

The Heart, Mind and Brain

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القلب والنفس والدماغ

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Abstract:

It has been a general observation that in many cultures throughout history, the heart has been considered the source of emotions, passion and wisdom. However, scientists in the past emphasized the role of the brain in the head, to be responsible for such experiences. Interestingly, recent studies explored physiological mechanisms by which the heart communicates with the brain, thereby influencing information processing, perceptions, emotions and health. These studies provided the scientific basis to explain how and why the heart affects mental clarity, creativity and emotional balance. Also research indicates that the heart is far more than a simple pump. The heart is, in fact a highly complex, self-organizing information processing centre with its own functional “brain” that communicates with and influences the cranial brain via the nervous system, hormonal system and other pathways. These influences profoundly affect brain function and most of the body’s major systems.

In this review, I shall try to summarize and integrate the interesting findings in this area.

Introduction:

The concept of mind is of central importance for psychiatrists and psychologists. However, little attention has been paid in most formal textbooks to this important issue, which is usually studied under the section of “Philosophical aspects of psychiatry / psychology”. The practicing psychiatrist should have some working model of the mind to help him/her understanding his patient’s problems¹. In the few available models, the main components of the mind are the Intellect and the affect². However, the central role of the heart as

a component of the mind has been emphasized by various cultures and religions across the world's history including the Islamic model³.

This review tries to discuss some aspects of the components of the mind, with a particular reference to the role of the heart on the light of new interesting neurophysiological and parapsychological discoveries.

The heart in the world cultures:

It is a general observation that in many cultures throughout history, the heart has been considered the source of emotions,

passion and wisdom. Also, people used to feel that they experience the feeling or sensation of love and other emotional states in the area of the heart. However, scientists in the past emphasized the role of the brain in the head, to be responsible for such experiences. Interestingly, recent studies explored physiological mechanisms by which the heart communicates with the brain, thereby influencing information processing, perceptions, emotions and health. These studies provided the scientific basis to explain how and why the heart affects mental clarity, creativity and emotional balance. In this review, I shall try to summarize and integrate the interesting findings in this area.

The heart and emotions:

It was long believed that changes in emotions are accompanied by predictable changes in the heart rate, blood pressure, respiration and digestion. So when we are aroused, the sympathetic division of the autonomic nervous system energizes us for fight or flight, and in more quiet times, the parasympathetic component cools us down. In this view it was assumed that the autonomic nervous system and the physiological responses moved in concert with the brain's response to a given stimulus⁴.

The heart and brain:

However, following several years of research, it was observed that, the heart

communicates with the brain in ways that significantly affect how we perceive and react to the world. It was found that, the heart seemed to have its own peculiar logic that frequently diverged from the direction of the autonomic nervous system. The heart appeared to be sending meaningful messages to the brain that it not only understood, but also obeyed⁵. Later, neurophysiologists discovered a neural pathway and mechanism whereby input from the heart to the brain could inhibit or facilitate the brain's electrical activity⁶.

The Brain in the Heart:

After extensive research, Armour (1994) introduced the concept of functional "HEART BRAIN"⁷. His work revealed that the heart has a complex intrinsic nervous system that is sufficiently sophisticated to qualify as a "little brain" in its own right. The heart's brain is an intricate network of several types of neurons, neurotransmitters, proteins and support cells like those found in the brain proper. Its elaborate circuitry enables it to act independently of the cranial brain – to learn, remember, and even feel and sense. The heart's nervous system contains around 40,000 neurons, called sensory neurites⁸. Information from the heart –including feeling sensations- are sent to the brain through several afferents. These afferent nerve pathways enter the brain at the area of the medulla, and cascade up into the

higher centres of the brain, where they may influence perception, decision making and other cognitive processes⁹.

Thus, it was revealed that the heart has its own intrinsic nervous system that operates and processes information independently of the brain or nervous system. This is what allows a heart transplant to work; normally, the heart communicates with the brain via nerve fibres running through the vagus nerve and the spinal column. In a heart transplant, these nerve connections do not reconnect for an extended period of time; however, the transplanted heart is able to function in its new host only through the capacity of its intact, intrinsic nervous system¹⁰.

The heart's magnetic field:

Research revealed also that the heart communicates information to the brain and throughout the body via electromagnetic field interactions. The heart generates the body's most powerful and most extensive rhythmic electromagnetic field. The heart's magnetic component is about 500 times stronger than the brain's magnetic field and can be detected several feet away from the body. It was proposed that, this heart field acts as a carrier wave for information that provides a global synchronizing signal for the entire body.¹¹

Heart field interactions between individuals: There is now evidence that a subtle yet influential electromagnetic

or "energetic" communication system operates just below our conscious awareness. Energetic interactions possibly contribute to the "magnetic" attractions or repulsions that occur between individuals, and also affect social relationships. It was also found that one person's brain waves can synchronize to another person's heart¹².

Communication via hormones; the heart as a hormonal gland:

Another component of the heart-brain communication system was provided by researchers studying the hormonal system. The heart was reclassified as an endocrine gland, when in 1983 a hormone produced and released by the heart called atrial natriuretic factor (ANF) was isolated. This hormone exerts its effect on the blood vessels, on the kidneys, the adrenal glands, and on a large number of regulatory regions in the brain. It was also found that the heart contains a cell type known as "intrinsic cardiac adrenergic" (ICA) cells. These cells release Noradrenaline and Dopamine neurotransmitters, once thought to be produced only by neurons in the CNS. More recently, it was discovered that the heart also secretes oxytocin, commonly referred to as the "love" or bonding hormone. In addition to its functions in childbirth and lactation, recent evidence indicates that this hormone is also involved in cognition, tolerance, adaptation, complex sexual and maternal

behaviours, learning social cues and the establishment of enduring pair bonds. Concentrations of oxytocin in the heart were found to be as high as those found in the brain¹³.

Increasing Psychophysiological Coherence:

Data indicate that, when the heart rhythm patterns are coherent, the neural information sent to the brain facilitates cortical function. This effect often experienced as heightened mental clarity, improved decision making and increased creativity. Additionally, coherent input from the heart tends to facilitate the experience of positive feeling states. This may explain why most people associate love and other positive feelings with the heart and why many people actually feel or sense these emotions in the area of the heart. So, the heart seems to be intimately involved in the generation of Psychophysiological coherence^{14,15}.

The heart and amygdala:

Also, research has shown that the heart's afferent neurological signals directly affect activity in the amygdala and associated nuclei, an important emotional processing centre in the brain. The amygdala is the key brain centre that coordinates behavioural, immunological, and neuroendocrine responses to environmental threats. It compares incoming emotional signals with stored emotional memories, and accordingly

makes instantaneous decisions about the level of perceived threat. Due to its extensive connections to the limbic system, it is able to take over the neural pathways, activating the autonomic nervous system and emotional response before the higher brain centres receive the sensory information^{16,17}.

The Heart and Intuition:

One of the very interesting research findings was that, the heart is involved in the processing and decoding of intuitive information¹⁸. Previous data suggests that the heart's field was directly involved in intuitive perception, through its coupling to an energetic information field outside the bounds of space and time¹⁹. Using a rigorous experimental design; there was evidence that both the heart and brain receive and respond to information about a future event before the event actually happens. Even more surprising was that the heart appeared to receive this intuitive information before the brain²⁰.

Discussion:

It has been long believed that conscious awareness originates in the brain alone. Recent scientific studies suggest that consciousness in reality emerges from the brain and body acting together²¹. As it has been shown, a growing body of evidence now suggests that the heart plays a particularly significant role in this process. The above research findings indicate that, the heart is far

more than a simple pump. The heart in fact is seen now as a highly complex, self-organizing information processing centre with its own functional “brain” that communicates with and influences the cranial brain via the nervous system, hormonal system and other pathways. The involvement of the heart with intuitive functions was another interesting piece of information. However, as persons with transplanted hearts can function normally, the heart can be considered here as a medium or a physical tool serving for an underlying more sophisticated integrating system that has the capacity to carry the personal identity of the individual. These new visions, an addition to the acknowledged precognitive dreaming ability of the mind might give better understanding to the concept of mind as

a multi-component unit that is not only interacting with the physical environment through demonstrable means, but also has the capacity to communicate with the cosmic universe through non physical, pathways^{22,23}. Also, this gives space to the concept of the spirit as the non physical element, or the field of the mind that can communicate with the cosmos outside the constraints of space and time. The evidence for such communication comes from the reported phenomena of extra-sensory perception, psycho-kinesis, and religious experiences^{24,25}.

Possibly further advancement in quantum physics might give us one day more insights into how we can formulate this new model of the heart, mind and spirit.

المخلص

من الملاحظ أن معظم الثقافات البشرية عبر التاريخ اعتبرت أن القلب هو مصدر الانفعالات والعواطف والحكمة ، وبالرغم من ذلك كان الباحثون في الماضي يصرون على أن الدماغ الذي في الرأس هو وحده المسئول عن مثل هذه الخبرات والتجارب ، ومما هو مثير للإهتمام أن بعض الدراسات الحديثة اكتشفت أن القلب يتواصل مع الدماغ من خلال آليات وظيفية فسيولوجية متعددة ، ومن خلالها يؤثر على عمليات معالجة المعلومات وإدراك والانفعالات ، وقد وفرت هذه الدراسات الأساس العلمي لتفسير كيفية أن حالة القلب من الممكن أن تؤثر على الصفاء الذهني والإبداع والتوازن الإنفعالي ، كما اتضح من هذه الأبحاث أن القلب أكبر بكثير من مجرد مضخة بسيطة ، فالقلب في الحقيقة يبدو كمركز على درجة عالية من التعقيد والتنظيم الذاتي لمعالجة المعلومات ، وله دماغ وظيفي خاص به قوامه أربعون ألف خلية عصبية ، ومن خلاله يتصل ويؤثر مع الدماغ الذي في الرأس من خلال الجهاز العصبي والهرمونات ووسائل أخرى ، وهذه الإتصالات تؤثر بشدة على وظائف الدماغ ومعظم أجهزة الجسم الرئيسية ، وسأحاول في هذه الورقة المرجعية استعراض وبيان بعض الإكتشافات المثيرة في هذا المجال .

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