative protein RNA signal transduction, to generate specific antibodies. Those specific antibodies against insulin, epo, or tpo, will recognize and bind not only extrinsic hormones, but also intrinsic (un-modified) normal hormones, respectively. And therefore, they are also called autoantibodies, which would generate hormone or growth factor resistance.

Reference

1. Nabehaus F. mRNA mediated detection of environmental conditions. Arch Microbiol. 178, 404-410. 2002
2. Yang C. DNA defines consciousness.<http://www.energinity.com/2010proceedings1.pdf>.2010 <http://precedings.nature.com/documents/5468/version/1>. 2010

Submitted and communicated since December 30, 2010

DNA Transtruction:

A major mechanism of genome reorganization before replication

Chun Yang, M.D. www.Energinity.com cyang_5@yahoo.com

Abstract

"Time for the epigenome", as *nature* editorial stated in 2010. [1] The mainstream is currently focusing on epigenomics. An extensive genome sequencing within or among species demonstrated that DNA sequences are so similar among individuals that are hardly able to explain the diversity of life. Therefore, epigenomics, which modifies DNA structures chemically without changing the actual DNA sequences, but affects the proteins coded by the modified DNA, was defined to explain the similar genetic codes are expressed uniquely in different individuals or even the same individual at different times. After several years' initiation, the Human Epigenome Project is launched through a global effort - the International Human Epigenome Consortium. Could the results of epigenome project explain the diversity of life satisfactorily? We will have to wait and see the outcomes. Here, I reported my recent study results, named as DNA transtruction, which is radically different from epigenomics. DNA transtruction was proposed to reflect the conclusion that DNA defines consciousness.[2] That the simplest life forms like a DNA or an RNA virus has consciousness has led me to further think how actually the mechanism of a virus consciousness has been. I had no other choice but to propose that DNA or RNA structures had been changed through each life cycle that I called DNA or RNA transtruction before replication. At the cell consciousness level, I also propose that a cell's genome of DNA also has DNA transtruction. The proposed stable region and adjustable region, "S" and "A" regions of the genome define the limited consciousness of life. This is against the standard doctrine that DNA from a parent cell will always replicated accurately without any changes. Changes of DNA, for example mutations, are considered as long time or many years' accumulations. None has concluded that for each life or cell cycle, DNA has been modified. Could I obtain any data to support my radically different ideal of DNA transtruction? The definition that a virus has consciousness seemes making the studies of biological consciousness including mental consciousness relatively simple. So I have hypothesized that virus genomes of DNA or RNA must be varied in size due to DNA sequence changes. I also predict that all genomes within the same species but different cells must have their own genome size varied slightly, though some may be more significantly in changed sizes than the others. The first sets of data were obtained from data mining of the GeneBank. Taking HIV (Human immune deficiency virus, an RNA virus) and HBV (Hepatis B virus, a DNA virus) for examples, out of millions of data entries, I proved my hypothesis of varied sizes of genomes - the genome sizes of both HIV and HBV are differed from many different report sources. Human genome of a great interest, though its actual genome size was not officially defined to exact base pairs, due to the difficulty to complete the whole genome sequences, I hypothesize that genomes are differed in various physiological or pathological conditions. This hypothesis was another

example of DNA transtruction. Extensive literature mining has derived data that have supported the DNA transtruction theory. For another example: Identical twins are differed in their counterpart genomes. Different tissues within the same individual are differed in genomes. Different ages of the same species for example, human, young vs old, are differed in genomes. At cellular level, the prokaryotic cells made through artificial chromosomes hosted by nuclei removed bacteria, but the artificial DNAs went to one cell, separated with the host cell remaining DNAs in another cell. Cells are remembering what had happened before ips cells (induced pluripotent stem cells) was generated. Conclusions: the above three lines of data, virus, cells, and organism level of human studies support the hypothesis of DNA transtruction, a major mechanism of DNA reorganization at genome level before replication. This theory provides a novel concept and approach to explain the diversity of life at genome level.

Reference

1. *Nature*.463:587.2010.
2. Yang C. DNA defines consciousness. <http://www.energinity.com/2010proceedings1.pdf>.2010 <http://precedings.nature.com/documents/5468/version/1>. 2010

Submitted and communicated since December 30, 2010