Short Communication

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2022.47.007491

Human Placental Mesenchymal Stromal Cell-Derived Exosome-Enriched Extracellular Vesicles for Chronic Liver Graft-Versus-Host Disease

Amir Hossein Norooznezhad, Reza Yarani, Mehrdad Payandeh*, Zohreh Hoseinkhani, Sarah Kiani, Elham Taghizadeh, Avnesh S Thakor and Kamran Mansouri

Kermanshah university of medical sciences, Iran

***Corresponding author:** Mehrdad Payandeh, Kermanshah university of medical sciences, Iran

ARTICLE INFO

Received: November 11, 2022

Published: November 30, 2022

ABSTRACT

Citation: Amir Hossein Norooznezhad, Reza Yarani, Mehrdad Payandeh, Zohreh Hoseinkhani, Sarah Kiani, Elham Taghizadeh, Avnesh S Thakor and Kamran Mansouri. Human Placental Mesenchymal Stromal Cell-Derived Exosome-Enriched Extracellular Vesicles for Chronic Liver Graft-Versus-Host Disease. Biomed J Sci & Tech Res 47(3)-2022. BJSTR. MS.ID.007491.

Background

Allogeneic peripheral blood stem cells transplantation (PBSCT) is now among the treatments for different haematological diseases and malignancies such as acute myeloid leukaemia (AML) [1,2]. Although this treatment is very advanced, graft-versus-host disease (GVHD) is still the most common and severe side effect. [3,4]? The cumulative incidence of chronic GVHD (cGVHD) during the first year of transplantation is as high as 43.8 ± 10% among recipients of allogeneic marrow transplantation [5]. Clinically, cGVHD involves mainly skin, lung, eye, liver and musculoskeletal system, [4, 6] in which the cutaneous type is the most prevalent and earliest exhibiting type. According to the studies, the cutaneous cGVHD is associated with an inflammatory state in which anti-inflammatory agents are the most important treatment option [7]. Human mesenchymal stromal cells (hMSC) have been used to treat many inflammatory diseases/disorders in the clinic. A recent systematic review and meta-analysis showed that treatment with these cells is not associated with any severe or notable side effects [8]. Exosomes are natural extracellular vesicles released by different cell types and contain proteins, lipids, and RNA. These vesicles have been known to participate in intercellular interactions and communications.

Methods and Patient

The patient was a 22-year-old Caucasian male diagnosed with ALL years ago (April 2020). Following routine treatments and after reaching complete remission, he underwent PBSCT (one session) from an identical donor (sister). After the transplantation, he presented with acute gastrointestinal (GI) GVHD on a prophylaxis immune suppression regime, with his symptoms and signs brought under control through increasing corticosteroid and cyclosporin dosages. After a year, the liver cGVHD started, with rising in ALT, AST, BIL (TOTAL AND DIRECT) AND ALK PH, which did not good responses to cyclosporine and high-dose corticosteroids and ATG. The exosomes-enriched EVs were isolated from placental-derived human mesenchymal stromal cells as has been described, and the patient received three treatments at a weekly interval (June 2021; 10 months after the transplantation). In each session, 0.5-0.8 mg (1.9-2.6 × 1011 particles) of exosome enriched EVs were administrated in 50 ml saline (0.9%) through the right cubital vein access. The patient well tolerated the treatment, and no side-effect was observed following the intervention. Also, no infection was

noted during the treatment and follow-up period. The changes began after the third injection, when he began to feel significant changes in his condition, the patient was evaluated more closely (15 days following the last injection), his skin has become less hyperpigmented. Also, the frequency and severeness of the pruritus and icterus decreased. The patient was followed for 5 months, and the mentioned changes remained sustained [9-15].

Conclusion

To our knowledge, we are reporting the second case of exosome therapy for GVHD in liver cGVHD patient, which showed clinically acceptable results for both the team and the patient. The results remained stable for 5 months with no relapse. This study only investigated the hPMSC exosome therapy due to the lack of resources. The authors suggest investigating differences among other sources of MSCs such as bone marrow for cGVHD treatment. Also, changes in the environment of the MSCs could be considered as other variables in future studies.

References

1. Mohammadi S, Norooznezhad AH, Mohammadi AM, Hajar Nasiri, Mohsen Nikbakht, et al. (2017) Optimizing peripheral blood stem cells transplantation outcome through amend relapse and graft failure: a review of current literature. Exp Hematol Oncol 6: 24.
2. Mohammadi AM, Norooznezhad AH, Aminian P, Mohsen Nikbakht, Bahram Chahardouli, et al. (2017) An alternative method for custom prime: a case report of successful peripheral blood stem cell harvesting from two low-weight child donors. Transfus Apher Sci 56: 886-888.
3. Mohammadi S, Malek Mohammadi A, Norooznezhad AH, Heshmati F, Alimoghaddam K, et al. (2017) Extra corporeal photochemotherapy in steroid refractory graft versus host disease: a review of guidelines and recommendations. Transfus Apher Sci 56(3): 376-384.
4. Moreno DF, Cid J (2019) Graft-versus-host disease. Med Clin 152: 22-28.
5. Ghavamzadeh A, Kamali MK, Bahar B, Jahani M, Foroughi F (2002) Thalassemia: incidence and predictive factors for chronic GVHD after HLA-identical sibling marrow transplantation. Acta Med Iran 40: 1-5.
6. Norooznezhad AH, Malek Mohammadi A, Fumani HK, Parivash Aminian, Mahdi Jalili, et al. (2019) Peripheral blood stem cell apheresis in low-weight children: A single centre study. Transfus Apher Sci 58: 300-303.
7. Ramachandran V, Kolli SS, Strowd LC (2019) Review of graft-versus-host disease. Dermatol Clin 37(4): 569-582.
8. Thompson M, Mei SHJ, Wolfe D, Josée Champagne, Dean Fergusson, et al. (2020) Cell therapy with intravascular administration of mesenchymal stromal cells continues to appear safe: an updated systematic review and meta-analysis. E Clinical Medicine 19: 100249.
9. Remberger M, Afram G, Sundin M, M Uhlin, K LeBlanc, et al. (2016) High incidence of severe chronic GvHD after HSCT with sibling donors. A single center analysis. Bone Marrow Transplant 51: 1518-1521.
10. Ludwig AK, Giebel B (2012) Exosomes: small vesicles participating in intercellular communication. Int J Biochem Cell Biol 44: 11-15.
11. De la Torre P, Pérez-Lorenzo MJ, Flores AI (2019) Human placenta-derived mesenchymal stromal cells: a review from basic research to clinical applications. (In: Valarmathi M (Eds.).,) Stromal Cells Structure, Function, and Therapeutic Implications. Intech Open, pp. 300-302.
12. Pelekanos RA, Sardesai VS, Futrega K, Lott WB, Kuhn M, et al. (2016) Isolation and expansion of mesenchymal stem/stromal cells derived from human placenta tissue. J Vis Exp 6: 54204.
13. Santos ESP, Bennett CL, Chakraverty R (2018) Unraveling the mechanisms of cutaneous graft-versus-host disease. Front Immunol 9: 963.
14. Bonig H, Kuçi Z, Kuçi S, Shahrzad Bakhtiar, Oliver Basu, et al. Children and adults with refractory acute graft-versus-host disease respond to treatment with the mesenchymal stromal cell preparation "MSC-FFM"-outcome report of 92 patients. Cells 8(12): 1577.
15. Kordelas L, Rebmann V, Ludwig AK, S Radtke, J Ruesing, et al. (2014) MSC-derived exosomes: a novel tool to treat therapy-refractory graft-versus-host disease. Leukemia 28: 970-973.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2022.47.007491

Mehrdad Payandeh. Biomed J Sci & Tech Res

Submission Link: https://biomedres.us/submit-manuscript.php