

# Predicting the future: Multivariate models of brain-ageing in health and disease

## Organizers:

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The ageing human population is experiencing a growing burden of brain diseases, due to the fact that the ageing brain becomes increasingly vulnerable to neurodegeneration and associated conditions. Treatment trials for neurodegenerative conditions have yielded few positive results, in part because the damage may be irreversible by the time symptoms manifest. Hence, methods are needed to make early predictions of people's future risk of advanced brain ageing and disease manifestation, to enable prevention through more targeted treatments. A key development in efforts to improve predictions of brain ageing is the adoption of multivariate analysis methods, enabling the incorporation of high-dimensional data and more personalised predictions, which is the focus of this symposium. Highlighting this topic is timely as the complex statistical methods for modelling and predicting brain ageing are now becoming more widespread and sophisticated. These technical developments are coinciding with an upsurge in data sharing, and the pooling of datasets necessary for modelling personalised longitudinal trajectories of brain ageing is increasingly commonplace. This symposium will provide a critical overview of methodological trends for modelling individual brain ageing, focusing on machine learning and multi-voxel pattern analysis. Further, it will showcase the most recent data that uses neuroimaging to predict future ageing and related health outcomes, including cognitive decline, the manifestation of neurodegenerative disease and mortality.

## Symposia Schedule:

14:45-15:00

### **An overview of neuroimaging markers of brain ageing**

*Katja Franke, PhD, University Hospital Jena, Jena, Germany*

15:00-15:15

### **Predicting brain-age from multimodal imaging data captures cognitive impairment**

*Franziskus Liem, PhD, University of Zurich, Zurich, Switzerland*

15:15-15:30

### **Predicting measures of healthy ageing and mortality using neuroimaging**

*James Cole, PhD, Imperial College London, London, United Kingdom*

15:30-15:45

### **Machine learning methods provide structural and functional brain aging signatures that predict subsequent clinical progression**

*Christos Davatzikos, PhD, University of Pennsylvania, Philadelphia, PA, United States*

15:45-16:00

## **Questions and Answers**