Accuracy of diagnostic classification algorithms using cognitive-, electrophysiological-, and neuroanatomical data in antipsychotic-naïve schizophrenia patients - DTU Orbit (05/10/2019)

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Background. A wealth of clinical studies have identified objective biomarkers, which separate schizophrenia patients from healthy controls on a group level, but current diagnostic systems solely include clinical symptoms. In this study, we investigate if machine learning algorithms on multimodal data can serve as a framework for clinical translation. Methods. Forty-six antipsychotic-naïve, first-episode schizophrenia patients and 58 controls underwent neurocognitive tests, electrophysiology, and magnetic resonance imaging (MRI). Patients underwent clinical assessments before and after 6 weeks of antipsychotic monotherapy with amisulpride. Nine configurations of different supervised machine learning algorithms were applied to first estimate the unimodal diagnostic accuracy, and next to estimate the multimodal diagnostic accuracy. Finally, we explored the predictability of symptom remission.

Results. Cognitive data significantly classified patients from controls (accuracies = 60–69%; p values = 0.0001–0.009). Accuracies of electrophysiology, structural MRI, and diffusion tensor imaging did not exceed chance level. Multimodal analyses with cognition plus any combination of one or more of the remaining three modalities did not outperform cognition alone. None of the modalities predicted symptom remission. Conclusions. In this multivariate and multimodal study in antipsychotic-naïve patients, only cognition significantly discriminated patients from controls, and no modality appeared to predict short-term symptom remission. Overall, these findings add to the increasing call for cognition to be included in the definition of schizophrenia. To bring about the full potential of machine learning algorithms in first-episode, antipsychotic-naïve schizophrenia patients, careful a priori variable selection based on independent data as well as inclusion of other modalities may be required.

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