CCLG: The Children & Young People's Cancer Association research:

Confirming bloodstream markers of children's kidney cancer

Project title: Validating circulating biomarkers of Wilms tumour

Project stage: Ongoing (started January 2023, planned end June 2027)

Funded by: CCLG and CCLG Special Named Funds including Bethany's Wish, Daniel's Rainbow Fund, Finlay's Fund, Freddie's Fight and The Georgie B Fund

Led by: Professor Matthew Murray, University of Cambridge

About the project

Wilms tumour is the most common kidney cancer in children, with around 80 new cases each year in the UK. Almost 9 in 10 children are now cured but, despite intensive treatment, some children's cancer returns. Wilms tumour is normally diagnosed with a biopsy, where a small piece of the tumour is removed surgically, but this comes with risks for small children and doesn't always give information about the whole tumour.

Biomarkers are tiny molecules found in the body that tell doctors more about a disease. At the moment there are no biomarkers routinely used for Wilms tumour. Treatment regimes are currently based on changes in the Wilms tumour cells, but treatments are not always successful for high-risk patients. We urgently need a better way to show which patients are high-risk, differences in tumours, and to see whether a treatment is working.

Professor Matthew Murray at the University of Cambridge believes that circulating biomarkers, found in the blood or urine of patients, are the answer to improving Wilms tumour care. His team hope to find biomarkers that they can use to create a non-invasive test to diagnose Wilms tumour. MicroRNA, tiny pieces of genetic code released from tumours into the blood stream, are the best candidate for a Wilms tumour biomarker. Lab tests can detect very small amounts of microRNA in the bloodstream and can tell doctors more about tumour makeup and genetic differences.

Professor Murray's team will be looking at samples from children with Wilms tumour, taken when they were diagnosed. They have already found potential biomarkers, and will be looking at whether these potential biomarkers can be found in the blood and urine samples. Showing that the biomarkers apply to lots of children with Wilms tumour is the first step in moving the new test towards clinical use. Along with this, the team will be comparing different biomarkers with patient's history to see whether any of the biomarkers can tell doctors new information about patients, such as the type of Wilms tumour, without the need for surgery.

Progress

Prof Murray's team has shown that microRNAs differ between children with Wilms tumour and children without the disease. Their earlier work narrowed down a long list of potential microRNAs to a group of seven that could accurately tell Wilms tumour samples apart from healthy samples. However, it wasn't clear whether these markers only worked in a certain combination or order, or whether some were more important than others.

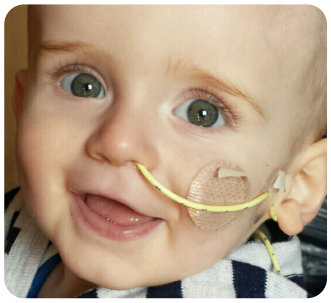
To check this and to look for any other useful markers, the researchers used machine learning – a type of artificial intelligence that can spot patterns in complex data. The AI confirmed many of the same microRNAs the team had identified in earlier stages of the project, and published Wilms tumour research supported these findings too. Across all the analyses, eight microRNAs appeared consistently, which the team believe will be the best combination for further work. They will now test whether these eight markers can reliably diagnose Wilms tumour in a larger group of patients. The project has been extended by 18 months to allow enough time to fully test and validate these markers.

What's next?

The eight microRNA markers will now be tested on as many existing patient blood samples as possible to confirm whether they can reliably show the difference between Wilms tumour samples and non-cancer samples. Once the team have tested the markers in blood samples, they will begin investigating whether the same microRNAs can also be found in urine samples. If so, this could offer an additional, and potentially easier, way to diagnose or monitor Wilms tumour.

Bethany's Wish
Wilms' tumour research fund

Daniel's Rainbow Fund



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