Prof. Matthias Geyer, PhD

Institute of Innate Immunity

new Member since 2015

Rheinische Friedrich-Wilhelms-Universität Bonn

Institute of Innate Immunity

Department of Structural Immunology

E-Mail: matthias.geyer@uni-bonn.de

Research Expertise

The Geyer lab is interested in the regulation of transcription and the molecular mechanisms that govern immune receptor activation. We use a variety of techniques from molecular biology and biochemistry to structural biology to analyze interaction between proteins, RNA, lipids, and ligands. The transcription cycle is regulated by cyclin-dependent kinases that phosphorylate the RNA polymerase II. We analyze the transition from transcription initiation to productive elongation in eukaryotic cells. We study the molecular and structural mechanisms that determine the activity and regulation of transcription-controlling kinases, as well as their inhibition by small molecular compounds. We recently also focused on the analysis of receptor activation of NLRP3 and formation of the NLRP3/ASC/caspase inflammasome. Besides NACHT-domain containing proteins, Toll-like receptors, RIG-I and the cGAS-STING pathway mediate the immune-recognition of pathogens. We aim at identifying target sites in these immune regulators that allow for the specific interference with the immune system, e.g., by small molecular compounds.

Education / Training

University of Heidelberg, Germany, Biochemistry, Habilitation, 2006

University of Heidelberg, Germany, Biophysics, PhD, 1995

University of Heidelberg, Germany, Physics, Diploma, 1991

Appointments / Positions Held

2014 - present
Group leader Structural Immunology, University of Bonn, Germany

2012 - 2014
Group leader Physical Biochemistry, Research center caesar, Bonn, Germany

2003 - 2012
Group leader, Department of Physical Biochemistry, Max Planck Institute of Molecular Physiology, Dortmund, Germany

2001 - 2002
Visiting Scientist, Computational and Structural Biology Programme, European Molecular Biology Laboratory, Heidelberg, Germany

1998 - 2001
Research associate at the Howard Hughes Medical Institute, Dept. of Medicine, Microbiology and Immunology, University of California at San Francisco, San Francisco, USA

1995 - 1998
Research fellow in the Dept. of Biophysics, Max-Planck-Institute for Medical Research, Heidelberg, Germany

Honors / Awards

2008
Editorial Board Member: Cytoskeleton

2001
Habilitation fellowship of the Peter and Traudl Engelhorn-Stiftung, Penzberg

1998
Long-term fellowship of the European Molecular Biology Organization (EMBO), Heidelberg

1995
Postdoctoral fellowship of the German Science Foundation (DFG)

10 Most Relevant Publications for Prof. Matthias Geyer

1. Greifenberg AK, Hönig D, Pilarova K, Düster R, Bartholomeeusen K, Bösken CA, Anand K, Blazek D, **Geyer M** (2016). Structural and functional analysis of the Cdk13/Cyclin K complex. Cell Rep. 14, 320–331.
2. Kühn S, Erdmann C, Kage, F, Block, J, Schwenkmezger L, Steffen A, Rottner K, **Geyer M** (2015). Structure of the FMNL2–Cdc42 complex yields insights in lamellipodia and filopodia formation. Nat. Commun. 6: 7088.
3. Bösken CA, Farnung L, Hintermair C, Merzel Schachter M, Vogel-Bachmayr K, Blazek D, Anand K, Fisher RP, Eick D, **Geyer M** (2014). The structure and substrate specificity of human Cdk12/Cyclin K. Nat. Commun. 5: 3505.
4. Eick D, **Geyer M** (2013). The RNA polymerase II carboxy-terminal domain (CTD) code. Chem. Rev. 113, 8456–8490.
5. Czudnochowski N, Bösken CA, **Geyer M** (2012). Serine-7 but not serine-5 phosphorylation primes RNA polymerase II CTD for P-TEFb recognition. Nat. Commun. 3: 842.
6. Vollmuth F, **Geyer M** (2010). Interaction of propionylated and butyrylated histone H3 lysine marks with Brd4 bromodomains. Angew. Chem. Int. Ed. Engl. 49, 6768–6772.
7. Gerlach H, Laumann V, Martens S, Becker CF, Goody RS, **Geyer M** (2010). HIV-1 Nef membrane association depends on charge, curvature, composition and sequence. Nat. Chem. Biol. 6, 46–53.
8. Anand K, Schulte A, Vogel-Bachmayr K, Scheffzek K, **Geyer M** (2008). Structural insights into the cyclin T1-Tat-TAR RNA transcription activation complex from EIAV. Nat. Struct. Mol. Biol. 15, 1287–1292.
9. Nekrep N, Jabrane-Ferrat N, Wolf HM, Eibl MM, **Geyer M**, Peterlin BM (2002). Mutation in a winged-helix DNA-binding motif causes atypical bare lymphocyte syndrome. Nat. Immunol. 3, 1075–1081.
10. Antz C, **Geyer M**, Fakler B, Schott MK, Guy HR, Frank R, Ruppersberg JP, Kalbitzer HR. (1998). NMR structure of inactivation gates from mammalian voltage-dependent potassium channels. Nature 385, 272–275.