MUZAMIL MAJID KHAN, *PhD*
Cell–Matrix Biology | Advanced Imaging | Translational Fibrosis Research
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RESEARCH VISION SUMMARY

I am a cell and matrix biologist integrating **advanced quantitative imaging** with human 3D tissue models to uncover how ECM structure, mechanics, and signalling drive fibrotic disease progression. My work combines multi-photon microscopy, high-content phenotyping, Brillouin microscopy and translational lung biology to establish human-relevant platforms for antifibrotic drug discovery. I am to bridge ECM mechanotransduction, imaging-based ECM dynamics analysis, and engineered ECM systems to define actionable pathways in fibrosis and develop **personalized ECM-based therapeutics.**

KEY SCIENTIFIC ACHIEVEMENTS

• Integrated ECM biology with advanced imaging, establishing Brillouin and multi-photon label-free microscopy to quantify ECM–cell mechanotransduction in human lung fibrosis.

• Developed a personalised synthetic ECM platform (CEM-ECM) and co-PIed a **250k€ translational biomaterials grant**; lead inventor on a **European patent for cell-free ECM production**.

• Corresponding author, Science Translational Medicine (2024): Discovered the anti-fibrotic mechanism of dextromethorphan and served as **scientific lead investigator for the Phase IIb clinical trial design in pulmonary fibrosis patients**.

• Lead Co-PI for the EMBL–GSK translational collaboration, **securing funding for two postdocs** and driving 3D human lung models and high-content screening pipelines for COPD and ILD drug discovery.

• Established advanced human 3D lung tissue systems, including longitudinal, live and label-free imaging workflows enabling mechanistic and therapeutic analysis of fibrotic pathways.

• Made foundational discoveries on receptor turnover at the NMJ (PNAS 2016; Autophagy 2014) and co-organiser of the German Matrix Biology Conference 2026.

CURRENT POSITION

DZL Principal Investigator & Staff Scientist – EMBL, Heidelberg, Germany (2022–Present)

EDUCATION

PhD, Neuromuscular Physiology & Microscopy – University of Heidelberg (2011–2014)
MSc Biotechnology – Lovely Professional University (2007–2009)

INDEPENDENT RESEARCH PROGRAM

1. ECM Mechanotransduction & Fibrotic Signalling
2. Advanced Imaging for Human Tissue ECM Biology
3. Translational Human Tissue Models for Anti-fibrotic Drug Discovery
4. Engineered ECM Biomaterials for Regenerative Medicine

FUNDING (PI / Co-PI)

- **Co-PI** – Commercial development of cell-free assembled ECM | **250,000 €**

- **Co-PI** – Mechanical signalling in human lung explants (GSK Academic Fund, 2024–26) | **172,000 €**
- **Co-PI** – Human PCLS platforms for COPD/ILD screening (GSK Academic Fund, 2024–26) | **344,400 €**
- **PI** – DZL Clinical Trial Application Fund (2024) | **30,000 €**

LEADERSHIP, MENTORING & TEACHING

- Supervising a team of postdoctoral fellows and trainees across EMBL and DZL.
- Instructor for EMBL & EMBO courses in advanced microscopy, cell biology, and 3D organotypic culture systems.
- Over 8 years of teaching experience across graduate and postdoctoral programmes.
- Organiser & Chair: **German Matrix Biology Conference 2026**.
- Regular mentor for master's, PhD, and postdoctoral researchers in microscopy, ECM biology, and translational lung research.

SELECTED KEY PUBLICATIONS (*Full publication list in Appendix*)

1. **Khan MM***, Zukowska J., …, Pepperkok R*. *Dextromethorphan inhibits collagen transport...* Science Translational Medicine, 2024.
2. **Khan MM**, Poeckel D., …, Pepperkok R. *Integrated multiomic and microscopy-based analysis...* Eur. Respir. J. 2021.
3. Jung J*, **Khan MM***, …, Pepperkok R. *ECM–focal adhesion regulation of SEC23A.* J Cell Biol, 2022.
4. **Khan MM**, …, Rudolf R. *Sympathetic innervation controls NMJ homeostasis.* PNAS, 2016.
5. **Khan MM**, Strack S., …, Rudolf R. *Autophagy-mediated AChR turnover.* Autophagy, 2014.
6. Wild F*, **Khan MM***, Rudolf R. *CHRN recycling at NMJs.* Small GTPases, 2016.

INVITED TALKS & KEYNOTES (Selected)

- Keynote — MENA-ART, Sidra Institute Qatar (2025)
- Utrecht University Pharmacology (2025)
- Leibniz Lung Centre Borstel (2024)
- Plenary — DZL Annual Meeting (2023)
- Plenary — EMBL Lab Day (2023)
- University of Giessen, Institute of Lung Health (2022)
- McMaster University Research Rounds (2021)
- CHEO Research Institute WIPS Seminar (2021)

PEER REVIEW & EDITORIAL ACTIVITY

Reviewer for: European Resp. J, AJRCCM, Respirology, Nature Communications, Scientific Reports, CMAJ, Life Science Alliance, Cellular & Molecular Neurobiology.
Judge: EMBO courses & DZL Annual Meetings.