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The Therapeutic Potential of Umbilical Cord Mesenchymal Stem Cells and Glutamine Supplementation in Mitigating Hepatic Injury in Acute Pancreatitis

Camila Espejo*

Department of Oncology, Utah Valley University, Orem Utah, United States of America

Perspective

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***For Correspondence:** Camila Espejo, Department of Oncology, Utah Valley University, Orem Utah, United States of America

Email: camila.espejo121@hotmail.com

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ABOUT THE STUDY

Acute Pancreatitis (AP) is a multifaceted inflammatory condition characterized by the release of proinflammatory mediators, often leading to severe complications such as liver failure and significant mortality rates. Despite advancements in medical care, current treatments for AP remain limited, necessitating the exploration of novel therapeutic approaches. In recent years, Umbilical Cord Mesenchymal Stem Cells (UCMSCs) have emerged as promising candidates for therapeutic intervention due to their unique properties, including multipotent differentiation and robust migratory responses to injury. Additionally, glutamine supplementation, known for its role in early nutritional support, has shown potential in managing pancreatitis-associated complications.

In this study aimed to evaluate the therapeutic efficacy of a combination therapy involving UCMSCs and glutamine in mitigating hepatic injury associated with AP. Utilizing a murine model of acute pancreatitis, UCMSCs were administered via tail vein injections, while oral glutamine supplementation was concurrently provided. The homing of UCMSCs to target tissues was assessed using fluorescence microscopy, and treatment outcomes were evaluated through a comprehensive array of techniques.

Histopathological examination revealed a significant reduction in pancreatic tissue damage in both the UCMSC-treated and combination therapy groups compared to untreated AP controls. Moreover, serum levels of amylase and lipase, indicative of pancreatic injury, were markedly decreased in the UCMSC and combination therapy groups, suggesting a potential therapeutic benefit of the interventions.

Notably, the combination therapy group exhibited superior outcomes compared to the UCMSC-alone group, indicating a synergistic effect of UCMSCs and glutamine supplementation in mitigating hepatic injury in the context of AP.

Acute pancreatitis arises from the aberrant activation of pancreatic enzymes within pancreatic acinar cells, triggering an inflammatory cascade and subsequent multi-organ complications. Liver injury, in particular, is a frequent and severe consequence of AP, with liver failure accounting for a significant portion of AP-related mortality. While the precise mechanisms underlying liver injury in AP remain elusive, factors such as the proximity of the liver to the pancreas and its role in metabolic processes likely contribute to its susceptibility to damage.

This study sheds light on the potential of UCMSCs and glutamine supplementation as a promising therapeutic approach for mitigating hepatic injury in the context of acute pancreatitis. The observed reduction in pancreatic tissue damage and improvement in serum biomarkers underscore the efficacy of the combination therapy in ameliorating pancreatitis-associated complications. Furthermore, the findings suggest a synergistic effect of UCMSCs and glutamine supplementation, warranting further investigation into their underlying mechanisms of action.

Future research endeavors should focus on elucidating the precise mechanisms by which UCMSCs and glutamine exert their therapeutic effects in the context of AP-associated hepatic injury. Additionally, optimizing treatment protocols, such as dosing regimens and timing of intervention may further enhance the efficacy of the combination therapy. Moreover, clinical trials are warranted to validate the findings of preclinical studies and translate them into clinical practice, ultimately improving outcomes for patients with acute pancreatitis.

The findings of this study highlight the therapeutic potential of UCMSCs and glutamine supplementation in mitigating hepatic injury in the context of acute pancreatitis. By elucidating the underlying mechanisms and optimizing treatment strategies, these promising therapeutic modalities hold the potential to revolutionize the management of acute pancreatitis and improve patient outcomes. In summary, our comparative analysis revealed a lack of statistically significant distinctions between MSC-based therapy and the combined therapy approach, both in terms of histopathological assessments of the liver and pancreas, as well as in the measurement of inflammatory factor levels and apoptotic indices. This implies that while both treatment modalities exhibited efficacy in mitigating liver injury in the context of pancreatitis, there exists no significant variance in their overall treatment effectiveness. The available body of evidence on glutamine supplementation combined with cellular therapy remains limited, and the optimal regimen, offering the highest therapeutic efficacy, necessitates validation through more expansive and rigorous clinical trials.