



DECEMBER 11-12, 2025
۲۱ و ۲۰ آذر ماه ۱۴۰۴



دومین کنگره
پلازما پزشکی ایران

The 2nd Congress on Plasma Medicine

دبیرخانه دائمی کنگره
پلازما پزشکی ایران
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Viability of Sertoli-Spermatogonial Stem Cells Treated with Cold Atmospheric Plasma-Activated Plasma-Derived Extracellular Nanovesicles

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OPEN ACCESS

Citation:

Toulabi A, Keshvari L, Amini E, Mahdian H, Azarnia M, Hajisharifi K. Viability of Sertoli-Spermatogonial Stem Cells Treated with Cold Atmospheric Plasma-Activated Plasma-Derived Extracellular Nanovesicles. *Iran Biomed J. Supplementary* (2-2026): 13.



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ABSTRACT

Introduction: Male infertility accounts for about 30-50% of couples' fertility issues, with damage to the spermatogenic lineage—especially spermatogonial stem cells (SSCs) and Sertoli cells—being one of the most important factors in its occurrence. These cells are highly sensitive to oxidative stress and gonadotoxic agents, making the development of effective reparative approaches crucial. Platelet-rich plasma-derived nanovesicles (PRP-EVs) serve as natural carriers of growth factors, while cold atmospheric plasma (CAP) as a source of reactive oxygen and nitrogen species. Both have shown significant potential for regenerating damaged tissue. The aim of this study was to investigate the effect of CAP-activated PRP-EVs on the viability of Sertoli-SSCs.

Materials and Methods: After extracting cells from the testis of Wistar rats and confirming their identity, the cells were treated with CAP-activated PRP-EVs. The MTT assay was used to assess viability.

Results and Discussion: The results showed that PRP-EVs activated by CAP at a voltage of 14 kV and a frequency of 14 kHz significantly increased cell viability.

Conclusion: Given that the culture and viability of SSCs in vitro are very important, the combination of CAP and PRP-EVs creates an effective synergy that improved the viability of spermatogonial and Sertoli stem cells. This approach offers a novel and practical solution for testicular tissue repair and addressing male infertility.

Keywords: Cold atmospheric plasma, PRP nanovesicles, Sertoli-spermatogonial stem cells

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Iranian Biomedical Journal Supplementary (February 2026): 13