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 December 2025)

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 levels of microRNA fragments, also called 'miRNAs', are different between healthy patients and Wilms tumours patients. They have focused on seven miRNAs after extensive testing, and found that they are able to consistently able to distinguish between healthy patients and Wilms tumour patients. This works both in the lab and with 'test cards', which are less powerful but more easily used in hospitals.

The researchers have also set up international collaborations which allow them to validate their test on many more patient blood samples. This will confirm that they can diagnose Wilms tumour - not just in the small test group of children, but in all patients.

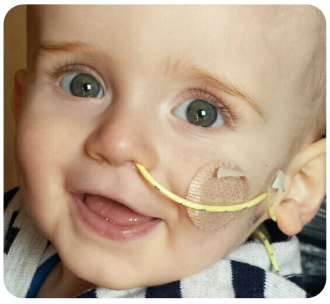
What's next?

Currently the test uses all seven miRNAs equally, but the team wants to find out whether any of the miRNAs are more important - for example whether one could provide the definite diagnosis and the others provide further validation or information. Over the next year the researchers are working on developing an artificial intelligence pathway that can demonstrate how to use the miRNA markers to create the best test.

As part of this, they will also be reassessing the markers that were removed at earlier stages of the project to ensure that all possible information is captured by the test. Once this stage is finished, they will begin validating their test on the large group of patient samples they have gathered.

Bethany's Wish
Wilms' tumour research fund

Daniel's Rainbow Fund



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CCLG The Children & Young People's Cancer Association

Century House, 24 De Montfort Street, Leicester, LE1 7GB
0333 050 7654 | **info@cclg.org.uk** | **www.cclg.org.uk**
@cclgUK