

Biodynamic Embryology – Theory, Perception, and Palpation

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“The embryological forces are present throughout life as healing and sustaining metabolic processes. This premise is the foundation of Biodynamics.”
Jim Jealous, D.O.

Introduction

Scientific embryology has two fields of study. The first is *metabolism* and the world of biochemistry and cell biology. The second is the field of *morphology* which is now accepted as a valid scientific field of study of the human embryo (see *Terminologia Embryologica*, Thieme Publisher, 2013). It is also called biodynamic embryology because Eric Blechschmidt and Raymond Gasser developed and wrote extensively about the field of embryonic morphology. Dr Jealous carried it into biodynamic osteopathy and Brian Freeman carries the tradition forward academically. This chapter seeks to bridge the study of biodynamic embryology to one’s inner perception of their body guided by Primary Respiration (PR) and dynamic stillness as a series of levels or *embodied order* to access the embryo present. And the additional intention is to bridge into the metabolism of the body in the contemporary client through embryonic palpation skills. Once one perceives their own perpetual embryo under their skin, this embodied knowledge is expressed through our “knowing” hands and placed on the client’s embryo. So, what is an embryo?

First Order

The embryo is 98% water. The adult human is 92% water. There are three basic canals that the fluid body has pre-existing: longitudinal, flowing along the limiting membrane, and flowing through the membrane since the water molecule is the smallest molecule in the human body, and it goes through everything it wants to go through. Nothing stops it. These movements have been verified by the work of Gerald Pollack (Fourth Phase of Water which is its gel state). Two primary membranes are inflamed (endothelium and epithelium) in the contemporary client. This interferes with the natural flow of biological water creating stagnation of waste product removal in the interstitium, fascia and blood. It blocks the feeding channels for cells to be nourished. And the electrical charge of these compromised cells is diminished from its optimal of 90mv (millivolts) to as low as 20 and 30 which is diseased. So, the *first order* of understanding the embryo and bridging to something we can sense in our body and that of the client is as Dr Jealous called it, is the fluid body. The fluid body carries the *potency* of PR, the wholeness of the Health. Biodynamic in morphological embryology is

defined as the ordered movement of the whole. Biokinetics is the development of the individual parts within the whole. Biodynamic describes the global movement of PR in the fluid body as a singular phenomenon.

Second Order

The biodynamic morphological model is defined as having four stages of development in the embryo. Each stage is a global transmutation of form and function and thus biodynamic by definition (the substages discussed later are called biokinetic). These macro-stages correspond beautifully with one per week for the first three weeks generating the first three stages. And the whole remaining time of the embryo from week four to eight are the fourth stage.

1. Stage one is compression,
2. Stage two is expansion,
3. Stage three is centering in the heart,
4. Stage four is flexion – extension.

Cavities, tubes, and a mooring line (connecting stalk) need to be established in the first two weeks within the context of global compression and expansion occurring simultaneously. This is followed in the third week by differentiation of tubes (gut and heart) through the coelomic sacs (pleura, pericardium, peritoneum), and continued differentiation of the amniotic cavity towards becoming the third ventricle. Biodynamics and biokinetics involve a lot of differential rates of growth, which means each organ system and structure not only has its own timing for differentiation, but its own velocity with which it develops. Some are fast like the brain, and some are slow like the heart. This supports the third aspect of biokinetics concerning structuring. Then add in local position as the global surface of the embryo has all different pressures upon it internally and externally and consequently its movement is not uniformly concentric. PR is uniformly concentric and thus the ideal starting point for a baseline biodynamic perception.

The other global movement is the growing rotation of the embryo to place the connecting stalk beginning on the dorsal surface of the ectoderm shifting it to the caudal end of the embryo connecting to the future sacrum and coccyx that begins the third week inducing the appearance of the famous notochordal midline and primitive streak. These are seams that are created that induce the cells on the edge of the seam to differentiate into heart cells, and they all go around

the midline and accumulate at the cranial end of the embryo against the future face of the endoderm tube. For a short time, this early heart sits on top of the notochordal midline. Then the heart begins its four stages of development: plexiform, tubular, S-curve and upside-down. And for a short period of time our future lips are kissing our own heart. Imagine that. Later the heart will induce the growth of the arms, fingers and their joints. And thus, the origin of heart in the hand as the heart slowly grows down from the cervical level of C3 to T5. This happens in the fourth phase of morphological development as it requires the embryo to continually flex and extend its entire body to facilitate these differential rates of growth.

And finally, during this fourth phase of morphological growth, the embryo continues to rotate until the connecting stalk has transformed into the umbilical cord on the ventral surface of the embryo. The umbilicus being the fulcrum for metabolism. I've watched the video by Johns Hopkins University of this fourth phase of development 50 times. Each time I've learned something different every time.

These are the global biodynamic movements that the whole embryo is making as a singular fluid body. So, the *second order* of bridging from morphology to palpation biodynamically is contact with these four stages in the context of the fluid body. Synchronizing with these movements via PR and the stillness gives you access, a bridge to the life of the whole fluid body of the embryo. Symmetry is self-generated in the whole around transient midlines and fulcrums called axial and radial symmetry. Frequently our perception is drawn to such symmetries within the whole (see appendix 1, Part 3).

Third Order

Biokinetics has three aspects: 1. local position within the total form, 2. which determines specific cell shape rather than genes, 3. and the numerous individual phases of structuring processes. Cells can exchange function and change into one another depending on location. Cells are told what to do depending on their location in the whole. They are told what to do by the whole. A gelled scaffolding spontaneously appears in the fluid body that will hold the organ being built. This is the *third order* of bridging from the academic to the palpatory. What is happening immediately under your hands with specific structures that come into our awareness? They are sensing the eight metabolic fields which are fields of purposeful directional movements of biokinetic structuring processes. In other words, depending on where you are in the body, because of the different

shapes of the cells and their aggregates, the different physical forces of the eight metabolic fields, as described by Blechschmidt and Gasser, are developing and consequently become more dense than the whole fluid body (although Dr Jealous said that the fluid body stiffens when it lesions, and this is a distinction he felt was important clinically). The eight metabolic fields are described as the biokinetics of all the structures that have to be built and their plumbing systems of nutrition delivery and waste removal. You can think of these eight fields as construction machine equipment. The densification process in the individual components of the embryo is called morphogenesis. It mimics the first morphological stage of compression. However, it is different in each of the structures being built because it is local (biokinetic) rather than global (biodynamic) and is more dense. Biokinetics at one end of the spectrum includes biomechanical palpation in many of the manual therapeutic arts. When you know the embryological direction of individual parts you can palpate the developmental movements. These movements are accessed through their metabolic fields which are automatic shifting fulcrums.

The most interesting field is the suction field, which is present from conception. Membranes and fluids move in way that creates suction, which means we are constantly being pulled from one place to another and towards the outside especially for all of whole week two in morphological development. Each organ in our body is literally being sucked into form with a strong, pulling force that opposes gravity especially in the embryo. In the adult, the cardiovascular system is still a suction field. This is because circulation starts at the capillary beds and ends at the heart, since it is metabolic demand in the tissues that pulls the blood rather than the heart pushing the blood.

To access any metabolic field, morphological phase or the fluid body, Dr Jealous reminded us that we must have afferent hands. As biodynamic practitioners we cultivate the sensibility of doing and equally so the sensibility of receiving. We allow the client into us through our perception and our hands. In this way our hands allow the organism and soma of the client to investigate the contact and determine at instinctual level if such contact is safe. This capacity is different in each session for each client. And the effect of acceptance by the client of the practitioner's presence is known by what Dr Jealous called a neutral. The interpersonal intersubjective field of the therapeutic relationship settles and is held by PR.

Fourth Order

The insight that Dr Jealous had (to simplify all this) was that the six or eight patterns of the sphenobasilar joint (SBJ), flexion extension, and so forth are all rooted in the embryology of the biokinetics of the cranial base. So, in other words, the movement of the SBJ is an embryonic biokinetic movement based on the presence of at least three metabolic fields, having to do with compression, shearing, and so forth. So the actual names of those SBJ patterns are the names of the metabolic fields translated by Sutherland without him knowing their connection to embryology but intuiting it. That is biokinetics in its simplest palpatory meaning. And biokinetics is linked to biodynamics in clinical practice as the *fourth order* of bridging perceptually during a session. Our perception rests on PR and the stillness and during a session we cycle our attunement regularly between the global and the local.

Fifth Order

The core piece that most practitioners don't recognize about Blechschmidt's work is all the drawings in his books show differential rates of growth of the individual body parts. He places specific types of arrows like a roadmap, showing where growth in one direction is balanced or comes into a still point with growth in another direction which are called points of balance tension in osteopathy. The perception of a still point becomes an automatic shifting fulcrum as growth and development keeps going and the biokinetics shift as cell aggregates get closer and closer to their final fate, or definitive structure. The stillpoint is the *fifth order* of bridging from the academic to perception and finally palpation. The best example of this is the fast accelerating growth of the brain and neural cord going superiorly and the very slow growth of the heart and vascular system anterior to it growing inferiorly. There is a still point in back of the heart because of this function. It then becomes a fulcrum for the subtle body fulcrum of PR, the all-pervasive Wind of wisdom to move through the heart and blood. Stillness has this function and at the molecular level, all molecules must achieve a stillpoint for transformation. The central canal in blood flow is also dynamically still. The endothelium of the vascular system is made up of quiescent cells and lose their quiescence because of inflammatory processes. Synchronizing with stillness locally and globally is critical.

Sixth Order

Blechschmidt said that all of the biokinetics and biodynamics occurs in an orderly way. This is the *sixth order* of bridging-order. The embryo has a constantly shifting balance between biological movement and biological stillness around radial

and axial symmetries. Dr Jealous linked the perception and palpation of this order to the rhythmic balanced interchange of PR and the dynamic stillness. Academic embryology is bridged to practitioner perception inwardly and then bridged to the palpation of the client. In other words, practitioners find their own embryo first before that of the client. These transitions from academic to perception and palpation is highly nuanced because the embryo is in constant movement. Compensatory layers of experience that are in the body are normalized when the practitioner encounters them and shifts his or her perception to the field of PR and dynamic stillness exteroceptively such as towards the horizon until it blends with the practitioner's interoceptive awareness (*fourth order*). This either shifts the fulcrum of attention in the client to a location inside or outside the body or dissipates the lesion internally. The bottom line is that the forces of PR and dynamic stillness are present at conception, and those same forces are still present in the adult. We are perpetual embryos constantly regeneration form and function. Dr Jealous was actually a genius putting all this together. In this way, there is only a fluid body. The fluid flows and especially the pulse in the artery, are approached by synchronizing with PR and dynamic stillness.

Seventh Order

Now that being said, perception and palpatory skills in contemporary biodynamic practitioners need to shift because of the contemporary client is suffering from metabolic disorders. Today's client is vastly different than a couple of years ago pre-Covid. It's heartening that Dr Jealous gave us the gift of finding our embryo. However, such embryonic study and investigation by the manual therapeutic community internationally can be weighted more academically than perceptual and palpatory without advancing the field of biodynamic practice. Dr Jealous said that when he studied embryology which includes a lot of images in such books, he would always take time to digest the image and feeling it in his own body as he studied the human embryo. As students of biodynamic embryology I did this practice as well and still do. Bridging from the academic to the perceptual is done in this way. Morphological principles of biodynamics (growth of the whole over time) and biokinetics (development of the parts over time) are important foundations. And my view is that PR and dynamic stillness need to be held both biologically (as ordering forces) and through the lens of the subtle body of Eastern medical traditions and then integrated into the next evolution of biodynamic perception and palpation. This is the *seventh order* of bridging to normalize the metabolism of the client. Biodynamic

practitioners must learn to treat the metabolism of the body with their hands and embryonic perception.

Over the years in my study of embryology and morphology, I have developed protocols as part of my own personal learning process. I taught some of these protocols, such as one for the ectodermal ring, the cranial base which does not vary that much from traditional approaches, the kidneys, which I found in a book called: Motility in Osteopathy, From Embryology to Clinical Practice by Alain Auberville and Andree Aubin, Handspring 2017. Dr. Jealous demonstrated a traditional osteopathic protocol called Power Points which is a very embryonic protocol and extremely valuable for the skeletal system, the engine of our endocrine, blood and lymphatic systems. The ossification centers of the cranial bones are a fascinating study, which for me was initiated by an image in Sutherland's and Magoun's Osteopathy in the Cranial Field. Almost every year, as I studied embryology intensively the number of ossification centers of the sphenoid and temporal bone would increase based on new science. And the fact that the inner ear is complete before the end of the embryonic period makes the temporal bone itself a completely embryonic bone not to mention in my opinion that it is the carotid canal that facilitates differentiation of that entire temporal bone complex. And from the ear canal in the embryo, the cells that become the facial structures emerge like a fountain.

Every time I touch the cranium in the past twenty years, I only sense the embryo, it's fluid fields and developmental motions in relationship to the carotid and intervertebral arteries and their derivatives. Cranial therapists claiming to practice biodynamically should be in a constant study and recollection of their embryo at both an academic and embodied level. Dr Jaap van der Wal, the Dutch embryologist, says we are "perpetual embryos" as mentioned earlier and he is absolutely correct. The client at this biodynamic level of wholeness is an extension of embryonic forces, such as the placenta and others. This is the fluid body as an interpersonal neurovascular system and co-mingled fluid filled clouds.

All organ systems of the body go through multiple stages of individual development. The heart has four stages, the nervous system has 23 stages corresponding to the Carnegie stages, the kidneys go through at least three, and perhaps as many as five phases of development if you include the allantois and bladder. Each of the stages of every organ in the body has its own unique metabolism, and that is the other half of scientific embryology with morphology. Biodynamic embryology is

metabolic palpation at the scientific level. The formative forces that allow us to come into relationship with embryonic metabolism are PR and dynamic stillness. At every level of biology and morphology they are critical.

The essence of treating someone via biodynamic informed embryology, is freeing the metabolic feeding channels and waste removal channels at all levels of growth and development. This is the first and last priority of an embryo and adult human being. Beginning with the early canalization zones to self-assembly of tubes, lining them with the endothelium for homeostasis in the body, producing blood to flow through the tubes that become the vascular tree, and finally their capillary beds. All of this is suspended in a connective tissue scaffolding from the core to the periphery initially within three fluid sacs of the embryo yolk-chorion-amnion. These three sacs are held by an outer membrane, holding the whole. This is the interrelationship of biodynamic and biokinetic embryology.

And the truth as told by Drs Sutherland and Jealous is that PR will always lead you to the primary site of what its priority is in the client's body. The corollary to that maxim is *you must synchronize with PR and the stillness in your own perception first*. And in my experience now of teaching this way, is that there are fulcrums in the body's metabolism that need to be checked to see if PR and dynamic stillness are available, more like introducing them to the Health as Dr Jealous called it (the potency of PR). For example, the kidneys are really the primary fulcrum of the fluid body and consequently the superior mesenteric and renal arteries need to be contacted as soon as possible. You can track the biokinetic pathways of the kidneys up to the cervical region of the embryo but that is a secondary consideration. And the vascular system in the vast majority of patients is metabolically unhealthy at the medical level. That is the primary consideration and the blood being the deepest part of the water element and consequently of the fluid body.

Eighth Order

There are many ways to bridge academic embryology into manual therapy. The fluid body is the starting point because it is the essence of biodynamic embryology. It is the whole and it moves globally under the direction of PR. From a therapeutic point of view my initial choice point for organizing a biodynamic protocol as the *eighth order* of bridging would then begin with the second week of development. This is the second stage of morphology in which there is tremendous expansion and growth happening in relationship to

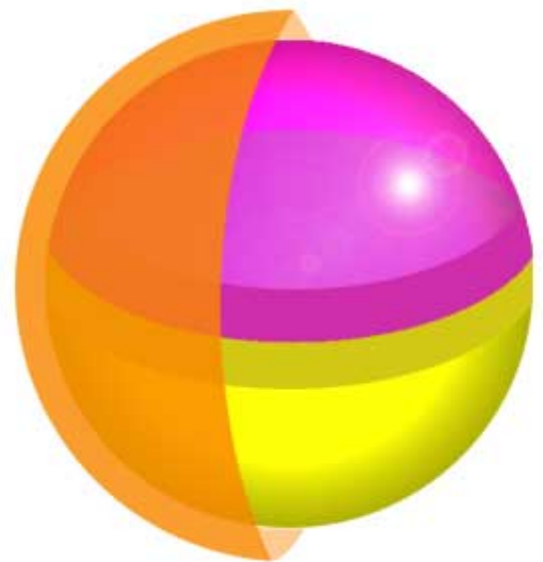
the metabolic demand of getting nutrition through cell diffusion from the future placenta into the three primary cavities that form in the second week. Structurally and metabolically we need these three primary cavities within which the human body can begin to grow and develop. Their order of appearance is as follows:

1. Yolk sac later becomes peritoneal coelom which becomes the mesentery and at least five overlapping layers of fascia around the entire circumference of the peritoneum. This is the framework upon which all abdominal organs, blood vessels and nerves are structured and function. At the beginning in the second week, fluid flow in the yolk sac directs nutrition diffused through the limiting membrane between the developing placenta and yolk sac to around the surface of the embryo thus stimulating its surface growth biodynamically. What reaches the inner tissue of the endoderm surface of the embryo will cause the endoderm to differentiate into two layers of cells biokinetically. The future abdomen and its contents are first and thus a biodynamic approach would include exploration of the client's abdominal viscera and tissues as soon as possible. The layers of the mesentery, fascia, abdominal aortic arteries, all organs, vagus nerve, enteric nervous system, sympathetic nervous system (SNS), and microbiome must be known. The lower Dantian in classical Chinese medicine or Hara in Japanese traditional healing recognize the primacy of this area of the body. This is the primary metabolic site in the human body.
2. Chorion becomes pericardial coelom. It is this cavity that generates what will become the blood and connective tissue. The connective tissue and blood also surround the embryo and provides a secure attachment of the embryo to the future placenta called a connecting stalk initially on the dorsal ectoderm. The connecting stalk then becomes the umbilical cord with its levels as the embryo rotates in the third week of development. There is an association with the pericardial coelom. The process of vasculo-genesis and angiogenesis, the self-assembly of the endothelial tubes that the blood flows through becomes the second priority in biodynamic practice. This is where "the rule of the artery is supreme" by A.T. Still comes into play. So, in the sequence of priorities with the contemporary client with metabolic problems the heart, blood and

vascular endothelium become the second priority in sequencing practice.

3. Amnion becomes third ventricle. This third level of biodynamic sequencing for exploring metabolism has traditionally been the starting point for Craniosacral Therapy and cranial osteopathy. Now what needs to be included in such treatments is the relationship the vascular supply to the cranium and face. The Cranial Concept of Dr. Sutherland in its biodynamic evolution is masterful in exploring the third ventricle of the brain. Thanks to Dr. Jealous for moving the osteopathic fulcrum from the fourth ventricle to the third ventricle. He said that the third ventricle induces all brain structures develop.

This is the most basic level of metabolic organization for building the pathways and tubes for nutrition to come in, be broken down and get to each cell. And also, the pathways by which waste products are removed from each cell and transported or recycled such as in the early septic systems of the yolk, chorion and amnion. And this is when the immune system begins to be built. These are the first principles of embryonic metabolic function bridging to perception and palpation. Here is an image of these three cavities in the second week. Yellow is yolk. Purple is amnion and orange is chorion:



Ninth Order

These are the three fulcrums, the principle geography to explore in biodynamic practice to access the early embryo. And since they are fulcrums, they are automatically shifting. We continue to treat the whole biodynamically and explore the biokinetic development of the parts,

especially inflammation in the metabolic pathways serving all tissues of the body. Nothing moves in the body at any level, especially the molecular without PR. That's why Eastern medical traditions all say that PR or whatever metaphor they have for it, is what moves the blood from a fulcrum in the back of the heart. Knowledge of this relationship to the subtle body is critical to metabolic function and can be especially influenced through visualization practices used in all Eastern medical traditions. And visualization is on equal grounds with the perception of PR and the Dynamic Stillness. And thus, the *ninth order* of bridging is visualizing colors associated with form and function spiritually. Our body is a spiritual body. Inflammation and metabolic disorder is a gateway to organizing the self from the inside and waking up the instinct for self-healing. These ten orders once familiarized become second nature during a session.

Tenth Order

Everyone claiming to be a biodynamic practitioner, needs to have an integrated and embodied perception, internally and externally of PR, and reverence for the immense value of dynamic stillness. This reverence must now be enhanced by a contemplative practice for abiding in mental peace of mind during biodynamic practice. All too often in any manual therapeutic art, the practitioner is attempting to identify intellectually and conceptually the names and experiences of the anatomy and physiology under their hands. This requires too much thinking and interferes with the clear perception and direction of PR and the midline of dynamic stillness around which all health and healing in the biodynamic model is oriented. It is not necessary to mentally label all of our clinical perception. This is a new *tenth order* of biodynamic practice - to include the mind, thoughts and concepts and their relative cessation during clinical practice. It is not unusual at all during a session to encounter the "out of the ordinary" or extra-sensory experience causing the mind to proclaim, "what the hell was that?" It is a question that cannot be answered in the moment, only held with the loving kindness of PR and the stillness.

Open awareness developed through any variety of meditation practices is the best way to unlock the potency and power of dynamic stillness. It is the true midline as Dr. Jealous said and deeply rooted in all molecular transformations biologically. Biodynamic practice is a contemplative art form and a great gift. The exploration of our embodied embryonic experience and that of a client during a session must be free of conceptual labeling of our own perception and what is mentally projected onto the client's experience coming through our hands. Leave your concepts in the waiting room. This

sequence of ten orders is conceptual itself. They are contemplations that are left outside the treatment room because they are innate and already present in our somatic responsiveness and heart. They represent an order, an evolutionary imprint that is intrinsic and instinctual to our body and the client's body. There is only movement and stillness in biodynamic practice. We now need to contemplate our embryo as a constant process of *becoming* rather than a source of origin and originality. Becoming is the state of the present moment that contains both the past and the future. Throughout birth, life, and death, we are in a constant state of becoming and transmuting under the guidance of Primary Respiration and the stillness. This is our principal somatic inheritance. It is what our embryo teaches us. And to receive this teaching we need clear perception. Be your embryo.

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