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Gastrulation: The mechanism of the spiritual living body

Abdelrazak Mansour Ali [1,*] and Ahmed Abdelrazak Ali [2]

[1] *Al-Azhar University, Faculty of Medicine, Pediatrics Department, Cairo, Egypt.*
[2] *Virginia Commonwealth University, Information system Department, USA.*

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Abstract

This novel study would describe a new notion about the spirit, whose eternity should anticipate that it couldn't be incorporated into our cells, rather a particular cell gene would develop during the embryonic period which could receive and decode the higher informational learning knowledge of the Spiritual energy. Gastrulation is a key developmental process during which embryonic pluripotent stem cells of the blastula reorganize into lineage-committed precursor cells to form the gastrula. Gastrulation takes place after cleavage and the formation of the blastula. The inner cell mass of embryo is pluripotent during this stage, meaning that each cell has the potential to differentiate into any cell type in the human body (organogenesis). When individual organs develop within the newly formed germ layers, then each layer gives rise to specific tissues and organs in the developing embryo. The nodal signaling pathway has a significant role in regional and cellular differentiation during development. The nodal family of proteins, a subset of the transforming growth factor beta (TGFβ) superfamily is responsible for patterning of the nervous system, It is evident that the embryo is formed in the third week post-fertilization and is accompanied by the process of brain formation that requires regulatory signals for the cells by a variety of genes that work like a communication network, during which the pluripotent embryonic stem cells and the signal induction of the homeobox genes are reorganized to plan the development and the future of embryo. Organizational plan does not take place unless a maximum information momentum is available with the highest concentration of information energy. This is the right time to blow the spirit to supply informational energy. Spirit is the eternal energy of universal cosmic information that formulate the higher cognition and consciousness of the human being, specifically, Adam's sons.

Keywords. Cells; Nodal; Signaling; Embryo; Development; Information

1. Introduction

Lewis Wolpert (1986) said "It is not birth, marriage, or death, but gastrulation, which is the most significant period in our life." Wolpert used the model which explained how signaling between cells early in morphogenesis could be used to inform cells with the same genetic regulatory network of their position and role [1]. The model uses the French tricolor flag to visually depict how embryonic cells could translate the genetic code to synthesize the same patterns, even after some pieces of the embryo had been excised [2]. The model provided a the basis of the process of embryonic gastrulation, during which, a living organism's body plan is established [3].

Biologists recognize Wolpert for elaborating the ideas of positional information and positional value: molecular signals and internal cellular responses to them that enable cells to do the proper thing in the proper time and place during embryonic development [4]. The essence of these concepts is that there is a selected set of molecules for real time spatial co-ordination of cells, identical across many species and across different developmental stages and tissues [4,5]. The discovery of Hox gene codes in vertebrates has significantly vindicated Wolpert's spatial-value concept, while identification of growth-factor morphogens in other species has supported the idea of positional information [6,7].

* Corresponding author: Abdelrazak Mansour Ali.

2. Discussion

Gastrulation is the process during which the embryo changes from single cell layered blastula to multiple cell layered a gastrula with the embryonic pluripotent stem cells of the blastula reorganize into mono potent precursor cells to form the gastrula. Gastrulation in humans begins at the 14th day post-fertilization and lasts for seven days, had resolved the single-cell transcriptomic profile of a gastrulating human embryo [8]. In humans, gastrulation occurs during the third week post fertilization. Our understanding of this process in humans is relatively limited due to its dependence on historical specimens, experimental models or, more recently, in vitro cultured samples. Here we characterize "in a spatially resolved manner" the single-cell transcriptional profile of the gastrulating human embryo, staged between 16- and 19-days post fertilization [9]. Gastrulation takes place after the formation of the blastula. Gastrulation is followed by organogenesis, in which the newly formed germ layers developed to give rise the organs [10]. The inner cell mass of embryo is a pluripotent during this stage, meaning that each cell has the potential to differentiate into any cell type in the human body. Pluripotency lasts for only a few days before the cells 'destinations are set to be the precursors to a specific lineage of cells [11]. Following gastrulation, cells in the body are either organized into sheets of connected cells (as in epithelial tissues), or as a net of isolated cells, such as mesenchyme. [10,12]. Each layer gives rise to specific organs in the growing embryo. The ectoderm gives rise to epidermis, the nervous system, and to the neural crest. The endoderm gives rise to the epithelium of the digestive system and respiratory system, and organs associated with the digestive, such as the liver and pancreas [13,14]. The mesoderm gives rise to many cell types such as muscle, bone, and connective tissue. In vertebrates, mesoderm derivatives include the notochord, the heart, blood and blood vessels, the cartilage, the vertebrae, and the dermis [15,16].

During gastrulation, the cells are differentiated into the ectoderm and mesendoderm**.** Then mesendoderm separates into the mesoderm and endoderm.[17]. The **Nodal signaling pathway** has a significant role in regional and cellular differentiation during embryonic development [18]. The Nodal family proteins, are linked to the transforming growth factor beta (TGFβ) superfamily that are responsible for mesoendoderm induction, patterning of the nervous system, and determination of dorsal- ventral axis. [19]. Studies reveal a novel role for Nodal signaling in regulating actin dynamics and migration behavior, which are crucial for endodermal morphogenesis and cell fate decisions [20]. Activation of the nodal pathway involves nodal binding to activin receptors which leads to phosphorylation of the Smad complexes which translocate into the nucleus to interact with transcription factors such as FoxH1 , p53 and Mixer. This will, in turn, lead to induction of target genes such as NODAL, Lefty, and others [19]. The Wnt pathway and β-catenin plays a key role in nodal signaling. Bone morphogenetic protein (BMP), Fibroblast growth factors (FGF), and retinoic acid (RA) are all important in the formation and development of the endoderm [21,22]. FGF are important in producing the homeobox gene which regulates early developmental stages of the embryo. Additionally, BMP signaling plays a role in the liver and promotes hepatic fate. RA signaling could induce homeobox genes, so the lack of RA signaling would affect mouse' lung development. RA signaling also has multiple roles in organ formation such as, pharyngeal arches, foregut, and hindgut.[23]. This information raises the question of how the nodal signaling does induce endoderm and mesoderm. The answer comes in form of a gradient of nodal protein. Realtime and spatial differences in nodal signaling will result in different cell fates. With the addition of antagonists and the variability of different nodes, we can draw a map of cell fates including both mesoderm and endoderm of the embryo [24]. Nodal signaling is necessary for establishing the Left-Right embryonic axis and so, cell signaling, and cell geometry are mutually interrelated, I, e, cell signaling impacts spatial organization. Alternatively, spatial organization enhances signaling, bestows unexpected properties to network motifs, and provides the fundamental mechanism for spatial polarization and gradient tracking. Similar studies of the dynamics of MAPK pathways in animals will reveal the full complement of biological signal processing in both spatial and temporal mechanisms [25,26]. Mitogen-activated protein kinase (MAPK) cascades are key signaling pathways that regulate a wide variety of critical cellular processes, including proliferation, differentiation, apoptosis, and stress responses. The MAPK pathway includes three main kinases, MAPK kinase kinase, MAPK kinase and MAPK, which activate and phosphorylate regulatory proteins [27,28].

MAPK pathways sense the extracellular environmental information and transmit this to regulate various cellular processes. It was found that most proteins involved in the MAPK pathways were linked together in a signal transduction pathway. Consequently, research has been directed, and conducted on understanding how the dynamic extracellular signals are processed for cellular decision making. Recent advances in cellular biological studies had exploited the advantage of microfluidics technologies combined with fluorescence imaging and automated cell tracking in addition to segmentation algorithms [29,30].

Neurulation refers to the embryonic folding process, which includes the transformation of the neural plate into the neural tube. Neurula is the term given to the embryo at this stage. The notochord induces the formation of the central nervous system (CNS) by signaling the ectoderm germ layer above it to form the thick and flat neural plate.

The neural tube is formed by folding the neural plate upon itself, then the neural tube will differentiate into the spinal cord and the brain, ending in central nervous system formation [31]. As nodal signaling gives rise to ectoderm and mesoderm, the blocking of nodal signaling by the expression of nodal antagonist, Cerberus leads to the neuroectoderm formation [32]. It is evidenced that cell wedging, and differential proliferation are sufficient for mammalian neurulation [33]. As the first cells wedge to bend the sheet, then cells intercalate and extend the initial invagination into a tube [34]. Different portions of the neural tube are formed by two the processes, namely primary, and secondary neurulation [35].

The neural tube formation starts during the 3rd and 4th week of gestation and requires various cell signaling and regulation by a variety of genes. This process is called primary neurulation, and it begins with an open neural plate, which creases inward until the edges fuse. In **secondary neurulation**, the tube forms by hollowing out of the solid precursor, then ends with the neural plate bending in distinct steps [36]. The embryonic disc begins flat and round, then elongates to form a wider cephalic part and narrow-shaped caudal end [37]. At the beginning of the second week, the two main layers of the bilaminar germ disc (hypoblast and epiblast) are formed [38]. The inner cells will turn into the hypoblast layer, which will surround the epiblast, forming the embryonic disc that will develop into the embryo [39]. At the beginning, the primitive line extends in cephalic direction and returns caudally until it disappears. the germ layer shows specific differentiation at the beginning of the fourth week, The germ layer shows specific differentiation at the beginning of the fourth week in the cephalic portion, while this specific differentiation in the caudal portion occurs at the end of the fourth week [40]. Cranial and caudal neuropores become progressively smaller until they close completely forming the neural tube [41]. This neural tube represents the embryonic brain and spinal cord. Errors in neural tube closure can lead to congenital anomalies, such as neural tube defects [42].

It is evident that the embryo is formed at the third week after fertilization and is accompanied by the process of brain formation that requires regulatory signals for the cells by a variety of genes which work like a communication network where the cells of the body are organized through a database and complex overlapping information that includes "Energy - modern communications - nervous system - living cells, and even artificial intelligence". Analyzing the database of this information is beyond our capabilities and inaccessible at this critical stage of our development. Four unique features of this stage include:

- It is the embryonic process during which the body life plan of the organism is developed.
- It is the coordination of thoughts, information, the generation of molecular signals and local cell responses that enables cells to do the right thing in the right place and at the right time during embryonic development.
- Cells in the body are either arranged in sheets of connected cells, or as a network of isolated cells. Each layer forms specific tissues and organs in the developing embryo. For example, the ectoderm layer forms the skin and the nervous system.
- A pivotal developmental process during which the pluripotent embryonic stem cells are reorganized. By contemplating these four characteristics of the developing embryo, we disclose that it would not take place unless the maximum information momentum is available with the highest concentration of informational energy. This is the right time to blow the spirit to supply this informational energy.

It is noteworthy to differentiate between Soul and Spirit; Soul is the driving secret of life in all living organisms, and it is cause of life for any cell, so the creation of cell started by the soul that integrated with and formulated the cell matter. But Spirit, is the eternal energy of universal cosmic information that formulate the higher cognition and consciousness of the human being, specifically, Adam's sons. Because the Spirit is eternal, so it couldn't be incorporated into the cells, rather a particular group of genes would develop into the embryo to receive and decode the higher informational learning knowledge of the Spirit energy. Since the embryonic gastrulation occurs at the third week after fertilization, specifically between 16-19 days after fertilization, therefore this is the time when DNA of the cell is supplied with the unique genes to receive and decode the information carried by the spirit.

- The process of in *vitro* fertilization in lab, occurs when mature eggs are removed from the ovaries and are placed in a cultured medium where they are fertilized by sperm, then the embryo will form in the culture. Fourteen days after fertilization, the primitive streak forms, which has been known to some countries as "human individuality" [43]. This means that the embryo is now a being itself, it has its own entity. The countries that believe this have created a 14-day rule in which it is illegal to study or experiment on a human embryo after the 14-day period in *vitro*. Research has been conducted on the first 14 days of an embryo, but no known studies have been done after the 14 days [44]. While growing to encompass the evolving science, clinical applications of stem cells, and the increasingly complex implications of stem cell research for society, but the basic principles underlying the guidelines remain unchanged, and they will continue to serve as the standard for the field and as a resource for scientists, regulators, funders, physicians, and members of the public, including patients [45]. With the rule in place, mice embryos are used to understand the development after 14

days; however, there are differences in the development between mice and humans. Scientists have created embryo models to help study the mysteries of early human development, the medical problems that happen before birth and why many pregnancies fail. These models are made from stem cells, not egg and sperm, and can't grow into babies. Real human embryos can be extremely hard to see at that stage because they burrow into the uterus. they're not complete to use them for reproduction. Guidelines cannot put any human embryo model into either a human or non-human uterus. For decades, the scientific community had a related "14-day rule" that guided researchers on the length of time of growth of embryos in the lab. But because the models are not embryos, they're not subject to the rule. The public have the wrong idea about these models, believing they might be able to create pregnancies. But scientific hurdles prevent this. Even in the future, as the field progresses, there are ways to guard against who may try to create pregnancies from embryo models [46].

Although the 14-day rule has been criticized, but there are several reasons for that time frame. After an egg cell is fertilized by a sperm cell, the resulting embryo consists of identical cells. Most embryos will implant in the uterus after the 14th day. After this point, the 'primitive streak' appears, which is the first sign of an embryo's developing nervous system. The rule also identified the point at which the embryo shows signs of individuation, because it is no longer possible for the embryo to divide into twins after 14 days. Some people reason that due to these events, it is at this stage that a moral being comes into existence, and it would not be accepted to perform research on embryos after this time [47]. The cutoff limit was set at 14 days for a variety of reasons. For example, 14 days is around the time when an embryo starts to develop the first signs of neuralization. It's also when an embryo can no longer divides into twins. At the time, scientists were far from being able to sustain living embryos in the lab anywhere close to 14 days [48].

Obviously, it is the critical period after the 14 days in which, the organizational plan should take place with the magnitude of informational energy available to plan, coordinate and integrate the developing individual embryo. That is the reason why the placental role to come into play upon implantation of the blastocyst into the maternal endometrium, with its consequent extraembryonic membrane development that ultimately acting as a barrier to protect the delivered spiritual informational energy from the potential hazards of other information carrying radiations such as electromagnetic waves. Therefore, it is considered the right time for the embryonic new genes to receive and decode the spiritual supply of informational energy via the synchronous blow of the spirit.

Abbreviations

- Wnt pathway = Wingless and Int-1.
- FGF = Fibroblast growth factors,
- BMP = bone morphogenetic protein.
- RA = retinoic acid.
- TGFβ = Transforming growth factor beta.

3. Conclusion

The embryo formed in the third week after fertilization is accompanied by the process of brain formation that requires regulatory signals for the cells by a variety of genes that work like a communication network, during which the pluripotent embryonic stem cells are reorganized and the signal induction of the homeobox genes that plan the developmental events, and the future of embryo are developed. it is the critical period after the 14 days in which, the organizational plan should take place with the magnitude of informational energy available to plan, coordinate and integrate the developing individual embryonic cells. This is the right time to blow and to activate the spirit to supply informational energy to the genes that plan the developmental events and the future of embryo.

Compliance with ethical standards

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The authors declare that they have no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The authors declare no conflict of interest.

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