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Editorial

Implementing magnetic resonance imaging into clinical routine screening in patients with psychosis?†

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Summary
In this issue, Falkenberg *et al* explore the practicability of magnetic resonance imaging (MRI) as part of the initial clinical assessment in patients with first-episode psychosis and the prevalence, nature and clinical significance of radiological abnormalities in these patients. They provide evidence for the use of MRI data to detect gross brain abnormalities. In addition, improvements in quantitative analyses makes MRI an indispensable tool to elucidate the neurobiological substrates that might underlie primary (or idiopathic) psychotic illness.

Declaration of interest
None.

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Background

Only a small proportion of patients with an acute episode of psychosis have an organic brain disorder underlying their symptoms.[1] In other words, there is a clear aetiology (physical illness) of the disease, in contrast to the unknown causes of idiopathic psychosis.[1] Discernible brain pathology associated with schizophrenia include reductions in global and regional grey matter volume, ventricular enlargement, cerebral atrophy and cavum septi pellucidi.[2] It is crucial to identify such radiological abnormalities as early as possible, as urgent treatment of the primary disease may be required. Some of these underlying 'organic' manifestations can be identified on magnetic resonance imaging (MRI) scans, which may be used in the initial assessment of patients presenting with heightened risk for psychosis or first-episode psychosis (FEP). However, whether radiological assessments of MRI data should be implemented as a routine screening instrument in patients who are psychotic has continued to generate debate. Although its potential for the detection of radiological abnormalities is undeniable, it has been argued that scanning people with psychosis is too logistically difficult to be clinically worthwhile and might induce anxiety-related reactions.[3] From an economic point of view, a previous cost-effectiveness analysis found that structural neuroimaging (MRI and computed tomography) as part of the standard screening procedure is only justifiable if the prevalence rate for organic causes amenable to treatment is 1% and the time between presentation and assessment is less than 3 months.[4]

Findings from previous research

Radiological studies on the utility of MRI as a clinical screening instrument provide controversial recommendations. The current National Institute for Health and Care Excellence (NICE) guidelines do not recommend routine use of structural MRI in all patients who have experienced a first episode of psychosis.[5] A study of 340 MRI reports from 98 healthy controls, 152 patients with FEP and 90 patients with schizophrenia revealed abnormalities in a large proportion of patients with chronic schizophrenia (30%), who did not have clear clinical indications for structural imaging.[2] Although the radiological abnormalities did not significantly alter the management of the majority of these patients, MRI scanning also identified three urgent cases (1.2%) of possible organic psychosis, which guided further clinical management.[2] This study showed that a small (although economically worthwhile) proportion of patients with chronic schizophrenia and FEP benefitted directly from MRI scanning. In a more recent study, clinically relevant radiological abnormalities have been reported in patients with psychosis and controls of 11 and 12%, respectively.[6] However, in contrast to Lubman *et al*,[2] in this sample of 656 patients with psychosis, none of the neuropathological findings observed in the patients was interpreted as a possible substrate for organic psychosis. The authors therefore concluded that radiological assessments of MRI scans should not be considered a necessary component of routine screening in patients with psychosis, because the minimum economical rate of 1% is not met, i.e. at least six patients should have met criteria for organic psychosis in this sample.

Findings from Falkenberg *et al*

An article in this issue contributes further to this debate by exploring (a) the practicability of MRI as part of the initial clinical assessment in patients with FEP, and (b) the prevalence, nature and clinical significance of radiological abnormalities in patients with FEP.[7] It is noteworthy that these questions were addressed in a clinical ($n = 241$) and research ($n = 108$) sample. First, they found that the great majority of patients were able to tolerate the scanning procedure very well, with scanning being interrupted

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in only 2.5% of the patients in the clinical sample, and none of those in the research one. Although researcher and clinicians may not have included patients that they thought would be too unwell to be scanned, these data strongly suggest that an MRI assessment is practicable and logistically feasible in most patients with FEP, including patients in whom scanning is being done for clinical purposes. Second, in accordance with other reports[2,6,8,9] this study further observed that radiological abnormalities were relatively common in patients with FEP (6% of the research sample and 15% of the clinical sample), although they were also evident in healthy controls. None of the findings in the FEP group entailed a change in clinical management. These results are comparable with a previous study in 37 people at clinical high risk for psychosis showing that radiological abnormalities are already present before the onset of the disorder.[10] Notably, the prevalence rates in high-risk individuals (35%) were similar to those in patients with FEP (40%).[10] They are unlikely to be related to antipsychotic medication, as the majority of individuals at high risk and with FEP had never or only very briefly been treated with antipsychotics. Falkenberg and colleagues concluded that MRI as part of the clinical assessment is feasible in most patients with FEP and although radiological abnormalities are quite common, most are incidental findings that do not require a change in clinical management.[7] However, they also point to the development of novel diagnostic MRI-based techniques by studying T_2 or FLAIR images. High-resolution MRI can now be acquired in a relatively short scanning time, which is particularly useful in patients who are acutely unwell, and the improvement of analytical approaches such as machine learning might further improve the detection of individual radiological abnormalities.[7] In any case, the authors also emphasise that the consequences of failing to exclude such disorders in a young adult may be so grave that it is worth assessing everyone and suggest including MRI scans in the clinical assessment of all patients presenting with FEP.

Conclusions

Taken together, Falkenberg *et al*[7] provide further evidence for the use of MRI data to detect gross brain abnormalities in patients with psychosis. In addition to its use as a standard screening instrument, the improvement in quantitative analyses makes MRI scanning an indispensable tool to elucidate the neurobiological substrates that might underlie primary (or idiopathic) psychotic illness. High-resolution MRI combined with sophisticated quantitative analyses may improve not only the detection of organic causes but also the prediction of (idiopathic) symptom progression and treatment responses. Bearing in mind the difficulty in causally relating organic abnormalities exclusively to psychosis and not any other psychiatric disorder, and the current move towards transdiagnostic approaches, MRI recording might not only support clinical decision-making in psychosis but also medical work-up across categorical diagnoses of psychiatric disorders. To exploit the full potential of MRI and to ultimately evaluate its clinical utility for psychiatric services we need quantitative results from large patient samples (preferably measured within the same scanner) using clinical combined with fast research MRI sequences.

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