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Exploring quantum mechanisms in heart-brain interaction: Bridging physics, cardiology, and physiology

Kalp-beyin etkileşiminde kuantum mekanizmalarını keşfetmek: Fizik, kardiyoloji ve fizyoloji arasında köprü kurmak

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Recent discoveries in quantum biology and neurocardiology call for a re-examination of how the heart and brain communicate. While classical models emphasize neural and neurochemical pathways, emerging evidence points toward complementary quantum and electromagnetic interactions that may operate concurrently.

The Orchestrated Objective Reduction (Orch-OR) theory proposed by Hameroff and Penrose[1] posits that consciousness arises from quantum computations in neuronal microtubules. This theory, while still debated, opens the possibility that microtubules in other excitable tissues, such as cardiac myocytes, can also support quantum coherence and sub-neural information processing. These intracellular structures may be sensitive not only to biochemical inputs, but also to external electromagnetic influences.

In parallel to this, electromagnetic field interactions in cardiovascular physiology are gaining attraction. A recent review has highlighted the diagnostic, therapeutic, and predictive implications of electromagnetic field exposure in cardiovascular disease.[2] Notably, the heart emits the most powerful electromagnetic field of any organ in the body, capable of being detected several feet away. These fields may influence neural oscillations and cortical excitability, thereby modulating brain function.

Moreover, biophoton emissions, ultra-weak light generated by biological tissues, have been observed in both the nervous and cardiovascular systems. These emissions may support quantum coherence and serve as a non-classical channel of intercellular communication.[3] Although the mechanistic pathways are still under investigation, their coherence properties suggest a possible role in synchronizing distant physiological systems.

More intriguingly, recent neuroimaging research has confirmed that heartbeat-evoked potentials (HEPs) produce detectable and functionally relevant cortical responses, particularly in the insular and somatosensory cortices.[4] These findings provide a direct link between cardiac signals and cortical processing, reinforcing the hypothesis that the heart is not merely a peripheral organ under central control, but an active participant in bidirectional communication.

Taken together, these findings imply that the interaction between the heart and brain may

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extend beyond classical mechanisms and include quantum, photonic, and electromagnetic domains. We believe this intersection warrants rigorous, interdisciplinary exploration. Collaboration among cardiologists, cardiovascular surgeons, quantum physicists, neurophysiologists, and biomedical engineers is essential to uncover the true depth of this dynamic relationship. We, therefore, propose that the Turkish Society of Cardiovascular Surgery consider facilitating and highlighting such interdisciplinary dialogue by publishing perspectives and pilot studies that explore quantum and electromagnetic dimensions of heart-brain communication.

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