

# The IMAGEMEND project



## Facts and figures

- Full project title: IMAGing GENetics for MENtal Disorders
- Start date: 1st October 2013
- Duration: 4 years
- EC funding: € 6 million
- Project coordinator: Central Institute for Mental Health, Mannheim, Germany  
Prof. Dr. Andreas Meyer-Lindenberg
- Mental disorders are now the leading causes of disability, absence from work and early retirement in Europe, costing more than 520.000 Million € per year.<sup>1</sup>
- Between 2004 and 2005, an approximate 27% of the adult EU population (18-65 years) has been affected by at least one mental disorder.<sup>2</sup>
- Despite the already staggering healthcare costs, during these 12 months only one quarter of affected subjects had any consultation with professional health care services, illustrating a substantial unmet clinical need.<sup>2</sup>
- Current diagnostic tools in mental health cannot address the need for earlier, better and more accessible clinical evaluation and treatment. These inadequacies can exacerbate suffering and stigma in mental illness.
- While magnetic resonance imaging (MRI) facilities are broadly available and a vast research literature exists, few neuroimaging applications have reached clinical practice in psychiatry.
- A major problem is that mental illnesses are currently diagnosed as discrete entities defined clinically.
- Instead, recent results show that mental disorders are best understood as quantitative alterations in neural systems relevant across traditional diagnostic boundaries that reflect individual, genetic and environmental risk factors.

<sup>1</sup> Wittchen, H U, F Jacobi, J Rehm, A Gustavsson, M Svensson, B Jönsson, J Olesen, et al. 2011. "The Size and Burden of Mental Disorders and Other Disorders of the Brain in Europe 2010." *European Neuropsychopharmacology the Journal of the European College of Neuropsychopharmacology* 21 (9): 655–679.

<sup>2</sup> Wittchen, Hans-Ulrich, and Frank Jacobi. 2005. "Size and Burden of Mental Disorders in Europe—a Critical Review and Appraisal of 27 Studies." *European Neuropsychopharmacology the Journal of the European College of Neuropsychopharmacology* 15 (4): 357–376.

## The project

- IMAGEMEND is a study with focus on development of effective imaging tools for diagnosis, monitoring and management of mental disorders.
- In the IMAGEMEND consortium, we aim to...
  - discover neural systems to identify the patient characteristics most relevant for treatment
  - derive biomarkers and decision rules from this systems-level dimensional account
  - systematically validate biomarker panels in patient, high-risk and epidemiological samples to produce automated imaging-based diagnostic and predictive tests tailored for wide distribution throughout Europe in standard clinical settings.
- **Focusing on schizophrenia, bipolar disorder and attention deficit-hyperactivity disorder**, we have assembled one of **Europe's largest datasets combining neuroimaging, genetic, environmental, cognitive and clinical information on approximately 13.000 participants**, and have recruited international replication datasets of more than 30.000 people.
- This unique resource will be processed using a new generation of multivariate statistical analysis tools to optimize existing imaging technology for the benefit of patients.
- We will also develop new imaging technology to enable the direct imaging-based therapeutic modification of neural circuits through rapid real-time MRI.
- Our deliverables will promote personalized treatment through more accurate patient stratification, allow diagnoses at the pre-symptomatic stage for early intervention and prevention, and improve prediction of treatment response and disease progression.

## Aim, methods and impact

### Aim:

- To improve the clinical management and aetiological understanding of mental illness through
  - discovery of neuroimaging based diagnostic
  - trans-diagnostic and predictive markers and their translation into clinical tests and therapeutics.

### Methods:

- IMAGEMEND will assemble an extensive integrative database comprising neuroimaging, genetic, environmental risk and clinical data on approximately 13000 patients with schizophrenia, bipolar disorder, Attention-Deficit Hyperactivity Disorder and controls.
- Cutting-edge analysis tools will be employed to link structural and functional brain abnormalities to their genetic and environmental determinants and transform findings into highly accurate, multivariate decision tools.
- IMAGEMEND will further develop and validate real-time fMRI based neurofeedback systems as an entirely new treatment modality for mental illnesses.

### Impact:

- We expect IMAGEMEND to significantly improve the clinical management of mental illnesses and contribute to better patient outcomes by
  - making available the first ever objective tool for diagnosis, prediction and at-risk identification and
  - development of an entirely novel approach towards treatment of mental illness based on real-time fMRI neurofeedback.

## The consortium

- IMAGEMEND brings together a consortium of European scientists with extensive experience that is ideally suited for its neuroimaging and multi-modal investigations into psychiatric illnesses and subsequent clinical translation as diagnostic and predictive tests.
- The consortium includes 14 partners from 4 EU and 3 EU-associated countries:
  - Central Institute of Mental Health | Germany
  - Institute of Psychiatry, King's College London | United Kingdom
  - University of Basel | Switzerland
  - University of Bari "Aldo Moro" | Italy
  - University of Edinburgh | United Kingdom
  - Life & Brain GmbH | Germany
  - Universitetet i Oslo | Norway
  - Radboud University Medical Centre | Netherlands
  - deCODE genetics | Iceland
  - Brain Innovation BV | Netherlands
  - concentris research management GmbH | Germany
  - Universität Bonn | Germany
  - QIMR Berghofer Medical Research Institute | Australia
  - Icahn School of Medicine at Mount Sinai | United States



### Contact:

Prof. Dr. Andreas Meyer-Lindenberg  
Zentralinstitut für Seelische Gesundheit (ZI)  
Tel.: +49 621 1703 2001 | Fax: +49 621 1703 2005

[www.imagemend.eu](http://www.imagemend.eu)

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