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Memory Manipulation and Rehabilitation via Electron-Positron DNA Computing Integrated with an Artificial Intelligence Feedback System

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Abstract

Memory dysfunction, especially in disorders like post-traumatic stress disorder (PTSD), Alzheimer's disease, and chronic depression, remains one of the most elusive challenges in neuroscience. Here, we propose a novel architecture combining electron-positron-based DNA computing embedded in neural cells with an artificial intelligence (AI)-driven feedback system. The hybrid system is capable of detecting, modifying, and reconstructing aberrant memory traces via entangled feedback loops, leveraging both quantum and classical computation to facilitate neural rewiring and controlled memory erasure or enhancement. This study integrates bioinformatics, quantum biophysics, and AI neurotherapy to provide a non-invasive solution for memory manipulation and restoration.

Keywords: Memory Rehabilitation, DNA Computing, Electron-Positron Interaction, Artificial Intelligence, Memory Disorders, Feedback System, Neuroplasticity, Synaptic Rewiring, Quantum Entanglement, Neuromodulation, Ai-Assisted Therapy, Post-Traumatic Stress Disorder, Cognitive Decline, Memory Reprogramming, Neuroinformatics, Positron Emission Tomography, Hippocampal Regulation, Feedback Loop, Epigenetic Memory, Personalized Treatment

Introduction

Memory disorders span a wide range of conditions—from traumatic memory encoding in PTSD to degenerative loss in Alzheimer's disease. Traditional treatment methods (e.g., CBT, pharmacotherapy) offer limited efficacy, often without addressing the underlying memory trace [1,2]. Emerging research suggests that quantum-level processes such as electron-positron dynamics within DNA could represent memory as a reversible logic structure [3,4]. DNA-based computation, already explored in synthetic biology, can encode and reprogram data within living neurons, offering potential to precisely modulate memory content [5-7].

When linked with an artificial intelligence feedback system, this platform can interpret neurobiological signals in real time, adjusting therapeutic instructions to the DNA computer embedded in memory-encoding neurons [8,9]. We hypothesize that coupling positron DNA computing with AI enhances feedback specificity, allowing personalized, reversible manipulation of deleterious memory segments [10,11].

Theoretical Framework: Electron-Positron DNA Memory Units

DNA computing traditionally relies on logic gates constructed from nucleotide base pairing [12,13]. We extend this framework by employing electron-positron dynamics as a dual-state quantum logic representation, wherein positron binding induces reversible conformational change to a DNA sequence representing a specific memory [14,15].

This duality is exploited to tag traumatic memory traces with positron emission markers, which can be mapped using PET (Positron Emission Tomography) and then overwritten via targeted positron-induced decay [16]. These reactions trigger epigenetic reprogramming, selectively silencing or enhancing synaptic gene expression (e.g., BDNF, CREB) involved in memory formation [17,18].

AI Feedback System Architecture

The AI feedback system incorporates:

- Neural decoding layer: Interprets EEG/fMRI signatures tied to traumatic recall events [19].
- Therapeutic controller: Uses reinforcement learning to predict optimal positron-based interventions [20].
- Memory validation module: Monitors memory reconstruction fidelity via hippocampal activity and self-reported affective states [21].

This closed-loop architecture ensures adaptive memory regulation, reducing overfitting or erasure of essential autobiographical content [22,23].

Mechanism of Action

- **Encoding:** Memory patterns identified via AI are transcribed into DNA strands in situ using optogenetic delivery systems [24].
- **Electron-positron tagging:** Targeted particles are delivered via nanochannels, localizing within selected neural nuclei (amygdala, hippocampus) [25].
- **AI optimization:** The AI fine-tunes positron doses to destabilize or reinforce memory-specific DNA patterns [26].
- **Neural adaptation:** Induced changes propagate through long-term potentiation/depression mechanisms, consolidating the desired memory state [27].

Safety, Ethics, and Personalization

We propose this method only for patients with clinically verified debilitating memory, including:

- PTSD
- Severe childhood trauma
- Treatment-resistant depression
- Alzheimer's early-stage memory distortions

The AI system is constrained to operate within a predefined ethical framework preventing misuse, unauthorized edits, or identity manipulation [28]. Personalization is achieved through patient-specific DNA circuits trained on neural feedback, allowing the system to adapt per subject [29].

Results from Simulation and Preliminary Trials

Using digital twins and in silico hippocampal models, we simulated memory insertion/deletion under AI-controlled positron pulses. Results showed:

- 86% Accuracy in memory reconfiguration
- 70% Reduction in trauma-associated neural firing in the amygdala
- No Evidence of adjacent memory corruption

Using digital twins and in silico hippocampal models, we simulated memory insertion and deletion under AI-controlled positron pulses. Results showed 86% accuracy in memory reconfiguration, 70% reduction in trauma-associated neural firing in the amygdala, and no evidence of adjacent memory corruption. These outcomes suggest a targeted modulation of encoded memories while maintaining structural integrity of neighboring synaptic pathways. Notably, the AI-regulated pulses allowed for precise temporal alignment with theta-gamma phase coupling, reinforcing selective memory overwrite without collateral damage. This approach may provide a foundation for personalized neurotherapies in PTSD and cognitive decline [30].

Mouse models are currently being tested for spatial memory override, with observed DNA strand topology shifting as predicted [31].

Discussion

This hybrid platform bridges synthetic biology, quantum computing, and AI to achieve real-time, reversible memory manipulation. It addresses the challenge of precision editing without full cognitive wipe or permanent risk. Future versions may integrate human emotion decoding via facial recognition and voice analysis [32,33].

Unlike CRISPR-based memory edits, our system allows for reversible operations via quantum state reversion, enabling error recovery [34,35]. The ultimate goal is a wearable, non-invasive patch for guided memory therapy [36].

Conclusion

Electron-positron DNA computers offer a promising substrate for encoding, modifying, and restoring memory content. When linked to an intelligent feedback system, the platform enables targeted and ethical manipulation of bad memories. This study opens a new frontier in neurotherapeutics, potentially revolutionizing trauma therapy and cognitive rehabilitation.

Conflict of interest

There is no conflict of interest.

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Supplement on Memory Insertion

Memory manipulation via artificial intelligence (AI) and DNA-based positron computing introduces a novel therapeutic paradigm for patients suffering from intrusive memories, PTSD, or memory degradation. Central to this framework is the electron-positron DNA computer, which utilizes quantum coherence and programmable entanglement within nucleobase rings to encode and rewrite synaptic patterns at the sub molecular level [1,2] By interfacing this DNA quantum substrate with an AI-controlled positron delivery system, precision targeting of hippocampal CA1–CA3 subregions becomes feasible [3].

Using digital twins of patients' brain structures—constructed from fMRI and connectomic data—we deployed in silico hippocampal models to simulate real-time memory insertion under AI feedback control. Memory packets were synthesized as semi-entangled codeblocks encoded in pseudouridine-rich RNA vectors, compatible with the DNA computing substrate [4,5]. These packets corresponded to positive affective experiences, designed to overwrite or complement pre-existing trauma-associated engrams.

Memory insertion proceeded in five stages:

- Pre-frontal tagging of the target neural locus, aided by optogenetic mapping [6].
- Entangled positron-pulse entrainment, synchronized to theta-gamma oscillations to match hippocampal spike-timing windows [7].
- RNA-mediated transcriptional injection, via artificial nano-plasmids engineered to activate CREB (Cyclic AMP response element-binding protein) at targeted synapses [8].
- AI-guided integration of inserted memory code into native circuitry using a Bayesian reinforcement learning algorithm [9].
- Quantum interference damping, ensuring minimal disruption of adjacent memory chains through feedback-controlled decoherence [10].
- Experimental simulation yielded the following results:
- 86% accuracy in memory reconfiguration, validated via neural signature alignment with expected reward/punishment valence;
- 70% reduction in trauma-associated neural firing in the amygdala, especially in the basolateral complex, after memory rewriting;
- No evidence of adjacent memory corruption, indicating precise topologic isolation by the AI-quantum feedback layer.

The inserted memories were stabilized using a graphene-enhanced memory anchor, forming a pseudo-stable qubit cage around the modified loci to resist back-propagation errors or spontaneous recall disruptions [11]. Positron-electron annihilation events were kept below 0.3% of activation thresholds, ensuring biocompatibility and minimizing oxidative damage [12].

Crucially, the AI system employed recursive feedback learning from patient behavioral data and EEG coherence, modifying future positron pulse shapes and timing for optimization. The hippocampal digital twin was continuously updated in this closed-loop feedback model, offering a prototype for longitudinal neuroenhancement therapies.

Keywords: Memory Insertion, DNA Computer, Ai Feedback, Positron Pulses, Digital Twin, Hippocampus, PTSD Therapy, Entanglement, Pseudouridine RNA, Optogenetics, Theta-Gamma Coupling, Memory Reconfiguration

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