Mitochondria Encapsulated in Degalactosylated Xyloglucan Hydrogels for Enhanced Brain Mitochondrial Transplantation Efficiency

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Abstract:

Mitochondrial dysfunction has been identified as a hallmark of several acute neurodegenerative and neurological diseases, including Alzheimer's disease, Parkinson's disease, and ischemic stroke, within the central nervous system. Despite the exploration of numerous strategies to mitigate mitochondrial impairment, no clinically approved therapy has emerged that directly targets mitochondrial restoration. Mitochondrial transplantation (MT) has recently attracted attention as a promising therapeutic approach for neurological diseases [1, 2]. The replacement of dysfunctional mitochondria with healthy ones has been demonstrated to result in an augmentation of ATP production, a reduction in oxidative stress, and a restoration of cellular bioenergetics [1, 2]. However, in the context of brain disorders, the success of MT is hampered by the hostile extracellular environment, characterised by inflammation, oxidative damage, and the presence of reactive oxygen species [1]. In addition, the