

CCLG: The Children & Young People's Cancer Association research: 'Radiogenomics': A novel non-invasive approach to identify different types of ependymoma brain tumours

Project title: 'Radiogenomics': A novel non-invasive approach to identify different types of ependymoma brain tumours

Project stage: Complete (ended August 2025)

Funded by: CCLG and CCLG Special Named Fund Edie's Butterfly Appeal

Led by: Professor Rob Dineen, University of Nottingham



About the project

Ependymoma is a type of brain tumour that occurs most commonly in young children and has one of the lowest chances of survival amongst childhood brain tumours. It is difficult to treat and there have been few recent improvements. In half of children with ependymoma, the tumour will return after treatment, and only a quarter of these children will survive for five years or more.

The chances of survival for a child with ependymoma are affected by the type of tumour (which are caused by differences in genes and chemicals). Currently, the type of tumour can only be identified after invasive surgery to remove it. However, if the tumour type could be identified before surgery, the doctors could start planning treatments sooner and discuss the risks in more detail with the family. In the future, scientists could even use the information to guide trials of new cancer treatments and predict the behaviour of the tumour, such as whether it is likely to come back again after treatment.

The research team at the University of Nottingham, led by Professor Rob Dineen, are exploring a new non-invasive way to identify ependymoma tumours. Building on previous research that suggests MRI scans can help determine tumour type, the researchers have developed a new method called 'radiogenomics'. This combines data from MRI scans with information about the tumour's genes and chemicals. A computer programme processes this information to predict tumour types without the need for surgery.

The team will use a much larger set of MRI scans from children with ependymoma to confirm that this approach works in identifying ependymoma types. They will then test whether this new method can help predict whether tumours are likely to respond to treatment or to relapse. Professor Rob Dineen hopes that this project will help to improve the overall survival of children with ependymoma brain tumours.

Results

The researchers have created a high quality dataset of scans, which will support valuable future research (including a newly funded project exploring whether scans can help predict patients' quality of life). They

analysed this collection of MRI brain scans using a method that can detect subtle patterns in images that are not visible to the eye. By combining this 'hidden' information with computer based analysis, they were able to reliably tell apart the two main types of ependymoma that occur at the back of the brain, as well as two smaller subgroups within one of these types. This is important because researchers think that these subgroups may behave, and respond to treatment, differently.

What's next?

The research shows that it is possible to make accurate predictions of specific types of ependymoma on scans alone. Although this needs further validation, it could mean that doctors know which type of ependymoma a child has before any surgery. This could allow more personalised treatment plans, such as starting certain chemotherapy drugs earlier than would otherwise be possible, or adjusting the surgical approach.



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