BIOGRAPHICAL SKETCH

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NAME: **Klengel, Torsten, MD, PhD**

eRA COMMONS USER NAME (credential, e.g., agency login): **tklengel**

POSITION TITLE: **Assistant Professor of Psychiatry, Harvard Medical School**
Director, Translational Molecular Genomics Laboratory, McLean Hospital
Secondary affiliation at U Göttingen, Germany

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	END DATE MM/YYYY	FIELD OF STUDY
University of Wurzburg, Wurzburg, Germany	MD	08/2007	Medicine
University of Munich (LMU) and Max Planck Institute of Psychiatry, Munich, Germany	PHD	01/2016	Neurobiology
Max Planck Institute of Psychiatry, Munich, Germany	Resident	04/2012	Adult Psychiatry
Max Planck Institute of Psychiatry, Munich	Fellow	03/2014	Clinical Research Scientist
Emory University, School of Medicine, Atlanta, GA	Fellow	07/2015	Neuroscience, Psychiatry
McLean Hospital, Harvard Medical School, Belmont, MA	Fellow	03/2016	Neuroscience, Psychiatry

A. Personal Statement

I am an Assistant Professor of Psychiatry at Harvard Medical School and the Director of the Translational Molecular Genomics Laboratory at McLean Hospital. My research program focuses on a broad spectrum of molecular mechanisms underlying the development of psychiatric disorders. Specifically, my lab performs rodent, non-human primate and human studies to investigate the role of environmental factors influencing long-term epigenetic programming, the expression of non-coding RNAs, and the risk to develop psychiatric disorders. I am also interested in the contribution of genetic disposition to psychiatric disorders and how genes and environment interact.

1. **Klengel T**, Mehta D, Anacker C, Rex-Haffner M, Pruessner JC, Pariante CM, Pace TW, Mercer KB, Mayberg HS, Bradley B, Nemeroff CB, Holsboer F, Heim CM, Ressler KJ, Rein T, Binder EB. Allele-specific FKBP5 DNA demethylation mediates gene-childhood trauma interactions. Nat Neurosci. 2013 Jan;16(1):33-41. PubMed PMID: 23201972; PubMed Central PMCID: PMC4136922.

2. **Klengel T**, Binder EB. Epigenetics of Stress-Related Psychiatric Disorders and Gene × Environment Interactions. Neuron. 2015 Jun 17;86(6):1343-57. PubMed PMID: 26087162.

3. Mehta D, **Klengel T**, Conneely KN, Smith AK, Altmann A, Pace TW, Rex-Haffner M, Loeschner A, Gonik M, Mercer KB, Bradley B, Müller-Myhsok B, Ressler KJ, Binder EB. Childhood maltreatment is associated with distinct genomic and epigenetic profiles in posttraumatic stress disorder. Proc Natl Acad Sci U S A. 2013 May 14;110(20):8302-7. PubMed PMID: 23630272; PubMed Central PMCID: PMC3657772.

4. Yehuda R, Daskalakis NP, Bierer LM, Bader HN, **Klengel T**, Holsboer F, Binder EB. Holocaust Exposure Induced Intergenerational Effects on FKBP5 Methylation. Biol Psychiatry. 2016 Sep 1;80(5):372-80. PubMed PMID: 26410355.

B. Positions and Honors

Positions and Employment

2007 - 2012	Residency in Adult Psychiatry, Max Planck Institute of Psychiatry, Munich
2012 - 2014	Clinical Research Scientist, Max Planck Institute of Psychiatry, Munich
2014 - 2015	Research Fellow, Emory University, Atlanta, GA
2015 - 2016	Research Fellow, McLean Hospital, Harvard Medical School, Belmont, MA
2016 - 2018	Instructor, McLean Hospital, Harvard Medical School, Belmont, MA
2018-	Assistant Professor of Psychiatry, McLean Hospital, Harvard Medical School, Belmont, MA with secondary affiliation at U Göttingen, Germany

Other Experience and Professional Memberships

2014 -	Member, Society for Neuroscience
2017 -	Member, Society of Biological Psychiatry
2017 -	Member, American Society of Human Genetics

Honors

2002	Scholarship, German National Academic Foundation
2006	DAAD Travel Scholarship Japan , German Academic Exchange Service
2007	Scholarship, Max Planck Society
2008	Dissertation Award (MD), Dr. Josef Schneider-Theresia-Stiftung
2010	Travel Award, Workshop on Neuropsychopharmacology, European College of Neuropsychopharmacology (ECNP)
2012	Scholarship, German Society of Neurology (Felgenhauer Stiftung)
2013	Travel Grant Herrenhausen Conference “Mental Health Throughout Life”, Volkswagen Foundation
2013	Career Development Travel Award, Anxiety and Depression Association of America
2013	International Travel Fellowship Award, Socienty of Biological Psychiatry
2013	Sponsorship Award, German Society of Psychotraumatology (DeGPT)
2013	Research Prize, European Psychiatric Association (EPA)
2013	Travel Award, GlaxoSmithKline Foundation
2013	NARSAD Young Investigator, Brain & Behavior Research Foundation
2014	Travel Award, GlaxoSmithKline Foundation
2014	EMBO Long-Term Fellowship , EMBO
2014	ADAA/ACNP Travel Award, American College of Neuropsychopharmacology
2015	Travel Award, Wisconsin Symposium on Emotion

C. Contribution to Science

1. I began my research career while earning my medical degree. I pursued an undergraduate research thesis in microbiology/infectious diseases with Fritz A. Muhlschlegel, MD at the University of Kent, Canterbury, UK. The focus was on environmental sensing in the human fungal pathogen Candida albicans. Here, I obtained a profound knowledge of molecular microbiology and biochemistry and helped investigate the molecular mechanism by which Candida senses carbon dioxide using a soluble adenylyl cyclase. Dissecting the molecular mechanism of carbon dioxide sensing, we showed how this pivotal environmental signal influences the morphological switch of Candida from yeast to hyphal growth, which is regarded as one of the major virulence factors. My work resulted in a highly cited first author article in Current Biology and a co-author publication in Eukaryotic Cell.

    1. **Klengel T**, Liang WJ, Chaloupka J, Ruoff C, Schröppel K, Naglik JR, Eckert SE, Mogensen EG, Haynes K, Tuite MF, Levin LR, Buck J, Mühlschlegel FA. Fungal adenylyl cyclase integrates CO2

sensing with cAMP signaling and virulence. Curr Biol. 2005 Nov 22;15(22):2021-6. PubMed PMID: 16303561; PubMed Central PMCID: PMC3646525.

2. Mogensen EG, Janbon G, Chaloupka J, Steegborn C, Fu MS, Moyrand F, **Klengel T**, Pearson DS, Geeves MA, Buck J, Levin LR, Mühlschlegel FA. Cryptococcus neoformans senses CO2 through the carbonic anhydrase Can2 and the adenylyl cyclase Cac1. Eukaryot Cell. 2006 Jan;5(1):103-11. PubMed PMID: 16400172; PubMed Central PMCID: PMC1360268.

2. I extended my clinical research knowledge and skills during my residency in Adult Psychiatry at the Max Planck Institute of Psychiatry, Munich, Germany. Here I focused on learning and applying my clinical skills with a strong emphasis on stress- and fear-related disorders. I contributed to several clinical genetic studies by actively recruiting patients, collecting biospecimens and analyzing data. I published my work in Acta Psychiatrica Scandinavica and co-authored publications in Neuropsychopharmacology, Genes, Brain and Behavior and others.

    1. **Klengel T**, Heck A, Pfister H, Brückl T, Hennings JM, Menke A, Czamara D, Müller-Myhsok B, Ising M. Somatization in major depression--clinical features and genetic associations. Acta Psychiatr Scand. 2011 Oct;124(4):317-28. PubMed PMID: 21838737.
    2. Menke A, Domschke K, Czamara D, **Klengel T**, Hennings J, Lucae S, Baune BT, Arolt V, Müller-Myhsok B, Holsboer F, Binder EB. Genome-wide association study of antidepressant treatment-emergent suicidal ideation. Neuropsychopharmacology. 2012 Feb;37(3):797-807. PubMed PMID: 22030708; PubMed Central PMCID: PMC3260972.
    3. Hennings JM, Kohli MA, Czamara D, Giese M, Eckert A, Wolf C, Heck A, Domschke K, Arolt V, Baune BT, Horstmann S, Brückl T, **Klengel T**, Menke A, Müller-Myhsok B, Ising M, Uhr M, Lucae S. Possible associations of NTRK2 polymorphisms with antidepressant treatment outcome: findings from an extended tag SNP approach. PLoS One. 2013;8(6):e64947. PubMed PMID: 23750220; PubMed Central PMCID: PMC3672143.
    4. Menke A, **Klengel T**, Rubel J, Brückl T, Pfister H, Lucae S, Uhr M, Holsboer F, Binder EB. Genetic variation in FKBP5 associated with the extent of stress hormone dysregulation in major depression. Genes Brain Behav. 2013 Apr;12(3):289-96. PubMed PMID: 23406438.

3. During my residency, I developed a strong interest in the basic molecular genetics of psychiatric disorders. Hence, I discontinued my clinical career and joined the lab of Elisabeth B. Binder MD, PhD at the Max Planck Institute of Psychiatry, Munich, Germany to pursue research on the epigenetic and genetic mechanisms of trauma related disorders. I was able to show that a functional polymorphism in the gene FKBP5, an important regulator of the stress hormone system, is a key regulator of the epigenetic consequence of childhood trauma. We were able to demonstrate, for the first time, an epigenetic mechanism behind a gene-by-environment interaction by an allele-dependent demethylation. We published our work in Nature Neuroscience, which was covered by the national and international media and has been cited in close to 700 publications so far. In addition, I collaborated with several researchers within the group, as well as international partners, on genetic and epigenetic projects regarding trauma related psychiatric disorders leading to co-author publications in PNAS, Neuropsychopharmacology, Journal of Clinical Investigation, Biological Psychiatry, Molecular Psychiatry and others.

    1. Mehta D, Gonik M, **Klengel T**, Rex-Haffner M, Menke A, Rubel J, Mercer KB, Pütz B, Bradley B, Holsboer F, Ressler KJ, Müller-Myhsok B, Binder EB. Using polymorphisms in FKBP5 to define biologically distinct subtypes of posttraumatic stress disorder: evidence from endocrine and gene expression studies. Arch Gen Psychiatry. 2011 Sep;68(9):901-10. PubMed PMID: 21536970; PubMed Central PMCID: PMC3686481.
    2. **Klengel T**, Mehta D, Anacker C, Rex-Haffner M, Pruessner JC, Pariante CM, Pace TW, Mercer KB, Mayberg HS, Bradley B, Nemeroff CB, Holsboer F, Heim CM, Ressler KJ, Rein T, Binder EB. Allele-specific FKBP5 DNA demethylation mediates gene-childhood trauma interactions. Nat Neurosci. 2013 Jan;16(1):33-41. PubMed PMID: 23201972; PubMed Central PMCID: PMC4136922.
    3. Mehta D, **Klengel T**, Conneely KN, Smith AK, Altmann A, Pace TW, Rex-Haffner M, Loeschner A, Gonik M, Mercer KB, Bradley B, Müller-Myhsok B, Ressler KJ, Binder EB. Childhood maltreatment is associated with distinct genomic and epigenetic profiles in posttraumatic stress disorder. Proc Natl

Acad Sci U S A. 2013 May 14;110(20):8302-7. PubMed PMID: 23630272; PubMed Central PMCID: PMC3657772.

4. Blair LJ, Nordhues BA, Hill SE, Scaglione KM, O'Leary JC 3rd, Fontaine SN, Breydo L, Zhang B, Li P, Wang L, Cotman C, Paulson HL, Muschol M, Uversky VN, **Klengel T**, Binder EB, Kayed R, Golde TE, Berchtold N, Dickey CA. Accelerated neurodegeneration through chaperone-mediated oligomerization of tau. J Clin Invest. 2013 Oct;123(10):4158-69. PubMed PMID: 23999428; PubMed Central PMCID: PMC3784538.

D. Additional Information: Research Support and/or Scholastic Performance

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/sites/myncbi/torsten.klengel.1/bibliography/40890177/public/?sort=date&direction=descending

Ongoing Research Support

1R21HD097524-01A1 Ethun, Sanchez, Klengel (PI) 04/01/19-03/31/21
Effects of Stress and Obesity on Longitudinal Epigenetic Programming"
Goal of this project: To examine the dynamic change of epigenetic profiles in response to social stress and diet in non-human primates.
Role: PI

1R21MH117609-01A1 Klengel, Berretta, Guffanti (PI) 12/01/18-11/31/20
A role for circRNAs in Schizophrenia
Goal of this project: To detect circular RNAs in post-mortem brain tissue of people with schizophrenia and controls and to investigate the molecular contribution of circRNAs to schizophrenia.
Role: PI

1R01MH117292 - 01 Ressler (PI) 07/01/18-06/30/23
Site 3/3, Understanding PTSD through Postmortem Targeted Brain Multiomics
Goal of this project: The major goals of this project are, in collaboration with University of Miami and the Lieber Institute, to perform transcriptomic, proteomic, and epigenetic analyses of hippocampus, mPFC, and amygdala from postmortem brain tissue from subjects with PTSD compared to those with depression or healthy controls.
Role: Co-I

R01 MH110441-01, Brothers (PI) 07/21/16-04/30/20
Development of Nociceptin Receptor Agonists for post-traumatic stress disorder
Goal of this project: To improve the drug-like characteristics of nociceptin receptor agonists and to attenuate PTSD-like fear and anxiety behavior.
Role: Co-Investigator

1R21MH115327-01, Guffanti, Macciardi (PI) 09/01/17-08/31/19
The role of Human Endogenous Retroviruses (HERVs) in the regulation of neural genome of schizophrenia
Goal of this project: The goal of this study is to identify active transcription of noncoding HERVs in brain regions related to cognitive control, such as dorsal lateral prefrontal cortex, and to characterize the molecular mechanisms by which HERVs alter neighboring gene expression in the neural genome of schizophrenia.
Role: Co-Investigator

McLean Hospital-Kids and Community Partners Collaboration, Ressler (PI) 01/01/18-12/31/20
Connor Foundation
Goal of this project: To build a longitudinal study on childhood adversity, epigenetic mechanisms, and predictive biomarkers in a cohort of disadvantaged children in Dayton, OH.
Role: Co-Investigator

Completed Research Support

1R21HD088931-01A1, Klengel, Sanchez, Ressler (PI) 01/01/17-12/31/18
Longitudinal DNA methylation in a non-human primate model of early-life stress
Goal of this project: To examine the formation and function of epigenetic changes in response to early life stress in developing nonhuman primates, as well as whether these epigenetic changes are transmitted across generations
Role: MPI

Presidential Award, McLean Hospital of Harvard Medical School, Klengel (PI) 07/01/17-06/31/18
Circular RNAs in Schizophrenia
Goal of this project: To examine the formation and function of circular RNAs in post-mortem brain tissue of individuals with schizophrenia and controls.
Role: PI

EMBO ALTF 1153-2013, Klengel (PI) 04/01/14-03/31/16
Transgenerational inheritance of stress-evoked epigenetic modifications in human and mice.
Goal of this project: To examine the effects of stress on inter- and transgenerational phenotypes in mice.
Role: PI

NARSAD YI 20895, Brain & Behavior Research Foundation, Klengel (PI) 01/15/14-01/14/16
Longitudinal epigenetic modification of FKBP5 in rhesus monkey in a non-human primate model of early life stress.
Goal of this project: To examine the effects of early life maltreatment on FKBP5 DNA methylation in rhesus monkeys.
Role: PI