The Embryonic Heart

By Carol Verner, RCST®

The physical heart forms very early in our embryonic development and is the first functioning organ. Perhaps the physical and metaphysical nature of the heart is never more integrated than at this source, as the ruby-red heart expands in the translucent embryo's centre, huge by comparison to the delicate body. The just-developing brain bows down to the heart, embodying sincerely the wisdom perceived by sages such as the Sufi mystic, Hazrat Inayat Khan, who says that the heart is the perfect master and the mind is the perfect servant.

There are two remarkable processes that precede the development of the heart. Imagine the journey thus far--the fertilized oocyte has divided into many cells to form the morula or *"little raspberry,"* readying for the dance of differentiation. This little being has found a place to grow, burrowed into the rich maternal endometrium by the beginning of the second embryological week. The two processes that follow are the emergence of the primitive streak and gastrulation.

According to Laura Sweeney (1998):

> *The flat two-layered embryo becomes a flat three-layered embryo... by a process of cell migration called gastrulation. The first sign that this is about to happen is the formation of the primitive streak, a thickening of the epiblast along the future cranial-caudal axis. Its prominent cranial end forms the primitive node.*
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> *The primitive streak is the target for gastrulating cells.... [and] results in the formation of the three definitive germ layers: endoderm, mesoderm, and ectoderm (p. 38).*

The inspiration for Biodynamic Craniosacral Therapy, Dr. William Sutherland, perceived the source of intelligence for these remarkable events arising from the animating principle of life, which he called the Breath of Life (Sills, 2001, p. 60). Sills goes on to say: *"This midline phenomenon is a primal midline around which we continually orient. Its uprising force, and the bioelectric field it is part of, are expressions of a precise intention to create" (p. 61).* The creative forces of the Breath of Life are expressed in the potency of the fluid field of the embryo (p. 60). This differs dramatically from the conventional theory of genetically-driven development. Michael Shea (2003) says that, *"For each metamorphosis of the embryo, both developmental stimuli of the Potency of the Breath of Life in the fluids...and gene expression are needed" (Shea, p. 60).* Dr. Shea continues:

> *The formation of the embryonic disc into its three distinct germ layers...is initiated by a folding and condensation of cells around a still place in the centre of the embryonic disc called the primitive streak and node. This creates a fulcrum for the appearance of a cellular midline structure called the notochord [which] maintains its position as the organizing midline of the embryo by its Dynamic Stillness. As a result... all subsequent organ development... is geometrically oriented and*

related to the notochord, and later to the ventricles, with uncanny precision and grace (p. 61).

With this uncanny grace, the primordial heart begins development late in the third week. Mesodermal cells - splanchnic lateral plate mesoderm - migrate rostrally of the neural plate. These swimming cells gather laterally along the forming endoderm tube and upward to the cranial region of the embryo (Sweeney, 1998, p. 249).

The embryonic heart derives from *"splanchnic [visceral] lateral plate mesoderm,"* which, says Sweeney , *"is the expected source for connective tissues and all muscle. However, this is one of two systems in which the epithelial components are also formed by mesoderm" (p. 248)*. This is of interest to me, considering the central position of the mesoderm between the endoderm and the ectoderm. One of the most common symbols and sensibilities about the heart in our lives is that of *"centre."* All tissues of the heart derive from the embryonic disc's migrating central cells, an expression of continuity from its origin to this very beat of my heart. It provides a tissue strand that unwinds all the way back to my embryo and a client's embryo.

Sweeney also notes that the splanchnic lateral plate mesoderm forms from lateral migration of mesodermal cells (p. 76), and I wonder if this flowing migration occurs around the fulcrum of the notochord in Primary Respiration's inhalation phase, with its palpable lateral fluctuations. In any case, the cranial-most mesodermal cells are soon washed caudalward by body folding, the result, according to Sweeney, of differential growth in germ layers of the embryo (p.40). This folding begins near the end of the third week, and continues into the fourth week, creating a recognizable body shape that is essentially *"tubes within tubes" (p. 40)*. Bilateral endocardial and myocardial tubes form on each side as the mesoderm coalesces, forming heart tubes to either side of the endoderm [gut] tube (p. 248). *"The heart tubes are brought together by embryonic folding,"* says Sweeney. *"The lateral body folds bring the heart tubes toward the midline ventral to the endoderm tube. The cranial head fold pushes the heart tubes caudal to the developing brain" (p. 248).* Like bringing two hands together to cup a drink of water, the body folds bring the two halves of the heart tubes together to form one tube. Says Sweeney, *"Fusion creates a single heart tube with an endocardial lining inside a myocardial wall...A thick extracellular matrix layer forms between them, called the cardiac jelly" (p. 248),* which I assume to be a type of ground substance similar to that produced by connective tissues generally, to bind and protect the form and flow of the developing heart.

Voila! In a surge with intention and grace, the waves of cells have responded to create a primitive heart tube. A pericardial cavity and membrane form around the heart tube from the same lateral plate mesoderm (p. 248). A cross-sectional view of the heart, suspended within its cavity, shows it at twenty-two days facing the maternal-umbilical direction (249). Embryo's heart faces mother's closest body.

As the heart tubes complete their fusion, the midsection of the heart *"...loops ventrally, caudally, and to the right during week four" (p. 250).* It is this genetically regulated right-sided looping that eventually brings forth the form of the four- chambered heart (p.250). As with the folding of the embryo, differential growth seems to be the cause of the looping. I encountered mention online of medical university projects to complete computer animations of the whole embryonic development. This will help us all to better sense the relationship of the heart's looping to the fluid dynamics of the potency of the Breath of Life - the primary source of these precisely developing patterns.

These events are all whole and holy unto themselves, and yet there is the next remarkable event: in the third week during looping, the embryonic heart, for unknown reasons, begins beating! *"Scientists still don't know exactly what triggers the beating [of the embryonic heart], but they use the word 'autorhythmic' to indicate that the heartbeat is self-initiated from within the heart" (Childre, 1999, p.9)*. *"Circulation,"* says Sweeney pragmatically, *"must replace diffusion for the embryo to develop beyond the germ layer stage. Thus the cardiovascular system is the first to develop, the only system that fully functions in the embryo and whose function is essential to the development of other organs" (p. 252).* Mainstream science does not know yet about the Potency and the sparks of conception and birth--perhaps this first heartbeat is an ignition spark, too.

The beating heart continues to loop; during weeks five and six, septa grow within the tubing, eventually giving rise to the right and left aspects of the atria and ventricles (p. 252). *"Autonomic nerves first contact the heart during septation,"* says Sweeney, *"but functional innervation occurs much later" (p. 252).*

Also, during this period, specialized conduction cells form from myocytes that will pace the rate of contraction of the myocardium (p. 252). Heart development continues, with the vasculature developing in the embryo concurrently (p. 268). Blood cells form as vessels form, says Sweeney. *"It is believed that the first blood cells differentiate from cells at the centre of the cavities, or blood islands, formed in the yolk sac. These cells... migrate into the embryo within the forming vessel and seed several organs as they form: the liver, spleen, thymus, lymph nodes, and finally the bone marrow" (p.268).* All are forming and flowing simultaneously, heart tubes, vessels, blood cells; fluctuations of the Tides ultimately bring together all of these elements. Thus the embryo, whole and holy and animated by the Breath of Life, becomes established more fully in relationship to the earthly environment through the placental circulation and connection to the mother, and the mother's outer connection to the resources of nature.

The more clarity I have around the events of embryology, the more clarity and connection I have with the creation forces and embryologic beauty and mystery within myself and others in this moment. I more fully understand the power of these forces expressed in Franklyn Sills' commentary (2001):

The organizing wind of the Breath of Life arises from the Dynamic Stillness. As the Long Tide is generated, the Original matrix is expressed as a dynamic bioelectric matrix. The potency within this field steps down in intensity as it transmutes within the fluids of the body. The fluids become potentised with its force. The cellular and tissue world then organizes around the Original matrix like the waves riding the Tide. Embryonic differentiation and cellular migration unfold in response to this pattern energy...This ordering system is with us from the moment of conception until the day we die.

How we organize around this universal principle is modified by our genetics and our life experience. Yet it is always possible to reorient to its potency and to its Original intention. In clinical process, tissues, fluids, and potency will naturally align to the intention of the Breath of Life. This is the heart of our work in the cranial field (p.63).

SUGGESTED READING LIST:

Childre & Martin. (2000). *The heartmath solution.* HarperCollins, San Fransisco.

Shea, Michael. (2002). *Biodynamic Craniosacral Therapy: A Primer.* Shea Education Group. North Palm Beach, FL.

Sills, Franklyn. (2001). *Craniosacral Biodynamics, Vol. 1.* North Atlantic Books, Berkeley, CA.

Sills, Franklyn. (2004). *Craniosacral Biodynamics, Vol. 2.* North Atlantic Books, Berkeley, CA.

Sweeney, Laura. (1998). *Basic concepts in embryology.* McGraw-Hill, NY.

ALSO HIGHLY RECOMMENDED:

Works by Jaap van der Wal at his website, Embryo in Motion: www.embryo.nl

Erich Blechschmidt's *The Beginning of Human Life.*