The Faculty of Medicine of Harvard University
Curriculum Vitae

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Place of Birth: Amsterdam, the Netherlands

Education:

09/1996	MA	Chemistry	University of Amsterdam, the Netherlands
02/2001	PhD	Chemistry (PIs: Henk Schenk, University of Amterdam and Victor Lamzin, EMBL Hamburg)	European Molecular Biology Laboratory (EMBL) Hamburg, Germany/University of Amsterdam, the Netherlands

Postdoctoral Training:

11/2000-06/2006	Postdoctoral fellow	Structural Biology/Neuro and Immunobiology (PI: Jia-huai Wang)	Dana Farber Cancer Institute, Boston, USA

Faculty Academic Appointments:

09/09-01/20	Group Leader	Hamburg Outstation	EMBL
08/21-present	Part-time Lecturer	Department of Biological Chemistry and Molecular Pharmacology, Blavatnik Institute	Harvard Medical School

Other Professional Positions:

06/06-09/09	Staff Scientist	Biology	Synchrotron Soleil, Saint Aubin, France
2016-2017	Consultant	Molecular Dimensions Ltd	
2019-2021	Head of Biological Discovery	Institute for Protein Innovation	
2021-present	Director	Institute for Protein Innovation	

Major Administrative Leadership Positions:

Local

2008	Course Director, EMBO Practical Course "X-ray crystal structure determination of macromolecules"	Synchrotron Soleil, Saint Aubin, France
2010-2018	Head of Facility, Sample preparation & characterization facility	EMBL Hamburg, Germany
2010	Course co-organizer, EMBO Practical Course "Protein expression, purification and crystallization",	EMBL Hamburg, Germany
2011, 2013	Course director EMBL Biophysics lecture course	EMBL and DESY campus, Hamburg Course Director
2012-2016	Course Director, EMBO Practical Course "Protein expression, purification and crystallization"	EMBL Hamburg, Germany
2014	Course co-organizer, EMBO Practical Course "Solution scattering from Biological Macromolecules"	EMBL Hamburg, Germany
2014	Course co-organizer, INSTRUCT sponsored course "Advanced Course on Hybrid Structural Biology Approaches"	EMBL Hamburg, Germany
2014	Co-organizer 40th Anniversary celebration of EMBL Hamburg	EMBL Hamburg, Germany
2018	Course co-organizer, EMBO Practical Course "Membrane protein expression, purification and crystallization"	EMBL Hamburg, Germany
2021	Member of Triumvirate Leadership	Institute for Protein Innovation
2022	Interim Executive Director	Institute for Protein Innovation

Regional

2014	Scientific Board member	15th International Conference on the Crystallization of Biological Macromolecules, Hamburg, Germany
2015	Organizer	Symposium "Native mass spectrometry: building a bridge between structural and systems biology" with the Centre for Structural Systems Biology (CSSB) and Heinrich Pette Institute (HPI).
2018-2019	Organizer	Lecture series on Molecular Neurobiology between EMBL Hamburg and the Center for Molecular Neurobiology of Hamburg (ZMNH).

International

2017	Co-organizer Axon-2017 conference	IST/Klosterneuburg, Austria
2018	Organizer	EMBO Workshop on Molecular Neuroscience, Crete, Greece
2020	Session Chair	Cold Spring Harbor Meeting on Molecular Mechanisms of Neuronal Connectivity

Committee Service:

Local

2010-2016	Graduate committee 2011-2016	EMBL Hamburg Main representative
2010 - 2018	Admission panel EMBL PhD program 2011 - 2016	EMBL Hamburg, EMBL Grenoble Chair
2010 - 2016	Admission panel EMBL EIPOD postdoctoral program	EMBL, all departments, member
2013, 2015, 2016	Hiring panel group leader	EMBL Hamburg, member search committee
2010-2017	Staff training Committees	EMBL Hamburg, member
2013-2019	Thesis Advisory committees (9 students) 2010-2019	EMBL Hamburg, Heidelberg & Grenoble Chair (5 students)
2010 - 2018	Hiring panel staff scientists 2010, 2015	EMBL Hamburg, Heidelberg Chair
2015 - 2018	Science and Society committee	EMBL, all departments, member
2015 - 2018	Proteomics user committee	EMBL, all departments, member
2015 - 2018	Courses and conferences committee	EMBL, all departments, member
2010-2018	EMBL@Petra3 synchrotron management committee	EMBL Hamburg, member

Regional

2012-2014	Partnership for Innovation, Education and Research (PIER) Executive Board 2012-2014	Partnership of Hamburg University and DESY(German synchrotron) Member

National

2013	Thesis Defense Committee Madhan Anandhakrishnan	Heidelberg University, Germany

International

2012	Thesis Defense Committee Andreas Boeggild	Aarhus University, Denmark
2016	Thesis Defense Committee Jan Felix	Ghent University, Belgium

2018	Thesis Defense Committee Diana Freire	Free University Amsterdam, The Netherlands
2020 - present	Scientific Advisory Board GeneCorner	VIB Ghent, Belgium

Professional Societies:

2017-2019	Society for Neuroscience	Member

Grant Review Activities:

2013	Research grant review	W.M. Keck Foundation, USA Ad-hoc reviewer
2013, 2015	Research grant review	Flemish Scientific Organization, Belgium Ad-hoc reviewer
2015	Research grant review Sachbeihilfe	DFG (German Science Foundation) Ad-hoc reviewer
2017	Research grant review OPUS funding scheme	National Science Centre, Poland Ad-hoc reviewer
2017	Research grant reviews for study section CE11 Biochemistry, biophysics, molecular and structural biology	National Agency for Research (ANR), France Ad-hoc reviewer
2018	ECHO research grant review	National Science Organization (NWO), the Netherlands Ad-hoc reviewer
2018	VEGA research grant review	Slovak Academy of Sciences, Slovakia Ad-hoc reviewer
2019	H2020-MSCA-IF-2019 Marie Skłodowska-Curie Individual Fellowships	European Commission Ad-hoc reviewer
2020	Joint NSFC-ISF Research Grant	Israel Science Foundation Ad-hoc reviewer

Editorial Activities:

- **Ad hoc Reviewer**

Nature, Nature Communications, Development, Neuron, Journal of Neuroscience, Journal of Cell Biology, European Molecular Biology Organization (EMBO) Journal, Biochemistry, Journal of Bacteriology, Scientific Reports, Biochimica et Biophysica Acta, Biotechnology & Bioengineering, Protein Expression & Purification, Biophysical Journal, FEBS letters, Biochemical Journal, Amino Acids, Acta Crystallographica D, PLOS One, Journal of Applied Crystallography

- **Other Editorial Roles**

2016	Section editor	Current Opinion in Structural Biology

Honors and Prizes:

1994	Erasmus fellowship	European Commission	Traineeship at Instituto de Tecnologia Química e Biológica (ITQB) in Oeiras, Portugal
1996-2000	PhD fellowship	EMBL	Predoctoral fellowship

Report of Funded and Unfunded Projects

Past

2010-2011 P-cube "Trans-national access to high-throughput crystallization platforms"
European Commission (FP7/2007-2013), I3 Research Infrastructure grant, P-cube (grant agreement N°227764)
Site PI and coordinator of final report for participating crystallization facilities (90,000 EUR)
Provide access to research groups within the European Research Area to high-throughput crystallization and characterization facilities for macromolecular samples

2011-2016 Biostruct-X joint research activity "A multi-method biophysical characterisation system for macromolecular samples"
European Commission (FP7/2007-2013), Integrated Infrastructure grant, BioStruct-X (grant agreement N°283570)
Co-investigator with Dmitri Svergun (200,000 EUR)
Installation of a size exclusion chromatography/light scattering system on the BioSAXS P12 EMBL synchrotron beamline

2011-2016 Biostruct-X "Trans-national access for Protein production and HTP crystallization"
European Commission (FP7/2007-2013), Integrated Infrastructure grant, BioStruct-X (grant agreement N°283570)
Site PI (130,000 EUR)
Provide access to research groups within the European Research Area to high-throughput crystallization and characterization facilities for macromolecular samples

2013-2016 Biostruct-X joint research activity "Integrated Beamline Environments for Biological Sample Characterisation and Optimisation"
European Commission (FP7/2007-2013), Infrastructure grant, BioStruct-X (grant agreement N°283570)
Workpackage leader
Required the coordination of joint research activities in the development of new techniques for biological sample handling among several European synchrotron sites.

2013-2016 "Entwurf, Konstruktion und Adaption eines Dynamischen Lichtstreusystems an die BioSAXS-Beamline P12 an PETRA III zur Optimierung der Charakterisierung biologischer Makromoleküle bei hohem Probendurchsatz".
Bundesministeriums für Bildung und Forschung, Research on Condensed matter on large infrastructures, (grant agreement 100183019)
Initiator, coPI (574,000 EUR) with Dmitri Svergun and Prof. Christian Betzel (Hamburg

University)
Installation of a dynamic light scattering system and optical port on the BioSAXS P12 EMBL synchrotron beamline

2016-2019 iNEXT "From macromolecular sample to X-ray data collection – Enhanced Support"
European Commission (Horizon2020), Integrated infrastructure grant, iNEXT (grant agreement 653706)
Site PI (123,200 EUR)
Provide access to research groups within the European Research Area to high-throughput crystallization and characterization of macromolecular samples

2022-2024 NSF/BMBF Collaborative Research in Computational Neuroscience Program grant
"Combining computational modeling and artificial intelligence to understand receptor function in physiology and disease", PI ($409,000)

Training Grants and Mentored Trainee Grants

2010-2014 Structural studies on pregnancy-specific glycoproteins
Marie Curie/EMBL EIPOD postdoctoral fellowship
Mentor of Anna Gieras (co-mentor Edward Lemke, EMBL Heidelberg)
The major goal is to understand how pregnancy-specific glycoproteins modulate the maternal immune response, identifying their receptors and molecular interactions

2013-2014 Structural studies on UNC5 receptors involved in axon guidance
EMBO short-term postdoctoral fellowship ASTF 444-2012
Host/Mentor of Lorenzo Finci (visiting from Peking University, PI Jia-huai Wang)
Production of different UNC-5 constructs in anticipation for structural analysis via X-ray crystallography in order to elucidate the mechanism of netrin-1 binding.

2013-2016 Structural studies on lipid mediated binding between adaptor proteins involved in endocytosis
Marie Curie/EMBL EIPOD postdoctoral fellowship
Mentor of Maria Garcia-Alai (co-mentor Marko Kaksonen, EMBL Heidelberg)
The major goal is to understand how the adaptor proteins epsin and HIP1R involved in clathrin-mediated endocytosis interact only through the phospholipid PIP2

2015-2018 Structural studies on netrin receptors
Marie Curie/EMBL EIPOD postdoctoral fellowship
Mentor of Tuhin Bhowmick (co-mentor Francesca Peri, EMBL Heidelberg)
The major goal is to understand how netrin/UNC5 interactions may affect apoptosis in a zebra-fish model

2016-2019 Structural studies on netrin/draxin interactions
Marie Curie/EMBL EIPOD postdoctoral fellowship
Mentor of Xuefan Gao (co-mentor Anne-Claude Gavin, EMBL Heidelberg)
The major goal is to understand how the auxiliary guidance cue draxin modulates netrin's function in axon guidance

2016-2019 Competitive assembly dynamics of the DCC receptor with its guidance cues integrates signals for
cellular steering
Marie Curie/EMBL EIPOD postdoctoral fellowship and individual Marie Skłodowska - Curie fellowship "GuideDesign"
Mentor of Rob Smock
The major goal is to understand how environmental factors cause netrin to alter binding to the Deleted in colorectal cancer (DCC) receptor, affecting cell migration and cell death

2019 Screening of meteorin receptors

Travelling fellowship, Company of Biologists
Fanny Eggeler (visiting from Marie Curie Institute, Paris, PI Felippo del Bene)
Production of meteorin and screening of candidate receptor ectodomains for binding using a D. rerio AVEXIS library

Report of Local Teaching and Training

Teaching of Students in Courses:

2009-2018	EMBL Predoc Course 1st year PhD students EMBL	Heidelberg/Hamburg 2 1 hour lecture
2011, 2013	EMBL Hamburg Biophysics lecture course (graduate students, postdocs)	EMBL and DESY campus, Hamburg Tutor (10 hours)
2012, 2016	Crystallography Course (graduate students, postdocs)	EMBL and DESY campus, Hamburg Tutor (5 hours)

Research Supervisory and Training Responsibilities:

2021 - current	Supervision of 10 staff scientists and 11 research technicians as Director of the Antibody platform	Half hour 1:1 meetings every week, three one hour lab meetings per week
2019 - 2021	Supervision of three staff scientists and four research technicians as a leader of the Protein Group at the IPI.	One hour lab meeting per week, biweekly 1:1 meetings with each staff member.
2010-2020	Supervision of postdoctoral research fellows (average of 2 fellows per year)	EMBL Hamburg One hour lab meeting per week, 1:1 supervision two hours per week per fellow
2010-2018	Supervision of staff scientist and research technicians at the Sample Preparation & Characterization facility	EMBL Hamburg One hour lab meeting per week, 1:1 Daily ongoing supervision

Mentored Trainees and Faculty:

2010-2014	Matthew Dunne Senior Scientist, ETH Zurich, Switzerland (Loessner lab) Career stage: PhD student. Mentoring role: research advisor. Accomplishments: 2 first-authored manuscripts in PLOS Pathogens and Journal of Biological Chemistry on bacteriophage proteins, now independent researcher in same field.
2010-2014	Heidi Kaljunen, PhD/Postdoctoral fellow, University of Eastern, Finland Career stage: PhD student. Mentoring role: research advisor. Accomplishments: first-authored manuscript in Angewandte Chemie
2012-2014	Nina Krueger, PhD/Scientific writer, Hamburg, Germany

	Career stage: research technician Mentoring role: research advisor Accomplishments: obtained a PhD based on her lab work within 2 years and a first author scholarship in Neuron
2012-	Sandra Kozak, Postdoctoral researcher at Evotec, Hamburg, Germany
	Career stage: research technician and PhD student. Mentoring role: facility manager and research advisor. Accomplishments: first-authored scholarship from facility work, admitted to EMBL PhD program, one first author publication.
2012-2015	Lorenzo Finci, PhD/ Scientist, National Center for CryoEM Access and Training, New York Structural Biology Center
	Career stage: research fellow. Mentoring role: co-PI and host. Accomplishments: multiple first-authored scholarship of mentored research in Neuron, Progress in biophysics and molecular biology and Protein Cell.
2013-2018	Maria Garcia-Alai, PhD/Team leader EMBL Hamburg
	Career stage: research fellow. Mentoring role: research advisor. Accomplishments: based on scholarship of mentored research and facility management, promoted to EMBL team leader to run Sample Preparation and Characterization facility
	Six publications, two first authorship manuscripts in Nature Communications.
2015-2018	Ioana Maria Nemtanu, Analyst at BioAgilytix
	Career stage: trainee/research technician. Mentoring role: supervisor. Accomplishments: based on traineeship established new protocols for sample preparation of macromolecular samples, was admitted to competitive Masters program in Neurobiology at University of Utrecht.
2015-2018	Tuhin Bhowmick, PhD/Co-founder Pandorum Technologies
	Career stage: research fellow. Mentoring role: research advisor. Accomplishments: based on scholarship of mentored research, established a branch of his company Pandorum Technologies in UC San Francisco incubator.
2016-2019	Yiqiong Liu, PhD/Postdoctoral fellow, Harvard Medical School, Boston Children's Hospital (Yi Zhang lab)
	Career stage: PhD student. Mentoring role: co-PI and host. Accomplishments: first-authored manuscript in Neuron
2020 - 2022	Elizabeth Gavin, MD student at University of Pennsylvania's Perelman School of Medicine
	Career stage: research technician. Mentoring role: supervisor. Accomplishments: launching bispecific ROBO antibody program, was admitted to medical school with full tuition scholarship
2021 - current	Shaotong Zhu, Principal Scientist at the Institute for Protein Innovation, Boston, USA
	Career stage: Starting principal investigator. Mentoring role: supervisor. Accomplishments: supervision of a postdoc and research technician working on membrane proteins for antibody discovery.
2022 - current	Nirakar Basnet, Postdoctoral fellow at the Institute for Protein Innovation
	Career stage: postdoc working on developing synthetic antibodies for the human mu-opioid

receptor

Local Invited Presentations:

☒ *No presentations below were sponsored by 3rd parties/outside entities*

☐ *Those presentations below sponsored by outside entities are so noted and the sponsor(s) is (are) identified.*

2010-2017	"Sample Preparation & Characterization", Project Evaluation Committee EMBL Hamburg facilities
2011-2017	"Sample Preparation, Crystallization & Characterization", Bilateral meeting between EMBL Hamburg and Grenoble (France)
2012,2014	Sample preparation and characterization/invited presentation EMBO Practical Course "Scattering from Biological Macromolecules"
2016,2018	Joint use of SAXS and crystallography /invited presentation EMBO Practical Course "Scattering from Biological Macromolecules"
2010	"Taking the inside on phage therapy", Institutional "Pink" seminar, EMBL Monterotondo (Italy)
2010	"Cell surface receptor recognition", EMBL Staff Retreat
2010	"Taking the inside on phage therapy", Institutional "Pink" seminar, EMBL Heidelberg
2012	"Closing the gap; the integrated EMBL@PETRA3 facility", Project Evaluation Committee EMBL Hamburg facilities
2013	"Guidance cues as molecular scaffolds", Institutional "Pink" seminar, EMBL Heidelberg
2014	"The molecular basis of the bifunctionality of netrin-1 in axon guidance", Senior Scientist Meeting, EMBL
2014	"Samples and SAXS services in Hamburg", EMBL Staff Retreat
2015	"Using a hybrid structural biology approach to solve a puzzle in axon guidance", Institutional "Pink" seminar, EMBL Heidelberg
2017	"Draxin and netrin modulate adhesion between neurites", Institutional "Pink" seminar, EMBL Heidelberg
2017	"Structural investigations into mechanisms of neuronal organization", EMBL Council
2020	"Harnessing the IPI pipeline for neurobiology", Scientific Advisory Board meeting IPI
2021	"Antibodies for neuroscience", Scientific Advisory Board meeting IPI
2021	"Update from the antibody platform", Scientific Advisory Board meeting IPI
2022	"Update on antigen and antibody production at the IPI," Scientific Advisory Board meeting IPI
2022	"Learning form success: from antigen production to cell sorting strategies", Scientific Advisory Board meeting IPI

Report of Regional, National and International Invited Teaching and Presentations

☐ *No presentations below were sponsored by 3rd parties/outside entities*

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Regional

2011 "Taking the inside on phage therapy"/Invited presentation
University of Hamburg

2016 "Wiring the brain with guidance cues and receptors"/Invited presentation
Heinrich Pette Institute, Hamburg

2018 "Netrin: a guidance cue that acts as an adhesive glue"/ Invited presentation, FOR2419 PhD Symposium
ZMNH Hamburg (Sponsor Deutsche Forschungs Gemeinschaft)

2018 "Netrin signaling through single-pass transmembrane receptors "/Invited presentation, PhD retreat MPI students Frankfurt
University of Hamburg

International

1998 "Atomic resolution structures of liver alcohol dehydrogenase"/Invited presentation
CoLuA meeting, Copenhagen, Denmark

2000 "The enzymatic activation of NADH"/Invited presentation
Dutch Crystallographic Meeting, Groningen, the Netherlands

2001 "The enzymatic activation of NADH"/Invited presentation, European Crystallography Meeting, Krakow, Poland (2001)

2001 "The crystal structure of an MHC II molecule in complex with CD4"/Invited presentation
European Crystallography Meeting, Krakow, Poland

2003 "Crystal structure of murine sCEACAM1a[1,4]: a coronavirus receptor in the CEA family/Invited presentation"
Carcino Embryonic Antigen Symposium, Munich, Germany

2006 "Structural basis of Dscam isoform specificity"/Invited presentation
European Crystallography Meeting, Leuven, Belgium

2008 "A variety of electrostatic interactions and adducts can activate NAD(P) cofactors for hydride transfer"/Invited presentation, Carbonyl Meeting, Kranjska Gora, Slovenia

2008 "Macromolecular X-ray beamlines at the Soleil Synchrotron", MaxInf meeting, Vienna, Austria

2010 "Taking the inside on phage therapy"/Invited speaker, Institute for Food Research, Norwich, United Kingdom

2011 "Endolysin activation"/Speaker,
70th Anniversary Jia-huai Wang, Dana Farber Cancer Institute, Boston

2012 EMBO Global Exchange Lecture Course/Teaching lectures/tutor
Hyderabad, India (sponsor EMBO)

2012,2014 FEBS Course "BioCrys. Fundamental of Modern Methods for Biocrystallography"/Teaching lectures/tutor
Oeiras, Portugal (sponsor FEBS)

2013 "Structural basis for the lysis trigger of endolysins targeting Clostridia bacteria"/Invited presentation
Sabanci University , Istanbul, Turkey

2013 EMBO Practical Course "High-throughput Protein Production and Crystallization"/Teaching lectures
Didcot, United Kingdom (sponsor EMBO)

2014,2016 Biostruct-X Course "Strategic pipeline planning: from sample preparation to 3D structure determination with bioSAXS and other biophysical techniques" /Teaching lectures/tutor
Athens, Greece

2014 "Counting sulfur atoms on PROXIMA I"/Invited presentation

Saint Aubin, France

2014 "The crystal structure of netrin-1 in complex with DCC reveals the bifunctionality of netrin-1 as a guidance cue"/Selected presentation from abstract
Gordon Research Conference Hong Kong, China

2014 "The use of bacteriophage proteins to stem infection by Clostridia bacteria"/Invited presentation
University of Muenster, Germany

2015 "Sample preparation & characterization facility"/Invited presentation
Univerity of Milan, Italy

2015 "The Sample Preparation & Characterization Facility: modular sample services", Biostruct-X Industry meeting, Hamburg, Germany

2015 "How netrin switches from attraction to repulsion"/Invited presentation
VIB Leuven, Belgium

2016 "How netrin switches from attraction to repulsion"/Invited presentation
VIB Ghent, Belgium

2016 "A molecular handshake between netrin and draxin"/Invited presentation
Xian 4th Military Hospital Microsympsium, China

2016 "A recipe to make superendolysins for the efficient eradication of Clostridia species"/Keynote speaker
Phage Therapy 2016, Paris, France

2016 "Sample preparation and optimization at EMBL Hamburg"/Facility presentation
iNEXT User meeting, Madrid, Spain

2016 "A secondary translation product regulates the activity of the CTP1L endolysin"/Leynote speaker
Lysin meeting, Rockefeller University, NYC, USA

2016 "Molecular Mechanisms of netrin-mediated axon guidance"/Invited presentation
EMBO Conference on Molecular Machines, Heidelberg, Germany (sponsor EMBO)

2017 "A secondary translation product regulates the activity of the CTP1L endolysin"/Invited presentation
Bacteriophage 2017, online conference

2017 "Structural insights into netrin signaling"/Invited presentation
McGill University, Montreal, Canada

2017 "Streamlined sample characterization and delivery for SAXS and macromolecular crystallography", MIT – PIER Hamburg Workshop in Boston, USA

2017 "Structural invesitgations into netrin signaling and clathrin endocytosis"/Invited presentation
UC San Diego, USA

2018 "Structural studies reveal a role for netrin-1 in axon fasciculation through draxin and DCC"/Selected presentation from abstract
Cold Spring Harbor Meeting on Molecular Mechanisms of Neuronal Connectivity

2018 "Structural studies reveal how netrin engages its receptors"/Invited presentation
Capital University, Beijing, China

2018 "Structural studies reveal how netrin engages its receptors"/Invited presentation
Hangzhou University, Hangzhou, China

2018 "DSCAM is an adhesion sensor"/Invited presentation
VIB Leuven, Belgium

2020 "Netrin synergizing activity factors affect conditional adhesion between neurons"
Cold Spring Harbor Meeting, Cold Spring Harbor, United States

2021 "Down syndrome cell adhesion molecule (DSCAM): an adhesion sensor?"/Selected presentation from abstract, EMBO Workshop on Molecular Neurobiology

2022 "Developing antibodies to study neural receptors", EMBO Workshop on Molecular Neurobiology

Report of Technological and Other Scientific Innovations

2013-2016 *RUBIC screens for sample optimization commercialized by Molecular Dimensions*
Development of two sample optimization screens for macromolecules that can be used to search for optimal purification and storage conditions using differential scanning fluorimetry (Thermofluor) or light scattering. A 96 condition Buffer screen covers common buffers over a wide pH range combined with different salt concentrations. An Additive screen can be used after the most optimal buffer has been found, to test the effect of chemicals commonly used in protein purification and storage.

2011-2016 *Development of a combined purification and characterization pipeline on the P12 BioSAXS beamline at EMBL Hamburg*
To optimize macromolecular sample delivery at the BioSAXS beamline, I have developed a pipeline for sample quality control, purification and characterization in collaboration with the group of Dmitri Svergun. We created partnerships with Malvern Instruments Ltd (United Kingdom) and XtalConcept GmbH (Germany) to design an online size exclusion chromatography system coupled to static & dynamic light scattering.

Report of Education of Patients and Service to the Community

☒ *No presentations below were sponsored by 3rd parties/outside entities*

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Activities

2016 European Learning Laboratory for the Life Sciences event "Bringing structures to life- new ways of teaching biology" for high school teachers (2016)

2 day course on basics of structural biology for high school teachers from around Europe

2018-2019 University of Applied Sciences in Flensburg, Germany

Adaptation of mammalian expression and protein production protocol for undergrad practical course

Report of Scholarship

ORCID: 0000-0003-2872-6279

Google Scholar ID: https://scholar.google.com/citations?user=uOLD9-EAAAAJ

Peer-Reviewed Scholarship in print or other media:

Research Investigations

1. Matias PM, Morais, J, Coelho, AV, **Meijers, R**, Gonzalez, A, Thompson, AT, Sieker L, LeGall J, Carrondo MA. A preliminary analysis of the three-dimensional structure of di-haem split-Soret

cytochrome c from Desulfovibrio desulfuricans ATCC 27774 at 2.5-Å resolution using the MAD phasing method: a novel cytochrome fold with a stacked-haem arrangement. JBIC 1997 Aug 1:2(4):507–514.
2. Adolph HW, Zwart P, **Meijers R**, Hubatsch I, Kiefer M, Lamzin V, Cedergren-Zeppezauer E. Structural basis for substrate specificity differences of horse liver alcohol dehydrogenase isozymes. Biochemistry. 2000 Oct 24;39(42):12885-97.
3. **Meijers R**, Morris RJ, Adolph HW, Merli A, Lamzin VS, Cedergren-Zeppezauer ES. On the enzymatic activation of NADH. J Biol Chem. 2001 Mar 23;276(12):9316-21.
4. Wang JH, **Meijers R**, Xiong Y, Liu JH, Sakihama T, Zhang R, Joachimiak A, Reinherz EL. Crystal structure of the human CD4 N-terminal two-domain fragment complexed to a class II MHC molecule. Proc Natl Acad Sci U S A. 2001 Sep 11;98(19):10799-804.
5. Tan K*, Zelus BD*, **Meijers R*,** Liu JH, Bergelson JM, Duke N, Zhang R, Joachimiak A, Holmes KV, Wang JH. Crystal structure of murine sCEACAM1a[1,4]: a coronavirus receptor in the CEA family. EMBO J. 2002 May 1;21(9):2076-86. (* contributed equally)
6. **Meijers R**, Blagova EV, Levdikov VM, Rudenskaya GN, Chestukhina GG, Akimkina TV, Kostrov SV, Lamzin VS, Kuranova IP. The crystal structure of glutamyl endopeptidase from Bacillus intermedius reveals a structural link between zymogen activation and charge compensation. Biochemistry. 2004 Mar 16;43(10):2784-91.
7. **Meijers R**, Lai CC, Yang Y, Liu JH, Zhong W, Wang JH, Reinherz EL. Crystal structures of murine MHC Class I H-2 D(b) and K(b) molecules in complex with CTL epitopes from influenza A virus: implications for TCR repertoire selection and immunodominance. J Mol Biol. 2005 Feb 4;345(5):1099-110.
8. **Meijers R#**, Adolph HW, Dauter Z, Wilson KS, Lamzin VS, Cedergren-Zeppezauer ES. Structural evidence for a ligand coordination switch in liver alcohol dehydrogenase. Biochemistry. 2007 May 8;46(18):5446-54. (#corresponding author).
9. **Meijers R***, Puettmann-Holgado R*, Skiniotis G, Liu JH, Walz T, Wang JH, Schmucker D. Structural basis of Dscam isoform specificity. Nature. 2007 Sep 27;449(7161):487-91. (*contributed equally)
10. Grotenbreg GM, Roan NR, Guillen E, **Meijers R,** Wang JH, Bell GW, Starnbach MN, Ploegh HL. Discovery of CD8+ T cell epitopes in Chlamydia trachomatis infection through use of caged class I MHC tetramers. Proc Natl Acad Sci U S A. 2008 Mar 11;105(10):3831-6.
11. **Meijers R**#, Cedergren-Zeppezauer E. A variety of electrostatic interactions and adducts can activate NAD(P) cofactors for hydride transfer. Chem Biol Interact. 2009 Mar 16;178(1-3):24-8. (#corresponding author)
12. Mayer MJ, Garefalaki V, Spoerl R, Narbad A, **Meijers R**. Structure-based modification of a Clostridium difficile-targeting endolysin affects activity and host range. J Bacteriol. 2011 Oct;193(19):5477-86.
13. Boivin S, Kozak S, **Meijers R**. Optimization of protein purification and characterization using Thermofluor screens. Protein Expr Purif. 2013 Oct;91(2):192-206.
14. Dunne M**, Mertens HD, Garefalaki V, Jeffries CM, Thompson A, Lemke EA, Svergun DI, Mayer MJ, Narbad A, **Meijers R**. The CD27L and CTP1L endolysins targeting Clostridia contain a built-in trigger and release factor. PLoS Pathog. 2014 Jul 24;10(7):e1004228. doi: 10.1371/journal.ppat.1004228. (** mentee)
15. Finci LI**, Krüger N**, Sun X, Zhang J, Chegkazi M, Wu Y, Schenk G, Mertens HDT, Svergun DI, Zhang Y, Wang JH, **Meijers R**. The crystal structure of netrin-1 in complex with DCC reveals the bifunctionality of netrin-1 as a guidance cue. Neuron. 2014 Aug 20;83(4):839-849. (** mentee)
16. Choo JA, Thong SY, Yap J, van Esch WJ, Raida M, **Meijers R**, Lescar J, Verhelst SH, Grotenbreg GM. Bioorthogonal cleavage and exchange of major histocompatibility complex ligands by employing azobenzene-containing peptides. Angew Chem Int Ed Engl. 2014 Dec 1;53(49):13390-4.
17. Skruzny M, Desfosses A, Prinz S, Dodonova SO, Gieras A, Uetrecht C, Jakobi AJ, Abella M,

Hagen WJ, Schulz J, **Meijers R**, Rybin V, Briggs JA, Sachse C, Kaksonen M. An organized co-assembly of clathrin adaptors is essential for endocytosis. Dev Cell. 2015 Apr 20;33(2):150-62.
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Thesis:

Title: The activation of NADH in liver alcohol dehydrogenase

Institute: Van 't Hoff Institute for Molecular Sciences (HIMS), University of Amsterdam, The Netherlands

Permalink: https://hdl.handle.net/11245/1.187186

Abstracts, Poster Presentations and Exhibits Presented at Professional Meetings:

DCC collaborates with Draxin to guide commissural axons. E Avilés, A Yung, Z DeLoughery, **R. Meijers,** Jia-Huai Wang, Lisa Goodrich, Cold Spring Harbor meeting on Neuronal Connectivity, Cold Spring Harbor, USA 2022

Narrative Report

My academic activities center around protein science, with a focus on cell surface receptor engineering and antibody discovery. I have been a research group leader at the European Molecular Biology Laboratory (EMBL) Hamburg Outstation in Germany for ten years, which is an intergovernmental organization serving member states in Europe as well as India, Australia and Argentina. Currently, I am Director of the Antibody Platform at the Institute for Protein Innovation in Boston where I lead a group of 20 researchers to make synthetic human antibodies for cell surface receptors and their ligands, using yeast display technology. I also hold a part-time lectureship in the Department of Biological Chemistry and Molecular Pharmacology at Harvard Medical School.

Approximately 60 % of my efforts relate to molecular biology research to develop synthetic antibodies for cell surface receptors and their ligands. Another 20 % is focused on the establishment of facilities for protein science and developing tools for general use by the protein science research community. Finally, about 20 % of my efforts are directed towards the education of the next generation of protein scientists.

Area of Excellence- Investigation

As a protein scientist, I combine structural biology and protein production techniques to study cell surface receptors involved in immune recognition, neurogenesis and tumor metastasis. At EMBL, I started a research program to understand how the guidance cue netrin interacts with its receptors and with environmental cofactors to promote neurogenesis and angiogenesis. This has resulted in two publications in the journal Neuron, I have raised $2.5 million through EMBL and European commission funds to support this research and have received speaker invitations in Europe, China and the United States. I have also investigated other immune and neuronal receptors, notably the Down syndrome cell adhesion molecule (DSCAM), and major histocompatibility (MHC) molecules.

I have a long track record in community building, through the development of large infrastructures and the organization of international workshops and courses at these facilities. I helped to build a microfocus X-ray crystallography beamline at the Soleil Synchrotron, designing the beam conditioning elements. I founded the Sample Preparation and Characterization (SPC) lab at EMBL Hamburg to support biophysicists preparing samples for structural biology. The SPC lab is now managed by a former postdoctoral fellow from my research group, and serves over 200 individual researchers each year. I developed protein buffer optimization screens at the SPC facility, that are now widely distributed as RUBIC screens by Molecular Dimensions.

At IPI, I am managing the synthetic antibody discovery platform where we are using yeast display to screen for human FABs that bind cell surface receptors and ligands, using our internally developed library. Over the last two years, the platform has been streamlined to provide high-throughput antigen production/labelling, cell sorting, next generation sequencing and human antibody production and characterization, all within one team. We have developed antibodies for cancer targets, axon guidance receptors, cytokines and soluble glycoproteins. We have obtained funding to develop antibodies for integral membrane proteins. In the future, we will focus specifically on developing antibodies for cell surface

receptors involved in neuronal signaling, synapse formation and neuronal migration.

Teaching and Educational Leadership

AT EMBL, I have provided teaching and mentorship to students, postdocs, and junior faculty and its member states, taught several advanced courses, and organized national and international protein science courses. I have been the main organizer of the biannual protein expression, purification and characterization (PEPC) course from 2012-2016, which is one of the most prestigious protein science courses in Europe sponsored by the European Molecular Biology Organization (EMBO). This is an intensive one-week practical course given by leaders in the field of protein science for twenty international students, and it was always ten-fold oversubscribed. I have organized and taught at other EMBO and European Union sponsored courses on protein science tools and protocols in France, Germany, Greece, India, Portugal and the United Kingdom.

Summary

I apply and develop protein science tools to study ligand/receptor complexes that are crucial for neurogenesis, immune recognition and tumor biology. I share these tools and make them accessible to the community through open source deposition, commercialization and the teaching of best practices in protein sample preparation and characterization.