

Article: 0055

Topic: S19 - Symposium 22: The use of computational techniques to automatically classify diagnosis and outcome of psychiatric disorders using neuroimaging data

Using Support Vector Machine to Predict Response to Treatment and Illness Course: the Impact of Scanner and Multiple Clinical Outcomes

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Introduction. Response to treatment and long-term outcome following the first-episode of psychosis are very heterogeneous. Therefore, the early identification of individuals destined to have a worse illness course is of crucial importance, since it can reduce disability, healthcare costs, and eventually improve long-term outcome.

Objectives. We have used structural Magnetic Resonance Imaging in patients at their first psychotic episode and followed them up clinically to identify neuroanatomical predictors of outcome.

Methods. We evaluated patients (n=260) at their first psychotic episode and followed them up for periods varying from 3 months to 5-6 years. We used a number of imaging approaches to study neuroanatomical predictors of outcome, including Support Vector Machine.

Results. At onset, brain alterations of likely neurodevelopmental origin (reduced frontal and temporal gyrification and altered white matter microstructure of interconnecting tracts) were present in individuals with poorer early outcome (all $p < 0.05$ corrected); furthermore, smaller volumes were predictive of subsequent illness episodes with significant accuracy (70% correctly classified; $p = 0.005$). However, brain changes were also observed after illness onset. Among these, hippocampal volume increase (present in 29% of patients) was predictive of better clinical, functional and cognitive outcomes at 6 years (all $p < 0.03$).

Conclusions. In combination with other neuroimaging and clinical measures, neuroanatomical data could considerably help patient stratification in psychiatry, ultimately allowing individualised patient management from the time of the first presentation to services.