

Decellularized dermal matrix-based hydrogels and their potential as immunomodulatory biomaterials



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PORTO

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Introduction

Decellularized extracellular matrices (dECMs)

✔ Positively influence cell adhesion, proliferation, and differentiation [1]

✔ Potential immunomodulatory effect → anti-inflammatory and pro-remodeling response [2]

✔ Benefit of being injectable and useful in defect areas with irregular shapes [3]

dECMs - based hydrogels

✔ Preservation of growth factors, bioactive binding sites, and the proteins of the ECM [3]

✔ Adjustable physical properties

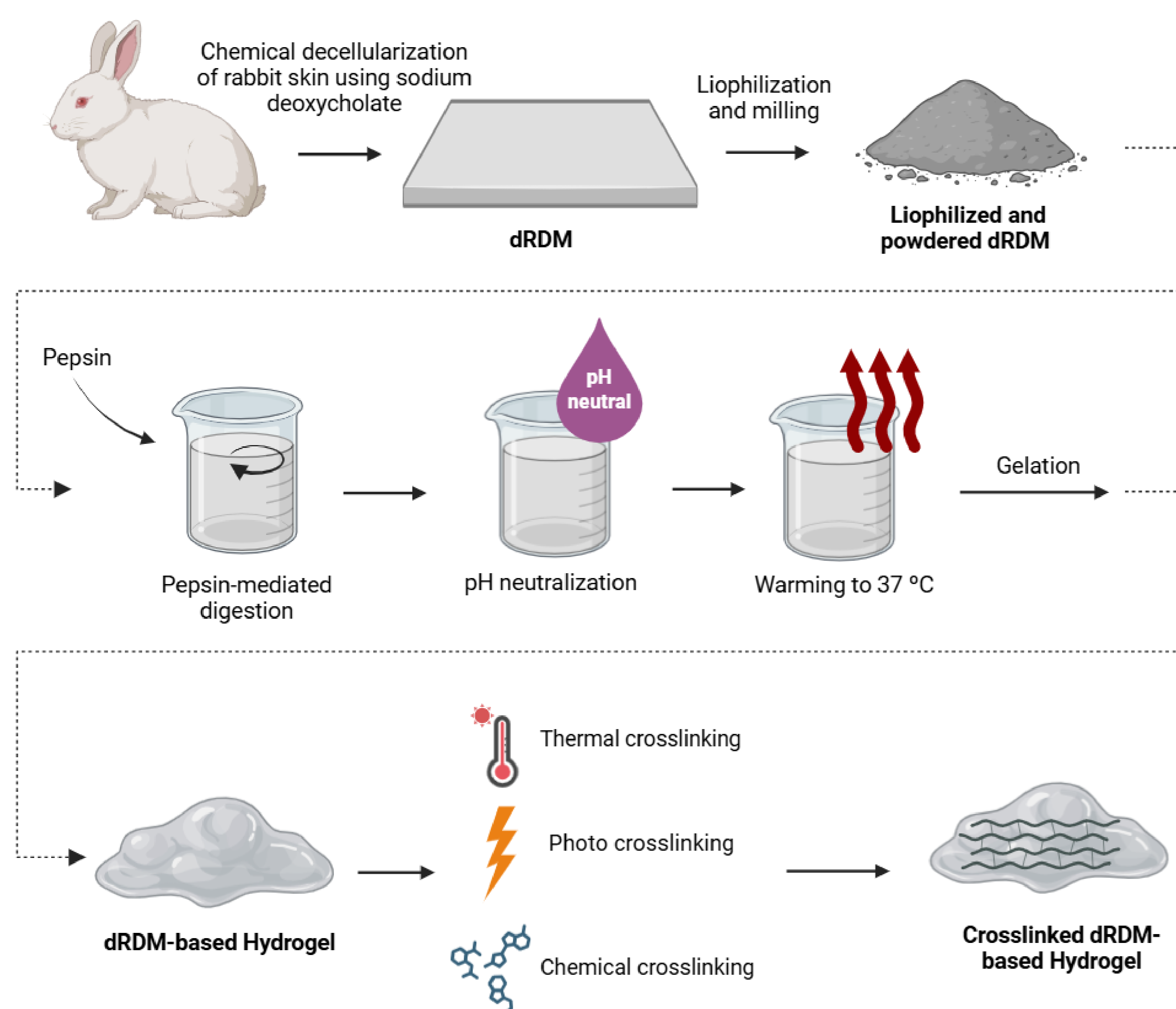
Objectives

Develop an **hydrogel matrix** derived from **decellularized rabbit dermal matrix** (dRDMs) and assess its **immunomodulatory capabilities** for applications in tissue engineering and regenerative medicine



Project

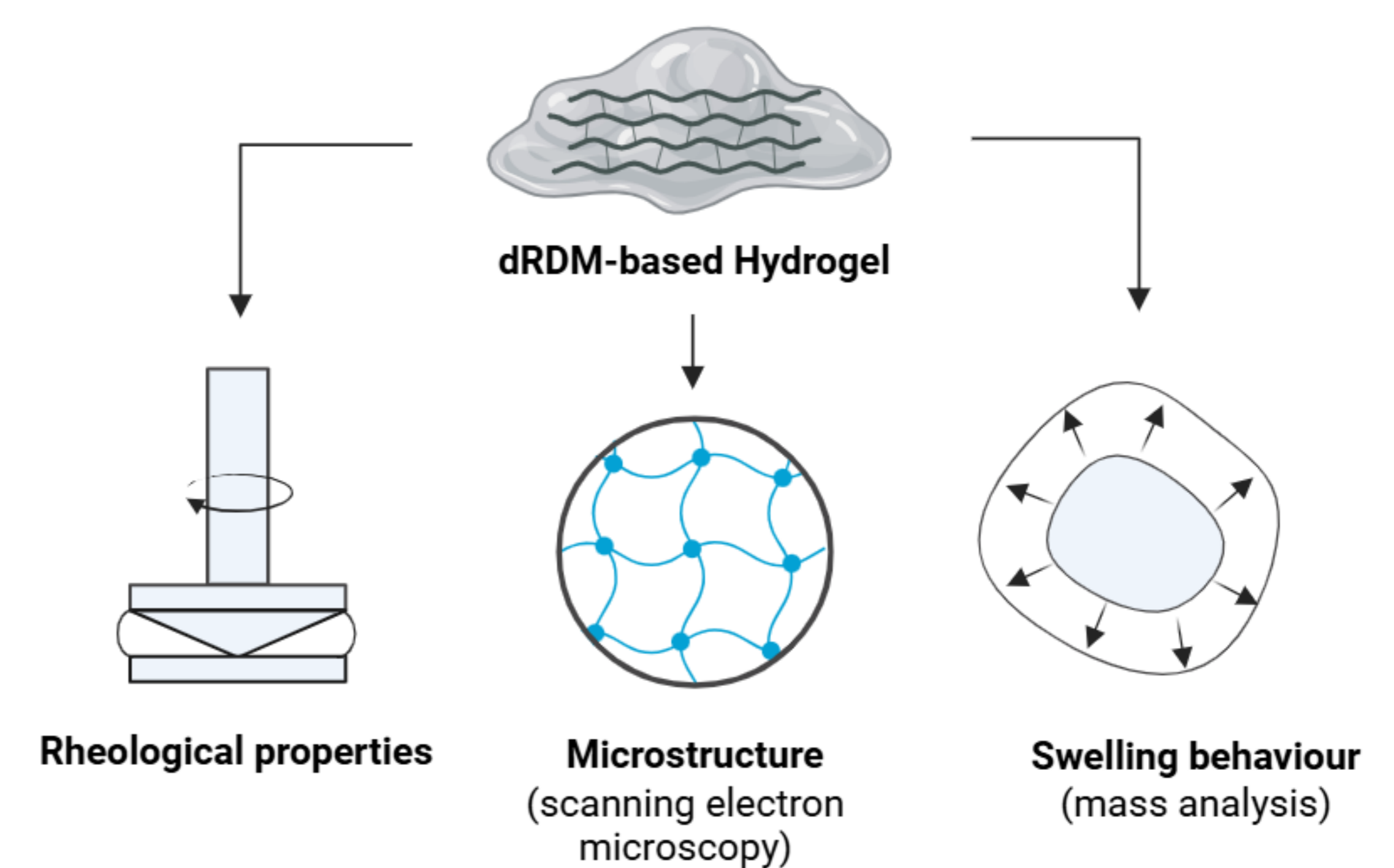
1 Development and optimization of dRDMs - based hydrogels



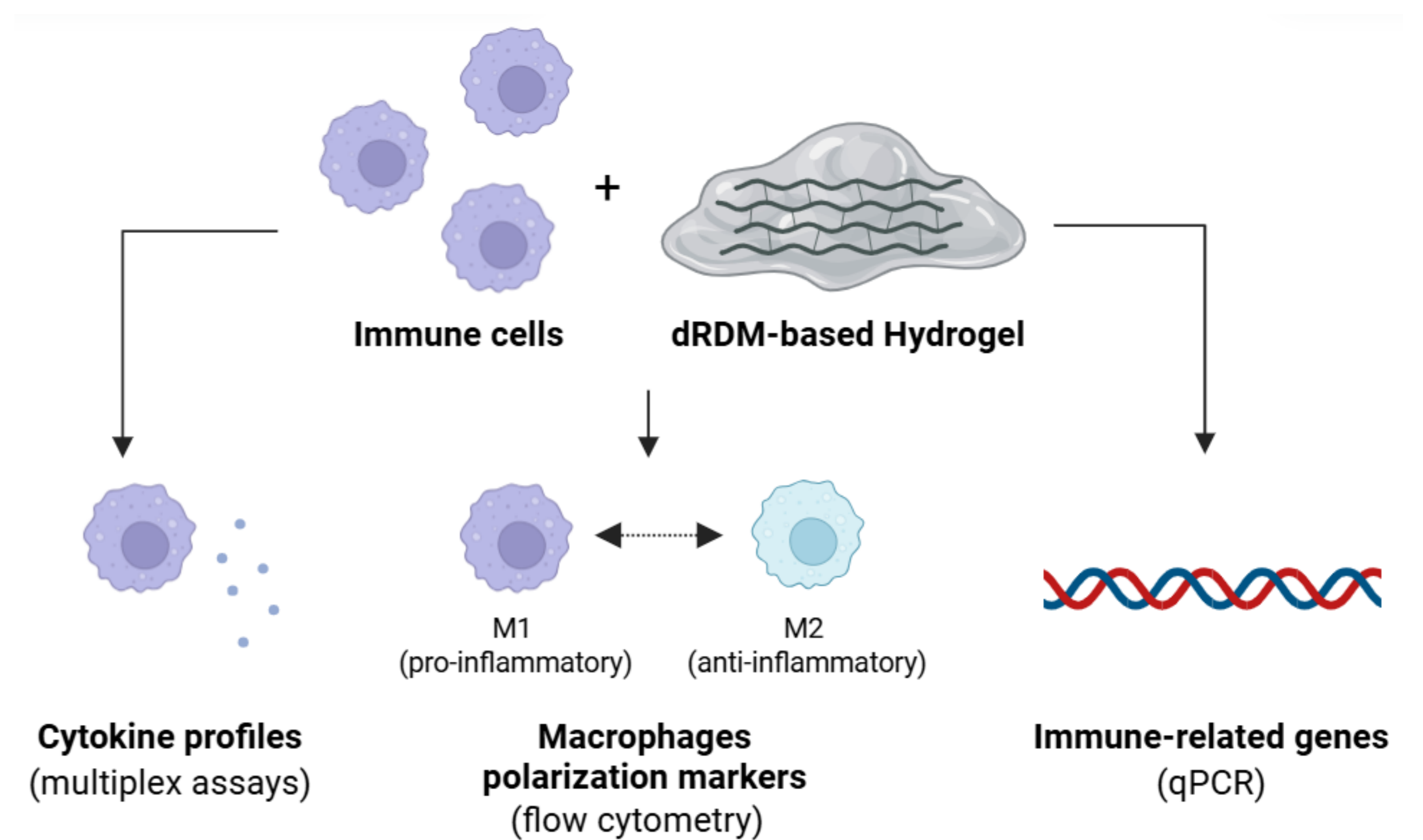
3 Applications/Solution

dRDMs-based hydrogels as immunomodulatory agents for....

2 Characterization of dRDMs - based hydrogels



3 Immunomodulatory analysis of dRDMs - based hydrogels



Conclusions

This project focuses on combining the innate immunomodulatory characteristics of dDMs with the adjustable physical properties of hydrogels. We hypothesize that the developed hydrogel matrices derived from dRDM will modulate immune response, potentially enabling....

The proposed research is ambitious, and it is expected to generate relevant knowledge related to the behaviour of dRDMs-based hydrogels as immunomodulatory agentes for.....

Acknowledgements

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References

- [1] M. Rosadas, I. V. Silva, J. B. Costa, V. P. Ribeiro and A. L. Oliveira, "Decellularized dermal matrices: unleashing the potential in tissue engineering and regenerative medicine," *Frontiers - Biomaterials and Bio-Inspired Materials*, vol. 10, 2024.
- [2] Y. Yu, W. Zhang, X. Liu, H. Wang, J. Shen, H. Xiao, J. Mei, Y. Chai, and G. Wen, "Extracellular matrix scaffold-immune microenvironment modulates tissue regeneration," *Composites Part B: Engineering*, vol. 230, 2022.
- [3] L. DeContanza, G. M. Grogan, A. C. Bruce, C. M. Peachey, E. A. Clark, K. Atkins, T. Tylek, M. D. Solga, K. L. Spiller, et al., "Decellularized porcine dermal hydrogel enhances implant-based wound healing in the setting of irradiation," *Acta Biomaterialia*, vol. 191, pp.260-275, 2025.