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Development of innovative therapeutic strategies for osteoarthritis: exploring thermosensitive hydrogels, hiPSC-derived cells and cell-products, and novel drugs in preclinical models

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Curriculum vitae

Sana Sayedipour was born on September 22, 1987, in Iran. She completed her pre-university education in 2006 at Shahed High School in Isfahan, Iran, obtaining a diploma in Natural Sciences (equivalent to a Dutch HAVO diploma). She earned her Bachelor of Science in Cellular and Molecular Biology from University in Tehran in 2010. She subsequently obtained her Master of Science in Microbial Biotechnology from the University of Isfahan in 2012, where her research focused on the antiviral activity of green-synthesized silver and gold nanoparticles derived from medicinal plants, and where she developed expertise in microbial and cell culture techniques. From October 2013 to March 2015, Sana completed a full-time academic internship at the Medical Microbiology Department of Alzahra Hospital in Isfahan. There, she was responsible for performing a wide range of microbial and fungal diagnostic tests on patient samples to detect infectious diseases. This experience laid the foundation for her deep engagement with clinical microbiology and translational research.

From 2015 to 2018, she worked as a researcher at the Medical Biology Research Center in Kermanshah, Iran. Her work involved directing multidisciplinary projects in regenerative medicine and bioengineering, including the development of wound-healing scaffolds and nano-liposomal drug delivery systems. These projects highlighted her initiative and ability to integrate chemical, biological, and engineering approaches.

In October 2018, she relocated to the Netherlands to work as a researcher at the Department of Biomechanical Engineering at the University of Twente. There, she contributed to developing cell-seeded vascular grafts for vascularized bone tissue, fabricating microfluidic systems for tissue engineering, and scaling up biomaterials production. Her work involved extensive cell culture, bioreactor fabrication, and quality monitoring.

In April 2020, Sana started her PhD at the Department of Radiology of Leiden University Medical Center (LUMC) working on the EU Horizon 2020 projects PAVE and AutoCRAT. Within the PAVE project, she focused on the design and synthesis of polymeric nanoparticles for the encapsulation and targeted delivery of antigenic peptides and immune adjuvants for pancreatic cancer immunotherapy. She conducted comprehensive physicochemical characterization of the nano-formulations and evaluated their immunological efficacy through *in vitro* dendritic cell activation assays and *in vivo* studies using murine tumor models. In parallel, within the AutoCRAT project, she developed thermosensitive injectable biomaterials for the delivery of stem cells and extracellular vesicles in osteoarthritis models. She designed and executed preclinical studies to assess therapeutic efficacy, tissue regeneration, and *in vivo* imaging of transplanted cells. In June 2023, she transitioned to the Department of Molecular Epidemiology, Osteoarthritis (OA) group, under the supervision of Prof. Dr. Ingrid Meulenbelt, to finalize her research within the AutoCRAT framework. Her doctoral research centers on the development of advanced injectable biomaterials for stem cell-based therapies in osteoarthritis, combining *in vivo* and *ex vivo* preclinical models to facilitate clinical translation.

List of publications

Included in this dissertation

- 1- **Sayedipour, S. Sana**, Jelle Nikkels, Tobias Tertel, Helena ED Suchiman, Marijke Koedam, Matilde Balbi, Georgina Shaw et al. "Therapeutic efficacy of extracellular vesicles from hiPSC-derived MSCs in serum-containing and xeno-free media for osteoarthritis treatment." *Stem Cell Research & Therapy* 17, no. 1 (2026): 72.
- 2- **S.Sana Sayedipour**, Timo Schomann, Sanne M. van de Looij , Somayeh Rezaie, Yolande F.M. Ramos, Tina Vermonden, Louise van der Weerd, Ingrid Meulenbelt, and Luis J. Cruz. Poloxamer-based Thermosensitive Injectable Hydrogels containing a Self-assembling Peptide for In situ Gelation. *Computational and Structural Biotechnology Journal*. 2025;29:248–57.
- 3- **S. Sana Sayedipour**, Giorgia Mazzini, Margo Tuerlings, Jelle Nikkels, Marijke Koedam, Luis J. Cruz, Rachid Mahdad, Louise de Weerd, Bram van der Eerden, Yolande FM Ramos, and Ingrid Meulenbelt. Evaluating therapeutic efficacy of Iopanoic acid in a DMM-induced osteoarthritis mouse model and osteochondral lesioned human explants. Revision state on Osteoarthritis and Cartilage journal.
- 4- Yolande FM Ramos, **S. Sana Sayedipour**, Georgina Shaw, Margo Tuerlings, Timo Schomann, Eka Suchiman, Rachid Mahdad, Hailiang Mei, Davy Cats, Luis J. Cruz, Mary Murphy, Ingrid Meulenbelt. Spatial transcriptomics of human articular cartilage shows improvement of lipidomic footprint upon stem cell treatment. Ready for submission.

Other publications

- 5- Daniele P. Ferrari , Ozmen Cobanoglu, **Sana Sayedipour**, Omar Luna , Sonia A. M. Ferkel, David Agorku, Yomkippur Perez , Luis J. Cruz, Fernando Albericio , Francois Trottein , Frauke Alves, Marietta Andrea Markus, and Fernanda Ramos-Gomes. Anti-Tumor Efficacy of a Mesothelin-Based Nanovaccine in a KPC Orthotopic Mouse Model of Pancreatic Cancer. *Vaccines*, 13(3), p.314.
- 6- Luna, Omar F., Yomkippur V. Perez, Daniele P. Ferrari, **Sana S. Sayedipour**, Miriam Royo, Gerardo A. Acosta, Luis J. Cruz et al. "Impact of N-Terminal PEGylation on Synthesis and Purification of Peptide-Based Cancer Epitopes for Pancreatic Ductal Adenocarcinoma (PDAC)." *ACS omega* 9, no. 32 (2024): 34544-34554.
- 7- Ferreira, N., Agorku, D., Rosa, A., Roosz, J., Christ, L., Anderle, N., Kulkarni, A., Hussein, A., **Sayedipour, S.S.**, Luna, O.F. and Legler, T., 2025. Advanced Human Immune Cell-Organoid Co-Cultures for Functional Testing of Cancer Nanovaccines. *Advanced Science*, p.e15199.
- 8- Gavanji, Shahin, **S Sana Sayedipour**, Behrouz Larki, and Azizollah Bakhtari. "Antiviral activity of some plant oils against herpes simplex virus type 1 in Vero cell culture." *Journal of Acute Medicine* 5, no. 3 (2015): 62-68.
- 9- Gavanji, S., **Sayedipour, S. S.**, Doostmohammadi, M., & Larki, B. (2014). The effect of different concentrations of silver nanoparticles on enzyme activity and liver tissue of adult male wistar rats in-vivo condition. *International Journal of Scientific Research in Knowledge*, 2(4), 182.
- 10- Behbahani, M., **S. Sayedipour**, A. Pourazar, and M. Shanehsazadeh. "In vitro anti-HIV-1 activities of kaempferol and kaempferol-7-O-glucoside isolated from *Securigera securidaca*." *Research in pharmaceutical sciences* 9, no. 6 (2014): 463-469.

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به خانواده‌ی عزیزم در ایران، پدر و مادرم و دو برادرم، علی و ایمان
 از شما برای عشق بی‌پایان و فداکاری بی‌انتان سپاسگزارم.
 ممنونم که در نبود من از پدر و مادرم مراقبت کردید و با وجود فاصله، با دگرمی با و حمایتان مرا به جلو راندید.
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