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The developing role of extracellular vesicles in autoimmune diseases: special attention to mesenchymal stem cell-derived extracellular vesicles

Ortiz G.G.R., Zaidi N.H., Saini R.S., Ramirez Coronel A.A., Alsandook T., Hadi Lafta M., Arias-Gonzales J.L., (...), Maaliw III R.R.

(2023) International Immunopharmacology, 122 , art. no. 110531

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1	Evaluation of the immune-modulatory, anti-oxidant, proliferative, and anti-apoptotic effects of nano-silymarin on mesenchymal stem cells isolated from multiple sclerosis patients' adipose tissue sources *Open Access*	Lavi Arab, F., Yousefi, F., Reza Jaafari, M., (...), Faridzadeh, A., Mahmoudi, M.	2024	Journal of Functional Foods 113,105958	0

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Silymarin (SL) has a long history of use for the treatment of a variety of diseases, but several limitations, such as poor bioavailability and negligible solubility, have restricted its successful translation in a clinical setting. However, the nano-micelle delivery system is a highly reproducible method which capable of improving poor-water solubility and bioavailability of free-SL. Mesenchymal stem cells (MSCs) are multipotent cells proficient in tissue renewal and regeneration. MSCs have similar properties to SL including immunomodulatory, antioxidant, and neuroprotective effects. Here, we show that nano-SL (1 and 2.5) increased AD-MSCs proliferation and protected from apoptosis. Our findings indicated that the levels of anti-inflammatory agents including IL-10, IL-4, FOXp3 and TGF-B mRNA expression were significantly upregulated in nano-SL-treated MSCs along with downregulated mRNA expression of pro-inflammatory cytokines (IL-6, IL-17). We identified that nano-SL elevated the T-regulatory (Treg) population (1 and 2.5 μM) and superoxide dismutase activity (2.5 μM) while decreasing nitrite oxide content. Conclusively, combinatorial therapy by nano-SL and MSCs may be useful for MS patients who are receiving MSCs for treatment.

2	Extracellular Vesicles: Novel Potential Therapeutic Agents in Inflammatory Bowel Diseases *Open Access*	Mignini, I., Piccirilli, G., Termite, F., (...), Gasbarrini, A., Zocco, M.A.	2024	Cells 13(1),90	0

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Patients affected by inflammatory bowel diseases (IBD) can nowadays benefit from a growing number of pharmacological options. However, in moderate-to-severe cases, the therapeutic response is still far from optimal, and treatment changes and optimizations are often required. Thus, researchers in this field are strongly engaged in studies aiming to identify new potential therapeutic targets. Extracellular vesicles (EVs) are tiny subcellular bodies with a phospholipid bilayer envelope containing bioactive molecules, which are released from different cells and are involved in intercellular communication. Recent pre-clinical data show their emerging role in the pathogenesis and treatment of IBD. In our review, we summarize current evidence about the function of EVs as active therapeutic agents in ulcerative colitis and Crohn's disease, analyzing the properties of EVs derived from different cellular sources and the mechanisms through which they may improve intestinal inflammation.

3	Diabetic stem cell therapy and nanomedicine: advancements in treating diabetes	Khoshnevisan, K., Sajjadi-Jazi, S.M.	2023	Journal of Diabetes and Metabolic Disorders 22(2), pp. 1805-1807	0

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Objectives: In recent years, significant advancements have been made in the field of medical sciences, particularly in the treatment of diabetes using innovative methods. Diabetes, a chronic metabolic disorder considered by elevated blood glucose levels, disturbs millions of people worldwide. Methods: Conventional treatments for diabetes have shown limited success in providing long-term solutions, leading researchers to explore alternative therapies such as diabetic stem cell therapy and nanomedicine. In this article, we delve into the promising potential of these cutting-edge treatments and their impact on diabetes management. Results: Several achievements have been obtained to treat diabetes type I by merging nanomedicine and cell therapy such as insulin-loaded exosomes and nanoparticles loaded with different drugs. For instance, by engineering exosomes with specific nanocarriers, researchers can precisely deliver some molecules to target cells, promoting tissue repair and regeneration. Conclusions: It seems that using nanomedicine and cell therapy, we can explore the inventive way for a future somewhere diabetes is no longer a problem for millions, and people can hold a great quality life. Graphical Abstract: [Figure not available: see fulltext.].

4	Immunological Regulation of Gut-Tropic Immune Cells by Extracellular Vesicles	Matsuzaka, Y., Yashiro, R.	2023	Immunological Investigations	1

Investigations

Journal Of Diabetes And Metabolic Disorders (1)

Journal Of Functional Foods (1)

Publication stage

Final (3)

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The remarkable diversity of lymphocytes, essential components of the immune system, serves as an ingenious mechanism for maximizing the efficient utilization of limited host defense resources. While cell adhesion molecules, notably in gut-tropic T cells, play a central role in this mechanism, the counterbalancing molecular details have remained elusive. Conversely, we've uncovered the molecular pathways enabling extracellular vesicles secreted by lymphocytes to reach the gut's mucosal tissues, facilitating immunological regulation. This discovery sheds light on immune fine-tuning, offering insights into immune regulation mechanisms.