Analytical Report on Cardiac Memory and Heart Transplantation

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Abstract: The concept of *heart memory* suggests that the human heart may contribute to emotional processing and memory-related functions beyond its well-established role as a circulatory pump. This hypothesis has gained scientific and clinical interest following reports from heart transplant recipients who describe notable changes in emotional states, behavioral patterns, personal preferences, and aspects of personality after transplantation. Although conventional neuroscience attributes memory storage primarily to neural circuits within the brain, emerging research highlights the presence of an intrinsic cardiac nervous system composed of approximately 40,000 sensory neurites. This system enables continuous bidirectional communication between the heart and the brain, influencing emotional regulation, stress adaptation, decision-making, and higher-order cognitive processes.

Current scientific consensus suggests that cardiac neural signaling modulates emotional and physiological states rather than serving as a direct repository of memory. However, the recurrent observation of post-transplant psychological and behavioral changes challenges strictly brain-centered models of cognition and raises important questions about the contribution of peripheral bodily systems to consciousness and behavior. In addition to its neural network, the heart functions as an endocrine organ and plays a critical role in a broader physiological network that shapes mood, motivation, and cognitive functioning.

Notably, a substantial proportion of cardiac transplant recipients report alterations in memory-related experiences and preferences, including newly acquired interests in artistic activities such as painting, heightened emotional responsiveness to music, and changes in food cravings. These observations suggest that transplantation may influence sensory processing and affective memory through mechanisms that extend beyond traditional neural pathways.

This review underscores the importance of heart–brain communication, embodied cognition, and self-awareness in understanding human consciousness. By integrating insights from neuroscience, cardiology, psychology, and cognitive science, this perspective encourages a more holistic framework for investigating memory, identity, and behavioral change, thereby opening new directions for future interdisciplinary research.

Keywords: *Heart Transplantation, Cardiac Memory, Brain, CNS, Prefrontal Cortex.*

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I. INTRODUCTION

Heart memory is the idea that the human heart may carry emotional information or memories, in addition to pumping blood. This concept became popular after some heart-transplant patients reported changes in their emotions, habits, or personality after surgery.

Scientists believe that memory is stored in the brain. However, studies show that the heart has its own group of nerve cells that can communicate with the brain and influence emotions and stress. Most agree that these signals help control feelings rather than store memories.

One transplant patient reported unexpected changes in personality and preferences, which she believed were linked to the donor's heart. Similar experiences have been shared by a few other patients.

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This shows that new "visuals" and abnormalities observed by the recipients in their thoughts and gaits are closely associated to their donors and the traits which are transferred through the donated organ (*heart in this case).

Research suggests that the heart contains its own internal neural network that influences not only how decisions are made but also aspects of both short-term and long-term memory. Around 40,000 specialized cells, called sensory neurites, are found in the heart and are believed to be involved in transmitting memory-related information. Beyond its primary role of pumping blood, the heart also functions as an endocrine organ and has a complex nervous system of its own. This cardiac system is shaped by several interacting factors, all of which can influence cognitive processes and emotional states. Together, these connections point to the role of sensory neurites in shaping cognition and regulating mood.

There is a connection between the heart and the brain and this relationship may affect memory, emotions, and behaviour, especially in people who have received heart transplants. After a transplant, changes in the body may influence how the brain works, which could explain why some recipients report changes in feelings or preferences.

The review explains that the heart is not just a blood-pumping organ but also has nerve cells that send signals to the brain. These signals help control heart activity and can influence emotions and stress levels. The brain also sends signals back to the heart, showing that communication between the two organs works both ways.

The study also discusses self-awareness, which allows humans to think, make decisions, and understand their surroundings. This ability depends on the interaction between the brain and the body. Nerve cells connected to the heart play an important role in maintaining normal heart function and are involved in some heart-related diseases.

Finally, the study suggests that looking at consciousness by considering both the body and the brain can help scientists better understand how the human mind works. This approach may become an important area for future research in neuroscience.

II. REVIEW OF LITERATURE

Cravings can be understood as a type of *food cue reactivity*, meaning learned responses to food-related signals that are often accompanied by psychological experiences, bodily reactions, and specific patterns of brain activity (Boswell and Kober, 2016). At the same time, individuals actively attempt to manage these cravings so that they do not inevitably result in eating the desired food (Giuliani and Berkman, 2015). An expanding area of research has examined the neural mechanisms underlying both food cue reactivity and the regulation of craving, with the aim of understanding how these brain responses relate to later health outcomes. So far, much of this work has relied on a single follow-up assessment or a limited outcome measure, such as body mass index or snack intake (Yokum et al., 2011; Lawrence et al., 2012). The current study builds on this foundation by (1) using a more detailed evaluation of food preferences, cravings, and consumption that goes beyond BMI, (2) examining responses to both nutritious and less healthy foods, and (3) developing a more comprehensive model of behavioral change across multiple time points.

➢ *Behavior Change Associated with Food Cue Reactivity*

Self-reported craving has consistently been shown to predict future eating behavior, both in situations where food cues are directly present (Cornell et al., 1989; Fedoroff et al., 1997, 2003; Nederkoorn et al., 2000) and in contexts where such cues are absent (Gilhooly et al., 2007; Martin et al., 2008; Batra et al., 2013; Cleobury and Tapper, 2014; Crowley et al., 2014). Evidence suggests that this predictive relationship is especially pronounced for highly palatable, energy-dense foods (Massicotte et al., 2019), which are also the foods most frequently reported as objects of craving (Chao et al., 2014). Although craving and liking are closely linked, they reflect distinct psychological processes: craving represents a motivational urge to obtain a food, whereas liking refers to the pleasurable experience associated with consuming it (Berridge, 2009). Consequently, comprehensive models of behavioral change driven by food cue reactivity should incorporate measures of subjective liking alongside craving and actual food intake.

In addition to subjective reports, physiological and neural reactions to food-related cues have been prospectively associated with eating behaviors and subsequent weight gain (Rogers and Hill, 1989; Nederkoorn et al., 2000; Nederkoorn and Jansen, 2002; Jansen et al., 2003; Stice et al., 2010; Yokum et al., 2011, 2014; Demos et al., 2012; Lawrence et al., 2012; Mehta et al., 2012; Murdaugh et al., 2012; Lopez et al., 2014; Winter et al., 2017; Versace et al., 2018). Despite the strength of this literature, findings are not entirely consistent. Some studies have failed to identify significant links between food cue reactivity and eating behavior or weight outcomes, while others have reported associations with physiological indicators but not with self-reported craving (Boswell and Kober, 2016). A meta-analysis conducted by Boswell and Kober (2016) reported a moderate overall relationship between food cue reactivity, craving, food consumption, and weight ($r = 0.33$), regardless of whether an explicit food cue was used to elicit craving.

Neurobehavioral research in this domain has largely concentrated on brain regions involved in reward processing and incentive valuation, including the ventral striatum, ventromedial prefrontal cortex, and amygdala (Giuliani et al., 2018). While craving is believed to engage these reward-related networks more strongly than liking, substantial overlap in neural activation patterns makes it difficult to empirically disentangle the two processes (Havermans, 2011). Emerging findings suggest that liking may be more strongly associated with body mass index than craving (Polk et al., 2017), and that activity in the ventral striatum may better predict food consumption than activation in the ventromedial prefrontal cortex, which appears more closely linked to craving (Lawrence et al., 2012). Previous work from

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our laboratory demonstrated that activity across a broader network of regions implicated in food cue reactivity—including the parahippocampal gyrus, cingulate cortex, inferior occipital gyrus, and anterior insula—predicted consumption of a personally desired unhealthy food, but only among individuals who were not actively dieting (Giuliani et al., 2015). Additional research has shown that activation of the inferior frontal gyrus, a region commonly associated with inhibitory control, during exposure to food cues was positively related to weight loss several months later (Neseliler et al., 2019). These findings suggest that an exclusive focus on the mesolimbic dopamine system may overlook the contributions of other brain regions and complementary cognitive processes, such as liking, in shaping eating behavior.

➢ *Behavior Change Through Food Craving Regulation*

Regulation represents an important complementary process in understanding eating behavior. When individuals encounter energy-dense foods they desire, they do not always act on these urges automatically. Instead, people frequently employ strategies to manage cravings that conflict with long-term health goals (Giuliani et al., 2018). One commonly studied strategy is cognitive reappraisal, which involves reframing the meaning of a tempting food stimulus to alter emotional and motivational responses—for example, by emphasizing the negative health consequences of consuming an unhealthy food (Giuliani and Berkman, 2015). The ability and tendency to regulate food cravings vary widely across individuals (Lowe et al., 2019), highlighting the complexity of obesity and unhealthy eating beyond simple differences in cue reactivity. Importantly, behavioral indicators of food craving regulation have been shown to predict longitudinal changes in both healthy and unhealthy food consumption (Giuliani et al., 2015; Reader et al., 2018).

Episodic memory for music refers to the capacity to recall contextual information previously associated with a musical excerpt. Neuroimaging studies examining episodic musical memory have identified bilateral activation in the middle and superior frontal gyri as well as the precuneus, with stronger involvement of the right hemisphere. The precuneus, in particular, has been repeatedly implicated in successful episodic recall and may reflect the retrieval of familiar melodic information.

Pitch memory appears to rely on a distributed neural network. Using functional magnetic resonance imaging, Gaab et al. (2003) demonstrated that performance on pitch memory tasks was positively correlated with activation in the supramarginal gyrus and the dorsolateral cerebellum. These findings suggest that the dorsolateral cerebellum may contribute to pitch discrimination, while the supramarginal gyrus may support short-term storage of pitch-related information. Notably, left-hemisphere regions showed greater involvement than right-hemisphere areas during pitch memory processing.

Musical training has also been shown to enhance memory performance. Altenmüller and colleagues reported that individuals receiving active musical instruction demonstrated superior long-term information retention compared to those receiving passive instruction. Active learners also exhibited increased cortical activation, while both active and passive learners showed enhanced left-hemisphere activity, a pattern commonly observed in trained musicians.

Finally, repeated listening to familiar songs has been linked to musical nostalgia. Research published in *Memory & Cognition* indicates that music is particularly effective at eliciting autobiographical memories, allowing individuals to vividly re-experience past events and emotional states through music-evoked recollections.

- *Heart-Brain Communication*

The literature has evidenced various modes of communication between the heart and the brain. These include neurological pathways involving nerve impulses, biochemical signaling through hormones, biophysical transmission via pulse waves, and energetic interactions through electromagnetic fields. In contrast to the brain, the heart generates approximately 40-60 times more electrical power and 5000 times more electromagnetic power. As a result, the heart possesses the capacity to harmonize and coordinate all bodily systems, leading to physiological coherence. The heart is responsible for producing and releasing multiple hormones. One such hormone is atrial peptide, also known as atrial natriuretic peptide. This hormone inhibits the release of stress hormones, diminishes sympathetic outflow, and impacts motivation and behavior . Additionally, it is noteworthy that the primary source of brain natriuretic peptide (BNP) is the cardiac ventricle rather than the brain itself. Furthermore, the heart plays a role in synthesizing and releasing oxytocin, commonly referred to as the "love" or "social bonding" hormone. Oxytocin is implicated in various cognitive processes such as tolerance, trust, and social bonding. The vagus nerve serves as a conduit for transmitting information from the heart and other internal organs to the brain. It terminates primarily in the brainstem, specifically within the medulla and the solitary nucleus. Approximately 80% of the fibers within the vagus nerve are afferent, or ascending, in nature. As mentioned earlier, this implies that the heart transmits more signals to the brain than it receives in return. Interestingly, signals originating from the "heart brain" are conveyed to the cerebral cortex via afferent neurons in the spine and the vagus nerve. Before reaching the cerebral cortex, these signals are directed to various brain regions, including the medulla, hypothalamus, thalamus, and amygdala [8]. Research indicates the existence of a pathway from the dorsal vagal complex and cardiovascular afferent signals that directly project to the frontal cortex.

➢ *Recipients Personality Changes After Heart Transplantation Preferences*

- *Food Preferences:*

Changes in food preferences have been reported post-transplant, including both alterations in preferred food types and the quantity consumed. For instance, a 29-year-old woman who received a heart transplant from a 19-year-old vegetarian expressed aversion to meat post-surgery, previously being a frequent consumer of meat-based fast food. Similarly, a 47-year-old male recipient experienced nausea and a desire to vomit after meals following transplantation from a 14-year-old donor with irregular eating habits. Conversely, a 48-year-old female recipient developed a newfound taste for green peppers and chicken nuggets, foods previously disliked, after receiving her transplant from a donor who favored these items, even discovering a packet of chicken nuggets with the donor after his accident.

- *Musical Preferences:*

Changes in musical preferences have also been observed post-transplant. A 45-year-old recipient started enjoying loud music, which was previously not a habit. An 18-year-old girl who received a heart from a musician reported a newfound love for music post-transplant. Similarly, a 47-year-old man who received a heart from a young African American male began appreciating classical music, a genre he previously disliked. These changes were attributed to the donors' preferences, indicating a possible influence of the transplanted heart on the recipient's tastes.

- *Sexual Preferences:*

Alterations in sexual preferences post-transplant have been documented. A male recipient of a heart from a lesbian artist reported heightened sexual desire toward women, suggesting a shift in his sexual orientation. On the contrary, a lesbian recipient of a heterosexual woman's heart found herself attracted to men post-transplant, leading to confusion about her sexual identity. These cases hint at potential changes in sexual orientation following heart transplantation, although the mechanisms behind such shifts remain unclear.

- *Other Preferences and Aversions:*

Beyond food, music, and sexuality, changes in preferences for art, colors, and aversions have been noted post-transplant. For instance, a landscape artist's heart recipient developed an interest in art, while a dancer's heart recipient experienced a shift in color preferences toward cooler tones. Contrariwise, recipients have developed aversions such as a fear of water following transplantation from a drowning victim. These cases underscore the complexity of psychological and behavioral changes that may occur post-heart transplant, possibly influenced by the donor's characteristics and experiences.

- *Emotional Changes Following Heart Transplantation*

After heart transplantation, recipients commonly report two broad categories of emotional changes. First, some individuals describe experiencing emotions that they believe originate from the donor. For example, a nine-year-old boy reported feelings of sadness and fear that he associated with his three-year-old donor, who had died by drowning. Subsequent information provided by the donor's family revealed a history of emotional distress, leading to speculation about a possible link between the donor's life experiences and the recipient's emotional perceptions. Second, recipients often report shifts in temperament, such as increased calmness or heightened emotional sensitivity, which they attribute to traits of the donor.

- *Identity-Related Changes*

Alterations in personal identity have also been frequently documented following heart transplantation, reflecting significant psychological effects. Many recipients report developing a strong emotional bond with their donor, sometimes perceiving them as a family member or engaging in imagined dialogue. For instance, a 19-year-old recipient described experiencing her donor as a sister, sensing her presence and engaging in emotional conversations. Similarly, a five-year-old child, unaware of the donor's identity, created an imagined persona of a younger brother named "Timmy," complete with a distinct character and background. In some cases, recipients report dreams or mental imagery that later appear consistent with donor information. One recipient recalled dreaming of a young man named Tim, later discovering that her donor's name was Tim Lamirande. Such experiences suggest potential donor-related influences on identity perception.

- *Memory-Related Experiences*

Some heart transplant recipients report memory-like experiences that they associate with their donors. These experiences often take the form of sensory impressions and may occur during wakefulness or sleep. Examples include unusual taste sensations accompanied by thoughts related to the donor's life, or tactile sensations resembling the physical trauma that caused the donor's death, such as a motor vehicle collision. Visual imagery has also been reported, including flashes of light or heat consistent with the donor's fatal injury, such as a gunshot wound to the face. In another case, a recipient described vivid dreams involving reckless driving, mirroring the circumstances of the donor's fatal motorcycle accident. These accounts raise the possibility that certain sensory or memory-related phenomena may be transferred following transplantation, highlighting the complex relationship between cognition and transplanted organs.

- *Potential Mechanisms Underlying Heart-Associated Memory*

The observation of personality and psychological changes following heart transplantation has drawn considerable attention across medical, psychological, and philosophical disciplines [3,10,12,13]. Although the idea that personality traits could be influenced by a transplanted organ challenges conventional assumptions, multiple reports suggest that recipients may develop preferences, emotions, or behaviors resembling those of their donors. These findings prompt deeper inquiry into the biological foundations of memory, identity, and consciousness.

One proposed explanation involves the concept of cellular memory. This hypothesis suggests that information related to memory or personality may be stored at the cellular level and transferred from donor to recipient through the transplanted heart. This notion contrasts with traditional models that locate memory exclusively within neuronal circuits of the brain.

Historically, memory has been understood as the brain's ability to encode, store, and retrieve information through synaptic and neural network activity. However, advances in

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genetics and epigenetics have expanded this view, demonstrating that information can also be stored through chemical modifications to DNA and histone proteins. These epigenetic changes influence gene expression and may persist over time, even across generations.

Epigenetic memory provides a plausible biological mechanism by which environmental experiences and life events may leave enduring molecular imprints that influence behavior and personality. In the context of heart transplantation, such mechanisms raise the possibility that donor experiences could be biologically encoded and subsequently expressed in the recipient.

Additionally, non-coding RNAs—particularly those packaged within extracellular vesicles such as exosomes—have been shown to play critical roles in intercellular communication and gene regulation. MicroRNAs and long non-coding RNAs have been implicated in processes related to learning, memory, and synaptic plasticity. Experimental studies have demonstrated that RNA extracted from trained organisms can induce memory-like changes when transferred to untrained recipients, suggesting that RNA-mediated mechanisms may contribute to the transmission of behavioral information.

Proteins may also play a role in memory storage and transfer. Prions, initially recognized for their involvement in neurodegenerative diseases, have since been implicated in normal cognitive processes, including synaptic plasticity and long-term memory formation. The presence of prion-like proteins within exosomes suggests a potential pathway for transmitting memory-related molecules between cells. Exosomes themselves are increasingly recognized as key mediators of molecular exchange, transferring proteins, nucleic acids, and lipids across cells in both physiological and pathological states.

Beyond molecular explanations, alternative mechanisms such as cardiac neural memory have been proposed. The heart possesses an intrinsic nervous system, often referred to as the "second brain," composed of neurons and neurotransmitters that regulate cardiac function and may participate in information processing. Another speculative hypothesis involves energetic memory, proposing that alterations in the heart's electromagnetic field could influence consciousness and personality. Although empirical evidence remains limited, such theories emphasize the interconnected nature of biological systems.

- ➢ *Functional Preservation After Hemispherectomy*

Hemispherectomy is a rare neurosurgical procedure involving the removal or functional disconnection of one cerebral hemisphere, typically performed to manage severe, medication-resistant epilepsy associated with conditions such as Rasmussen's encephalitis or Sturge–Weber syndrome. Despite concerns regarding cognitive and personality outcomes, particularly in pediatric patients, many individuals demonstrate unexpectedly favorable functional recovery due to neural plasticity.

While postoperative challenges related to language, memory, or motor function may occur, core personality traits are often preserved. Although adjustments are expected, changes are frequently less severe than initially anticipated. Patients often retain emotional responsiveness and personal interests, with variations influenced by both neurological and psychological factors. Existing literature on hemispherectomy in Rasmussen's encephalitis remains limited, but available studies consistently demonstrate significant seizure reduction with relatively stable functional outcomes.

Thome et al. examined 44 patients with Rasmussen's encephalitis characterized by early seizure onset, high seizure frequency, and focal neurological deficits. Prior to surgery, all patients were receiving multiple antiepileptic medications, and half had undergone immunomodulatory therapy, highlighting the limited effectiveness of non-surgical treatments.

Although hemispherectomy is often considered a last-resort intervention due to its potential functional consequences, advances in surgical techniques have reduced complication rates and improved outcomes. Modern approaches emphasize functional disconnection with minimal tissue removal, resulting in decreased morbidity and blood loss.

Functional outcomes remain a critical consideration, as hemispherectomy can lead to permanent deficits such as hemiparesis, visual field loss, and language impairments, particularly when the dominant hemisphere is involved. However, early surgical intervention, especially in younger patients, has been associated with better preservation of language and cognitive abilities. Long-term neuropsychological follow-up in the Thome et al. study revealed stable cognitive functioning in most patients, with improvement observed in a minority. Predictors of favorable outcomes remain unclear, though younger age at surgery and higher preoperative intelligence quotient may contribute to improved recovery.

- ➢ *Broader Implications and Unresolved Questions*

The introduction of cyclosporine in the early 1980s significantly improved heart transplant success rates, but it also contributed to increased demand for donor organs, intensifying shortages. Concurrently, evolving definitions of death—shifting from cardiopulmonary cessation to brain-based criteria—introduced ethical and conceptual challenges. While brain death became widely accepted, some critics argue that its adoption was driven partly by transplantation needs.

Reports of individuals recovering from states resembling brain death further complicate this framework. One well-documented case involved a patient undergoing hypothermic cardiac arrest during aneurysm surgery, during which no detectable brain activity was present. Despite this, the patient later recovered fully, challenging assumptions about irreversible loss of consciousness.

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As heart transplantation becomes more common, questions regarding post-transplant personality and memory changes warrant deeper investigation. Unresolved issues include the donor's physiological and psychological state at organ retrieval, the nature of information stored within transplanted tissues, and the extent to which such information may influence recipients.

Addressing these questions requires interdisciplinary research that extends beyond current medical and legal definitions of death. Investigating the cellular and molecular foundations of memory and identity may not only improve transplant patient care but also advance broader understanding in neuroscience, psychology, and human consciousness.

III. METHODOLOGY

➢ *Cardiac Memory (Electrophysiological Phenomenon):*

Table 1 Data 1 on Cardiac Transplantation Surgery and its Effect

Name of the person	**Age**	**Gender**	**Country**	**Effect**
Claire Sylvia	47-Year-old	Female	USA	• After the heart transplant, the changes in her and the effects are as follows: • Developed cravings towards foods that she had previously disliked (There were findings of similar favourite foods of the donor who had donated his heart [age of donor-18-year-old, male]) • Began walking in a more masculine way(gait). • Became more active, energetic and changes resulting in personality traits resembling the previous donor, (characteristics of a young man and the energy level of a youth).

Source: Autobiography: A Change of Heart (1997)

- *Donor:*

The donor of the heart to Claire Sylvia died in a motorcycle accident. After Claire had certain effects after the transplant, she later met the donor's family and soon learnt that those were the exact same favourite foods and habits that the donor had before in his life.

Table 2 Data 2 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
William Sheridan	63-year-old	Male	USA	Previously a construction worker, William did not have any Artistic passions or any hobbies related to Art (no obvious interest towards it too). But, immediately after, William started painting and drawing compulsively. Later, William became a well-published artist. Since then, he had been drawing and painting images inspired by the donor's ideas and style. He later exhibited and sold his art.

Source: The Heart's Code; Media Interviews (New York Times,2006)

- *Donor:*

The Donor of the heart to William was a 24-year-old man, The donor previously had aspiration towards Art. Just like the previous cases, the habits and likings were passed on to the recipient.

So, the older William who was not fond of art, started to paint and sell the paintings from the donors' Artistic ideas and his style.

Table 3 Data 3 on Cardiac Transplantation Surgery and its Effect

Name of the person	**Age**	**Gender**	**Country**	**Effect**
Kendra Hilfiker	14-Year-old	Female	USA(Illinois)	After the transplant, she got paranoid and felt being" Watched over" Developed a sudden tasteful craving for chicken nuggets and the candy (supposedly the donor's favourite food). All these habits and food habits were confirmed by the donor's family.

Source: Paul Pearsall's Case Collections.

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- *Donor:*

After the heart transplant, 14-year-old Kendra Hilfiker experienced a lot of paranoid feeling which the donor had before. The donor of the heart was a 3-year-old child. Later, it was confirmed that all these matched the donor's habits.

➢ *Multiple Cases from Around the World:*

Such cases have been recorded everywhere around the world, some of the examples are given below:

Table 4 Data 4 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
Not Revealed	30-40(exact age not revealed)	Female	UK	After the transplant, she had an urge to go and visit a random town It turned out to be the donor's hometown which was confirmed by the donor's family.

Source: Harwood et al., 2024 (Narrative Inquiry in Bioethics).

- Donor: Not Revealed

Table 5 Data 5 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
Not revealed	Middle-aged	Male	Canada	After the transplant, flashes of visions of unfamiliar faces and places occurred in the recipient After further investigation, It was apparently connected to the donor's life and some important events from it.

Source: Harwood et al., 2024 (Narrative Inquiry in Bioethics).

- Donor: Not revealed

Table 6 Data 6 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
Not revealed	Middle-Old Aged	Female	USA	Donor's Prescence was felt by the recipient. (Feeling "accompanied" by the donor during important life events) Donor's family confirmed that the donor could in fact, feel the presence of other people and has some weird feelings often.

Source: Harwood et al., 2024 (Narrative Inquiry in Bioethics).

- Donor: Not Revealed

Table 7 Data 7 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
Not Revealed	36-Year-old	Male	USA	Began liking loud music and fast driving Personality shifted to be more Risk-Taking (The spirit and Vibe of a youth-The donor)

Source: Pearsall Case Archive.

- Donor: 19-Year-Old Male, liked loud music, fast and risky driving.

Table 8 Data 8 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
Not Revealed	55-Year-Old	Female	USA	Showed sudden interest in health and fitness. Developed Athletic Tendencies That she never had before.

Source: Schwartz & Russek, Case Interviews.

- Donor: 25-Year-Old Man (health conscious) killed in an accident.

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Table 9 Data 9 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
Not revealed	47-Year-Old	Male	USA	New cravings for Beer and Fried Chicken Sudden liking for Rock music Donor's mother confirmed that those were her son's exact favourites.

Source: Pearsall et al., 2002.

- Donor: 18-Year-Old Male, who liked beer, fried chicken and rock music.

Table 10 Data 10 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
Not Revealed	55-Year-Old	Female	Austria	Strong new love for Classical Music and Fine dining. Donor's wife later confirmed that those were his exact same passions.

Source: Haraldsson & Lindström (2003, European Qualitative Study).

- Donor: 34-Year-Old Man, killed in a car accident, who liked Classical Music and had interest towards Fine Dining.

Table 11 Data 11 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
Sonya	29-Year-Old	Female	USA	Developed sudden passion for Painting Her style eerily resembled the Donor's.

Source: The Heart's Code.

- Donor: Young Woman, who was a professional artist and had a unique art style which was passed on to the recipient of her heart.

Table 12 Data 12 on Cardiac Transplantation Surgery and its Effect

Name of the person	Age	Gender	Country	Effect
Not Revealed	8-Year-Old	Female	USA	Nightmares of being chased and murdered Identified attacker, weapon, clothes in detail which had matched the same crime scene of the Donor Helped Police confirm the case.

Source: Pearsall et al., Journal of Near-Death Studies (2002)

- *Donor:*

10-Year-Old girl, who was murdered, shared her nightmare memories of being murdered with the recipient of her heart who was able to find and identify the killer and confirm the case.

➤ *Following Cases Show the Survival Rate*

Table 13 Case 1

Recipient	Louis Washkansky (South Africa)
Recipient Age	53
Donor	Denise Darvall, 25
Year / Place	1967, Cape Town (by Dr. Christiaan Barnard)
Outcome	Lived 18 days; surgery proved transplant possible.

Source: Groote Schuur Hospital archives / BBC History of Medicine.

Table 14 Case 2

Recipient	John McCafferty (UK)
Recipient Age	39
Donor	Anonymous donor (UK)
Year / Place	1982, Harefield Hospital
Outcome	Survived 33 years — longest heart-transplant survivor in the UK.

Source: NHS / Guinness World Records (2014).

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Table 15 Case 3

Recipient	**Angela Dunn (UK)**
Recipient Age	38
Donor	18-year-old male donor (UK)
Year / Place	1983, London
Outcome	Still alive over 35 years post-transplant; one of the UK's longest-living recipients.

Source: British Heart Foundation / BBC News (2018).

Table 16 Case 4

Recipient	**Tony Huesman (USA)**
Recipient Age	20
Donor	Anonymous donor (USA)
Year / Place	1978, Ohio
Outcome	Lived 31 years, world record for a heart-transplant survivor at the time.

Source: The Washington Post (2009).

Table 17 Case 5

Recipient	**Simon Keith (Canada/UK born, USA transplant)**
Recipient Age	21
Donor	Anonymous donor (USA)
Year / Place	1986, Nevada, USA
Outcome	First professional athlete to play after a heart transplant; remains active decades later.

Source: ESPN / Simon Keith Foundation.

Table 18 Case 6

Recipient	**Steve Austin (UK)**
Recipient Age	34
Donor	Anonymous donor (UK)
Year / Place	1980s, Papworth Hospital
Outcome	One of UK's early transplant successes; lived more than 25 years post-surgery.

Source: NHS Organ Donation Stories.

Table 19 Case 7

Recipient	**Hannah Clark (UK)**
Recipient Age	1 year old (infant)
Donor	Baby donor (anonymous, UK)
Year / Place	1994, London
Outcome	Recovered well and lived into adulthood after later reversal surgery.

Source: The Guardian / Great Ormond Street Hospital.

Table 20 Case 8

Recipient	**Stan Larkin (USA)**
Recipient Age	25
Donor	Deceased donor (anonymous, USA)
Year / Place	2016, University of Michigan
Outcome	Successfully transplanted after living 555 days on artificial support; healthy after transplant.

Source: University of Michigan Health News (2016).

Table 21 Case 9

Recipient	**Erika Brendel (Germany)**
Recipient Age	51
Donor	Anonymous donor (Germany)
Year / Place	1998, Berlin
Outcome	Returned to normal life and became an organ donation advocate.

Source: Deutsche Welle (DW) Organ Donation Awareness Reports.

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Table 22 Case 10

Recipient	Paul Cardall (USA)
Recipient Age	35
Donor	Young male donor (anonymous, USA)
Year / Place	2009, Utah
Outcome	Successful recovery; now musician and public speaker promoting organ donation.

IV. RESULT AND DISCUSSION

Almost all the cardiac transplantation exhibited the memory of painting, Music and craving for food.

➢ *Painting, Music, and Food Cravings*

The interaction between painting, music, and food crav ings is influenced by the central nervous system (CNS). The CNS regulates eating and brain functions through various ne ural networks and interactions with neurotransmitters and ho rmones. The CNS receives feedback about an individual's m etabolic status from organs and systems that govern food int ake, controlling the stages of hunger, satiation, and satisfacti on.

➢ *California Learning Resource Network*

Artistic experiences, such as painting, can trigger a range of neurochemical and physiological responses that affect the brain's emotional regulation, memory consolidation, and cognitive resilience. The brain's default mode network, which is active during artistic creation and appreciation, suggests that art facilitates introspection and the exploration of personal meaning.

➢ *Springer*

Musical experiences can also impact the brain's reward system, influencing the hedonic control of eating. The CNS receives feedback about an individual's metabolic status from organs and systems that govern food intake, controlling the stages of hunger, satiation, and satisfaction.

➢ *California Learning Resource Network*

Food cravings are influenced by specialized neurons in the amygdala that respond to hunger and thirst signals. These neurons play a key role in regulating the desire to eat and drink, guiding the body's nutritional needs.

In summary, the CNS plays a crucial role in regulating painting, music, and food cravings, influencing the brain's emotional responses and the body's nutritional needs.

➢ *Hippocampus*

Musical memory is primarily controlled by the hippocampus, which is crucial for creating and storing memories, especially those with emotional significance. The amygdala is also involved in processing the emotional content of music, while the prefrontal cortex helps evaluate the musical experience and may associate it with personal significance. These brain regions work together to process, encode, and retrieve musical elements, making music a powerful tool for recalling memories and evoking emotions.

Hickok, G.; Buchsbaum, B.; Humphries, C.; Muftuler, T. (2003). "Auditory–motor interaction revealed by fMRI: speech, music, and working memory in area SPT". J. Cogn. Neurosci. 15 (5): 673–682. doi:10.1162/089892903322307393. PMID 12965041

➢ *Painting Memory Controlled by Which Part of the Brain*

The memory of painting is controlled by multiple brain regions, each playing a specific role in the creative process. The prefrontal cortex is crucial for planning and decision-making, allowing artists to conceptualize their work and make choices about colors, composition, and techniques. The visual cortex processes visual information, enabling the artist to perceive and interpret shapes, colors, and spatial relationships on the canvas. The parietal lobe is involved in hand-eye coordination, ensuring precise brushstrokes and movements. The right hemisphere is often associated with creativity and holistic thinking, while the cerebellum contributes to fine motor control. Together, these brain regions collaborate to transform imagination into tangible art, highlighting the intricate relationship between neuroscience and creativity.

Food craving and food-related memory are regulated by a network of interconnected brain regions rather than a single structure. The hypothalamus plays a central role by controlling hunger and responding to metabolic hormones, while the hippocampus stores memories of past eating experiences and influences how previous meals affect current intake. The amygdala links emotions and stress to food cravings, especially for comfort foods, and the nucleus accumbens drives the pleasure and reward aspects of eating through dopamine signaling. The insular cortex integrates taste and internal body signals, and the prefrontal cortex provides conscious control and decision-making that can suppress or regulate cravings. Together, these regions coordinate physiological needs, emotional states, memory, and self-control to shape eating behavior.Part of the brain that control the heart

The activity of the heart is primarily controlled by the brainstem, especially the medulla oblongata. The medulla contains vital cardiac control centers that regulate heart rate, blood pressure, and the strength of heart contractions by balancing the autonomic nervous system. It sends signals through the sympathetic nerves to increase heart rate and through the parasympathetic (vagus) nerve to slow it down.

Other brain regions also influence heart activity indirectly. The hypothalamus integrates emotional and physiological responses and adjusts heart function during stress, fear, or excitement, while higher brain areas such as the limbic system and cerebral cortex affect the heart through emotional and cognitive processes. However, the medulla oblongata remains the primary and essential center for direct control of cardiac activity.

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REFERENCES

[1]. Bates D., Mächler M., Bolker B. M., Walker S. C. (2015). Fitting linear mixed-effects models using lme4. *J. Stat. Softw.* 67 1–48. 10.18637/jss.v067.i01 [DOI] [Google Scholar]

[2]. Batra P., Das S. K., Salinardi T., Robinson L., Saltzman E., Scott T., et al. (2013). Relationship of cravings with weight loss and hunger. Results from a 6-month worksite weight loss intervention. *Appetite* 69 1–7. 10.1016/j.appet.2013.05.002 [DOI] [PubMed] [Google Scholar]

[3]. Berkman E. T., Hutcherson C. A., Livingston J. L., Kahn L. E., Inzlicht M. (2017). Self-control as value-based choice. *Curr. Direct. Psychol. Sci.* 26 422–428. 10.1177/0963721417704394 [DOI] [PMC free article] [PubMed] [Google Scholar]

[4]. Berridge K. C. (2009). "Liking" and "wanting" food rewards: brain substrates and roles in eating disorders. *Physiol. Behav.* 97 537–550. 10.1016/j.physbeh.2009.02.044 [DOI] [PMC free article] [PubMed] [Google Scholar

[5]. How feelings of stereotype threat influence older adults' memory performance. Chasteen AL, Bhattacharyya S, Horhota M, Tam R, Hasher L. https://doi.org/10.1080/03610730590948177. Exp Aging Res. 2005;31:235–260. doi: 10.1080/03610730590948177. [DOI] [PMC free article] [PubMed] [Google Scholar]

[6]. 6.Hashim HT, Ahmed N, Faggian G, Manyalich M, Onorati F. Heart Transplantation.Cham: Springer International Publishing. Cham: Springer International Publishing; 2022. Heart Transplantation; pp. 10–1007. [Google Scholar]

[7]. Personality changes following heart transplantation: the role of cellular memory. Liester MB. Med Hypotheses. 2020; 135:109468. doi: 10.1016/j.mehy.2019.109468. [DOI] [PubMed] [Google Scholar]

[8]. 8.The memory of the heart. Cirillo M. https://doi.org/10.3390/jcdd5040055. J Cardiovasc Dev Dis. 2018;5:55. doi: 10.3390/jcdd5040055. [DOI] [PMC free article] [PubMed] [Google Scholar]

[9]. 9.Heart versus head: do judges follow the law of follow their feelings. Wistrich AJ, Guthrie C, Rachlinski JJ. https://heinonline.org/HOL/LandingPage?handle=hein.journals/tlr93&div=30&id=&page= Tex Rev. 2014 [Google Scholar]

[10]. How feelings of stereotype threat influence older adults' memory performance. Chasteen AL, Bhattacharyya S, Horhota M, Tam R, Hasher L. https://doi.org/10.1080/03610730590948177. Exp Aging Res. 2005;31:235–260. doi: 10.1080/03610730590948177. [DOI] [PMC free article] [PubMed] [Google Scholar]

[11]. Hashim HT, Ahmed N, Faggian G, Manyalich M, Onorati F. Heart Transplantation.Cham: Springer International Publishing. Cham: Springer International Publishing; 2022. Heart Transplantation; pp. 10–1007. [Google Scholar]

[12]. Personality changes following heart transplantation: the role of cellular memory. Liester MB. Med Hypotheses. 2020; 135:109468. doi: 10.1016/j.mehy.2019.109468. [DOI] [PubMed] [Google Scholar]

[13]. The memory of the heart. Cirillo M. https://doi.org/10.3390/jcdd5040055. J Cardiovasc Dev Dis. 2018;5:55. doi: 10.3390/jcdd5040055. [DOI] [PMC free article] [PubMed] [Google Scholar]

[14]. Heart versus head: do judges follow the law of follow their feelings. Wistrich AJ, Guthrie C, Rachlinski JJ. https://heinonline.org/HOL/LandingPage?handle=hein.journals/tlr93&div=30&id=&page= Tex Rev. 2014 [Google Scholar]