



MEDIZINISCHE  
FAKULTÄT

# Forschungsbericht 2017

Institut für Kognitive Neurologie und Demenzforschung

# INSTITUT FÜR KOGNITIVE NEUROLOGIE UND DEMENZFORSCHUNG

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## 1. Leitung

Prof. Dr. med. Emrah Düzel

## 2. Forschungsprofil

- Erforschung höherer Mechanismen kognitiver Hirnfunktionen (Gedächtnis, Motivation, zielgerichtetes Handeln, Entscheidungsfindung, Verhaltenskontrolle)
- Erforschung neurodegenerativer Erkrankungen (Demenz, Parkinson'sche Erkrankung)

## 3. Methoden und Ausrüstung

Funktionelle Bildgebungverfahren (Kernspintomographie, Magnetenzephalographie und EEG)

## 4. Forschungsprojekte

**Projektleitung:** Prof. Dr. Emrah Düzel

**Förderer:** Stiftungen - Sonstige; 01.07.2015 - 30.06.2020

### **Energil: Verbundprojekt "Anregung des Hippocampus bei älteren Menschen" (BMBF)**

Physical and cognitive inactivity as well as metabolic dysfunction are important risk factors for cognitive decline in old age. Very little is unknown about how the benefits of physical and cognitive activity are mechanistically linked to the plastic properties and energy metabolism of the brain nor the extent to which such risks are modifiable to improve cognition in aging. This consortium aims to test hypotheses that focus on the interdependence and interaction of neural plasticity and metabolic regulatory pathways such as insulin signaling. We also hypothesize that this interaction is modified by individual risk factors such as cerebral amyloidosis found in over 20% of cognitively normal older individuals. We will focus on a specific brain region, the hippocampus, because its dysfunction impairs spatial navigation and memory precision. These functions will be boosted through plasticity-related interventions and probed using parallel behavioral assays in animals and humans. In a tightly interconnected effort we aim to relate mechanistic insights at the level of synapses and small synaptic networks, epigenetic processes including histone modifications and non-coding RNAs, to human aging, its individual variability and scope for plasticity in the face of metabolic dysregulation. Thus the participating groups aim to narrow the existing gaps in our mechanistic and clinical understanding of the crossroads between genetic, neural and metabolic effects of a physically and cognitively active lifestyle. We want to apply the novel insights provided in this consortium to develop scientifically proven novel commercial products for combined physical and cognitive training interventions in humans. Furthermore, we anticipate that mechanistic insights gained will identify novel pharmacological targets for the interaction between metabolic signaling pathways and neural plasticity.

## 5. Veröffentlichungen

### ***Begutachtete Zeitschriftenaufsätze***

**Berron, David; Vieweg, Paula; Hochkepler, Anne; Pluta, John B.; Ding, Song-Lin; Maass, Anne; Luther, A.; Xie, Long; Das, Sandhitsu; Wolk, David A.; Wolbers, Thomas; Yushkevich, Paul; Düzel, Emrah; Wisse, Laura E.M.**

A protocol for manual segmentation of medial temporal lobe subregions in 7 Tesla MRI

In: *NeuroImage: Clinical: a journal of diseases affecting the nervous system: open access journal* - [Amsterdam u.a.]: Elsevier, Bd. 15.2017, S. 466-482  
[Imp.fact.: 4,348]

**Betts, Matthew J.; Cardenas-Blanco, Arturo; Kanowski, Martin; Jessen, Frank; Düzel, Emrah**

In vivo MRI assessment of the human locus coeruleus along its rostrocaudal extent in young and older adults

In: *NeuroImage: a journal of brain function* - Orlando, Fla: Academic Press, Bd. 163.2017, S. 150-159

[Imp.fact.: 5,835]

**Demenescu, Liliana Ramona; Colic, Lejla; Li, Meng; Safron, Adam; Biswal, Bharat; Metzger, Coraline Danielle; Li, Shijia; Walter, Martin**

A spectroscopic approach toward depression diagnosis - local metabolism meets functional connectivity

In: *European archives of psychiatry and clinical neuroscience* - Darmstadt: Steinkopff, Bd. 267.2017, 2, S. 95-105

[Imp.fact.: 3,569]

**Görke, Monique; Sobieray, Uwe; Becke, Andreas; Düzel, Emrah; Cohrs, Stefan; Müller, Notger Germar**

Successful physical exercise-induced weight loss is modulated by habitual sleep duration in the elderly - results of a pilot study

In: *Journal of neural transmission* - Wien [u.a.]: Springer, Bd. 124.2017, Suppl.1, Seite 153-162

[Imp.fact.: 2,392]

**Götting, Florian N.; Borchardt, Viola; Demenescu, Liliana R.; Teckentrup, Vanessa; Dinica, Katharina; Lord, Anton R.; Rohe, Tim; Hausdörfer, Dorothea I.; Li, Meng; Metzger, Coraline Danielle; Walter, Martin**

Higher interference susceptibility in reaction time task is accompanied by weakened functional dissociation between salience and default mode network

In: *Neuroscience letters: an international multidisciplinary journal devoted to the rapid publication of basic research in the neurosciences* - Amsterdam [u.a.]: Elsevier Science, Bd. 649.2017, S. 34-40

[Imp.fact.: 2,180]

**Hämmerer, Dorothea; Hopkins, Alexandra; Betts, Matthew J.; Maaß, Anne; Dolan, Ray J.; Düzel, Emrah**

Emotional arousal and recognition memory are differentially reflected in pupil diameter responses during emotional memory for negative events in younger and older adults

In: *Neurobiology of aging* - Amsterdam [u.a.]: Elsevier Science, Bd. 58.2017, S. 129-139

[Imp.fact.: 5,117]

**Jafarpour, Anna; Penny, Will; Barnes, Gareth; Knight, Robert T.; Düzel, Emrah**

Working memory replay prioritizes weakly attended events

In: *eNeuro* - Washington, DC: Soc, Bd. 4.2017, 4, insges. 11 S.

**Li, Meng; Demenescu, Liliana Ramona; Colic, Lejla; Metzger, Coraline Danielle; Heinze, Hans-Jochen; Steiner, Johann; Speck, Oliver; Fejtova, Anna; Salvatore, Giacomo; Walter, Martin**

Temporal dynamics of antidepressant ketamine effects on glutamine cycling follow regional fingerprints of AMPA and NMDA receptor densities

In: *Neuropsychopharmacology: official publication of the American College of Neuropsychopharmacology* - London: Springer Nature, Bd. 42.2017, 6, S. 1201-1209

[Imp.fact.: 6,403]

**Li, Shijia; Demenescu, Liliana Ramona; Sweeney-Reed, Catherine; Krause, Anna Linda; Metzger, Coraline Danielle; Walter, Martin**

Novelty seeking and reward dependence-related large-scale brain networks functional connectivity variation during salience expectancy

In: *Human brain mapping* - New York, NY: Wiley-Liss, Bd. 38.2017, 8, S. 4064-4077

[Imp.fact.: 4,530]

**Loh, Eleanor; Kurth-Nelson, Zeb; Berron, David; Dayan, Peter; Düzel, Emrah; Dolan, Ray; Guitart Masip, Marc**

Parsing the role of the hippocampus in approach-avoidance conflict  
In: Cerebral cortex - Oxford: Oxford Univ. Press, Bd. 27.2017, 1, S. 201-215  
[Imp.fact.: 6,559]

**OLoughlin, Elaine; Pakan, Janelle M. P.; Yilmazer-Hanke, Deniz; McDermott, Kieran W.**

Acute in utero exposure to lipopolysaccharide induces inflammation in the pre- and postnatal brain and alters the glial cytoarchitecture in the developing amygdala  
In: Journal of neuroinflammation: JNl - London: BioMed Central, Bd. 14.2017, Art.-Nr. 212, insges. 12 S.  
[Imp.fact.: 5,102]

**Teipel, Stefan; Grothe, Michel; Metzger, Coraline Danielle; Grimmer, Timo; Sorg, Christian; Ewers, Michael; Franzmeier, Nicolai; Meisenzahl, Eva; Klöppel, Stefan; Borchardt, Viola; Walter, Martin; Dyrba, Martin**

Robust detection of impaired resting state functional connectivity networks in Alzheimer's disease using elastic net regularized regression  
In: Frontiers in aging neuroscience - Lausanne: Frontiers Research Foundation, Bd. 8.2017, insges. 9 S.  
[Artikel Nummer 318]  
[Imp.fact.: 4,504]

**Teipel, Stefan; Wohler, Alexandra; Metzger, Coraline Danielle; Grimmer, Timo; Sorg, Christian; Ewers, Michael; Meisenzahl, Eva; Klöppel, Stefan; Borchardt, Viola; Grothe, Michel; Walter, Martin; Dyrba, Martin**

Multicenter stability of resting state fMRI in the detection of Alzheimer's disease and amnesic MCI  
In: NeuroImage: Clinical: a journal of diseases affecting the nervous system: open access journal - [Amsterdam u.a.]: Elsevier, Bd. 14.2017, S. 183-194  
[Imp.fact.: 4,348]

**Wisse, Laura E. M.; Daugherty, Ana M.; Olsen, Rosanna K.; Berron, David; Carr, Valerie A.; Stark, Craig E. L.; Amaral, Robert S. C.; Amunts, Katrin; Augustinack, Jean C.; Bender, Andrew R.; Bernstein, Jeffrey D.; Boccardi, Marina; Bocchetta, Martina; Burggren, Alison; Chakravarty, M. Mallar; Chupin, Marie; Ekstrom, Arne; Flores, Robin; Insausti, Ricardo; Kanel, Prabesh; Kedo, Olga; Kennedy, Kristen M.; Kerchner, Geoffrey A.; LaRocque, Karen F.; Liu, Xiuwen; Maass, Anne; Malykhin, Nicolai; Mueller, Susanne G.; Ofen, Noa; Palombo, Daniela J.; Parekh, Mansi B.; Pluta, John B.; Pruessner, Jens C.; Raz, Naftali; Rodrigue, Karen M.; Schoemaker, Dorothee; Shafer, Andrea T.; Steve, Trevor A.; Suthana, Nanthia; Wang, Lei; Winterburn, Julie L.; Yassa, Michael A.; Yushkevich, Paul A.; Joie, Renaud**

A harmonized segmentation protocol for hippocampal and parahippocampal subregions - why do we need one and what are the key goals?.Commentary  
In: Hippocampus - New York, NY [u.a.]: Wiley, Bd. 27.2017, 1, S. 3-11  
[Imp.fact.: 3,945]

**Ziegler, Gabriel; Ridgway, Gerard R.; Blakemore, Sarah-Jayne; Ashburner, John; Penny, Will**

Multivariate dynamical modelling of structural change during development  
In: NeuroImage: a journal of brain function - Orlando, Fla: Academic Press, Bd. 147.2017, S. 746-762  
[Imp.fact.: 5,835]

### **Dissertationen**

**Berron, David; Düzel, Emrah [AkademischeR BetreuerIn]**

Functional architecture of medial temporal lobe pathways and mnemonic discrimination in young and elderly adults.  
- Magdeburg, 2017, vi, 133, XIII Seiten, Illustrationen, 30 cm  
[Literaturverzeichnis: Seite 121-133]