Abstracts

Advances in stem cell–derived beta-cell therapy: A new frontier in type 1 diabetes treatment

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Type 1 diabetes (T1D) is a chronic autoimmune disease characterized by the destruction of pancreatic beta cells (β-cell), leading to lifelong dependence on exogenous insulin. Despite advances in insulin delivery systems and glucose monitoring, achieving tight glycemic control remains a challenge for many patients. In recent years, stem cell–derived β-cell therapy has emerged as a promising strategy for restoring endogenous insulin production. This review explores the progress in differentiating human pluripotent stem cells, such as embryonic stem cells and induced pluripotent stem cells (iPSCs), into functional insulin-secreting β-like cells. We highlight recent breakthroughs in improving cell maturity, graft survival, and immune protection. Delivery approaches, encapsulation technologies, and transplantation strategies are discussed alongside an overview of ongoing clinical trials. The review also addresses current limitations, including immune rejection, cell dedifferentiation, and safety concerns. Finally, we examine future directions, such as genome editing, personalized cell therapy, and the integration of artificial intelligence in monitoring and optimizing treatment. Stem cell–derived β-cell therapy holds transformative potential as a curative approach for T1D, but further research is essential to overcome remaining barriers to its widespread clinical application.

Reference:

Zi G, Zhang L, Zhou L, Liu X, Wang L, Zhou R, Zheng P, Wei J, Chen X, Wei S. Advances and prospects in cell therapy for cancer: explorations from T cells to stem cells. Signal Transduction and Targeted Therapy. 2026; 11(1): 255.

The Impact of Artificial Intelligence Tools on Human Cognitive Abilities: A Comprehensive Review

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Background: The rapid integration of artificial intelligence (AI) tools into daily cognitive tasks has raised questions about their impact on human cognitive abilities.

Objective: This review synthesizes current research on how the use of AI tools affects cognitive domains, including critical thinking, memory, creativity, and decision-making.

Methods: We reviewed empirical studies, including randomized controlled trials, field experiments, and neurophysiological investigations, that examined AI's

cognitive effects across educational and professional settings.

Results: Evidence reveals a complex, non-linear relationship between AI use and cognition. Moderate AI usage shows minimal cognitive impact, while excessive reliance correlates with decreased critical thinking abilities (cognitive offloading effect), reduced metacognitive accuracy, and lower retention on delayed assessments. Field studies with approximately 1,000 students demonstrated improved immediate performance but worse unassisted outcomes following AI removal, particularly with unrestricted AI access. Neurophysiological data showed reduced brain network connectivity during AI-assisted tasks. Age-related differences emerged, with younger users (17-25 years) exhibiting greater dependence and lower critical-thinking scores. However, well-designed AI tutoring systems with scaffolding produced superior learning gains compared with traditional instruction.

Discussion: The findings reveal a fundamental paradox: AI assistance frequently improves immediate task performance while simultaneously undermining durable skill acquisition. Three primary mechanisms mediate these effects: reduced cognitive effort through offloading, diminished metacognitive monitoring, and altered practice patterns. Critically, the cognitive impact of AI is not deterministic but depends on implementation design, with scaffolded AI systems that maintain active engagement producing dramatically different outcomes than those providing direct solutions. Age-related vulnerabilities, particularly among younger users (17-25 years), raise developmental concerns, though higher educational attainment appears to provide protective effects against cognitive offloading tendencies.

Conclusions: AI tools do not inherently impair or enhance cognition; rather, their impact depends critically on implementation design, user agency, and interaction patterns. Strategic use that maintains active cognitive engagement can augment human capabilities, while passive reliance risks skill atrophy. Educational interventions promoting AI literacy and metacognitive awareness are essential for optimizing cognitive outcomes.

Keywords: Artificial Intelligence, cognitive abilities, critical thinking, cognitive offloading, educational technology, metacognition.

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