Lifespan Development

Tuesday, Jun 19: 10:30 AM - 11:45 AM
Oral Sessions
Tuesday - Oral Session

Presentations

2231: White matter hemispheric asymmetry of the newborn brain: a multi-centric diffusion MRI study

10:30 AM - 10:42 AM
The anatomical and functional asymmetry of the brain has been known for over a century, however, we do not yet completely understand how such asymmetry supports hemispheric specialization, and how it emerges during development. Newborn neuroimaging studies offer an unpreceded possibility to observe asymmetry before later life development and neuroplasticity. Our purpose was to evaluate the hemispheric asymmetry of white matter in a multi-centric cohort of newborns using diffusion magnetic resonance imaging.

Presenter

Andras Jakab, University Children's Hospital Zürich

2232: Multi-Layer Functional Connectome Reveals New Developmental Patterns of the Infant Brain

10:42 AM - 10:54 AM
Infants have rapidly developing brains. Our understanding of the dynamic maturing processes in the scale of whole-brain networks in these pivotal ages is limited [1-4]. While community analysis is a powerful tool in across-sectional studies, noisy infant fMRI data poses a great challenge to robust module detection while preserving individual variability for individualized developmental charting [5]. Moreover, there is [i]no temporally consistent[/i] module detection method for longitudinal studies. We propose a new method, Multi-Layer Inter-Subject-Constrained Modularity Analysis (MLISMA), for probing early brain development along spatial, temporal, and subject dimensions. Specifically, we aimed to robustly detect developmental characteristics of community structures from large-scale infancy brain functional networks.

Presenter

Han Zhang, University of North Carolina at Chapel Hill

2234: Adolescent development of functional brain networks

10:54 AM - 11:06 AM
Human brain networks undergo substantial maturation during adolescence. Multiple studies have evaluated maturation of fMRI functional connectivity (FC), defined using cross-correlations in BOLD signal between pairs of

grey-matter regions. However, prior network studies have focused on higher-order graph theoretical measures, which show a strong dependence on the mean correlation (van den Heuvel et al. 2017). Furthermore, many of these studies were conducted before the realisation of the confounding effects of in-scanner motion on FC estimates. Here we describe adolescent development of FC in a sample with acquisition and processing tailored to adequately deal with effects of motion, while characterising changes in FC at the level of the FC distribution.

Presenter

František Váša, University of Cambridge

1778: Whole Lifespan Development of Hippocampal Functional Connectivity

11:06 AM - 11:18 AM

The hippocampus (HP) is central to memory, especially episodic memory [1]. Developmentally, rudimentary episodic memory skills (e.g., associative/relational memory) experience dramatic improvements during the first years of life [2] so we would expect a fast development of the HP-dependent memory system (HMS) during infancy. However, given the commonly observed "infantile amnesia" phenomenon, the infantile memory system established by 2 years of age likely experiences another episode of substantial reorganization to its adult form [3]. After adulthood, episodic memory is extremely sensitive to aging thus one would also expect a fast decline of the HMS during aging [4]. However, to date, these hypotheses have not been systematically tested in vivo in human in the same study. Hence, we conducted a resting-state fMRI (rsfMRI) study to characterize the whole lifespan growth trajectory of the HMS to test these hypotheses.

Presenter

Wan Li, Beijing University of Technology

2190: Structural brain aging and neurobiology, lifestyle and genetics in 8,137 UK Biobank participants

11:18 AM - 11:30 AM

Extensive neuroimaging studies have yielded a better understanding of the neuroanatomical correlates of age-related cognitive changes [1]. However, the shapes of the regionally differential trajectories of structural brain aging are still inconclusive due to the cohort effects and sampling bias that exist in the limited study samples. Moreover, various age-related risk factors may influence the relationships of age with brain structure but have not always been well addressed [2]. The current study was designed to address the issues. We examined the trajectories of structural brain aging in a large well-defined sample from the UK Biobank [3], and investigated the relationships of the complex aging trajectories with the cortical cytoarchitecture and various cognitive, lifestyle and genetic factors.

Presenter

Lu Zhao, University of Southern California

2186: Generalizing age effects on brain structure and cognition – a two-study comparison approach

11:30 AM - 11:42 AM

Normal aging is accompanied by a decline in cognitive abilities [1] and brain structure [2]. However, there is much inconsistency across studies with respect to affected cognitive domains and brain regions. Generally, age-related changes are associated with high inter-individual variability, especially in later decades of life [3]. Extracting consistent trends from the literature is further hampered by differences in sample characteristics and high variability of methods used across studies. Hence, it still is an open question whether results obtained from single center studies are generalizable. This poses a major challenge in the field of neuroimaging, especially with respect to the upward trend of imaging consortia and multicenter studies. Therefore, the current study aimed at cross-validating age-related differences in cognitive abilities and brain structure in two large independent samples of healthy older adults.

Presenter

Christiane Jockwitz, Institute of Neuroscience and Medicine - 1, Research Center Juelich