Department of Infectious Diseases

Major Infectious Diseases

DEPARTMENT OF INFECTIOUS DISEASES, HEIDELBERG UNIVERSITY

Research Groups of the Department of Infectious Diseases

Infectious Diseases - A Brief Description

Although infectious diseases have been known for thousands of years, the understanding of their source emerged only in the past century. Thus, the study of infectious diseases at the molecular and cellular level is a rather new research area, whose origin as an independent scientific discipline can be traced back to the discovery of pathogenic microorganisms in the 19th century.

Today it is common knowledge that infectious diseases are caused by bacteria, viruses, fungi and parasites. Although a lot has been learned about human pathogens in the past decades, infectious diseases continue to be a major threat for human health. Not only well known diseases like malaria, AIDS or chronic hepatitis, but also gastrointestinal or respiratory infections result in millions of deaths each year. Rapid evolution of pathogens and a changing environment result in rising threats from multiresistant bacteria or the emergence and spread of pathogens including novel strains of influenza virus, SARS or Dengue virus. Furthermore, advances in medicine have led to an increased number of immunocompromised people who are particularly susceptible to infectious diseases.

Apart from their enormous medical importance, microbes are also important model systems for molecular and cell biology. For example, RNA splicing was discovered in adenoviruses, oncogenes were found for the first time in retroviruses and the structure of nucleosomes was described initially for DNA viruses.

Current infectious disease research is a highly interdisciplinary topic at the interface between medicine and molecular, cell and structural biology. The Major "Infectious Diseases" within the MSc "Molecular Biosciences" offers the opportunity to study this topic in considerable depth, both in theory and in practice.

Research at the Department of Infectious Diseases

Main research topics of the Department include HIV/Aids, malaria, viral hepatitis and the interaction between pathogens and their host (immunology of infection, pathogen spread) (https://www.klinikum.uni-heidelberg.de/UEberblick.1208.0.html). Researchers from all units are integrated within the new Center for Integrative Infectious Disease Research, where replication and spread of pathogens is studied in systems of increasing complexity, from molecular detail to interaction with the host immune response in 3D culture systems or animal models. Interactions are further strengthened by the new CIID building (INF 344) opened in November 2017, which houses many groups from the Department of Infectious Diseases and offers state of the art equipment, in particular an Infectious Disease Imaging Platform (https://www.idip-heidelberg.org/) for imaging of pathogens by a broad spectrum of advanced methods.

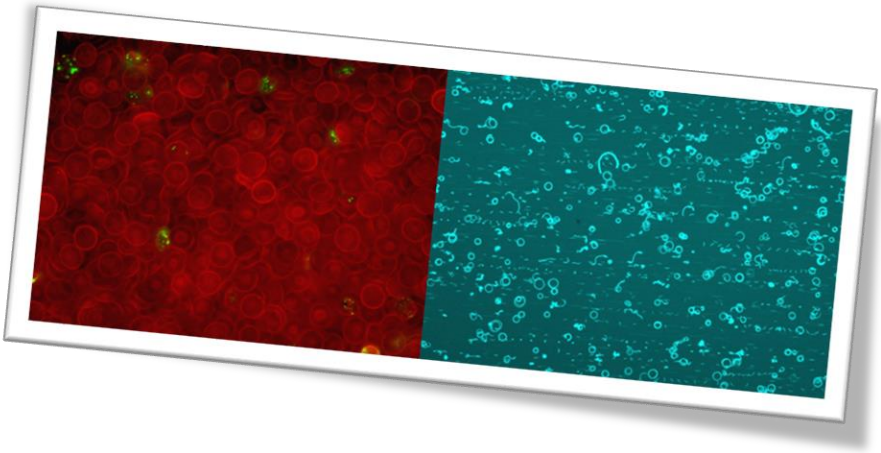
Beyond that, all research groups of the department are connected within local and international research consortia and networks, some of which are coordinated by members of the department. This comprises the Cluster of Excellence "CellNetworks" (http://www.cellnetworks.uni-hd.de/), the German Center for Infection Research "DZIF" (http://www.dzif.de/) as well as DFG collaborative research centers:
SFB1129 (http://www.sfb1129.de/),
SFB-TR179 (www.trr179.de),
SFB-TR83 (http://www.trr83.de/)
and the DFG priority program 1923 (web tba).

We cooperate with numerous institutions from Heidelberg University, the European Laboratory for Molecular Biology (EMBL), the German Cancer Research Center (DKFZ) and the Max-Planck-Institute for Medical Research, as well as with international partners. Our research activities are strengthened in particular by close interdisciplinary collaboration with scientists from the fields of physics, chemical biology, proteome and transcriptome analysis, cryo-electron microscopy, image analysis and scientific modelling.

More information on the research activities of the members of the Department of Infectious Diseases, the ZMBH-group and the associated research groups participating in this Major can be found in the profiles provided in the appendix and on the corresponding websites.

Content and Structure of the Major Infectious Diseases

The Major "Infectious Diseases" is intended for students with a good basic knowledge of molecular and cell biology who wish to put their main focus on infectious disease pathogens. In the context of the Major they will deepen their knowledge of the basics of molecular and cell biology and get to know specific aspects of the replication of infectious pathogens and their interactions with their hosts. The participating departments and research groups offer internationally renowned research programs as well as an excellent infrastructure and they are very well connected with other research institutions inside and outside the university. Therefore, they offer ideal conditions for the Major "Infectious Diseases".



Criteria for admission

We welcome appropriately qualified students from all over the world to this course. Since modern infectious disease research focuses on molecular mechanisms of pathogenesis, a good basic knowledge of molecular and cell biology is a prerequisite for admission. Some prior knowledge of infectious disease biology and immunology is also helpful, but not mandatory. Students in the Heidelberg Bachelor courses "Biology" and "Molecular and Cellular Biology" who are interested in this Major are advised to attend the lectures and courses on microbiology, infectious disease immunology, parasitology and virology in Semesters 4 and 5.

Acquired Degree

With the successful completion of the course the student acquires the MSc in Biology with the specialization (Major) "Infectious Diseases". This Master's degree qualifies students to enter PhD programs in Europe or could be a starting point for a career in the pharmaceutical industry or a biotech company.

Various doctoral study programs are offered by the institutes involved in the "Infectious Diseases" Major. Further information is to be found on the websites of the participating departments. Students who are particularly keen to pursue a doctoral degree, and who have sufficiently high grades, may transfer to a doctoral program already after three semesters of Masters studies.

CONTACT POINT

Major Infectious Diseases

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https://www.klinikum.uni-heidelberg.de/zentrum-fuer-infektiologie/molecular-virology/major-infectious-diseases

Education at the Department of Infectious Diseases

The Department of Infectious Diseases at the Medical Faculty of Heidelberg represents the subject of Infectious Diseases in research, education and diagnostics, in the fields of bacteriology, virology, parasitology and tropical medicine. There are five units with a large number of research groups, most of which are involved in the educational activities of this Major. These units are:

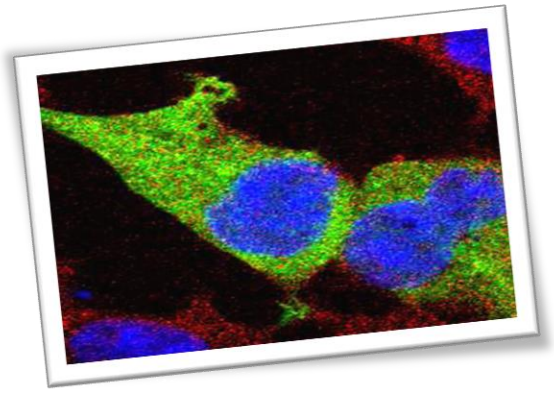
- Medical Microbiology and Hygiene
- Molecular Virology
- Virology
- Integrative Virology
- Parasitology

Medical Microbiology

Fields of Interest

Teams in the Medical Microbiology and Hygiene unit work in the field of Infection & Immunity. Specifically, we are interested to understand how host immunity reacts towards the contact with invading pathogens. A focus over the last years has been innate immunity which comprises the first line of defense against pathogenic microorganisms. Groups within the research unit study the biology of macrophages and dendritic cells which first encounter microbes. Moreover, frontline immunity at mucosal surfaces is analyzed. As the immune system is organized as a cellular network, communication between cells is of crucial importance. Therefore the research unit has a deep interest in signal transduction.

While classical bacteriology focuses on virulence factors and pathogenicity principles it is nowadays obvious that altered immune responses are equally important for infection susceptibility. The research unit analyzes the complex interplay of bacteria and immune cells thereby paving new roads for understanding current problems in infection defense, including sepsis, opportunistic infections in immunocompromised hosts and multi-resistant bacteria.



In order to address these topics we are using a multitude of methods and experimental approaches covering the fields of immunology, microbiology, molecular and cell biology as well as biochemistry.

The following teams belong to Medical Microbiology:

-Prof. Dr. Klaus Heeg (Head of the Medical Microbiology)

-apl. Prof. Dr. Katharina Hieke-Kubatzky

apl. Prof. Dr. Katharina Hieke-Kubatzky

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Scientific Vita

2018: Professorship (apl.) at Heidelberg University

2012: Habilitation in "Molecular Medicine" at the University of Heidelberg

2008: Max Kade Grant for a research year at the University of Michigan, Ann Arbor, USA

2007-present: Group Leader at the Department of Infectious Diseases, University of Heidelberg

2005-2006: Junior Group Leader at the University of Freiburg, Institute of Experimental and Clinical Pharmacology and Toxicology

2002-2004: Postdoctoral Fellow at the Ludwig Institute for Cancer Research, Brussels, Belgium

2001-2002: Researcher at Alantos Pharmaceuticals, Heidelberg

1997-2000: PhD Thesis at the Max Planck Institute for Immunobiology, Freiburg

1992-1997: Studies in Chemistry at the University of Freiburg

Specific Research Interests

- Signal Transduction
- Bacterial Protein Toxins
- Cytokine receptor signaling, JAK-STAT pathway
- Mechanisms of immune evasion used by *Pasteurella multocida* Toxin
- Osteoclastogenesis: Crosstalk between the skeletal and the immune system

Selected Publications

Kubatzky KF, Uhle F, Eigenbrod T: From macrophage to osteoclast – How metabolism determines function and activity. **Cytokine**. **2018;** pii: S1043-4666(18)30261-8. doi: 10.1016/j.cyto.2018.06.013. [Epub ahead of print]

Chakraborty S, Kloos B, Harre U, Schett G, Kubatzky KF: Pasteurella multocida Toxin Triggers RANKL-independent Osteoclastogenesis. **Front Immunol 2017;** 8:185

Hildebrand D, Heeg K, Kubatzky KF: Pasteurella multocida Toxin Manipulates T Cell Differentiation. **Front Microbiol 2015**; Nov 19; 6:1273

Kloos B, Chakraborty S, Lindner SG, Noack K, Harre U, Schett G, Krämer OH, Kubatzky KF: Pasteurella multocida Toxin induced osteoclastogenesis requires mTOR activation. **Cell Commun Signal 2015**; Sep 14; 13:40

Wiedenmann T, Ehrhardt S, Cerny D, Hildebrand D, Klein S, Heeg K, Kubatzky KF: Erythropoietin acts as an anti-inflammatory signal on murine mast cells. **Mol Immunol 2015**; 65(1): 68-76

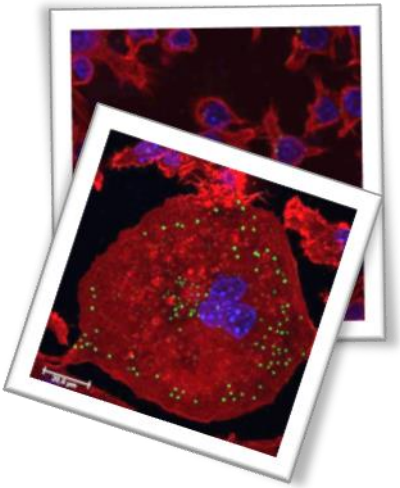
Hildebrand D, Bode KA, Rieß D, Cerny D, Waldhuber A, Römmler F, Strack J, Korten S, Orth JH, Miethke T, Heeg K, Kubatzky KF: Granzyme A produces bioactive IL-1b through a non-apoptotic inflammasome-independent pathway. **Cell Rep 2014;** 6;9(3): 910-7

Hildebrand D, Sähr A, Wölfle SJ, Heeg K and Kubatzky KF: „Regulation of Toll-like receptor 4-mediated immune responses through Pasteurella multocida toxin-induced G protein signalling. **Cell Commun Signal 2012;** 1;10(1): 22

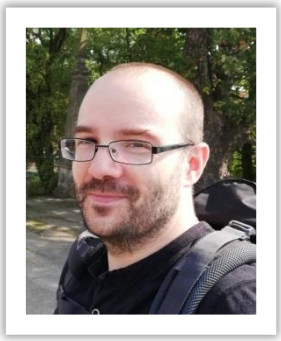
Reipschläger S, Kubatzky K, Taromi S, Burger M, Orth J, Aktories K and Schmidt G: Toxin-induced RhoA activity mediates CCL1-triggered STAT signalling. **J Biol Chem 2012;** 287(14): 11183-94. IF 4.258

Hildebrand D, Heeg K and Kubatzky KF: Pasteurella multocida toxin stimulates B cell dependent osteoclast differentiation. **Infect Immun 2011;** 79(1)

Preuss I, Hildebrand D, Orth JH, Aktories K and Kubatzky KF: Pasteurella multocida toxin is a potent activator of anti-apoptotic signalling pathways. **Cell Microbiol 2010;** 12(8): 1174-85



Dr. Sébastien Boutin



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Scientific Vita

2014-present: Post-doctoral Fellowship at the Department of Infectious Diseases, University Hospital Heidelberg

2013-2014: Post-doctoral Fellowship at the Université Laval, Canada

2009-2013: PhD student at the Université Laval, Canada

2008-2009: Master degree (second year) at Rennes university, France

2007-2008: Master degree (first year) at Poitiers university, France

2004-2007: Licence degree in Biology: speciality in ecology and evolution. Poitiers university, France

Specific Research Interests

- Human microbiome
- Airways infection
- Host-microbes interactions
- Microbial ecology and evolution
- Next-generation sequencing

Selected Publications

Boutin S, Weitnauer M, Hassel S, Graeber SY, Stahl M, Dittrich AS, Mall M, Dalpke AH: One Time Quantitative PCR Detection of Pseudomonas Aeruginosa to Discriminate Intermittent from Chronic Infection in Cystic Fibrosis. **J Cyst Fibros 2018;** 17(3): 348–55

Boutin S, Dalpke AH: Acquisition and adaptation of the airway microbiota in the early life of cystic fibrosis patients. **Mol Cell Pediatr 2017;** 4(1): 1-9

Boutin S, Graeber SY, Stahl M, Dittrich AS, Mall MA, Dalpke AH: Chronic but not intermittent infection with Pseudomonas aeruginosa is associated with global changes of the lung microbiome in cystic fibrosis. **Eur Respir J 2017;** 50(4)

Boutin S, Depner M, Stahl M, Graeber SY, Dittrich S, Legatski A, Von Mutius E, Mall M, Dalpke AH: Comparison of oropharyngeal microbiota from children with asthma and cystic fibrosis. **Mediators Inflamm 2017;** 2017:5047403

Boutin S, Hagenfeld D, Zimmermann H, El Sayed N, Höpker T, Greiser HK, Becher H, Kim TS, Dalpke AH: Clustering of subgingival microbiota reveals microbial disease ecotypes associated with clinical stages of periodontitis in a cross-sectional study. **Front Microbiol 2017;** 8: 340

Boutin S, Alburaki M, Mercier PL, Giovenazzo P, Derome N: Differential Gene Expression between Hygienic and Non-Hygienic Honeybee (Apis Mellifera L.) Hives. **BMC Genomics 2015;** 16:500

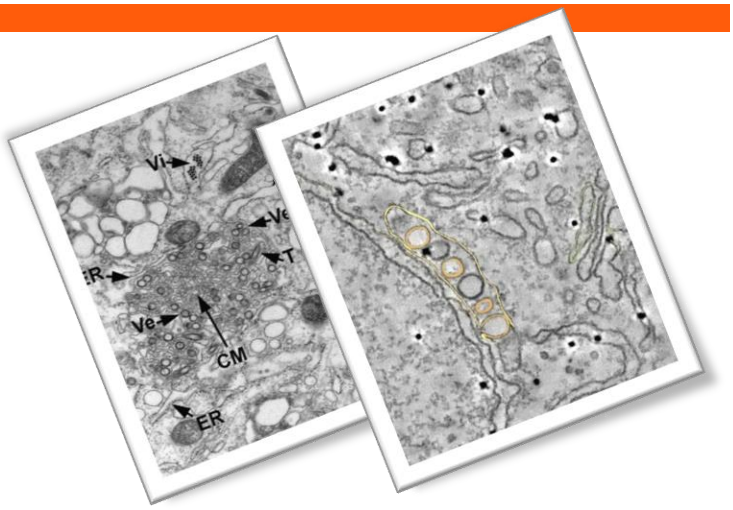
Boutin S, Sauvage C, Bernatchez L, Audet C, Derome N: Inter Individual Variations of the Fish Skin Microbiota: Host Genetics Basis of Mutualism? **PLOS ONE 2014;** 9 (7)

Boutin S, Audet C, Derome N: Probiotic Treatment by Indigenous Bacteria Decreases Mortality without Disturbing the Natural Microbiota of Salvelinus Fontinalis. **Can J Microbiol 2013;** 59 (10):662–70

Boutin S, Bernatchez L, Audet C, Derome N: Network Analysis Highlights Complex Interactions between Pathogen, Host and Commensal Microbiota. **PLOS ONE 2013;** 8 (12)

Boutin S, Sevellec M, Pavey SA, Bernatchez L, Derome N: A Fast, Highly Sensitive Double-Nested PCR-Based Method to Screen Fish Immunobiomes. **Mol Ecol Resour 2012;** 12(6):1027–39

Molecular Virology



Fields of Interest

Teams in the department Molecular Virology work on several highly important human pathogens, namely hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), hepatitis D virus (HDV) and several flaviviruses, most notably Dengue virus (DENV), Zikavirus (ZIKV) and, most recently, coronaviruses such as SARS-CoV-2. These viruses are leading causes for death worldwide with about 400 million people suffering from a chronic infection with HBV/HDV or HCV and about 400 million new DENV infections occurring each year, especially in tropical countries. Moreover, the recent pandemic spread of ZIKV underscores the medical relevance of this virus family.

As a department that focuses on the molecular and cell biology of these infections, the following topics are studied: virus-host cell interactions, mechanism of host cell infection, morphology, biogenesis and dynamics of viral replication factories, virus assembly and involved host cell factors, viral and cellular factors and their suitability for (broad-spectrum) antiviral therapy, RNA structures and their role for viral replication, mathematical modeling and simulation of virus replication and interaction with innate immune responses, virus-induced host cell alterations, host cell stress response to virus infection, innate immune response and viral counter measures, antiviral therapy and therapy resistance and development of viral diagnostics and antiviral drugs. In order to cover these topics, we are using a broad and diverse array of methods and experimental approaches covering the fields of molecular biology, cell biology, biochemistry and immunology. In addition to state-of-the-art methods in these fields we use live cell imaging, cutting edge light and electron microscopy as well as 3D reconstructions.
The following teams belong to Molecular Virology:

-Prof. Dr. Ralf Bartenschlager (Head of the Molecular Virology)

-Prof. Dr. Stephan Urban (DZIF Professorship for Translational Virology)

-apl. Prof. Dr. Volker Lohmann (Head of Section „Virus Host Interactions")

-Dr. Alessia Ruggieri

Prof. Dr. Ralf Bartenschlager

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Scientific Vita

2002-present: Full Professor and head of Department of Infectious Diseases, Molecular Virology, Heidelberg University, Germany; CHS Stiftungsprofessur "Molekulare Virologie"

2001: Full Professor for Molecular Biology, University of Mainz

1999: Habilitation, University of Mainz

1994-1998: Assistant, University of Mainz

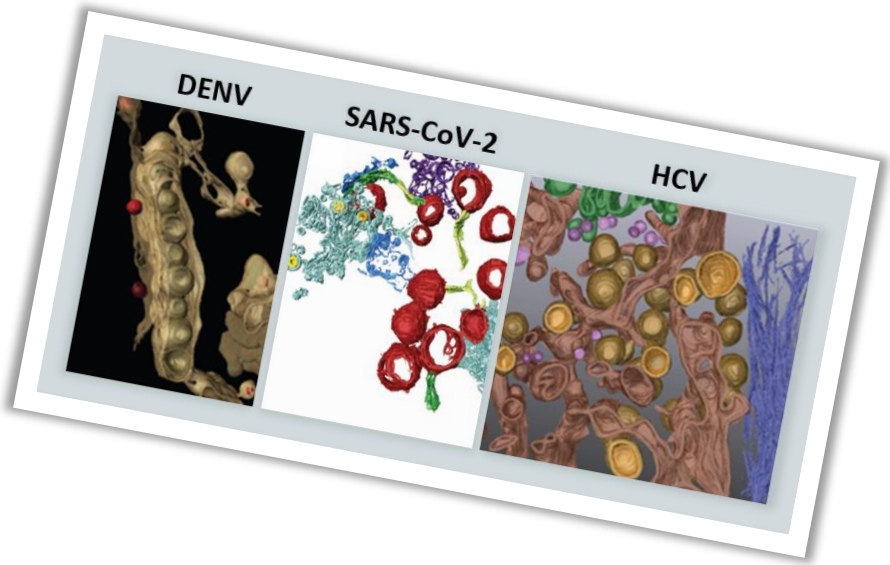
1991-1993: PostDoc, Central Research Unit, Hoffmann-La Roche AG, Basel, Switzerland

1990: PhD in Molecular Biology, Heidelberg University

1981-1987: Studies in Biology, Heidelberg University

Specific Research Interests

- Virus - host cell interaction (HBV, HCV, DENV, ZIKV and SARS-CoV-2)
- Structural and functional aspects of viral RNA replication and assembly
- Viral and host targets for antiviral therapy
- Innate immune responses and viral countermeasures
- Strategies of viral persistence



Selected Publications

Ke Z, Oton J, Qu K, Cortese M, Zila V, McKeane L, Nakane T, Zivanov J, Neufeldt CJ, Cerikan B, Lu JM, Peukes J, Xiong X, Kräusslich HG, Scheres SHW, Bartenschlager R, Briggs JAG: Structures and distributions of SARS-CoV-2 spike proteins on intact virions. **Nature 2020**; doi: 10.1038/s41586-020-2665-2 Epub ahead of print. PMID: 32805734

Neufeldt CJ, Cortese M, Scaturro P, Cerikan B, Wideman JG, Tabata K, Moraes T, Oleksiuk O, Pichlmair A, Bartenschlager R: ER-shaping atlastin proteins act as central hubs to promote flavivirus replication and virion assembly. **Nat Microbiol. 2019**; (12):2416-2429

Lauber C, Seitz S, Mattei S, Suh A, Beck J, Herstein J, Börold J, Salzburger W, Kaderali L, Briggs JAG, Bartenschlager R: Deciphering the Origin and Evolution of Hepatitis B Viruses by Means of a Family of Non-enveloped Fish Viruses. **Cell Host Microbe 2017**; 22(3):387-399

Chatel-Chaix L, Cortese M, Romero-Brey I, Bender S, Neufeldt CJ, Fischl W, Scaturro P, Schieber N, Schwab Y, Fischer B, Ruggieri A, Bartenschlager R: Dengue Virus Perturbs Mitochondrial Morphodynamics to Dampen Innate Immune Responses. **Cell Host Microbe 2016**; 20(3):342-56

Seitz S, Iancu C, Volz T, Mier W, Dandri M, Urban S, Bartenschlager R: A Slow Maturation Process Renders Hepatitis B Virus Infectious. **Cell Host Microbe 2016**; 20(1):25-35

Romero-Brey I, Merz A, Chiramel A, Lee JY, Chlanda P, Haselman U, Santarella-Mellwig R, Habermann A, Hoppe S, Kallis S, Walther P, Antony C, Krijnse-Locker J, Bartenschlager R: Three-dimensional architecture and biogenesis of membrane structures associated with hepatitis C virus replication. **PLoS Pathog 2012**; 8(12)

Welsch S, Miller S, Romero-Brey I, Merz A, Bleck CK, Walther P, Fuller SD, Antony C, Krijnse-Locker J, Bartenschlager R: Composition and three-dimensional architecture of the dengue virus replication and assembly sites. **Cell Host Microbe 2009**; 5(4): 365-75

Meylan E, Curran J, Hofmann K, Moradpour D, Binder M, Bartenschlager R, Tschopp J: Cardif is an adaptor protein in the RIG-I antiviral pathway and is targeted by hepatitis C virus. **Nature 2005**; 437(7062): 1167-72

Wakita T*, Pietschmann T*, Kato T, Date T, Miyamoto M, Zhao Z, Murthy K, Habermann A, Kräusslich HG, Mizokami M, Bartenschlager R*, Liang TJ. (* equal contribution): Production of infectious hepatitis C virus in tissue culture from a cloned viral genome**. Nat Med 2005**; 11(7): 791-6

Lohmann V, Körner F, Koch J, Herian U, Theilmann L, Bartenschlager R: Replication of subgenomic HCV RNAs in a hepatoma cell line. **Science 1999**; 285(5424): 110-3

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Scientific Vita

Since 2014: Full professor (W3) "Translational Virology" at the Medical Faculty ot the University of Heidelberg

2008-2014: Professorship (apl.) at the Faculty for Biosciences at the University of Heidelberg

2001-present: Research group leader at the Department of Infectious Diseases, Molecular Virology of the University Hospital Heidelberg

2000-2001: CHS Stipendium at the ZMBH, Heidelberg University

2000: Habilitation at the faculty of Biosciences, Heidelberg University

1995-2000: PostDoc Center for Molecular Biology (ZMBH), Heidelberg University (Prof. Dr. H. Schaller)

1991-1995: PhD, Dept. of Virology (Prof. Dr. P. H. Hofschneider), Max-Planck-Institut für Biochemie, Martinsried

1991: Diploma in Biochemistry, University of Tübingen

Specific Research Interests

- Molecular mechanisms of Hepatitis B- and Hepatitis D Virus/host interactions with a focus on the early events of infection
- Identification of hepadnaviral receptors and structural analyses of virus receptor interactions
- Development of novel cell culture systems and animal models for HBV/HDV
- Clinical development of entry inhibitors (Myrcludex B) for HBV/HDV infection
- Development of hepatotropic drugs for the therapy of liver diseases
- Development of point of care (POC) test for HDV

Selected Publications

Ni Y, Zhang Z, Engelskircher L, Verch G, Tu T, Lempp F A, Urban S: Generation and characterization of a stable cell line persistently replicating and secreting the human hepatitis delta virus. **Scientific Reports 2019**; 10.1038/s41598-019-46493-1

Lempp FA, Schlund F, Rieble L, Nussbaum L, Link C, Zhang Z, Ni Y, Urban S: Recapitulation of HDV infection in a fully permissive hepatoma cell line allows efficient drug evaluation. **Nat Commun. 2019**; 10.1038/s41467-019-10211-2

Zhang Z, Filzmayer C, Ni Y, Sültmann H, Mutz P, Hiet MS, Vondran FWR, Bartenschlager R, Urban S: Hepatitis D virus replication is sensed by MDA5 and induces IFN-β/λ responses in hepatocytes. **J Hepatol 2018**; 69(1):25-35

Lempp FA, Ni Y, Urban S: Hepatitis delta virus: insights into a peculiar pathogen and novel treatment options. **Nature Reviews Gastroenterology & Hepatology 2016**; 13(10):580-9

Bogomolov P, Alexandrov A, Voronkova N, Macievich M, Kokina K, Petrachenkova M, Lehr T, Lempp FA, Wedemeyer H, Haag M, Schwab M, Haefeli WE, Blank A, Urban S: Treatment of chronic hepatitis D with the entry inhibitor myrcludex B: First results of a phase Ib/IIa study. **J Hepatol 2016**; pii: S0168-8278(16)30148-9.

Li W, Urban S: Entry of hepatitis B and hepatitis D virus into hepatocytes: Basic insights and clinical implications. **J Hepatol 2016**; doi: 10.1016/j.jhep.2016.02.011

Ni Y, Lempp FA, Mehrle S, Nkongolo S, Kaufman C, Fälth M, Stindt J, Königer C, Nassal M, Kubitz R and Urban S: Hepatitis B and D viruses exploit sodium taurocholate co-transporting polypeptide for species-specific entry into hepatocytes. **Gastroenterology 2014**; 146: 1070-1083

Urban S, Bartenschlager R, Kubitz R, Zoulim F: Strategies to inhibit entry of HBV and HDV into hepatocytes. **Gastroenterology 2014**; 7:48-64

Meier A, Mehrle S, Weiss TS, Mier W and Urban S: The myristoylated preS1-domain of the Hepatitis B Virus L-protein mediates specific binding to differentiated hepatocytes. **Hepatology 2012**; doi: 10.1002/hep.26181

Petersen J, Dandri M, Mier W, Lutgehetmann M, Volz T, von Weizsäcker F, Haberkorn U, Fischer L, Pollok JM, Erbes B, Seitz S and Urban S: Prevention of hepatitis B virus infection in vivo by entry inhibitors derived from the large envelope protein. **Nature Biotechnology 2008**; 26: 335-341

Seitz S*, Urban S*, Antoni C and Böttcher B: Cryo-electron microscopy of hepatitis B virions reveals variability in envelope capsid interactions. **EMBO J 2007**; 26: 4160-4167

Gripon P, Rumin S, Urban S, Le Seyec J, Glaise D, Cannie I, Guyomard C, Lucas J, Trepo C, Guguen-Guillouzo C: Infection of a human hepatoma cell line by hepatitis B virus. **PNAS 2002**; 99(24): 15655-15660

apl. Prof. Dr. Volker Lohmann

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Scientific Vita

2020: Head of Section „Virus Host Interactions"

2012: Habilitation, Heidelberg University

2002-present: Group Leader, Heidelberg University

1998-2002: PostDoc, Institute for Virology, University of Mainz

1993-1997: PhD, University of Mainz

1982-1993: Diploma Thesis, University of Mainz

1987-1992: Biology School, University of Mainz

Specific Research Interests

- Replication of hepatitis C virus and hepatitis A virus
- Host cell factors of viral replication
- Lipid kinases and phosphatidylinositides
- Antiviral therapy and mode of action of inhibitors
- Role of the innate immune system in virus control
- Function of norovirus nonstructural proteins

Selected Publications

Grünvogel O, Colasanti O, Lee JY, Klöss V, Belouzard S, Reustle A, Esser-Nobis K, Hesebeck-Brinckmann J, Mutz P, Hoffmann K, Mehrabi A, Koschny R, Vondran FWR, Gotthardt D, Schnitzler P, Neumann-Haefelin C, Thimme R, Binder M, Bartenschlager R, Dubuisson J, Dalpke AH, Lohmann V: Secretion of Hepatitis C Virus Replication Intermediates Reduces Activation of Toll-Like Receptor 3 in Hepatocytes. **Gastroenterology 2018**; 154(8):2237-2251

Schult P, Roth H, Adams RL, Mas C, Imbert L, Orlik C, Ruggieri A, Pyle AM, Lohmann V: microRNA-122 amplifies hepatitis C virus translation by shaping the structure of the internal ribosomal entry site. **Nat Commun 2018**; 4; 9(1):2613

Doerflinger SY, Cortese M, Romero-Brey I, Menne Z, Tubiana T, Schenk C, White PA, Bartenschlager R, Bressanelli S, Hansman GS, Lohmann V: Membrane alterations induced by nonstructural proteins of human norovirus. **PLoS Pathog 2017**; 27;13(10)

Klöss V, Grünvogel O, Wabnitz G, Eigenbrod T, Ehrhardt S, Lasitschka F, Lohmann V, Dalpke AH: Interaction and Mutual Activation of Different Innate Immune Cells Is Necessary to Kill and Clear Hepatitis C Virus-Infected Cells. **Front Immunol 2017**; 29;8:1238

Harak C, Meyrath M, Romero-Brey I, Schenk C, Gondeau C, Schult P, Esser-Nobis K, Saeed M, Neddermann P, Schnitzler P, Gotthardt D, Perez-Del-Pulgar S, Neumann-Haefelin C, Thimme R, Meuleman P, Vondran FW, Francesco R, Rice CM, Bartenschlager R, Lohmann V:Tuning a cellular lipid kinase activity adapts hepatitis C virus to replication in cell culture. **Nat Microbiol. 2016** Dec 19;2:16247.

Esser-Nobis K, Schmidt J, Nitschke K, Neumann-Haefelin C, Thimme R, Lohmann V: The cyclophilin-inhibitor alisporivir stimulates antigen presentation thereby promoting antigen-specific CD8(+) T cell activation. **J Hepatol. 2016**; 64(6):1305-14

Esser-Nobis K, Harak C, Schult P, Kusov Y and Lohmann V: Novel perspectives for hepatitis A virus therapy revealed by comparative analysis of hepatitis C virus and hepatitis A virus RNA replication. **Hepatology 2015**; 62(2): 397-408

Reiss, S., C. Harak, I. Romero-Brey, D. Radujkovic, R. Klein, A. Ruggieri, I. Rebhan, R. Bartenschlager, and Lohmann V: The lipid kinase phosphatidylinositol-4 kinase III alpha regulates the phosphorylation status of hepatitis C virus NS5A. **PLoS Pathog 2013**; 9:e1003359

Bartenschlager R, Lohmann V, Penin F: The molecular and structural basis of advanced antiviral therapy for hepatitis C virus infection. **Nat Rev Microbiol 2013**; 11(7): 482-96 Review

Lohmann V: Hepatitis C virus RNA replication. **Curr Top Microbiol Immunol 2013**; 369:167-98 Review

Lohmann V., Körner F, Koch JO, Herian U, Theilmann L and Bartenschlager R.: Replication of subgenomic hepatitis C virus RNAs in a hepatoma cell line. **Science 1999**; 285: 110-113

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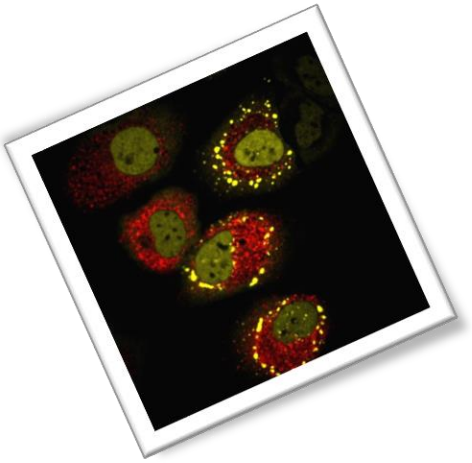


Scientific Vita

2014-present: Independent group leader at the Department of Infectious Diseases, Heidelberg University

2008–2013: Postdoc at the Department of Infectious Diseases, Heidelberg University (Prof. R. Bartenschlager)

2004–2008: PostDoc at the Institute of Human Genetics, University of Saarland (Dr. J. Mayer)

1999–2003: PhD in Virology, École Normale Supérieure de Lyon, France

1998–1999: Diploma thesis, University of Lyon, France

1995–1998: Studies in Cellular and Molecular Biology Metz and Lyon, France

Specific Research Interests

- Dynamics of the host stress response to RNA virus infection
- Identification of regulators of hepatitis C virus-induced stress granule oscillation
- Mathematical modeling of oscillating host stress response to hepatitis C virus infection
- Interplay of Flaviviruses with the host cell translation machinery
- Innate immune sensing of human endogenous retroviruses

Selected Publications

Roth H, Magg V, Uch F, Mutz P, Klein P, Haneke K, Lohmann V, Bartenschlager R, Fackler OT, Locker N, Stoecklin G, Ruggieri A. Flavivirus infection uncouples translation suppression from cellular stress responses. **mBio 2017**; *8:e02150-16.*

Cortese M, Goellner S, Acosta EG, Neufeldt CJ, Oleksiuk O, Lampe M, Haselmann U, Funaya C, Schieber N, Ronchi P, Schorb M, Pruunsild P, Schwab Y, Chatel-Chaix L, Ruggieri A, Bartenschlager R. Ultrastructural characterization of Zika virus replication factories. **Cell Reports 2017**, *18(9): 2113–2123.*

Chatel-Chaix L, Cortese M, Romero-Brey I, Bender S, Fischl W, Scaturro P, Fischer B, Ruggieri A, Bartenschlager R. Dengue virus modulates mitochondrial morphodynamics through the inhibition of DRP-1 for the benefit of viral replication. **Cell Host Microbe 2016**; *20(3):342-56.*

Trotart M, Tsopoulidis N, Tibroni N, Willemsen J, Binder M, Ruggieri A, Fackler OT. Sensing of HIV-1 infection in Tzm-bl cells with reconstituted expression of STING. **J Virol. 2015**; *90(4):2064-76.*

Schmid B*, Rinas M*, Ruggieri A, Reuter A, Fischl W, Harder N, Bergeest J-P, Flossdorf M, Rohr K, Höfer T, Bartenschlager R. Live-cell analysis and modeling identify determinants of attenuation of Dengue virus 2-O-methyl mutant. **PLoS Pathog**. **2015**; *11(12):e1005345.*

Hiet M-S, Bauhofer O, Zayas M, Roth H, Tanaka Y, Schirmacher P, Willemsen J, Grünvogel O, Bender S, Binder M, Lohmann V, Lotteau V, Ruggieri A†, Bartenschlager R†. Control of temporal activation of hepatitis C virus-induced interferon response by domain 2 of nonstructural protein 5A. **J Hepatol**. **2015**; *63(4):829-37.*

Ruggieri A, Dazert E, Metz P, Hofmann S, Bergeest JP, Mazur J, Bankhead P, Hiet MS, Kallis S, Alvisi G, Samuel CE, Lohmann V, Kaderali L, Rohr K, Frese M, Stoecklin G, Bartenschlager R. Dynamic oscillation of translation and stress granule formation mark the cellular response to virus infection. **Cell Host Microbe 2012**; *12(1): 71-85.*

Bauhofer O, Ruggieri A, Schmid B, Schirmacher P, Bartenschlager R. Persistence of HCV in quiescent hepatic cells under conditions of an interferon-induced antiviral response. **Gastroenterology 2012**; *143(2): 429-438.*

Ruggieri A, Maldener E, Sauter M, Müller-Lantzsch N, Meese E, Fackler O, Mayer J. Human endogenous retrovirus HERV-(HML-2) encodes a stable signal peptide with biological properties distinct from Rec. **Retrovirology 2009**; *6: 17.*

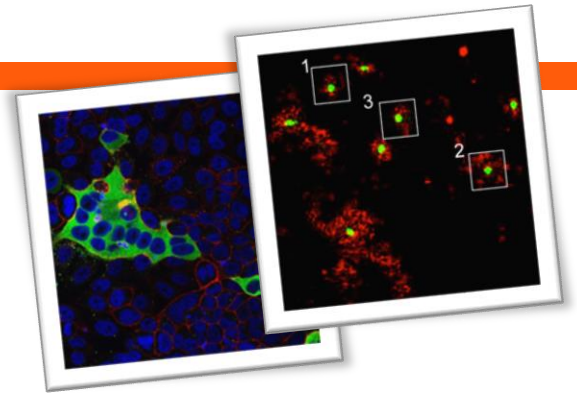
Virology

Fields of Interest

Groups in Virology are interested in the molecular mechanisms leading to viral infection. The broad expertise of the various groups within the department allows us to dissect various steps in the viral life cycle, ranging from receptor binding to assembly and release, and to investigate pathogen-host interactions for a number of medically relevant viruses.

A major focus of our research is human immunodeficiency virus (HIV), the causative agent of AIDS (Kräusslich, Müller). In spite of several decades of intense research, many questions concerning the biology of the virus remain unanswered; among these are surprisingly basic questions as 'Where does the virus enter the host cell?' or 'When and how is virus maturation initiated?' Our projects address the molecular and structural biology of the virus and its interaction with the host cell, including the evaluation of novel targets for antiviral therapy. We mainly focus on detailed analyses of virus morphogenesis and structure, as well as on the cell biology and dynamics of HIV entry, assembly and release and the induction of the innate immune response. To address these topics, we combine traditional biochemical and virological approaches with advanced imaging techniques (live-cell imaging, novel fluorescent labeling strategies, various super-resolution fluorescence microscopy, (cryo)electron microscopy and -tomography, correlative microscopy, click chemistry) that we employ alone or together with strong collaborators. By this we aim at a quantitative and time resolved description of HIV-1 entry and morphogenesis, delineating the mechanistic role of viral and cellular factors (proteins and lipids) in these processes.

Other viral systems studied include parvoviruses, the enteropathogens norovirus and reovirus, bunyaviruses, influenza virus and hepatitis E virus. We develop and use vectors based on adeno-associated virus for basic research and gene therapy approaches (Grimm) and exploit the CRISPR/Cas system for gene therapeutic and antiviral strategies (Grimm, Kräusslich). The Hansman group investigates the structural biology of the interaction of noroviruses, a major cause of infectious diarrhea, with cellular binding molecules. A further focus of interest is virus entry: the Lozach group is interested in entry pathways of bunyaviruses in the mammalian host and arthropod vector cells, whereas the Boulant group



addresses the induction of innate immune response upon reovirus entry in human polarized intestinal epithelial cells and organoid systems, and the group of Dao Thi studies interactions between Hepatitis E virus and host cells in stem-cell derived culture systems. Finally, we are interested in influenza virus structure, particle formation and entry, and in the role of host proteins and lipids in these processes (Kräusslich, Chlanda). Combination of conventional virological approaches with a wide variety of specialized techniques (e.g. cryo-electron tomography, high throughput approaches, advanced fluorescence microscopy techniques, x-ray crystallography and more) is employed to address our virological questions.

The following teams belong to the Virology:

-Prof. Dr. Hans-Georg Kräusslich (Head of the Virology)

-Prof. Dr. Dirk Grimm

-apl. Prof. Dr. Barbara Müller

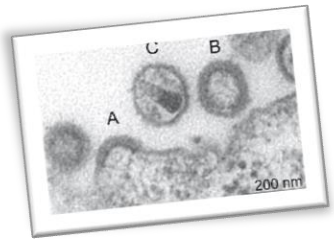
-Dr. Steeve Boulant

-Dr. Petr Chlanda

-Dr. Viet Loan Dao Thi

-Dr. Grant Hansman

-Dr. Pierre-Yves Lozach



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Web: http://www.klinikum.uni-heidelberg.de/index.php?id=6550&L=1

Scientific Vita

2019–present: Dean of the Medical Faculty, Heidelberg University

2019–present: coordinator, German Center of Infectious Disease Research

2014–2019: Vice-dean for research Medical Faculty, Heidelberg University

2004–present: Director Department of Infectious Diseases, Heidelberg University

2000–present: Full professor and head of virology, Heidelberg University

1995–1999: Full professor and head of department, Heinrich-Pette-Institute, Hamburg

1996–1999: Director, Heinrich-Pette-Institute, Hamburg

1993–1995: Head of junior department, German Cancer Research Centre, Heidelberg

1990: Habilitation, University of Heidelberg

1989–1993: Group leader, German Cancer Research Centre, Heidelberg

1986–1989: PostDoc, Dept. of Mol. Biology, State Univ. New York at Stony Brook

1985: MD in experimental virology (LMU Munich)

1977–1984: Medical School (LMU Munich)

Specific Research Interests

- Cell biology of virus infection
- Virus-host interactions in the early post-entry phase of viral replication
- Nuclear import of HIV-1
- Structural and functional analyses of HIV-1 and influenza virus assembly and release
- HIV Protease and antiviral resistance

Selected Publications

Peukes J, Xiong X, Erlendsson S, Qu K, Wan W, Calder LJ, Schraidt O, Kummer S, Freund SMV, Kräusslich HG, Briggs JAG: The native structure of the assembled matrix protein 1 of influenza A virus. **Nature 2020**; 10.1038/s41586-020-2696-8

Bejarano DA, Peng K, Laketa V, Börner K, Jost KL, Lucic B, Glass B, Lusic M, Müller B, Kräusslich HG: HIV-1 nuclear import in macrophages is regulated by CPSF6-capsid interactions at the nuclear pore complex**. Elife 2019**; 8:e41800

Mattei S, Tan A, Glass B, Müller B, Kräusslich HG, Briggs JAG: High-resolution structures of HIV-1 Gag cleavage mutants determine structural switch for virus maturation. **PNAS 2018**; 2;115 (40):E9401-E9410

Mücksch F, Laketa V, Müller B, Schultz C, Kräusslich HG: Synchronized HIV assembly by tunable PIP2 changes reveals PIP2 requirement for stable Gag anchoring. **Elife 2017**; pii: e25287. doi: 10.7554/eLife.25287

Mattei S, Glass B, Hagen WJ, Kräusslich HG, Briggs JA: The structure and flexibility of conical HIV-1 capsids determined within intact virions. **Science 2016**; 354(6318):1434-1437

Hanne J, Göttfert F, Schimer J, Anders-Össwein M, Konvalinka J, Engelhardt J, Müller B, Hell SW, Kräusslich HG: Stimulated Emission Depletion Nanoscopy Reveals Time-Course of Human Immunodeficiency Virus Proteolytic Maturation. **ACS Nano 2016**; 10(9):8215-22

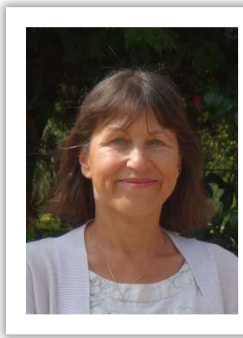
Schur FK, Obr M, Hagen WJ, Wan W, Jakobi AJ, Kirkpatrick JM, Sachse C, Kräusslich HG, Briggs JA: An atomic model of HIV-1 capsid-SP1 reveals structures regulating assembly and maturation. **Science 2016**; 353(6298):506-8

Herold N, Anders-Ößwein M, Glass B, Eckhardt M, Müller B, Kräusslich HG: HIV-1 Entry in SupT1-R5, CEM-ss, and Primary CD4+ T Cells Occurs at the Plasma Membrane and Does Not Require Endocytosis. **J Virol 2014**; 88:13956-70

Izquierdo-Useros N, Lorizate M, Puertas MC, Rodriguez-Plata MT, Zangger N, Erikson E, Pino M, Erkizia I, Glass B, Clotet B, Keppler OT, Telenti A, Kräusslich HG***, Martinez-Picado J***: Siglec-1 is a novel dendritic cell receptor that mediates HIV-1 trans-infection through recognition of viral membrane gangliosides. **PLoS Biol 2012**; 10(12):e1001448

Chojnacki J, Staudt T, Glass B, Bingen P, Engelhardt J, Anders M, Schneider J, Müller B, Hell SW, Kräusslich HG: Maturation Dependent HIV-1 Surface Protein Redistribution Revealed by Fluorescence Nanoscopy. **Science 2012**; 338:524-528

apl. Prof. Dr. Barbara Müller



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Scientific Vita

2000-present: Group leader, Department of Infectious Diseases, Heidelberg

2004: Habilitation (Experimental Virology, Heidelberg University)

1995-2000: Postdoctoral fellow/research associate, Heinrich-Pette-Institute, Hamburg

1995: Postdoctoral fellow, German Cancer Research Center Heidelberg

1992-1995: Postdoctoral fellow, Fox Chase Cancer Center, Philadelphia, USA

1991-1992: Postdoctoral associate, MPI for Medical Research, Heidelberg

1991: Dr. rer. nat., Heidelberg University

1988-1991: PhD thesis (MPI for Med. Research Heidelberg, lab of R.S. Goody)

1987: Diploma (Heidelberg University)

1981-1986: Study of Biology (Technical University Darmstadt, Heidelberg University)

Specific Research Interests

- Biology of human immunodeficiency virus
- Fluorescently labeled HIV-1 derivatives
- Dynamics of HIV cell entry and HIV particle formation
- HIV assembly and maturation
- Quantitative analysis of HIV replication steps

Selected Publications

Movie:
http://www.spektrum.de/video/partner/cellnetworks/virus-cell-interactions-brought-to-light/1471891

Bejarano DA, Peng K, Laketa V, Börner K, Jost KL, Lucic B, Glass B, Lusic M, Müller B, Kräusslich HG: HIV-1 nuclear import in macrophages is regulated by CPSF6-capsid interactions at the nuclear pore complex. **Elife 2019**; 8:e41800

Mattei S, Tan A, Glass B, Müller B, Kräusslich HG, Briggs JAG: High-resolution structures of HIV-1 Gag cleavage mutants determine structural switch for virus maturation. **PNAS 2018**; 2;115 (40):E9401-E9410

Sakin V, Hanne J, Dunder J, Anders-Össwein M, Laketa V, Nikić I, Kräusslich HG, Lemke EA, Müller B: A Versatile Tool for Live-Cell Imaging and Super-Resolution Nanoscopy Studies of HIV-1 Env Distribution and Mobility. **Cell Chem Biol 2017**; 24: 635-645.e5

Sakin V, Paci G, Lemke E, Müller B: Labeling of virus components for advanced quantitative imaging analyses. **FEBS L 2016**; 590, 1896–1914

Hanne J, Göttfert F, Schimer J, Anders-Össwein M, Konvalinka J, Engelhardt J, Müller B, Hell SW, Kräusslich HG: Stimulated Emission Depletion Nanoscopy Reveals Time-Course of Human Immunodeficiency Virus Proteolytic Maturation. **ACS Nano 2016**; 10(9):8215-22

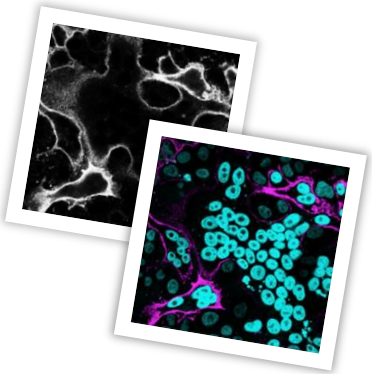
Konvalinka J, Kräusslich HG, Müller B: Retroviral proteases and their roles in virion maturation. **Virology 2015**; doi: 10.1016/j.virol.2015.03.021

Schimer J, Pavova M, Anders M, Pachl P, Sacha P, Cigler P, Weber J, Majer P, Rezacova P, Kräusslich HG, Müller B***, Konvlinka J***: Triggering HIV polyprotein processing inside virions by rapid photodegradation of a tight-binding photodestructable protease inhibitor. **Nature Communications 2015**; 6:6461

Hendrix J, Baumgärtel V, Schrimpf W, Ivanchenko S, Digman MA, Gratton E, Kräusslich HG, Müller B and Lamb DC: Live-cell observation of cytosolic HIV-1 assembly onset reveals RNA-interacting Gag oligomers. **J Cell Biol 2015**; 210:629-646

Schur FKM, Hagen WJH, Rumlová M, Ruml T, Müller B, Kräusslich HG and Briggs JAG: The structure of the immature HIV-1 capsid in intact virus particles at 8.8 Å resolution. **Nature 2015**; 517:505-8

Baumgärtel V, Ivanchenko S, Dupont A, Sergeev M, Wiseman PW, Kräusslich HG, Bräuchle C, Müller B***, Lamb DC***: Dynamics of HIV budding site interactions with an ESCRT component visualized in live cells. **Nat Cell Biol 2011**; 13: 469-474



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Scientific Vita

2012-present: Junior Group Leader CHS Foundation, University Hospital Heidelberg

2008-2012: Postdoctoral associate, Harvard Medical School Boston MA, USA

2006-2008: Marie curie Postdoctoral fellow, MRC Virology Unit Glasgow, UK

2005-2006: Postdoctoral associate, MRC Virology Unit Glasgow, UK

2004-2005: Bridging grant fellow, IBCP-CNRS Lyon, France

2001-2004: PhD in Molecular Biology and Biochemistry, IBCP-CNRS, France

2000-2001: DEA in Molecular Biology and Biochemistry (Master), Lyon, France

1998-2000: Bachelor degree in Molecular Biology and Biochemistry, Lyon, France

Specific Research Interests

- Characterization of the dynamic uptake, intracellular trafficking and endosomal rupture of non-enveloped viruses using live-cell confocal microscopy
- Evaluation of the forces exerted during viral entry
- Characterization of the kinetics and mechanism of clathrin structures
- Determining the anti-viral innate immune response in intestinal polarized epithelium cells
- Evaluation of the intracellular location and functional aspects of innate immunity sensor proteins (TLR and RLR) in polarized cells

Selected Publications

Fratini MT, Wiegand T, Funaya C, Jiang Z, Shah P, Spatz J, Cavalcanti-Adam A, Boulant S: Surface Immobilization of Viruses and Nanoparticles Elucidates Early Events in Clathrin-mediated Endocytosis. **ACS Inf Disease 2018**; In press

Bucher D, Frey F, Sochacki KA, Kummer S, Bergeest J-P, Godinez WJ, Kraeusslich H-G, Rohr K, Taraska JW, Schwarz US, Boulant S: Flat-to-curved transition during clathrin-mediated endocytosis correlates with a change in clathrin-adaptor ratio and is regulated by membrane tension. **Nat Commun 2018**; 10.1101/162024

Shah PNM, Stanifer ML, Höhn K, Engel U, Haselmann U, Bartenschlager R, Kräusslich H-G, Krijnse Locker J, Boulant S: Genome packaging of reovirus is mediated by the scaffolding property of the microtubule network. **Cell Microbiol 2017**; 2, e12765

Pervolaraki K, Stanifer ML, Münchau S, Renn LA, Albrecht D, Kurzhals S, Senís E, Grimm D, Schröder-Braunstein J, Rabin RL, Boulant S: Type I and Type III Interferons Display Different Dependency on Mitogen-Activated Protein Kinases to Mount an Antiviral State in the Human Gut. **Front Immunol 2017**; 8, 459

Stanifer ML, Rippert A, Kazakov A, Willemsen J, Bucher D, Bender S, Bartenschlager R, Binder M, Boulant S: Reovirus intermediate subviral particles constitute a strategy to infect intestinal epithelial cells by exploiting TGF-β dependent pro-survival signaling. **Cell Microbiol 2016**; 18, 1831–1845

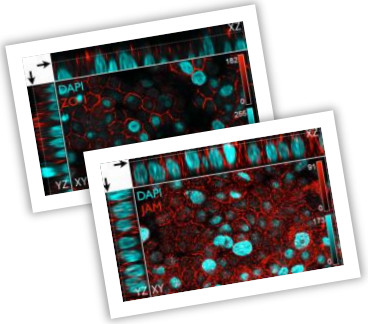
Boulant S*, Stanifer M, Kural C, Cureton DK, Massol R, Nibert ML, Kirchhausen T: Similar uptake but different trafficking and escape routes of reovirus virions and infectious subvirion particles imaged in polarized Madin-Darby canine kidney cells. **Mol Biol Cell 2013**; 24(8):1196-207

Kural C, Tacheva-Grigorova SK, Boulant S, Cocucci E, Baust T, Duarte D, Kirchhausen T: Dynamics of intracellular clathrin/AP1- and clathrin/AP3-containing carriers. **Cell Rep 2012**; 2(5):1111-9

Cocucci E, Aguet F, Boulant S and Kirchhausen T: The first five seconds in the life of a clathrin coated pit. **Cell 2012**; 150(3):495-507

Boulant S, Kural C, Zeeh JC and Kirchhausen T: Actin dynamics counteract membrane tension during clathrin-mediated endocytosis. **Nat Cell Biol 2011**; 13(9):1124-31

Dixit E, Boulant S, Zhang Y, Lee ASY, Odendall C, Shum B, Hacohen N, Chen ZJ, Whelan SP, Fransen M, Nibert ML, Superti-Furga G, Kagan JC: Peroxisomes are signaling platforms for antiviral innate immunity. **Cell 2010**; 141, 668–681



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Scientific Vita

2012-present: Group Leader, Heidelberg University and DKFZ, Germany

2005-2012: Senior Scientist, National Institute of Infectious Diseases, Japan

2001-2005: PhD, The University of Tokyo, Japan

1998-1999: Honors Degree, University of New South Wales, Australia

1993-1996: BSc, Macquarie University, Australia

Specific Research Interests

- Norovirus and other caliciviruses
- Structural biology of viral proteins (X-ray crystallography and cryo-EM)
- Drug discovery using X-ray crystallography
- Antigenicity using virus-like particles
- Molecular epidemiology of noroviruses
- Zoonosis among caliciviruses
- Human norovirus reverse genetics

Selected Publications

Hansman GS, Taylor DW, McLellan JS, Smith TJ, Georgiev I, Tame JRH, Park SY, Yamazaki M, Gondaira F, Miki M, Katayama K, Murata K, and Kwong PD: Structural basis for broad detection of genogroup II noroviruses by a monoclonal antibody that binds to a site occluded in the viral particle. **J Virol 2012**; 86: 3635-3646

Hansman GS, Shahzad-ul-Hussan S, McLellan JS, Chuang G, Georgiev I, Shimoike, T, Katayama K, Bewley, CA, and Kwong PD: Structural basis for norovirus inhibition and fucose mimicry by citrate. **J Virol 2012**; 86: 284-292

Hansman GS, Biertümpfel C, Georgiev I, McLellan JS, Chen L, Zhou T, Katayama K, Kwong PD: Crystal Structures of GII.10 and GII.12 Norovirus Protruding

Domains in Complex with Histo-Blood Group Antigens Reveal Details for a Potential Site of Vulnerability. **J Virol 2011**; 85: 6687-6701

Ozawa K, Oka T, Takeda N Hansman GS: Norovirus infections in symptomatic and asymptomatic food handlers in Japan. **J Clin Microbiol 2007**; 45: 3996-4005

Prof. Dr. Dirk Grimm

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Web: http://www.bioquant.uni-heidelberg.de/research/groups/cellnetworks-research-group-virus-host-interactions/home.html

Scientific Vita

2007-present: Group leader "Virus-Host Interactions", Heidelberg University Hospital

2006-2007: Research Associate, Stanford University, School of Medicine, CA, USA

2001-2006: Postdoctoral Fellow, Stanford University, School of Medicine, CA, USA

1999-2001: Postdoctoral Fellow, German Cancer Research Center, Heidelberg

1998: PhD (Biology) with Summa cum laude, University of Heidelberg

1994: Diploma (Biology), University of Kaiserslautern

1988-1994: Study of Biology (Universities of Kaiserslautern and Heidelberg)

Specific Research Interests

- Human gene therapy
- Viral and parasital infections (HIV, hepatitis viruses, Plasmodium)
- Adeno-associated viral (AAV) and bocaviral (BoV) vectors
- Gene/genome engineering (CRISPR, TALENs)
- RNA interference (RNAi)
- Induced pluripotent stem cells (iPSC)
- Synthetic biology

Selected Publications

Senís E, Mockenhaupt S, Rupp D, Bauer T, Paramasivam N, Knapp B, Gronych J, Grosse S, Windisch MP, Schmidt F, Theis FJ, Eils R, Lichter P, Schlesner M, Bartenschlager R, Grimm D: TALEN/CRISPR-mediated engineering of a promoterless anti-viral RNAi hairpin into an endogenous miRNA locus. **Nucleic Acids Res 2016**; in press

Michler T, Grosse S, Mockenhaupt S, Röder N, Stückler F, Knapp B, Ko C, Heikenwälder M, Protzer U, Grimm D: Blocking sense strand activity improves potency, safety and specificity of anti-hepatitis B virus short hairpin RNA. **EMBO Mol Med 2016**; 8:1082-98

Mockenhaupt S, Grosse S, Rupp D, Bartenschlager R and Grimm D: Alleviation of off-target effects from vector-encoded shRNA via co-delivered RNA decoys. **PNAS 2015**; 112:E4007-16

Hentzschel F*, Hammerschmidt-Kamper C*, Börner K*, Heiss K*, Knapp B, Sattler JM, Kaderali L, Castoldi M, Bindman JG, Malato Y, Willenbring H, Mueller AK, and Grimm D: AAV8-mediated in vivo overexpression of miR-155 enhances the protective capacity of genetically-attenuated malarial parasites. **Mol Ther 2014**; 22:2130-41

Senís E*, Fatouros C*, Grosse S*, Wiedtke E, Niopek D, Mueller AK, Börner K and Grimm D: An adeno-associated viral (AAV) vector toolbox for CRISPR/Cas9-mediated genome engineering. **Biotechnol J 2014**; 9:1402-12

Schürmann N, Trabuco LG, Bender C, Russell RB and Grimm D: Molecular dissection of human Argonaute proteins using DNA family shuffling. **Nat Struct Mol Biol 2013**; 20:818-26

Börner K, Niopek D, Cotugno G, Kaldenbach M, Pankert T, Willemsen J, Zhang X, Schürmann N, Mockenhaupt S, Serva A, Hiet MS, Wiedtke E, Castoldi M, Starkuviene V, Erfle H, Gilbert DF, Bartenschlager R, Boutros M, Binder M, Streetz K, Kräusslich HG and Grimm D: Robust RNAi enhancement via human Argonaute-2 overexpression from plasmids, viral vectors and cell lines. **Nucleic Acids Res 2013**; 41:e199

Grimm D, Wang L, Lee JS, Schürmann N, Gu S, Börner K, Storm TA and Kay MA: Argonaute proteins are key determinants of RNAi efficacy, toxicity, and persistence in the adult mouse liver. **J Clin Invest 2010**; 120:3106-19

Grimm D, Lee JS, Wang L, Desai T, Akache B, Storm TA and Kay MA. In vitro and in vivo gene therapy vector evolution via multispecies interbreeding and re-targeting of adeno-associated viruses. **J Virol 2008**; 82:5887-911

Grimm D, Streetz KS, Jopling CL, Storm TA, Pandey K, Davis CR, Marion P, Salazar F and Kay MA: Fatality in mice due to oversaturation of cellular microRNA/short hairpin RNA pathways. **Nature 2006**; 441:537-41

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Scientific Vita

2018-present: Chica and Heinz Schaller Junior Group Leader, University Hospital Heidelberg

2015-2017: Postdoctoral fellow, The Rockefeller University, USA

2012-2014: Postdoctoral associate, Institute of Microbiology of the University Hospital Centre Vaudois and of the University of Lausanne, Switzerland

2007-2011: PhD, Ecole Normale Superieur de Lyon, France

2003-2004: MSc, Dongseo University, South Korea

2000-2006: Dipl.-Ing, Berlin Institute of Technology, Germany

Specific Research Interests

- Molecular virology, virus-host interaction, virus life cycle
- Hepatotropic viruses with a special focus on hepatitis E virus (HEV)
- Stem cell technology for improved cell culture models
- Personalized models of virus infection, precision medicine
- Antiviral therapy and therapy resistance

Selected Publications

Dao Thi VL, Wu X, Belote RL, Andreo U, Takacs CN, Fernandez JP, Vale-Silva LA, Decker CC, Fu RM, Qu B, Uryu K, Molina H, Saeed M, Steinmann E, Urban S, Singarja RR, Schneider WM, Simon SM and Rice CM: Stem cell-derived polarized hepatocytes. **Nature Commun. 2020**; 11(1):1677

Fu RM, Decker CC and Dao Thi VL: Cell Culture Models for Hepatitis E Virus. **Viruses 2019**; 11(7):608

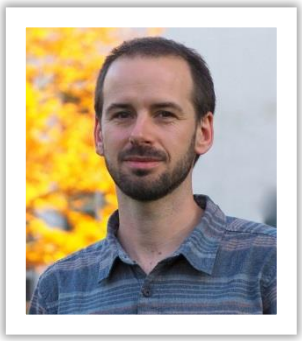
Wu X, Dao Thi VL, Liu P, Takacs CN, Xiang K, Andrus L, Gouttenoire J, Moradpour D, Rice CM: Pan-Genotype

Hepatitis E Virus Replication in Stem Cell-Derived Hepatocellular Systems. **Gastroenterology 2018**; 154(3):663-674

Wu X, Dao Thi VL, Huang Y, Billerbeck E, Saha D, Hoffmann HH, Wang Y, Vale Silva LA, Sarbanes S, Sun T, Andrus L, Quirk C, MacDonald MR, Schneider WM, An X, Rosenberg BR, Rice CM: Intrinsic Immunity Shapes Viral Resistance of Stem Cells. **Cell 2018**; 172(3):423-438

Dao Thi VL, Debing Y, Wu X, Rice CM, Neyts J, Moradpour D, Gouttenoire J: Sofosbuvir inhibits Hepatitis E virus replication in vitro and results in an additive effect when combined with ribavirin. **Gastroenterology 2016**; 150:82-85

Dr. Petr Chlanda



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Scientific Vita

2017-present: Schaller research group leader at the Department for Infectious Diseases-Virology, University of Heidelberg Medical School

2011-2017: Postdoc at the National Institutes of Health, Bethesda, USA

2010-2011: Postdoc at the European Molecular Biology Laboratory, Heidelberg, Germany

2006-2010: Ph.D. at Heidelberg University, Heidelberg, Germany

2000-2006: M.S. at Charles University, Prague, Czech Republic

Specific Research Interests

- virology
- cryo-electron microscopy
- membranes and lipids
- cell biology
- membrane fusion

Selected Publications

Chlanda P, Mekhedov E, Waters H, Sodt A, Schwartz C, Nair V, Blank PS, Zimmerberg J: Palmitoylation contributes to membrane curvature in Influenza A virus assembly and hemagglutinin-mediated membrane fusion. **J Virol 2017**; 91(21)

Chlanda P: Influenza Hemagglutinin and M2 ion channel priming by trypsin: Killing two birds with one stone. **Virology 2017**; 509:131-132

Chlanda P, Krijnse Locker J: The sleeping beauty kissed awake: new methods in electron microscopy to study cellular membranes. **Biochem J 2017**; 474(6):1041-1053

Quemin ERJ, Chlanda P, Sachse M, Forterre P, Prangishvili D, Krupovic M: Eukaryotic-like virus budding in Archaea. **MBio 2016**; 13;7(5)

Chlanda P, Mekhedov E, Waters H, Schwartz CL, Fischer ER, Ryham RR, Cohen FS, Blank PS Zimmerberg J: The hemifusion structure induced by Influenza virus hemagglutinin is determined by physical properties of the target membranes. **Nat Microbiol 2016**; 18;1(6):16050

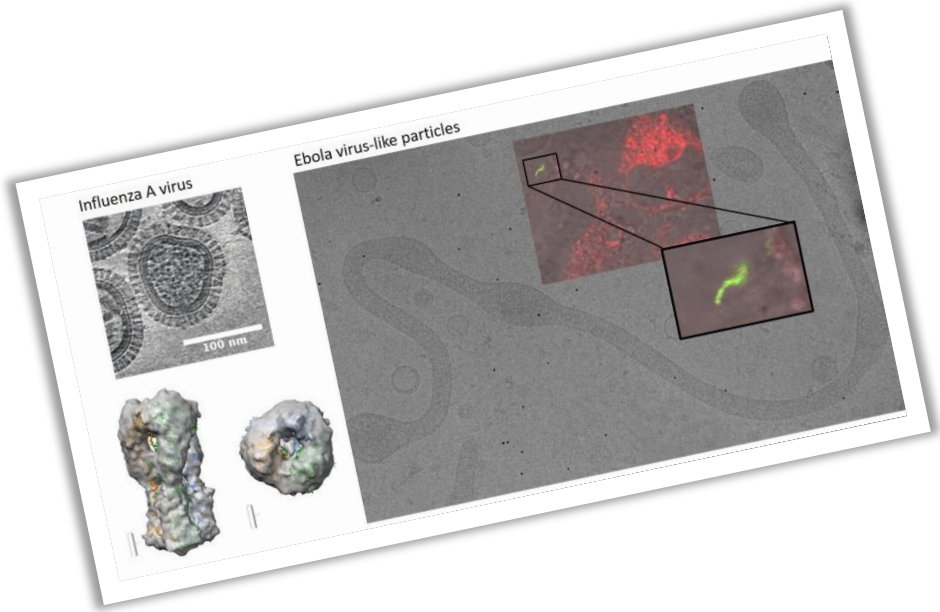
Chlanda P, Zimmerberg J: Protein-lipid interactions critical to replication of the influenza A virus during infection. **FEBS Lett 2016**; 590(13):1940-54

Chlanda P, Schraidt O, Kummer S, Riches J, Oberwinkler H, Prinz S, Kräusslich HG, Briggs JAG: Structural analysis of the contributions of individual proteins to influenza assembly and morphology. **J Virol 2015**; 89(17):8957-66

Chlanda P, Sachse M: Cryo-Electron Microscopy of Vitreous Sections. **Methods Mol Biol 2014**; 1117:193-214

Merz A, Long G, Hiet MS, Bruegger B, Chlanda P, Andre P, Wieland F, Krijnse-Locker J, Bartenschlager R: Biochemical and morphological properties of hepatitis C virus particles and determination of their lipidome. **J Biol Chem 2011**; 286(4):3018-32

Chlanda P, Carbajal MA, Cyrklaff M, Griffiths G, Krijnse-Locker J: Membrane rupture generates single open membrane sheets during vaccinia virus assembly. **Cell Host Microbe 2009**; 6(1):81-90



Integrative Virology

Fields of Interest

Our work aims at dissecting general principles of host cell biology and immunology that are exploited and hijacked by HIV-1 to cause disease. To this end we apply advanced virology, cell biology and molecular biology techniques to cell systems with physiological relevance ranging from individual primary cell types to organoid and organotypic cell cultures to in vivo models.

Part Fackler laboratory:

Our research addresses the cell biology, immunology and pathogenesis of HIV 1 infection with an emphasis on CD4+ T lymphocytes. One focus of our studies is on the molecular mechanisms of action by which the HIV 1 pathogenicity factor Nef reprograms host cell vesicular transport, signal transduction and motility to optimize HIV 1 spread in the host and to accelerate disease progression. Another important aspect of our work is on the host innate immune system in HIV infection and on viral evasion mechanisms. This includes dissecting how the intrinsic immunity factor SERINC5 impairs HIV 1 particle infectivity and how this activity is antagonized by the viral protein Nef, but also studies to elucidate which barriers prevent productive HIV 1 infection of resting CD4+ T lymphocytes. These HIV-related studies involve the development of complex 3D culture systems for studying the relationship between host cell motility and HIV 1 spread in tissue. Finally, we are also interested in the cell biology of CD4 T cell activation and differentiation. In this context, we particularly focus on the newly identified role of nuclear actin filament formation for CD4 T cell help.

Part Lusic laboratory:

The studies of the Lusic laboratory focus on deciphering the cellular mechanisms used by the virus to either promote or repress viral gene expression. We investigate which parameters control integration of the viral genome and subsequent gene expression, with a strong focus on reactivation of viral gene expression after a silent phase of latency.

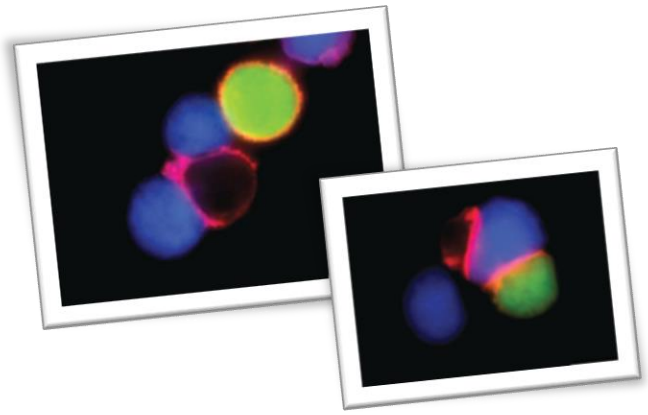
While an overall goal of our laboratory is to explore the specific contributions of nuclear topology and chromatin factors to HIV integration site selection and establishment of latency, we are specifically interested in determining the role of nuclear pore complex proteins in integration site selection. Moreover, we would like to focus on the interactions between nucleoporins with proteins that we previously found to contribute to proviral latency such as TRIM proteins.

Our methodology comprises the visualization of integrated HIV DNA in host cells by using a combination of 3D Immuno DNA FISH and Chromatin Immunoprecipitation technology.

The following teams belong to the Integrative Virology:

-Prof. Dr. Oliver T. Fackler (Head of the Integrative Virology)

-Dr. Marina Lusic



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Scientific Vita

2013-present: Head of section Integrative Virology, Department of Infectious Diseases, Virology, Heidelberg University

2007-present: W3 professor at the Department of Infectious Diseases, Virology, Heidelberg University

2003: Habilitation in experimental virology, Heidelberg University

2000-2007: Group leader, Department of Virology, Heidelberg University

1997-2000: Postdoctoral fellow, University of California at San Francisco

1994-1997: PhD in molecular virology (Homburg/Saar)

1993-1994: Diploma thesis in molecular virology (Homburg/Saar)

1989-1993: Studies in biology (Saarbrücken)

Specific Research Interests

- Immuno- and cell biology of HIV infection
- Adaptive and Innate immunity against HIV-1 and viral evasion thereof
- Synthetic and organotypic 3D models of HIV pathogenesis
- CD4 T cell biology

Selected Publications

Imle A, Kumberger P, Schnellbächer ND, Fehr J, Carrillo-Bustamante P, Ales J, Schmidt P, Ritter C, Godinez WJ, Müller B, Rohr K, Hamprecht FA, Schwarz US, Graw F, Fackler OT: Experimental and computational analyses reveal that environmental restrictions shape HIV-1 spread in 3D cultures. **Nat Commun.** 2019; 10:2144

Tsopoulidis N, Kaw S, Laketa V, Kutscheidt S, Baarlink C, Stolp B, Grosse R, Fackler OT: T cell receptor-triggered nuclear actin network formation drives CD4+ T cell effector functions. **Sci Immunol 2019**; 4. pii: eaav1987

Trautz B, Wiedemann H, Lüchtenborg C, Pierini V, Kranich J, Glass B, Kräusslich HG, Brocker T, Pizzato M, Ruggieri A, Brügger B, Fackler OT: SERINC5 restricts HIV-1 infectivity without altering the lipid composition and organization of viral particles. **J. Biol. Chem.2017**; 292:13702–13713

Baldauf HM, Stegmann L, Schwarz SM, Ambiel I, Trotard M, Martin M, Burggraf M, Lenzi GM, Lejk H, Pan X, Fregoso Oi, Lim ES, Abraham L, Nguyen L, Rutsch F, König R, Kim B, Emerman M, Fackler OT* and Keppler OT*: Vpx overcomes a SAMHD1-independent block to HIV reverse transcription that is specific to resting CD4 T cells. **Proc. Natl. Acad. Sci. USA 2017**; 114: 2729–2734. (* corresponding authors)

Imle A, Abraham L, Tsopoulidis N, Hoflack B, Saksela K and Fackler OT: Association with PAK2 Enables Functional Interactions of Lentiviral Nef Proteins with Exocyst**. mBio 2015**; 6: e01309-15

Fackler OT, Murooka TT, Imle A, Mempel TR: Adding new dimensions: Towards an integrative understanding of HIV-1 spread. **Nat Rev Microbiol 2014**; 12:563-574

Kutscheidt S, Zhu R, Antoku S, Luxton GGW, Stagljar I, Fackler OT, Gundersen G: FHOD1 interaction with nesprin-2G mediates TAN line formation and nuclear movement. **Nat Cell Biol 2014;** 16: 708-715

Baldauf HM, Pan X, Erikson E, Schmidt S, Daddacha W, Burggraf M, Schenkova K, Ambiel I, Wabnitz G, Gramberg T, Panitz S, Flory E, Landau NR, Sertel S, Rutsch F, Lasitschka F, Kim B, König R, Fackler OT*, Keppler OT*: The deoxynucleoside triphosphate triphosphohydrolase SAMHD1 restricts HIV-1 infection in resting CD4+ T cells. **Nat Med 2012**; 18: 1682-1687, (* corresponding authors)

Stolp B, Imle A, Coelho FM, Hons M, Mendiz RG, Lyck R, Stein JV and Fackler OT: HIV-1 Nef Interferes With T Lymphocyte Circulation Through Confined Environments in vivo. **PNAS 2012**; 109: 18541–18546

Pan X, Rudolph JM, Abraham L, Habermann A, Haller C, Krijnse-Locker J and Fackler OT: HIV-1 Nef Compensates Disorganization of the Immunological Synapse by Assembly of an Intracellular Lck Signalosome. **Blood 2012;** 119: 786-797

Stolp B, Raichman-Fried M, Abraham L, Pan X, Giese SI, Hannemann S, Goulimari P, Raz E, Grosse R and Fackler OT: HIV-1 Nef interferes with host cell motility by deregulation of cofilin. **Cell Host Microbe 2009**; 6:174-186

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Scientific Vita

2014-present: Group leader, Department of Infectious Diseases, Heidelberg

2009-2014: Extended faculty member/project leader at San Raffaele Scientific Institute, Milan and ICGEB, Trieste, Italy

2004-2009: PostDoc, ICGEB, Trieste, Italy

2003: PhD degree in Molecular Biology and Biochemistry, Faculty of Biological Sciences, University of Belgrade

1999-2004: Long term ICGEB Fellowship, Molecular Medicine Laboratory, International Centre for Genetic Engineering and Biotechnology (ICGEB), Trieste, Italy

1998: Magister of Science, Biochemistry and Molecular Biology, University of Belgrade

Specific Research Interests

- Nuclear organization and chromatin changes upon viral infection
- Control of HIV-1 integration and cellular fate
- HIV-1 transcription and latency; role of oxidative stress

Selected Publications

Lusic M and Robert F. Siliciano: Nuclear landscape of HIV-1 infection and integration. **Nat Rev Microb 2016;** (in press)

Lucic B and Lusic M: Connecting HIV-1 integration and transcription: a step toward new treatments. **FEBS Letters 2016;** 590 (13):1927

Marini B, Kertesz-Farkas A, Lucic B, Hashim A, Lisek K, Manganaro L, Pongor S, Luzzati R, Mavilio F, Giacca M and Lusic M: Nuclear architecture dictates HIV-1 integration site selection. **Nature 2015;** 14;521(7551):227-31

Lusic M and Giacca M: Ground Control to Major Tom: "Prepare for HIV Landing". **Cell Host Microbe 2014;**Vol 16(5): 557–559

Lusic M and Giacca M: Regulation of HIV-1 latency by chromatin structure and nuclear architecture. **J Mol Biol 2014;** 427(3):688-94 Review

Lusic M, Marini B, Ali H, Lucic B, Luzzati R and Giacca M: Proximity to PML Nuclear Bodies negatively regulates HIV-1 gene expression in CD4+ T cells. **Cell Host Microbe 2013;** 13: 665-677. Research highlight in Science Vol 341 (2013) p:11 and in Cell Host Microbe Vol 13:625-626

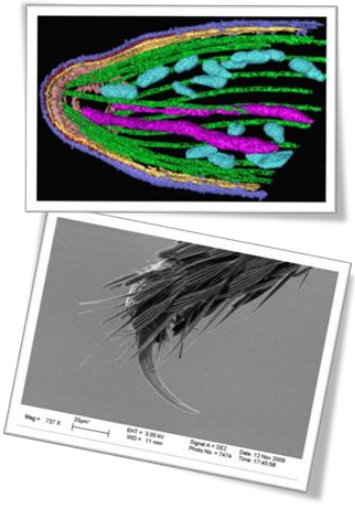
Della Chiara G, Crotti A, Liboi E, Giacca M, Poli G and Lusic M: Negative Regulation of HIV-1 Transcription by a Heterodimeric NF-κB1/p50 and C-Terminally Truncated STAT5 Complex. **J Mol Biol 2011;** 410 (5): 933-943

Manganaro L, Lusic M*, Gutierrez MI, Cereseto A, Del Sal G and Giacca M*: Concerted action of cellular JNK and Pin-1 restricts HIV-1 genome integration to activated $CD4^+$ T lymphocytes. **Nat Medicine 2010**; 16 (3): 329-323

Dieudonné M, Maiuri P, Biancotto C, Knezevich A, Kula A, Lusic M, and Marcello A: Transcriptional competence of the integrated HIV-1 provirus at the nuclear periphery. **EMBO J 2009;** 28 (15):2231-2243

Perkins KJ, Lusic M, Mitar I, Giacca M and Proudfoot NJ: Transcription dependent gene looping of the HIV-1 provirus is dictated by recognition of pre-mRNA processing signals. **Molecular Cell 2008;** 29 (1) 56-68

Parasitology



Fields of Interest

Malaria has remained one of the most important infectious diseases worldwide, causing an estimated 214 million clinical cases and killing approximately 438,000 people every year (WHO, 2015). Hopes of malaria control have been thwarted by widespread drug resistances. Malaria is caused by protozoan parasites of the genus Plasmodium, of which Plasmodium falciparum is the most virulent form. Infection starts with the bite of an infected Anopheles mosquito that transmits infective stages termed sporozoites into the human body. Sporozoites are carried with the blood flow to the liver where they invade hepatocytes. After completing their development within the liver, the parasite is released and now invades erythrocytes. Intra-erythrocytic development of the parasite is responsible for the clinical manifestation of the disease, including intermittent fever, shaking chills, organ dysfunction and the syndromes associated with cerebral and maternal malaria. Severe complications result from the ability of infected erythrocytes to adhere to the endothelial lining of venular capillaries and to sequester in the deep vascular bed.

Malaria research conducted by the Parasitology Unit includes the following aspects:

The Lanzer lab addresses key questions related to the molecular and biophysical mechanisms underpinning cytoadhesion of Plasmodium falciparum-infected erythrocytes. P. falciparum is the most virulent of the 5 Plasmodium species that can cause malaria in humans. The group is further interested in understanding how genetic polymorphisms in the human genome, such as those leading to sickle cell haemoglobin or haemoglobin C protect carriers from severe malaria-related disease and death. Another research focus concerns mechanisms of drug resistance and strategies to overcome established resistance mechanisms, including the development of novel antimalarial drugs.

The Frischknecht lab studies the formation and motility of the sporozoite and the intracellular development within the liver using a mix of reverse genetics, imaging and biophysical approaches. Studies are mainly performed using rodent malaria parasites, which can be easier manipulated than the human parasites. The group has many collaboration partners on the Heidelberg campus and around the world.

The Ganter lab investigates the unusual way in which the malaria parasite Plasmodium replicates. Cells usually divide themselves into two daughter cells; however, Plasmodium forms multinucleated cells, within which nuclei autonomously divide before daughter cells are formed. Using various techniques–including reverse genetics, advanced imaging, and proteomic approaches–the group uses human and rodent malaria parasites to gain insight into the molecular mechanisms that drive this non-canonical replication cycle.

The Guizetti lab studies the unusual cell division mechanisms of the malaria parasite Plasmodium falciparum. Rapid mitotic divisions enable proliferation of the parasite in the human blood cells and contribute to disease severity. Even though mitosis in this parasite shows significant differences to what has been described in classical model organisms, it is poorly studied so far. We use super-resolution, electron, and live cell microscopy technologies combined with CRISPR/Cas9 genome editing to describe the dynamics and regulation of chromosomes, centromeres, and the nuclear envelope during division. Thereby we hope to uncover new targets within this essential pathway and contribute to the fight against malaria.

The Osier lab works to identify the antibody targets of naturally acquired immunity against Plasmodium falciparum malaria and the antibody-dependent mechanisms that underlie protective immunity. The group also seeks to understand how parasite diversity is overcome in immune persons facing natural challenge, and to test the efficacy of combination malaria vaccines. The group aims to contribute to the development of highly effective vaccines against malaria using the model of naturally acquired protective immunity.

The Portugal lab aims to explore the biology of asymptomatic P. falciparum parasites and its interactions with the human host during the dry season that ensure that the parasite is not cleared and can be transmitted in the next transmission season. The main interests are: 1) Compare the properties and function of P. falciparum parasites from asymptomatic individuals during the dry season versus symptomatic individuals during the malaria season; 2) Determine the kinetics of gametocyte carriage throughout the dry season; and 3) Scrutinize internal signals and/or environmental cues promoting proliferation and gametocytogenesis when the mosquito vector returns during the rainy season.

The Przyborski lab studies how the malaria parasite P. falciparum modifies its host cell, the mature human erythrocyte. In particular, the group is interested in the role of a large number of proteins that the parasite synthesizes and transports to the erythrocyte, and which themselves are involved in further modification of the infected cell. Of particular interest is an expanded family of Dnaj/Hsp40-like proteins that is likely to be important for the transport of virulence factors to the surface of the infected red-blood cell. Additional exported proteins, although important for parasite survival, have no counterparts in other biological systems, and may thus potentially be targeted by future generations of antimalarials. With the eventual goal of identifying potential future drug-targets, and in collaboration with other researchers in Heidelberg and around the world, the group combines a diverse array of cell biology, genetic and biochemical techniques.

The following teams belong to the Parasitology Unit:

-Prof. Dr. Michael Lanzer (Head of the Parasitology Unit)

-Prof. Dr. Friedrich Frischknecht

-Dr. Markus Ganter

-Dr. Julien Guizetti

-Dr. Faith Osier

Prof. Dr. Michael Lanzer

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Scientific Vita

2000: Chair of Parasitology offered by the Seattle Biomedical Institute, USA *(*declined)

1999: Full Professor & Department Chair of Parasitology, Heidelberg University

1996: Habilitation in Microbiology, University of Würzburg

1994-1998: Junior Group Leader, Research Center for Infectious Diseases, University of Würzburg

1988-1993: PostDoc, Sloan-Kettering Inst., New York

1985-1988: Graduate Student, Center for Molecular Biology, Heidelberg University

1984-1985: Undergraduate Student, Hoffman LaRoche AG, Basel

Specific Research Interests

- Molecular Parasitology
- Drug resistance mechanisms of the malarial parasite
- Antigenic variation, cytoadherence, protein trafficking in *P. falciparum*
- Membrane transport processes

Selected Publications

Pegoraro S, Duffey M, Otto TD, Wang Y, Rosemann R, Baumgartner R, Fehler SK, Lucantoni L, Avery VM, Moreno-Sabater A, Mazier D, Vial HJ, Strobl S, Sanchez CP, Lanzer M: Erratum: SC83288 is a clinical development candidate for the treatment of severe malaria. **Nature communications 2017**; 8, 15273

Cyrklaff M, Srismith S, Nyboer B, Burda K, Hoffmann A, Lasitschka F, Adjalley S, Bisseye C, Simpore J, Mueller AK, Sanchez CP, Frischknecht F, Lanzer M: Oxidative insult can induce malaria-protective trait of sickle and fetal erythrocytes. **Nature communications 2016**; 7, 13401

Rieger H, Yoshikawa HY, Quadt K, Nielsen MA, Sanchez CP, Salanti A, Tanaka M and Lanzer M: Cytoadhesion of Plasmodium falciparum-infected erythrocytes to chondroitin-4-sulfate is cooperative and shear enhanced. **Blood 2015**; 125: 383-391

Sanchez CP, Liu CH, Mayer S, Nurhasanah A, Cyrklaff M, Mu J, Ferdig MT, Stein WD and Lanzer M: A HECT ubiquitin-protein ligase as a novel candidate gene for altered quinine and quinidine responses in Plasmodium falciparum. **PLoS Genet 2014**; 10: e1004382

Summers RL, Dave A, Dolstra TJ, Bellanca S, Marchetti RV, Nash MN, Richards SN, Goh V, Schenk RL, Stein WD, Kirk K, Sanchez CP, Lanzer M and Martin RE: Diverse mutational pathways converge on saturable chloroquine transport via the malaria parasite's chloroquine resistance transporter. **PNAS 2014**; 111: E1759-1767

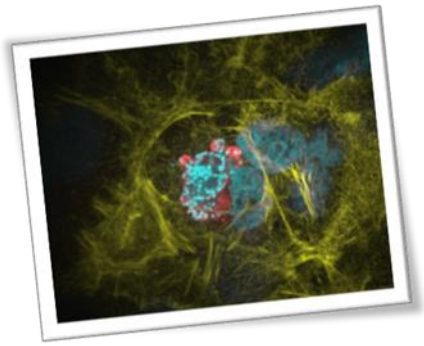
Cyrklaff M, Sanchez CP, Kilian N, Bisseye C, Simpore J, Frischknecht F and Lanzer M: Hemoglobins S and C interfere with actin remodeling in Plasmodium falciparum-infected erythrocytes. **Science 2011**; 334: 1283-1286

Rohrbach P, Sanchez CP, Hayton K, Friedrich O, Patel J, Sidhu AB, Ferdig MT, Fidock DA and Lanzer M: Genetic linkage of pfmdr1 with food vacuolar solute import in Plasmodium falciparum. **Embo J 2006**; 25: 3000-3011

del Portillo HA, Fernandez-Becerra C, Bowman S, Oliver K, Preuss M, Sanchez CP, Schneider NK, Villalobos JM., Rajandream MA, Harris D, Pereira da Silva LH, Barrell B and Lanzer M: A superfamily of variant genes encoded in the subtelomeric region of Plasmodium vivax. **Nature 2001**; 410: 839-842

Scherf A, Hernandez-Rivas R, Buffet P, Bottius E, Benatar C, Pouvelle B, Gysin J and Lanzer M: Antigenic variation in malaria: in situ switching, relaxed and mutually exclusive transcription of var genes during intra-erythrocytic development in Plasmodium falciparum. **Embo J 1998**; 17: 5418-5426

Lanzer M, de Bruin D and Ravetch JV: Transcriptional differences in polymorphic and conserved domains of a complete cloned P. falciparum chromosome. **Nature 1993**; 361: 654-657



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Scientific Vita

2005-present: Group Leader, Center of Infectious Diseases, Parasitology, Heidelberg University Hospital

2001-2005: Postdoc, Institut Pasteur, Paris, France

2000: PhD, FU Berlin (summa cum laude)

1996-2000: PhD thesis, EMBL, Heidelberg

1995-1996: Research student, Lab of Molecular Biology, Cambridge, UK

1990-1996: Studies of Biochemistry (FU Berlin)

Specific Research Interests

- Cell biology and biophysics of pathogen infection
- Malaria cell biology
- Live cell imaging
- Cell motility

Selected Publications

Douglas RG, Nandekar P, Aktories JE, Kumar H, Weber R, Sattler JM, Singer M, Lepper S, Sadiq SK, Wade RC, Frischknecht F: Inter-subunit interactions drive divergent dynamics in mammalian and Plasmodium actin filaments. **PLoS Biology 2018**; 16, e2005345

Klug D, Frischknecht F: Motility precedes egress of malaria parasites from oocysts. **Elife 2017**; 6, e19157

Cyrklaff M, Frischknecht F, Kudryashev M: Functional insights into pathogen biology from 3D electron microscopy. **FEMS Microbiol Reviews 2017**; 41, 828-853

Quadt K, Streichfuss M, Moreau C, Spatz JP, Frischknecht F: Coupling of retrograde flow to force production during malaria parasite migration. **ACS Nano 2016**; 10, 2091-2102

Singer M, Marshall J, Heiss K, Mair GR, Grimm D, Mueller AK and Frischknecht F: Zinc-finger nuclease-based double strand breaks attenuate malaria parasites and reveal rare micro-homology mediated end joining. **Genome Biology 2015**; 16, 249, 2015

Douglas RG, Amino R, Sinnis P, Frischknecht F: Active migration and passive transport of malaria parasites. **Trends Parasitol 2015**; 31,357-62

Hellmann JK, Münter S, Kudryashev M, Schulz S, Heiss K, Müller AK, Matuschewski K, Spatz JP, Schwarz US and Frischknecht F: Environmental constraints guide migration of malaria parasites during transmission. **PLoS Pathogens 2011**; 7, e1002080

Münter S, Sabass B, Selhuber-Unkel C, Kudryashev M, Hegge S, Spatz JP, Engel U, Matuschewski K, Schwarz US# and Frischknecht F#: Plasmodium sporozoite motility is modulated by the turnover of discrete adhesion sites. **Cell Host Microbe 2009**; 6: 551-562

Cyrklaff M#, Kudryashev M, Leis A, Leonard K, Baumeister W, Ménard R, Meissner M and Frischknecht F#: Cryoelectron tomography reveals periodic luminal material in subpellicular microtubules from apicomplexan parasites. **Journal of Experimental Medicine 2007**; 204, 1281-1287

Amino R#, Thiberge S, Martin B, Celli S, Shorte SL, Frischknecht F# and Ménard R#: Quantitative imaging of malaria parasite transmission to the mammalian host. **Nature Medicine 2006**; 12, 220-224

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Scientific Vita

2016-present: Junior Group Leader, Department of Infectious Diseases, Parasitology, Heidelberg University Hospital, Heidelberg

2010-2016: PostDoc, Harvard University, Cambridge, MA, USA

2009-2010: PostDoc, Max Planck Institute for Infection Biology, Berlin

2005-2009: PhD student, Department of Infectious Diseases, Parasitology, Heidelberg University Hospital, Heidelberg

2000-2005: Studies of Biology, Heidelberg University, Heidelberg

Specific Research Interests

- Molecular parasitology
- Malaria cell biology of replication
- Cell cycle regulation
- Reverse genetics and inducible knockdown technology
- Advanced imaging and proteomics

Selected Publications

Ganter M, Goldberg JM, Dvorin JD, Paulo JA, King JG, Tripathi AK, Paul AS, Yang J, Coppens I, Jiang RHY, Baker DA, Dinglasan RR, Gygi SP, Duraisingh MT. Plasmodium falciparum CRK4 directs continuous rounds of DNA replication during schizogony. **Nature Microbiology 2017**; 2, 17017

Paul AS, Saha S, Jiang RHY, Coleman BI, Kosber AL, Chen C, Ganter M, Espy N, Gubbels MJ, Duraisingh MT. Parasite calcineurin regulates host cell recognition and attachment by apicomplexans. **Cell Host Microbe 2015**; 18, 49-60

Ganter M, Rizopoulos Z, Schuler H, Matuschewski K. 2015. Pivotal and distinct role for Plasmodium actin capping protein alpha during blood infection of the Malaria parasite. **Molecular Microbiology 2015**; 96, 84-94

Coleman BI, Skillman KM, Jiang RHY, Childs LM, Altenhofen LM, Ganter M, Leung Y, Goldowitz I, Kafsack BFC, Marti M, Llinas M, Buckee CO, Duraisingh MT. A Plasmodium falciparum histone deacetylase regulates antigenic variation and gametocyte conversion. **Cell Host Microbe 2014**; 16, 177-186

Sattler J#, Ganter M#, Hliscs M, Matuschewski K, Schuler H. 2011. Actin regulation in the malaria parasite. **European Journal of Cell Biology 2011**; 90, 966-971

Siden-Kiamos I#, Ganter M#, Kunze A, Hliscs M, Steinbüchel M, Mendoza J, Sinden R, Louis K, Matuschewski K. Stage-specific depletion of myosin A supports an essential role in motility of malarial ookinetes. **Cellular Microbiology 2011**; 13, 1996-2006

Ganter M, Schuler H, Matuschweski K. Vital role for the Plasmodium capping protein (CP) beta subunit in motility of malaria sporozoites. **Molecular Microbiology 2009**; 74, 1356-1367

Kursula I, Kursula P, Ganter M, Panjikar S, Matuschewski K, Schuler H. Structural basis for parasite-specific functions of the divergent profilin of Plasmodium falciparum. **Structure 2008**; 16, 1638-1648

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Scientific Vita

2017-present: Young group leader at Heidelberg University Hospital investigating nuclear division mechanisms in human malaria parasites.

2017: Visiting researcher at Siegel lab, University Würzburg (Germany).

2011-2016: Postdoc as HFSP fellow Scherf lab, Institut Pasteur, Paris (France).

2011: One-month volunteering project, Sironko, (Uganda).

2007-2011: PhD project at Gerlich lab, ETH Zurich (Switzerland).

2006: Diploma thesis project at Vogel lab, McGill University, Montreal (Canada).

2003 – 2005: Studies in Biotechnology, ESBS university, Strasbourg (France).

2001 – 2003: Studies in Biology, University Karlsruhe (Germany).

Specific Research Interests

- Molecular parasitology
- Cell division mechanisms of malaria parasite
- Cellular dynamics of mitotic factors

- Super-resolution and electron microscopy methods
- Genome editing of human blood stage malaria parasites
- Host-pathogen interactions and antigenic variation

Selected Publications

Barcons-Simon A, Cordon-Obras C, Guizetti J, Bryant J, Scherf A: CRISPR interference of a clonally variant GC-rich non-coding RNA family leads to general repression of var genes in Plasmodium falciparum. **mBio 2020**; 11(1), e03054-19

Mehnert AK, Simon CS, Guizetti J: Immunofluorescence staining protocol for STED nanoscopy of Plasmodium-infected red blood cells. **Mol Biochem Parasitol. 2019**; 229, 47-52

Bryant J.M., Regnault C., Scheidig-Benatar C., Baumgarten S., Guizetti J.*, Scherf A.. CRISPR/Cas9 Genome Editing Reveals That the Intron Is Not Essential for var2csa Gene Activation or Silencing in Plasmodium falciparum. **MBio 2017**; 8(4) pii: e00729-17

Guizetti, J.*, Barcons-Simon, A., Scherf, A. Trans-acting GC-rich non-coding RNA at var expression site modulates gene counting in malaria parasite. **Nucleic Acids Res 2016**; 44, 9710–9718

Zhang, Q., Siegel, T. N., Martins, R.M., Wang, F., Cao, J., Gao, Q., Cheng, X., Jiang, L., Hon, C. C., Scheidig-Benatar, C., Sakamoto, H., Turner, L., Jensen, A. T., Claes, A., Guizetti, J., Malmquist, N. A., and Scherf, A.. Exonuclease-mediated degradation of nascent RNA silences genes linked to severe malaria. **Nature 2014** 513, 431-435

Guizetti, J., Martins, R.M., Guadagnini, S., Claes, A., and Scherf, A. Nuclear Pores and Perinuclear Expression Sites of var and Ribosomal DNA Genes Correspond to Physically Distinct Regions in Plasmodium falciparum. **Eukaryot Cell 2013**; 12, 697-702

Guizetti, J.*, and Scherf, A. Silence, activate, poise and switch! Mechanisms of antigenic variation in Plasmodium falciparum. **Cell Microbiol 2013**; 15, 718-726

Guizetti, J., Schermelleh, L., Mantler, J., Maar, S., Poser, I., Leonhardt, H., Muller-Reichert, T., and Gerlich, D. W. Cortical constriction during abscission involves helices of ESCRT-III-dependent filaments. **Science 2011**; 331, 1616-1620

Guizetti, J., Mantler, J., Muller-Reichert, T., and Gerlich, D.W. Correlative time-lapse imaging and electron microscopy to study abscission in HeLa cells. **Methods Cell Biol 2010**; 96, 591-601

Guizetti, J., and Gerlich, D.W. Cytokinetic abscission in animal cells. **Semin Cell Dev Biol 2010**; 21, 909-916

Steigemann, P., Wurzenberger, C., Schmitz, M.H., Held, M., Guizetti, J., Maar, S., and Gerlich, D.W. Aurora B-mediated abscission checkpoint protects against tetraploidization. **Cell 2009**; 136, 473-484

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Scientific Vita

2016-2021: Junior Group Leader, Department of Parasitology, University of Heidelberg

2013-present: Clinical Research Fellow and Group Leader, Biosciences Dept, KEMRI-Wellcome Trust Research Program (KWTRP), Kenya

2010-2012: Postdoc, Burnet Institute for Medical Research, Melbourne, Australia

2008-2010: Clinical Fellow in Immunology, Centre for Vaccinology and Tropical Medicine, Oxford, UK and KWTRP

2004-2008: Wellcome Trust Training Fellow (PhD), London School of Hygiene and Tropical Medicine and KWTRP

2003-2004: Masters in Human Immunity (with Distinction), University of Liverpool, UK

2001-2003: Member of the Royal College of Paediatrics and Child Health (MRCPCH), UK

1997-2003: Training in Paediatrics, KWTRP and National Health Service, UK

1990-1996: Bachelor of Medicine and Surgery, University of Nairobi, Kenya

Specific Research Interests

- Human immunity to *Plasmodium falciparum* malaria
- Parasite-host interactions
- Vaccine Development for malaria
- Epidemiology & Molecular biology of infectious diseases

Selected Publications

Murungi LM, Sondén K, Llewellyn D, Rono J, Guleid F, Williams AR, Ogada E, Thairu A, Färnert A, Marsh K, Draper SJ, Osier FH: Severe Plasmodium falciparum malaria: targets and mechanisms associated with protection in Kenyan children. **Infect Immun 2016**; 84: 950-63

Rono J, Färnert A, Murungi L, Ojal J, Kamuyu G, Guleid F, Nyangweso G, Wambua J, Kitsao B, Olotu A, Marsh K, Osier FH: Multiple clinical episodes of Plasmodium falciparum malaria in a low transmission intensity setting: exposure versus immunity. **BMC Med 2015**; 13: 114

Boyle MJ, Reiling L, Feng G, Langer C, Osier FH, Aspeling-Jones H, Cheng YS, Stubbs J, Tetteh KK, Conway DJ, McCarthy JS, Muller I, Marsh K, Anders RF, Beeson JG: Human Antibodies Fix Complement to Inhibit Plasmodium falciparum Invasion of Erythrocytes and Are Associated with Protection against Malaria. **Immunity 2015**; 42: 580-90

Osier FH, Mackinnon MJ, Crosnier C, Fegan G, Kamuyu G, Wanaguru M, Ogada E, McDade B, Rayner JC, Wright GJ, Marsh K: New antigens for a multicomponent blood-stage malaria vaccine. **Sci Transl Med 2014**; 6: 247ra102

Osier FHA, Feng G, Boyle MJ, Langer C, Zhou J, Richards JS, McCallum FJ, Reiling L, Jaworowski A, Anders R, Marsh K, Beeson JG: Opsonic phagocytosis of Plasmodium falciparum merozoites: mechanism in human immunity and a correlate of protection against malaria. **BMC Med 2014**; 12: 108

Murungi LM, Kamuyu G, Lowe B, Bejon P, Theisen M, Kinyanjui SM, Marsh K, Osier FH. A threshold concentration of anti-merozoite antibodies is required for protection from clinical episodes of malaria. Vaccine 2013; 31: 3936-42

Douglas AD, Williams AR, Illingworth JJ, Kamuyu G, Biswas S, Goodman AL, Wyllie DH, Crosnier C, Miura K, Wright GJ, Long CA, Osier FH, Marsh K, Turner AV, Hill AV, Draper SJ: The blood-stage malaria antigen PfRH5 is susceptible to vaccine-inducible cross-strain neutralizing antibody. **Nat Commun 2011**; 2: 601

Osier FHA, Weedall GD, Verra F, Murungi L, Tetteh KKA, Bull P, Faber BW, Remarque E, Thomas A, Marsh K, Conway DJ: Allelic diversity and naturally acquired allele-specific antibody responses to Plasmodium falciparum apical membrane antigen 1 in Kenya. **Infect Immun 2010**; 78: 4625-33

Osier FHA, Murungi LM, Fegan G, Tuju J, Tetteh KK, Bull PC, Conway DJ, Marsh K: Allele-specific antibodies to Plasmodium falciparum merozoite surface protein-2 and protection against clinical malaria. **Parasite Immunol 2010**; 32: 193-201

Osier FHA, Fegan G, Polley SD, Murungi L, Verra F, Tetteh KKA, Lowe B, Mwangi T, Bull PC, Thomas AW, Cavanagh DR, McBride JS, Lanar DE, Mackinnon M, Conway DJ, Marsh K: Breadth and magnitude of antibody responses to multiple Plasmodium falciparum merozoite antigens are associated with protection from clinical malaria. **Infect Immun 2008**; 76: 2240-8

Prof. Dr. Christine Clayton

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Scientific Vita

1990-present: Professor for Microbiology, University of Heidelberg

1990-1990: Associate Professor, The Rockefeller University, New York USA

1983-1990: Assistant Professor, The Rockefeller University, New York USA

1981-1983: Postdoctoral Fellow, Stanford University Medical Center, California, USA

1978-1981: Postdoctoral Fellow, Imperial College, London, UK

1979: PhD (Zoology) University of London, UK

1975-1978: PhD student, National institute for Medical research, Mill Hill, London, UK

1972-1975: Bachelor of natural Sciences, major Biochemistry, University of Cambridge, UK

Specific Research Interests

- Regulation of mRNA decay and translation in trypanosomes
- Control of mRNA processing in trypanosomes
- Inhibition of mRNA processing by trypanocidal benzoxaboroles

Selected Publications

Begolo D, Vincent IM, Giordani F, Pöhner I, Witty MJ, Rowan TG, Bengaly Z, Gillingwater K, Freund Y, Wade RC, Barrett MP, Clayton C: The trypanocidal benzoxaborole AN7973 inhibits trypanosome mRNA processing. **PLoS Pathog 2018**; 25;14(9):e1007315

Terrao M, Kimanyi Marucha K, Mugo E, Braun J, Droll D, Minia I, Egler F, Clayton C: The suppressive cap-binding-complex factor 4EIP is required for normal differentiation. **Nucleic Acids Res 2018**; 46(17):8993-9010

Mulindwa J, Leiss K, Ibberson D, Kamanyi Marucha K, Helbig C, Nascimento L, Silvester E, Matthews K, Matovu E, Enyaru J, Clayton C: Transcriptomes of Trypanosoma brucei rhodesiense from sleeping sickness patients, rodents and culture: effects of strain, growth conditions and RNA preparation methods. **PLoS Negl Trop Dis 2018**; 23;12(2):e0006280

Mugo E, Clayton C: Expression of the RNA-binding protein RBP10 promotes the bloodstream-form differentiation state in Trypanosoma brucei. **PLoS Pathog 2017**; 11;13(8):e1006560

Minia I, Mercé C, Terrao M, Clayton C: Translation regulation and RNA granule formation after heat shock of procyclic form Trypanosoma brucei: many heat-induced mRNAs are increased during differentiation to mammalian-infective forms. **PLoS Negl Trop Dis 2016**; 8;10(9):e0004982

Clayton C: Gene expression in Kinetoplastids. **Curr Opin Microbiol 2016**; 32, 46-51

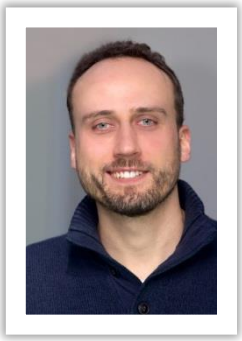
Minia I, Clayton C: Regulating a post-transcriptional regulator: protein phosphorylation, degradation and translational blockage in control of the trypanosome stress-response RNA-binding protein ZC3H11. **PLoS Pathog 2016**; 22;12(3):e1005514

Antwi E, Haanstra J, Ramasamy G, Jensen B, Droll D, Rojas F, Minia I, Terrao M, Mercé C, Matthews K, Myler PJ, Parsons M, Clayton C: Integrative analysis of the Trypanosoma brucei gene expression cascade predicts differential regulation of mRNA processing and unusual control of ribosomal protein expression. **BMC Genomics 2016**; 26;17:306

Fadda A, Ryten M, Droll D, Rojas F, Färber V, Haanstra JR, Bakker BM, Matthews K and Clayton C: Transcriptome-wide analysis of mRNA decay reveals complex degradation kinetics and suggests a role for co-transcriptional degradation in determining mRNA levels. **Mol Microbiol 2014**; 94, 307-26

Singh A, Minia I, Droll D, Fadda A, Clayton C, Erben E: Trypanosome MKT1 and the RNA-binding protein ZC3H11: interactions and potential roles in post-transcriptional regulatory networks. **Nucleic Acids Res 2014**; 42, 4652-68

List of the Associated Research Groups Major Infectious Diseases



Dr. Marco Binder

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Specific Research Interests

- Cell intrinsic immune defense and inflammatory signaling pathways
- Regulation and dynamics of signaling events
- Dynamics of RNA-virus replication
- Virus-host interactions in innate immunity
- Systems biology and mathematical modeling

apl. Prof. Dr. Martin Müller

Research Group "*Tumorvirus-specific vaccination strategies"*
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Specific Research Interests

- Prophylactic and therapeutic vaccination against human papillomaviruses (HPV)
- Scaffolds for vaccine antigens
- Natural and vaccine induced immunity against HPV
- Host cell restriction and dependency factors for adeno-associated viruses (AAV) and HP

Dr. Ellen Krautkrämer

Research Group "*Hantavirus pathogenesis*"
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Specific Research Interests

- Replication cycle of hantaviruses in renal cells
- Clinical characteristics of hantavirus infection
- Mechanisms of hantavirus-induced cellular damage and renal failure

PD Dr. Dr. Angelika Riemer

Research Group "*Immunotherapy and Immunoprevention*"
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Specific Research Interests

- Therapeutic cancer vaccines, especially against HPV-mediated malignancies
- Direct (MS-based) detection of CTL target epitopes on the surface of infected or transformed cells
- Therapeutic vaccine design and formulation
- Directing vaccination-induced T cells to certain body sites
- HPV-induced changes in antigen processing and presentation

apl. Prof. Dr. Martin Löchelt

Research Group "*Molecular Biology and Application of Recombinant Foamy Viruses*"
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Specific Research Interests

- Spuma Retroviruses (Foamy Viruses)
- Vaccine vector development
- Virus-host interaction in virus replication in vitro and in vivo
- Retrovirus assembly, morphogenesis and release
- APOBEC3 proteins: antiviral restriction factors and cancer genome mutators

Prof. Dr. Felix Hoppe-Seyler

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Specific Research Interests

- Human papillomavirus (HPV)-linked cancers: Transformation mechanisms and novel therapeutic strategies
- Crosstalk between HPVs and the host cell metabolism (hypoxia, iron and glucose metabolism)
- Cell biology of HPV-positive cancer cells: Regulation of senescence and apoptosis
- Signal transduction

Prof. Dr. Hedda Wardemann

Research Group "B Cell Immunology / B-Zell-Immunologie" (D130)
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Specific Research Interests

- Human immune responses against Plasmodium falciparum
- Malaria vaccine development
- Immunological memory to infection and vaccination
- Antigen-receptor diversity and quality of immune responses

Dr. Erec Stebbins

Research Group "Structural Biology of Infection and Immunity" (D160)
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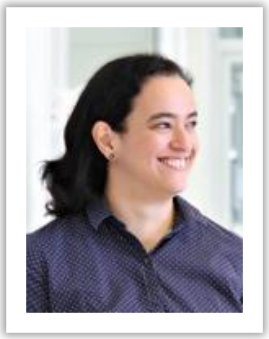
Specific Research Interests

- Microbial pathogens as they relate to immunology and human carcinogenesis
- Structural biology/X-ray crystallography
- The African trypanosome (*T. brucei*), the causative agent of sleeping sickness
- Genotoxins or agents impacting oncogenic growth regulatory factors in the cell



Prof. Dr. F. Nina Papavasiliou

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Specific Research Interests

- Surface receptor diversification in the African trypanosome (*T. brucei*), the causative agent of sleeping sickness
- The interface between host immunity (antibodies) and the ever changing coat composition of *T. brucei* (also known as antigenic variation)
- Informational diversity through epitranscriptomic mechanisms in host immune cells

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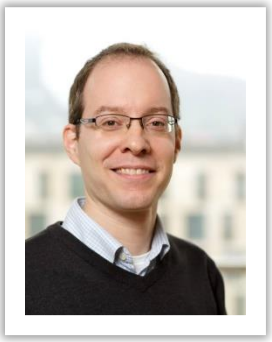
Specific Research Interests

- Regulation of immune responses by the micromilieu (human and mouse models)
- Co-stimulatory signaling in T lymphocytes, cytoskeletal remodeling and redox regulation
- Regulation and function of granulocytes
- Allergy and chronic inflammatory diseases (SFB TRR 156)
- Tumor immunology and immune therapy (CAR T-cells, Checkpoint inhibitors)
- Tumor migration and metastasis
- Immunomodulation by plant-derived substances (www.azkim.de, www.cimresearch.org)
- High resolution imaging, InFlow microscopy



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Specific Research Interests

- Mathematical modeling of host-pathogen interactions
- Spatio-temporal dynamics of infection and immune processes
- Viral spread within tissues
- Immune cell differentiation and vaccine design

Prof. Dr. Frank Rösl

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Specific Research Interests

- Interference of papillomaviruses in signal transduction pathways
- relationship between "white" skin cancer and the infection with so-called cutaneous papilloma viruses

Dr. Antonio Marchini

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Specific Research Interests

- Oncolytic parvoviruses
- Oncolytic Virotherapy

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Specific Research Interests

- Molecular mechanism of NK/ILC activation
- Functional Diversification of NK cells
- Interaction of NK/ILCs with other Immune Cells, Endothelial Cells and virus-infected Liver Cells
- novel NK Cell-based Immunotherapies and Combination Therapies in preclinical Mouse Models

PD Dr. med. Dennis Nurjadi

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Specific Research Interests

- Immune mechanisms and pathogen-host interaction of *Staphylococcus aureus* colonization and infection
- Molecular mechanisms and epidemiology of antimicrobial resistance in clinically relevant pathogens
- NGS-based strain typing and (bacterial) outbreak diagnostics
- Clinical studies in infectious diseases

Dr. Dr. Christine E. Engeland

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Specific Research Interests

- viral vectors for cancer immunotherapy and vaccination
- measles virus (vaccines) and paramyxoviruses
- virus-host interactions

Former group leaders of the Major Infectious Diseases

!Practicals/master theses that are completed in these working groups are considered external and must be applied for separately!

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Specific Research Interests

- amyloid fibril proteins
- arbovirus
- cell biology of virus entry
- early virus–host cell interactions
- emerging zoonotic viruses
- molecular factors responsible for viral virulence
- viral fusion
- virus–receptor interactions

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Specific Research Interests

- Malaria
- Chaperones
- Evolution
- Protein traffic
- Protein folding

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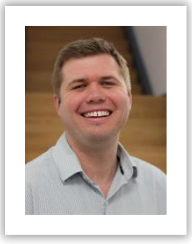
Web: https://www.mpiib-berlin.mpg.de/2019364/malaria-parasite-biology

Specific Research Interests

- *Plasmodium* seasonal transmission
- Survival mechanisms of *P. falciparum* when no vectors are available
- Immune response to asymptomatic *P. falciparum* infections
- *Plasmodium* virulence and variant surface antigens
- *Plasmodium* gametocytogenesis dynamics throughout the dry season
- Transmission capacity of *P. falciparum* kept asymptomatically during the dry season



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Specific Research Interests

- *Plasmodium* cytoskeleton dynamics

Students of the Major ‘Infectious Diseases’ WS 2016-2017

From left to right, in the back: Yannik Voß, Léanne Strauß, Jasmin Dehnen, Tammy Lan, Christian Sommerauer, Moritz König. In the middle: Micha Rosenkranz, Thomas Kehrer, Emma Pietsch, Franziska Kraus, Benjamin Lang, Silke Schmidt, Anna Huhn. In the front: Sabina Ganskih, Julia Heinze.

Students of the Major ‘Infectious Diseases’ WS 2017-2018

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Students of the Major ‘Infectious Diseases’ WS 2019-2020

From left to right, in the back: Carl-Niklas Schneider, Romy Brecht, Nathan Ribot, Christoph Wenz, Vidmante Visockaite. In the front: Mariana Ríos Vázquez, Antonia Louisa Boehmert, Koleta Michalek, Sara Kraker, Paulina Schad, Sarah Peterl, Charlotte Kamm.