

BIOGRAPHICAL SKETCH

Sasha Mendjan

Principal Investigator
Institute of Molecular Biotechnology (IMBA)
Dr. Bohr-Gasse 3, 1030 Vienna, Austria

Personal Data

Date of Birth: 1st June 1978
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Research topics

- Human cardiogenesis across biological scales
- Congenital heart disease & human fetal regeneration
- Stem cell-derived self-organization in cardioids

Research achievements in numbers

- 2841 citations (Google scholar), h-index: 17
- 22 publications in *Cell*, *Nature*, *Molecular Cell*, *Cell Stem Cell*, *Genes & Development*, *Nature Cell Biology*, *Science Advances*, *Stem Cell Reports and Development*
- 2 pending patents on cardioid generation
- > 40 invited talks at national and international conferences or institutions
- 6 research grants as PI (total budget > 3 million €).

Education

2002-2006: Ph.D. **EMBL** & University of **Heidelberg**, Germany; Asifa Akhtar lab
2001-2002: Diploma thesis in Biochemistry, **LMU, Munich**, Germany; Rudolf Grosschedl lab
1997-2002: Diploma studies in Biology, **LMU, Munich**, Germany

Professional career

Mar. 2024- **IMBA Group leader & Ass. Professor**, Medical University of Vienna (**MUV**)
Oct. 2015- **Junior group leader**, Institute of Molecular Biotechnology (**IMBA**), Austria
2013-2015: Senior postdoc, **Vallier lab, Cambridge Stem Cell Institute**, UK
2007-2013: Postdoc, **Pedersen lab, LRM, University of Cambridge**, UK

Personal statement

Missing human cardiac models allowing the development of therapies and predicting responses in patients is the most significant bottleneck toward much-needed treatments in cardiovascular disease. My mission is to address this key problem, causing more deaths than any other disease globally. The Mendjan team aims to recapitulate human heart development *in vitro* to discover the underlying molecular mechanisms of fetal heart growth, vascularization, congenital malformations, and regeneration. Our guiding principle is that mechanisms of heart development and disease in adults are intimately linked. Hence, to serve as predictive disease models, we are developing pluripotent stem cell-derived self-organizing heart organoids called "cardioids" ([Hofbauer et al., 2021](#); [Schmidt, Deyett, et al., 2023](#)).

We systematically apply principles of *in vivo* development, translate them *in vitro*, and dissect organogenesis from the tissue scale down to the cellular, molecular, and ultra-structural levels. Our lab benefits from my Ph.D. and postdoc experiences across biological scales, illuminating fundamental mechanisms of transcriptional regulation in Asifa Akhtar's lab at the EMBL in Heidelberg ([Mendjan et al., 2006](#)) and signaling control of the transcription factor, epigenetic, and mRNA machinery directing cell specification ([Mendjan et al., 2014](#); [Bertero et al., 2015](#); [2018](#)) in Roger Pedersen's and Ludovic Vallier's labs at Cambridge University. We combine organoid model development ([Hofbauer et al., 2021](#); [Haider et al., 2018](#); [2019](#)) with molecular analysis, (single-cell) proteomics ([Ctortecka et al., 2022a](#); [Ctortecka et al., 2022b](#)), genomics, electrophysiological, and EM ultra-structural methods to elucidate the mechanisms of cardiogenesis, growth, and regeneration *in vitro*.

By doing science, we learn how to efficiently teach, work in a team, communicate, and apply the scientific method to the highest standard. As a lab head and teacher, I am committed to my students through dedicated supervision, mentoring, and an organizational framework that promotes asking critical questions, diverse perspectives, and having fun while learning, making discoveries, and benefiting patients & society.

Team size & structure

- 1 part-time lab manager, 1 staff scientist, 5 Ph.D. students, 1 technician, 2 master's students

Selected publications (links to all publications: [Scholar](#), [Pubmed](#))

[Multi-chamber cardioids unravel human heart development and cardiac defects.](#) Clara Schmidt, Alison Deyett, Tobias Ilmer, Simon Haendeler, Aranxa Torres Caballero, Maria Novatchkova, Michael A Netzer, Lavinia Ceci Ginistrelli, Estela Mancheno Juncosa, Tanishta Bhattacharya, Amra Mujadzic, Lokesh Pimpale, Stefan M Jahnel, Martina Cirigliano, Daniel Reumann, Katherina Tavernini, Nora Papai, Steffen Hering, Pablo Hofbauer, **Sasha Mendjan**. *Cell*. 2023 Dec 7;186(25):5587-5605.e27. doi: 10.1016/j.cell.2023.10.030. PMID: 38029745

[Cardioids reveal self-organizing principles of human cardiogenesis.](#) Pablo Hofbauer, Stefan Jahnel, Nora Papai, Magdalena Giesshammer, Mirjam Penc, Katherina Tavernini, Nastasja Grdseloff, Christy Meledeth, Alison Deyett, Clara Schmidt, Claudia Ctordecka, Šejla Šalic, Maria Novatchkova, **Sasha Mendjan**. *Cell*. 2021 Jun 10;184(12):3299-3317.e22. doi: 10.1016/j.cell.2021.04.034. PMID: 34019794.

[In vitro models of the human heart.](#) Hofbauer P, Jahnel SM, **Mendjan S**. *Development*. 2021 Aug 15;148(16):dev199672. doi: 10.1242/dev.199672. PMID: 34423833. *Review*.

[Quantitative Accuracy and Precision in Multiplexed Single-Cell Proteomics.](#) Ctordecka C, Stejskal K, Krššáková G, **Mendjan S**, Mechtler K. *Anal Chem*. 2022 Feb 8;94(5):2434-2443. doi: 10.1021/acs.analchem.1c04174. PMID: 34967612

[NANOG and CDX2 pattern distinct subtypes of human mesoderm during exit from pluripotency.](#) **Mendjan S***, Mascetti VL, Ortmann D, Ortiz M, Karjosukarso DW, Ng Y, Moreau T, Pedersen RA*. *Cell Stem Cell*. 2014 Sep 4;15(3):310-25. doi: 10.1016/j.stem.2014.06.006. Epub 2014 Jul 18. PMID: 25042702. (* Co-corresponding)

[The SMAD2/3 interactome reveals that TGFβ controls m6A mRNA methylation in pluripotency.](#) Alessandro Bertero, Stephanie Brown, Pedro Madrigal, Nina C. Hubner, Anna Osnato, Daniel Ortmann, Edward Farnell, Jernej Ule, Hendrick G. Stunnenberg, **Sasha Mendjan**, and Ludovic Vallier. *Nature*. 2018 Mar 8;555(7695):256-259. doi: 10.1038/nature25784. PMID: 29489750.

[Activin/nodal signaling and NANOG orchestrate human embryonic stem cell fate decisions by controlling the H3K4me3 chromatin mark.](#) Bertero A, Madrigal P, Galli A, Hubner NC, Moreno I, Burks D, Brown S, Pedersen RA, Gaffney D, **Mendjan S***, Pauklin S*, Vallier L*. *Genes Dev*. 2015 Apr 1;29(7):702-17. doi: 10.1101/gad.255984.114. PMID: 25805847. (* Co-senior)

[Activin/Nodal signalling maintains pluripotency by controlling Nanog expression.](#) Vallier L, **Mendjan S**, Brown S, Chng Z, Teo A, Smithers LE, Trotter MW, Cho CH, Martinez A, Rugg-Gunn P, Brons G, Pedersen RA. *Development*. 2009 Apr;136(8):1339-49. doi: 10.1242/dev.033951. PMID: 19279133.

[Self-Renewing Trophoblast Organoids Recapitulate the Developmental Program of the Early Human Placenta.](#) Haider S, Meinhardt G, Saleh L, Kunihs V, Gamperl M, Kaindl U, Ellinger A, Burkard TR, Fiala C, Pollheimer J, **Mendjan S**, Latos PA, Knöfler M. *Stem Cell Reports*. 2018 Aug 14;11(2):537-551. doi: 10.1016/j.stemcr.2018.07.004. PMID: 30078556.

[Nuclear pore components are involved in the transcriptional regulation of dosage compensation in Drosophila.](#) **Mendjan S**, Taipale M, Kind J, Holz H, Gebhardt P, Schelder M, Vermeulen M, Buscaino A, Duncan K, Mueller J, Wilm M, Stunnenberg HG, Saumweber H, Akhtar A. *Mol Cell*. 2006 Mar 17;21(6):811-23. PMID: 16543150.

[Synthetic organs for regenerative medicine.](#) Pedersen RA, Mascetti V, **Mendjan S**. *Cell Stem Cell*. 2012 Jun 14;10(6):646-647. doi: 10.1016/j.stem.2012.04.003. PMID: 22704499.

Manuscripts to be submitted

[Modeling human posterior lateral plate mesoderm to decipher congenital defects.](#) Marie Leitner, Anna Bandura, Stefan Jahnel, Martina Cirigliano, Michael Mueller, Paulina Latos*, Sasha Mendjan*. Submission in spring 2024.

[Hyaluronan controls cardioid formation and functionality.](#) Stefan Jahnel, Julia Kodnar, Keisuke Ishihara, Sasha Mendjan. Submission in summer 2024.

[Efficient generation of self-organizing cardioids.](#) Stefan Jahnel, Nora Papai, Pablo Hofbauer, Clara Schmidt, Alison Deyett, Marie Leitner, **Sasha Mendjan**. Methods paper. Submission in summer 2024.

Patents

2020 – pending patent on the cardioid platform technology; 2022 – pending patent on multi-chamber cardioids

Fellowships and grants

2023 **FWF Stand-alone** grant 399.000€; **Era4Health** Consortium grant, 380.000€
2021 **Additional Ventures** Single Ventricle Fund collaborative grant, 330.000€ out of 660.000€
2021 **VBA** Life Science collaborative grant, 131.109€ out of 500.000€
2019 **FWF DOC** funds fellowship, stem cell & development Ph.D. program, 183.202€

2018	FFG NEAT consortium grant, 282.869€ out of 1.900.000€
2016	OEAW Infrastructure grant for the Stem Cell Core Facility , 800.000€
2009	EMBO Long-Term Postdoctoral Fellowship
2002	EMBL Ph.D. Fellowship

Teaching

- Co-initiator and co-organizer (with Prof. Florian Raible) of the **Stem Cell Biology Seminar** at the University of Vienna since 2016, 2 ECTS per semester (course IDs: 300277, 300097, 301277, 301278, 301275, 301276, 301277, 301278, 301275, 301276, for master programs: MMEI III, MGE III-1, MGE III-2, MMB III-2, MMB IV-2, MMB W-2, M-WZB). Highly positive student evaluation (ID: 19W-30-301277-01).
 - Co-initiator and co-organizer of the **Stem Cell Journal Club** at IMBA/IMP since 2016.
 - **Lectures** in the series “Model systems and concepts in stem cell biology and regeneration”, 2 ECTS (lecture ID: 301902), since 2018, University of Vienna.
 - **Undergraduate student supervisor** of small groups for subjects: Biology of Cells, Biochemistry, Molecular and Developmental Biology, Homerton and Hughes Hall Colleges, 2010-2015, University of Cambridge.
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Supervision and mentoring

- **3 graduated Ph.D. students**: Nora Papai (2021, team leader at Bit.bio), Pablo Hofbauer (2021, head of research at HeartBeat.bio), Claudia Ctordecka (2022, postdoc at the Broad Institute/MIT); they produced **four first-author papers, at least one each**; Pablo won the prestigious **VBC best Ph.D. thesis award** in 2021;
 - Former and current students presented at multiple international meetings and won poster awards
 - Currently supervising **four Ph.D. students**, member of **six Ph.D. thesis committees** (Knoblich, Tanaka, Technau, Cochella, Pauli, Djinic groups); supervised 14 master theses;
 - As a postdoc, **co-supervised three Ph.D. students** (Alessandro Bertero, Bowen Sun, Daniel Ortmann), who produced **seven first-author papers**
 - Extensive **VBC Leadership Program 2023**, strengthening mentorship and leadership skills
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Selected talks and scholarly activities

- Talk invitations: **2024**: Human Development Symposium, Surrey/UK; *Cell* Symposium, San Diego/USA; New Cardiobiology, Heidelberg/GER; Cardioascona, Switzerland; **2023**: Mending Broken Hearts, University of Oxford/UK; ISSCR Principles of Development, Vienna/AUT; EMBL Organoid Conference Heidelberg/GER; ISSCR Virtual – Next Generation Organoids; Hubrecht Institute (Netherlands); RIKEN Symposium, Kobe/Japan; **2022** - CNIC Heart Regeneration Symposium in Madrid 2022, French Society of Cardiology, Tours: International Society for Stem Cell Research (ISSCR) - Annual Conference (plenary talk); The Broad Institute/MIT; China Heart Congress; Gwangju-Boston Symposium 2021/22; Oxford Global 2021/22; **2021** - University of Munich/Helmholtz; SYStem Conference Vienna; Radboud University; University of Montreal;
 - Initiator and co-organizer of the first [International Stem Cell Symposium SYStem](#), Vienna, 2018 and 2020, 2022
 - Initiator and co-organizer of the first [Regional Meeting on Development and Stem Cells](#), 2018 and 2019
 - Peer review: *Nature*, *Cell Stem Cell*, *Nature Methods*, *Nature Cell Bio*, *Cell Reports*, *Development*, *Nature Comm.*, *Science Advances*, *Plos Biology*
 - Funding review: ERC (Starting/Consolidator grants), ANR (France), AV-SVF (USA), BI Fellowships (Germany)
 - Institutional review: Infrastructure & research review of the MDC, Berlin/GER
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Institutional responsibilities

- **SAB member** of the IMP/IMBA/GMI Core Facilities since 2023
 - **Communication** with media, political & business representatives, donors, patient organizations
 - IMBA Core Stem Cell Facility **Steering Committee** (since 2016), Proteomics Facility representative, 2018-21
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Most relevant collaborators

- Kate McDole (LMB, Cambridge), Prisca Liberali (FMI, Basel), Eldad Tzahor (Weizmann, Israel)
- Paulina Latos and Wolfgang Weninger (Anatomy and Cell Biology, Medical University Vienna), Martin Andreas (Cardiac Surgery, Medical University Vienna), Steffen Hering (Pharmacology, University of Vienna).
- Karl Mechtler (IMP/IMBA), Elly Tanaka (IMP), Stefan Ameres (IMBA/University of Vienna), Josef Penninger (IMBA), Ludovic Vallier (University of Cambridge, UK), Alessandro Bertero (University of Turin, Italy)

Startup Company

- Co-founder of [HeartBeat.bio](#), an IMBA spin-off developing a cardioid drug discovery platform; supervisory & scientific board member. Raised 10 mil € in grants and private funding.