

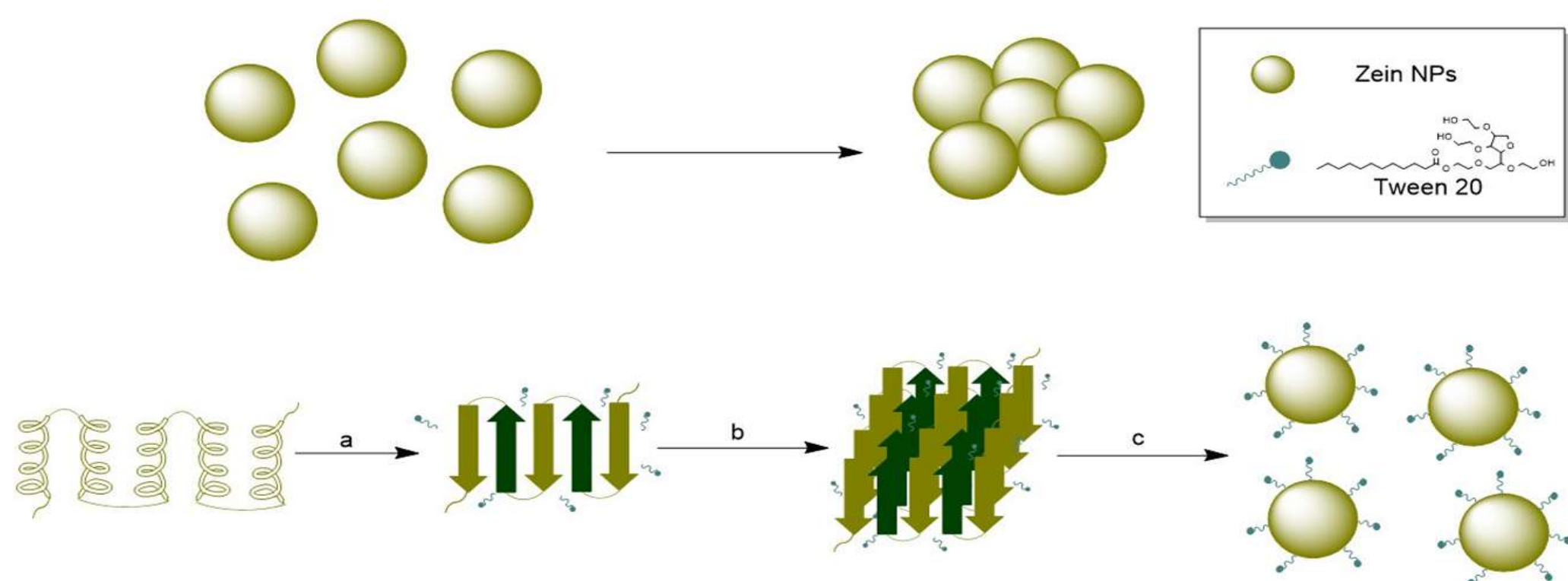
Assessment of Zein Nanoparticles as Carriers of SARS-CoV-2 Antigens.

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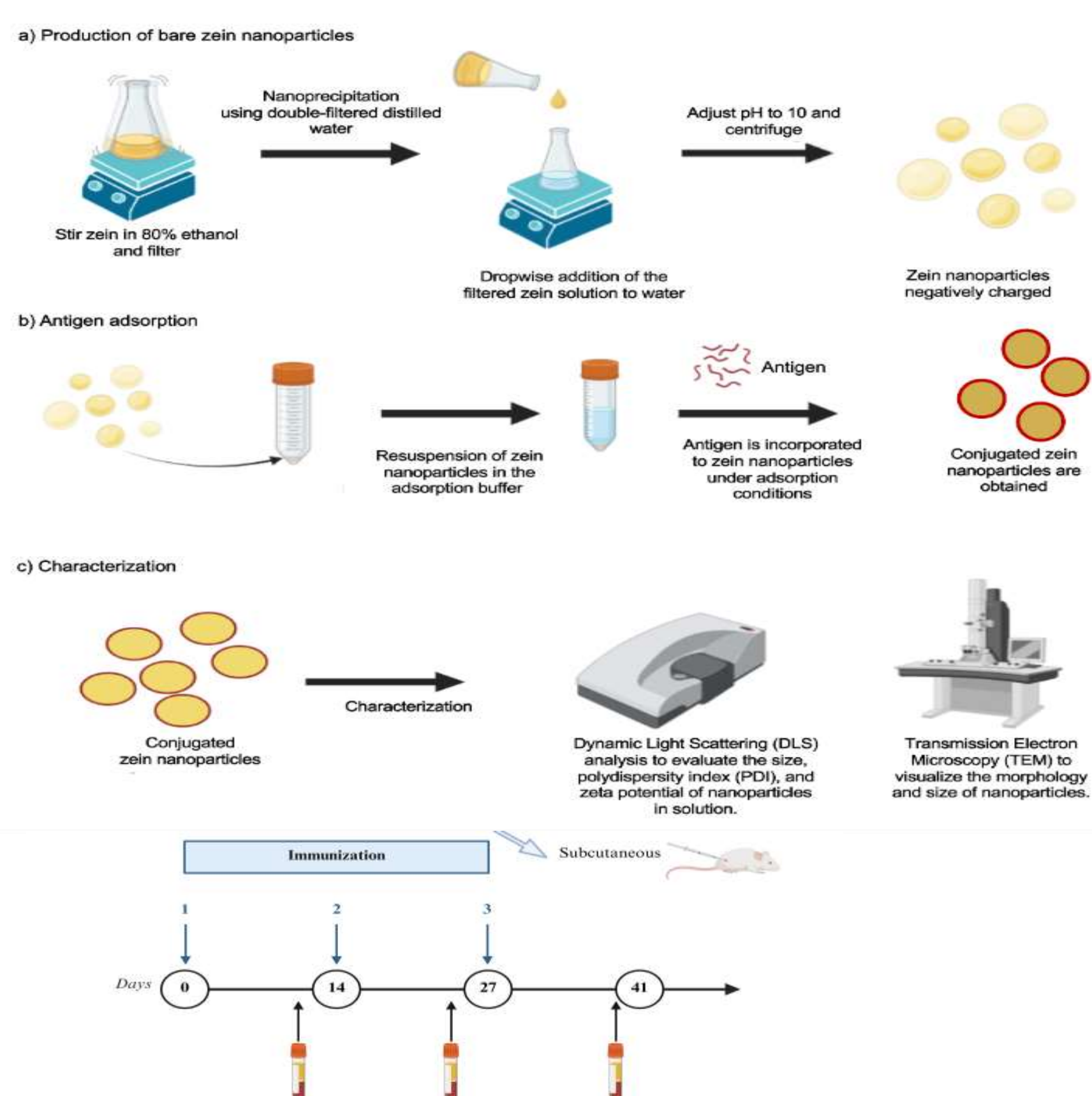
INTRODUCTION & AIM

Nanoparticles offer a versatile antigen delivery vehicle for vaccines, enhancing immune responses and promoting robust immunity. Zein is a promising material for organic nanoparticle synthesis due to its unique attributes such as biodegradability, biocompatibility, and safety thanks to its natural origin. In this study, the potential of zein nanoparticles (ZNPs) used as nanocarriers was evaluated for an antigenic peptide (p30) and the receptor binding domain (RBD) from SARS-CoV-2 spike protein.



METHOD

ZNPs were synthesized by nanoprecipitation and characterized by DLS and TEM. A cytotoxicity assay in the Vero cell line was performed prior to the in vivo test. The immunogenicity of ZNP conjugates was evaluated in BALB/c mice using an immunization scheme comprising three subcutaneous doses. Two different doses of ZNP-p30 conjugates were evaluated: a low dose (5 µg) and a high dose (10 µg). With regard to the ZNP-RBD conjugates, only a 1 µg dose was tested.

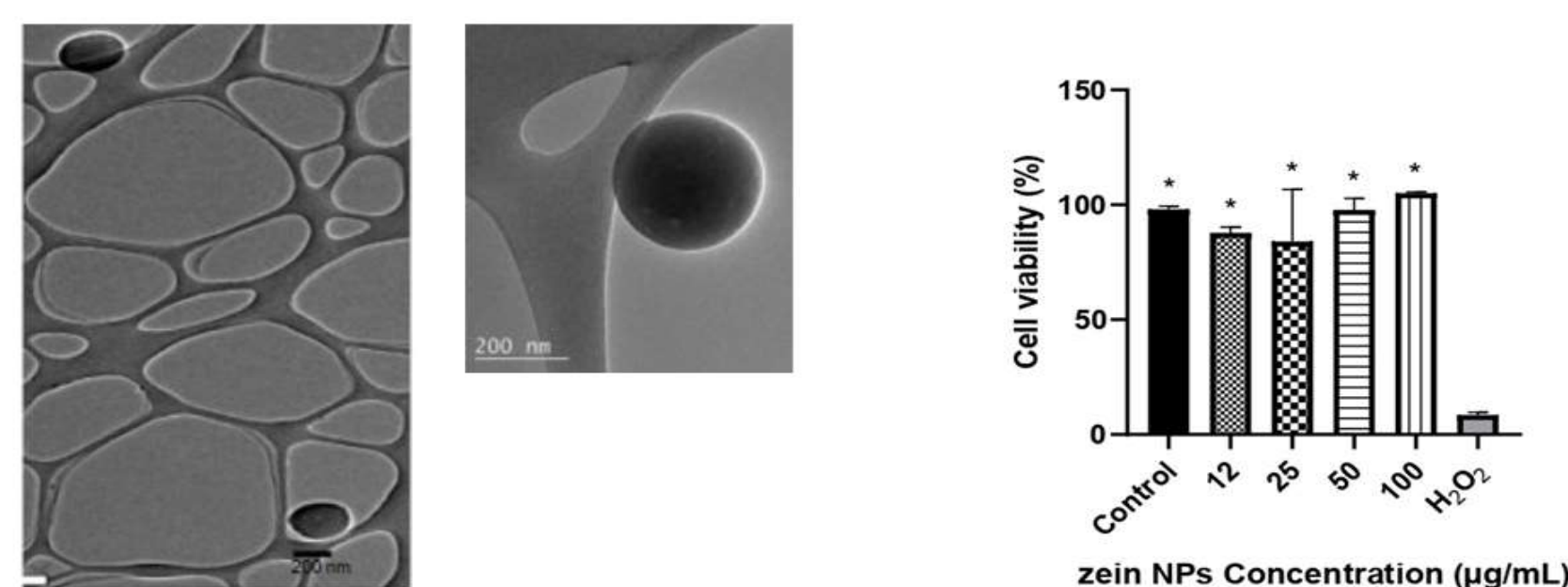


RESULTS & DISCUSSION

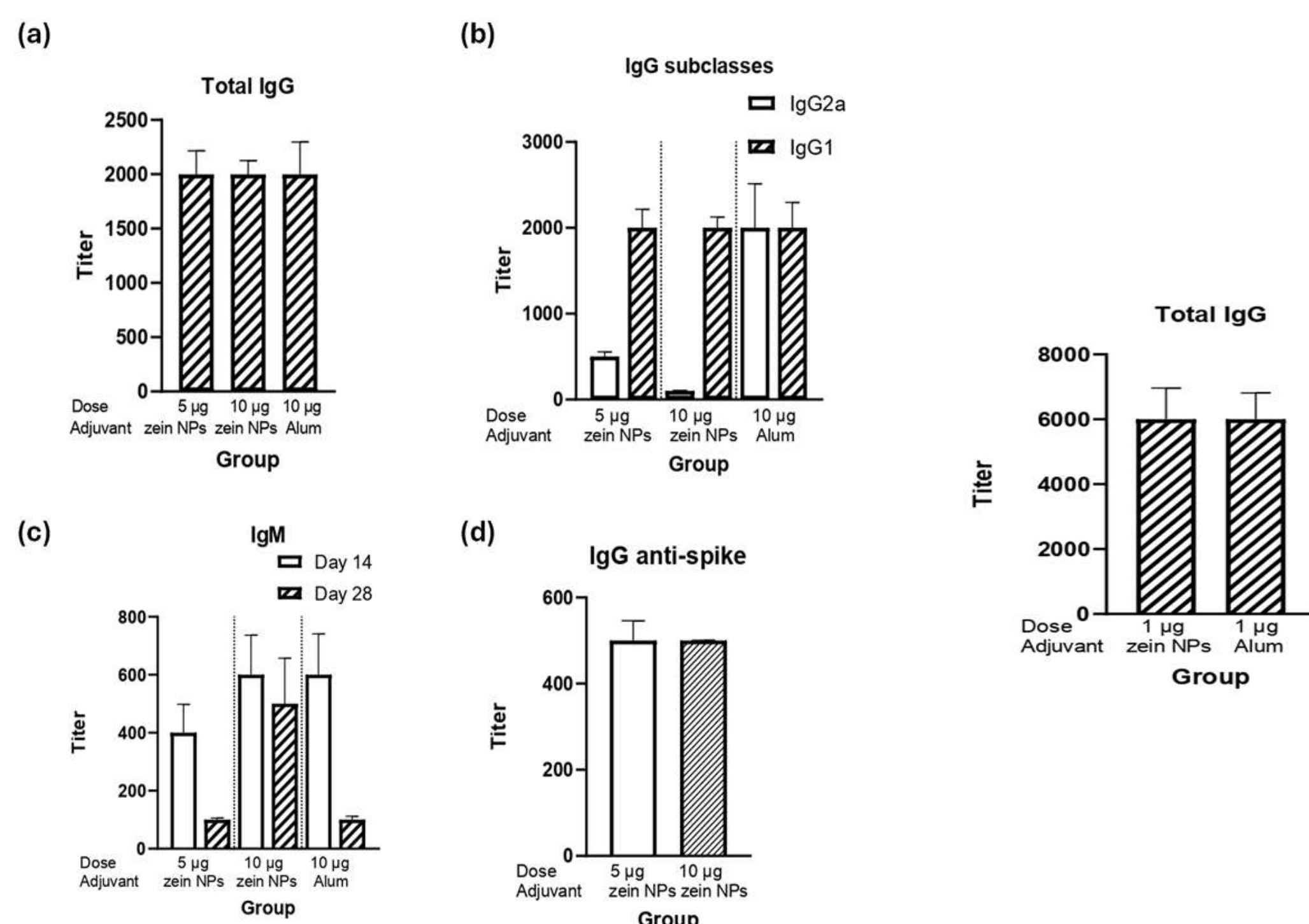
Table 1. Characterization of ZNP-p30 by DLS.

Formulation	Size (nm)	PDI	Zeta potential (mV)
ZNP	220 ± 10	0.13 ± 0.15	-8.9 ± 0.89
ZNP-p30	318.6 ± 18.6	0.25 ± 0.14	-16.72 ± 2.75
ZNP-RBD	471 ± 9.9	0.323 ± 0.23	-28.4 ± 8.34

TEM characterization -----Cell viability



Humoral Response



CONCLUSION

In conclusion, ZNPs are promising carriers for subcutaneous immunization with the SARS-CoV-2 antigens used, eliciting an immune response comparable to that produced by the commercial adjuvant.

FUTURE WORK / REFERENCES

Márquez-Escobar, V.A.; Alonso-Cerda, M.J.; Rosales-Mendoza, S.; Betancourt-Mendiola, M.L. Evaluation of Zein Nanoparticles as Delivery Agents of SARS-CoV-2 Antigens. *Vaccines* 2025, 13, 139. <https://doi.org/10.3390/vaccines13020139>.
 Lozano, D.; Larraga, V.; Vallet-Regí, M.; Manzano, M. An Overview of the Use of Nanoparticles in Vaccine Development. *Nanomater* 2023, 13, 1828.
 Meewan, J.; Somani, S.; Almowalad, J.; Laskar, P.; Mullin, M.; MacKenzie, G.; Khadke, S.; Perrie, Y.; Dufès, C. Preparation of Zein-Based Nanoparticles: Nanoprecipitation Versus Microfluidic-Assisted Manufacture, Effects of PEGylation on Nanoparticle Characteristics and Cellular Uptake by Melanoma Cells. *Int. J. Nanomed.* 2022, 17, 2809–2822.