From EAV Acupuncture and StemCells to the model of Acupuncture System as a Network of Interrelated Clusters of Adult StemCells

(From electroacupuncture and stem cells to a model of the acupuncture system as a network of interconnected clusters of adult stem cells)

L. Ristovsky[one], G. Davidovich-Ristovsky[one], Z. Jovanovic-Igniatich[2]
([one]Association "Biofield", [2]Association for the Development of Quantum Medicine "Quanttes",
Belgrade, Serbia)

The purpose of this work present and substantiate the hypothesis that the system of acupuncture points is a superficial part of the network structure of clusters of adult stem cells located both in the dermis and in the body. This network system of interconnected clusters is designed to transfer stimuli from the surface of acupuncture points to clusters of internal somatic structures. Thus, there are superficial and internal acupuncture points, divided into groups of the same type. There are many types of tissues, many different adult stem cells and, accordingly, many types of different acupuncture points. Although this system is similar to the system of organizational centers presented in the theory of morphogenetic singularity of acupuncture and does not find an explanation in physics,

Conclusion

Acupuncture points are clusters of adult stem cells, with the number of stem cell varieties corresponding to the number of types of acupuncture points. Acupuncture points and clusters of adult stem cells exist not only on the surface of the body, but in all parts of the body.

The systems of superficial and internal acupuncture points, which are clusters of adult stem cells, form a communication network of interconnected points, which is most important in acupuncture. Just as the neural network carries external stimuli to centers in the brain, so the cluster network carries energy from stimulated surface acupuncture points to internal somatic structures.

Interaction can only occur between acupuncture points of the same type.

Abstract: The aim of this paper is to promote and support the hypothesis that the acupuncture points system is the surface part of the networked system of clusters consisting of adult stem cells, which are distributed in dermis, as well as inside our body. This networked system of interrelated clusters has the role of transferring the stimuli from surface acupuncture points to clusters in the internal somatic structures. This implies that there are surface and volume acupuncture points, which are divided into groups which contain only points of the same type. Namely, there are many types of different tissues, therefore many types of different AS cells and, consequently, many types of different acupuncture points. Although, generally speaking, this system is

similar to the system of organizing centers introduced in the morphogenetic singularity theory of acupuncture, we did not find the supporting arguments in physics, but in medical research of the metastasis of so-called cancer stem tumors.

Introduction

The aim of this paper is not the analysis of EAV acupuncture (Voll 1975, Julia 1995), nor the analysis of the Adult Stem Cells (AS cells) (Bethesda 2012), but to point out that empirical experiences of EAV acupuncture and current studies of AS cells may be important for a deeper scientific insight into the phenomenon of acupuncture. In the case of EAV acupuncture, we consider that its practice has pointed to the uniqueness and importance of electrical properties of acupuncture points, but also a relatively large number of new therapeutically relevant points has been identified, which are not located on the body meridians. This was an indication that a departure from the traditional acupuncture teaching that acupuncture points are located on the body meridians is possible. On the other hand, the investigations of AS cells can be considered as a confirmation of the morphogenetic singularity theory (Shang 1989, Shang 2001), according to which acupuncture points are actually identified as organizing centers, which could be considered as remains of embryogenesis. In fact, the properties of AS cells is similar to the properties of organizing centers, as they are described in the mentioned theory, which obviously could have been expected because both of those are considered as embryogenetic leftovers.

Most of traditional and contemporary texts, describing or studying acupuncture, are dedicated to the main body meridians and acupuncture points contained in them. However, there are a few correspondent acupuncture systems, such as the auricular acupuncture system, in which the meridians do not exist, and yet very effective regulation of all processes in the body based on the stimulation of acupuncture points on the ear lobe has been confirmed ... Evidence of eighteen different microacupuncture holograms in the body, including ones on the hands, feet, arms, neck, tongue, and even the gums have been presented in recent papers. It has been hypothesized that every finger, and even every cell, may contain its own acupuncture microsystem (Leviton
1988).

The effectiveness of auricular acupuncture, as well as of other correspondent systems, and their distribution of acupuncture points show that the most of acupuncture points are not located on the body meridians, but on the body parts (such as ear lobe) with the complex morphology ... This fact could be also taken as a confirmation of the morphogenetic singularity theory, according to which the density of acupuncture points is maximal on the parts of the body with a complex surface shape structure (such as bumps, hollows and ridges).

Modern acupuncture practice, thanks to the mentioned correspondent acupuncture systems, has identified more than 1500 new therapeutically relevant acupuncture points, which are generally not on the body meridians. The fact that these points are not located on the main body meridians shows that body meridians have secondary role, or even more that they do not exist. Of course, there are experiments with radioactive tracer, which allegedly show that meridians exist (Tiberiu 1981, Kovatz 1992). However, the results of some other experiments, based on the use of same radioactive tracer (Simon 1988), indicate that meridians do not exist, ie thatnoted lymphatic and venous drainage of the technetium 99m was misinterpreted as the acupuncture meridian. Beside these contradictory experiments, it is worth to mention the experiment in which

the SQUID[one] instrumentation has been used (Cohen 1980). The results indicate that there is a distinct signal transduction system, which is not part of the nervous and circulatory systems. The conclusion that this can be regarded as confirming the existence of the meridian system is a pretentious, because it assumes that if there is such a signal transduction system, then it must be the meridian system, which is still subject to debate. In any case, if we accept that they exist, that can even be visualized, the question remains how these surface flows of energy can affect the functional state of the organs in the depths of the human body.

The acupuncture points are embryogenetic leftovers

During the past two decades morphogenetic singularity theory (Shang 1989, Shang 2001) indicates that the research of acupuncture phenomenon should be directed to the organizing centers, which until recently seemed like futile work, because there was only one referent paper (Mashansky 1983), which hinted at their existence. However, new research results (medicalxpress 2011) have been announced recently, which confirm their existence and role in embryogenesis, although not truly related to the human embryo. Beside this, there are interesting results related to the investigation of the CS cells[2] tumours (Goldthwaite 2006, Clarke 2006, Pardal 2003), which have led to some new and important findings about the role and the potencies of the AS cells, which exhibit many properties that are commonly attributed to the organizing centers. The basic idea of the morphogenetic singularity theory is that acupuncture points and meridians are ontogenetic relapse of the embryogenetic growth control system, whose carriers are the organizing centers that make the first regulatory and communication network in the embryo. Organizing centers are cells (or group of cells) that determine and coordinate the differentiation of other cells. At the macroscopic level, organizing centers are singular points in the morphogen gradient and electromagnetic field. The organizing centers are characterized, as well as acupuncture points, by more gapjunctions and a lower electric resistance. According to this theory, acupuncture points originate from organizing centers and are found on similar places on the body. Their communication network is reflected in the meridian system. The change of electrical activity in the organizing centers correlates with signal transduction and can precede morphologic change (Shang 1993). Previously mentioned investigations of the
meridian system using SQUID instrumentation (Cohen and all 1980) and its indication that a distinct signal transduction system that is not part of the nervous and circulatory systems exists, is accepted as a support of the hypothesis that the meridian system is an evolutionary outgrowth of organizing centers, which are high electrical conductance points on the body surface.

According to the morphogenetic singularity theory the meridians are separator boundaries. Namely, at early of embryogenesis gap junctions, that mediated stages cellcell communication, were diffusely distributed. During the embryogenesis the gap junctions become restricted at discrete boundaries, leading to the subdivision of the embryo into compartment domains (Lee 1994). These boundaries are pathways of bioelectrical currents and divide the embryo into domains of different electrical properties. The meridians lie at the separator boundaries between these different domains. The electrical conductance of organizing centers, as well as the conductance of acupuncture points, varies and correlates with physiological change and pathogenesis (Community 1995, Olson 1980).

(organizing centers).

The meridians and acupuncture points, or acupuncture points only

As it was mentioned previously, there are opinions that meridians are abstract lines (Simon 1988), as well as the evidences that they can become visible by injecting radioactive tracers into acupuncture points (Tiberiu 1981, Kovatz 1992). In any case, if we accept that they exist, the question remains how these surface flows of energy can affect the functional state of the organs in the depths of the human body. Although in the existing theories of the acupuncture phenomenon prevailing is the approach that is unavoidable the role of meridians, as they are introduced in the traditional teaching about meridian energy phenomenon, the fact is that there is not much data on the role of energy meridians. There is a plenty of reliable data on specific electrical and other properties of acupuncture points, which particularly emphasize the confirmed role of gap junction in the intercellular communication. This means that research of the acupuncture phenomenon should be directed towards studying of network of organizing centers, whose existence is assumed in the morphogenetic singularity theory. This means the transition from the traditional energetic approach to the level of scientific biophysical research. This opinion can be supported by the practice of the EAV electro acupuncture.

EAV acupuncture is based on the empirical investigations of the electrical resistance or electrical conductivity in specific acupuncture points, located on hands and feet, which were made by the dr R. Voll. In EAV the human body is part of the closed circuit that includes DC power source and a special tester, which measures the electrical resistance of acupuncture points. Dr. Voll found that the value of electrical resistance at a given acupuncture point provides informations about the health state of the body organ that is energetically associated with that acupuncture point. He detected a relatively large number of diagnostically and therapeutically relevant acupuncture points, which are all located on hands and feet.

Since the mid-twentieth century, intensive studies of electrical properties of acupuncture points began, which have shown that these are the points of high electrical conductance on the body surface (Community 1995, Bergsman 1993). The high conductivity is further supported by the finding of high density of gap junctions at the epithelia of acupuncture points (Mashanskii 1983, Cui 1988, Fan 1990), that form channels between adjacent cells, facilitate intercellular communication, increase electrical conductivity and decrease electrical resistivity ... The successful practical application of EAV indicated that the complexity of acupuncture phenomenon substantially exceeds the knowledge of the acupuncture, which existed prior to EAV. First of all, EAV practice showed that the number of therapeutically relevant acupuncture points is significantly higher than the number of such points used in the practice of acupuncture previously. It is also reasonable to argue that the practice of EAV indirectly initiated the development of Su Jok acupuncture and other correspondence systems, based on work with acupuncture points, which are located on hands and feet.

Acupuncture points are the clusters of AS cells

AS cells are the undifferentiated cells, found residing in a specific area of tissue or organ (called a stem cell niche) among the differentiated cells in the domicile tissue or

organ. These cells are distinguished from other cell types by the following unique characteristics (Bethesda 2012, Goldthwaite 2006):

1. They are unspecialized capable cells of renewing and replicating themselves through cell division, even after long periods of inactivity. This means that they do not have any tissue-specific structures like muscle or blood cells.
2. Under certain inner physiologic or external trigger signals, AS cells can be induced to become tissue- or organ-specific cells with special functions and thus to give rise to specialized cells, including muscle, blood or nerve cells. This process is calleddifferentiation of the AS cells. The internalsignals are controlled by a cell's genes, while the external signals include chemicals or physical interaction with neighboring cells and its microenvironment.
3. Again, under unknown inner physiologic or external trigger signals, certain AS cells types can differentiate into cell types characteristic for different organs or tissues. For example, AS cells which usually differentiate into nerve stem cells, start to differentiate into blood cells, blood cardiac muscle cells, and so forth. This phenomenon is calledtransdifferentiation.

AS have been identified in many organs and tissues (brain, bone, skin, teeth, liver, blood vessels, skeletal muscle, heart, etc.), where they may remain quiescent (non-dividing) for long periods of time until they are activated by a need for more cells to maintain tissues, or by disease or tissue injury. Namely, the primary roles ofAS cells are to maintain and repair the tissue in which they are located. Therefore, the term somatic stem cell instead of AS cell is used, where somatic refers to cells of the body, not to the embryonic stem cells (sperm or eggs). The major difference between AS cells and embryonic stem cells is their ability in number and types of differentiation. Embryonic stem cells can become all cell types of the body because they are pluripotent. AS cells are thought to be limited to differentiating into different cell types of their tissue of origin, although the transdifferentiation demonstrates that is not always so. It should be emphasized that there are some important questions about the properties of the AS cells, to which answers are not obtained yet. For example, how many kinds of AS cells exist, how do they evolve during the embryogenesis, why do they remain undifferentiated, even though surrounded by the differentiated tissue cells, what are the characteristics of their niches and what are the mechanisms of their activation?

Taking into account the fundamental role of the AS cells, which is the maintenance of tissues and removal of damage caused by the disease or physical injury, we can directly conclude that they must be present in every tissue and every organ, awaiting in their niches for activation signals to differentiate, or transdifferentiate. As many different tissues, as many niches withAS cells, which does not imply that there are as many different types of AS cells, because, due to the transdifferentiation, a single type of AS cells can maintenance more different types of tissues. Locations of niches are not identified yet, as well as the sources and the nature of activation signals, but it cannot be doubted that they exist, because it is an undeniable fact that theAS cells with their proliferation, followed by differentiation or transdifferentiation, perform the basic functions mentioned above.

Comparing the properties of the acupuncture points or organizing centers, as they are described in the morphogenetic singularity theory, with the above properties of the AS cells, we can conclude that there are significant similarities. If it is an acceptable assumption of that theory that the acupuncture points are the embryogenetic leftovers, then it is also acceptable to assume that they are the clusters of AS cells, because these

cells are the only scientifically verified embryogenetic leftovers with properties attributed to the organizing centers (acupuncture points) in morphogenetic singularity theory. Beside this, another conditional similarity refers to the activation of the specific properties of the AS cells and acupuncture points. The process of the AS cells differentiation starts with activation signals, while the energy regulatory mechanisms of acupuncture points start by their external stimulation, which is in fact energetically. Both of them remain inactive - dormant, until their function is activated by some external stimuli.

The network of interrelated AS cells clusters

The assertion stated in the title of this chapter is only partially confirmed by some observations from previous chapters. Specifically, it was pointed to some undeniable biophysical similarities between: a) acupuncture points, whose genesis is unknown, b) organizing centers, whose genesis is assumed in the morphogenetic singularity theory and c) AS cells, whose genesis is partially predictable. Beside that, we have mentioned some valuable experimental data which concern specific electrical properties of acupuncture points, for which morphogenetic singularity theory claims being identical to the electrical properties of the organizing centers, as well as some facts which concern the specific role of the AS cells in regulation of functional states and processes in tissues. Regarding the network,

All acupuncture teachings, both traditional and contemporary, operate with surface distributed acupuncture points, because all of them are located on the surface of the body. Therefore, any question concerning the mechanism of information transfer from externally stimulated surface acupuncture points to the inner somatic structures remains unanswered. Strictly speaking, this problem is unsolvable in terms of these teachings, because any offered solution can not overcome the framework of an empirically poorly supported hypothesis. Previously proposed model, according to which acupuncture points are clusters of AS cells, offers the possibility of empirically verifiable solutions, because these cells are located in all tissues within our bodies. Furthermore, according to the proposed model, acupuncture points do not exist only at the surface of the body, but they are located in all parts of our body. On the other side, the fact that effectiveness of acupuncture therapy can not be doubted leads to the assumption that there must be some kind of a controlled transfer of external stimulation to the interior somatic structures, where surface and volume acupuncture points (clusters of AS cells) have a crucial role. In other words, the assumption is that systems of surface and volume acupuncture points, which is in fact the system of clusters of AS cells, make a communication network of interrelated points, which plays the most important role in acupuncture therapy. As the neural network transfers external stimulation to the centers in the brain,

Thus, by our opinion there are two networks for transmission of information about functional and other dysfunctional activities in our body, as well as for transmission of regulatory feedback of the appropriate centers. The first one is the neural network, whose operation is based on the transmission of nerve impulses, and which can be

activated only if the nerve irritation is such that it reaches the threshold stimulation of neurons. Another network is a network of cluster of AS cells, whose activity is based on transfer of energy inducements, and could be activated, as the alternative energy therapies show, by extremely fine energy changes in the microenviroment of cell clusters.

It is bizarre, or maybe interesting, to assume that there is a communication network of AS cells clusters, which is supported by the results of medical investigations of the CS cells tumours. American Association of Cancer Research has defined the CS cells tumor asa cell within a tumor that possesses the capacity to self-renew and to cause the heterogeneous lineages of cancer cells that comprise the tumor (Clarke 2006). This does not imply that cancer is always caused by stem cells, but that the behaviors of metastatic cancer cells are highly similar to the properties of AS cells, although some researches have demonstrated that AS cells and metastatic cancer cells share several properties that are essential to the metastatic process. For example, as it is the requirement of a specific microenvironment (niche) to support growth, it is also to use the specific cellular pathways for migration (Pardal 2003). Therefore, metastatic sites for cancer could be those tissues that provide or promote development of a compatible niche, from which CS cells could expand through normal or irregular cellular signaling.

From a medical point of view, metastasis is a complex, multi-step process that involves specific sequences: the cancer cells must escape from the original tumor, migrate through the blood or lymph to a new site, move from the circulation into the local tissue and form micrometastases, However, as it was mentioned previously, CS cells, as well as AS cells, could expand through deregulated cellular signaling, that does not obviously imply the migration from their niches. In fact, it is possible that the process of metastasis is not based on the migration of CS cells, but that it is a process of sequential activation of cells within different niches, which is based on some specific distant interaction between the cells of different niches , such as the frequency resonant interactions, orinduced dipole - induced dipole attraction, known as London long range attractive interaction. These interactions could be activated by the change of polarization of the cells in some niche, which is a consequence of their proliferation or differentiation. In that case cells in all niches form a kind of informational network, where the mentioned interactions, both or one of them, play a role of activation signals, which initiate the processes of differentiation or transdifferentiation.

The network of specialized surface and volume acupuncture points

Since there are several types of AS cells, due to several types of tissues, communication network of AS cells clusters (acupuncture points) is not structurally uniform, because it contains several types of AS cells clusters. It is reasonable to assume that the energy regulation of the functional state of given somatic structures is achieved through specific sets of specialized clusters, ie clusters which contain AS cells of the same type. Speaking in terms of acupuncture, activation of some communication pathway between surface acupuncture points and corresponding somatic structures is provided by a certain number of volume acupuncture points of the same type.

If we presume that each somatic structure consists of many different tissues, it appears that regulation of its functional states requires participation of more specialized types of acupuncture points. This was confirmed through acupuncture practice, because

regulation of the functional states usually requires stimulation of more acupuncture points, while the stimulation of a single acupuncture point gives satisfactory results in the pain therapies only.

The question is whether the particular type of acupuncture point make particular communication pathways, and if is so, how does an acupuncture point of the given type recognize the acupuncture point of the same type. These two questions can be reduced to the following one: whether there is some selective interaction, such that the acupuncture points of the given type interact only, or primarily, with the acupuncture points of the same type? The answer is affirmative, because the existence of such interactions has been confirmed during the investigations of the system of deformable macromolecules (monomers) capable of electric dipole oscillations, which are located in the dispersive environment (Baumik 1978, Frohlich 1988, Ristovski 2012), as it is the environment in our body. Beside this, there is another important similarity. Namely, the mentioned system of macromolecules is pumped by an external energy supplier, as well as the acupuncture points, which are in fact the cells, energetically pumped by some external energy supplying system, like a local electromagnetic field, or by the internal process of ATP hydrolysis. This particular selective interaction is a consequence of coherent vibrations of the macromolecules dipole moments, which means that it is in fact a resonant interaction (Ristovski 2012). In other words, dipole moments of macromolecules, or acupuncture points of given type have same oscillatory properties, and the process of their recognition, physically speaking, is reduced to establish a frequency resonant interaction. This interaction was previously referred to as an as well as the acupuncture points, which are in fact the cells, energetically pumped by some external energy supplying system, like a local electromagnetic field, or by internal process of ATP hydrolysis. This particular selective interaction is a consequence of coherent vibrations of the macromolecules dipole moments, which means that it is in fact a resonant interaction (Ristovski 2012). In other words, dipole moments of macromolecules, or acupuncture points of given type have same oscillatory properties, and the process of their recognition, physically speaking, is reduced to establish a frequency resonant interaction. This interaction was previously referred to as an as well as the acupuncture points, which are in fact the cells, energetically pumped by some external energy supplying system, like a local electromagnetic field, or by internal process of ATP hydrolysis. This particular selective interaction is a consequence of coherent vibrations of the macromolecules dipole moments, which means that it is in fact a resonant interaction (Ristovski 2012). In other words, dipole moments of macromolecules, or acupuncture points of given type have same oscillatory properties, and the process of their recognition, physically speaking, is reduced to establish a frequency resonant interaction. This interaction was previously referred to as an This particular selective interaction is a consequence of coherent vibrations of the macromolecules dipole moments, which means that it is in fact a resonant interaction (Ristovski 2012). In other words, dipole moments of macromolecules, or acupuncture points of given type have same oscillatory properties, and the process of their recognition, physically speaking, is reduced to establish a frequency resonant interaction. This interaction was previously referred to as an This particular selective interaction is a consequence of coherent vibrations of the macromolecules dipole moments, which means that it is in fact a resonant interaction (Ristovski 2012). In other words, dipole moments of macromolecules, or acupuncture points of given type have same oscillatory properties, and the process of their recognition, physical

Conclusions

The acupuncture points are the clusters of AS cells, meaning that there are as many different types of acupuncture points, as there are different types of AS cells. The acupuncture points, as well as the cluster of AS cells, do not exist only on the surface of the body, but they are located in all parts of our bodies.

The systems of surface and volume acupuncture points, which is in fact the system of clusters of AS cells, make a communication network of interrelated points, which plays the most important role in the acupuncture therapy. As neural network transfers the external stimulation to the centers in the brain, similarly this network of clusters transfers the energy from the stimulated surface acupuncture points to the interior somatic structures, following the particular communication pathways.

The interaction between the acupuncture points of the given type is attractive, frequency resonant and selective, which means that it arises between the acupuncture points of the same type only.

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[one] SQUID = Superconducting Quantum Interference Device
[2] CS cells = Cancer Stem cells = Cancer Adult Stem cells

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