A new blood test could improve treatment for children with cancer

Any parent would dread being told their child has cancer. But thanks to support from Abbie's Fund, pioneering research by scientists at The Institute of Cancer Research, could offer hope to children and their families by developing a blood test specifically designed to support personalised medicine for children.

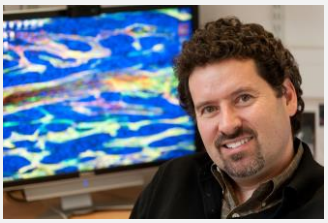
"If you cure a lethal cancer in a five-year old child, you have given them the potential to lead a long, healthy life, free of side-effects."

Louis Chesler, Professor of Paediatric Cancer Biology

Childhood cancers are different to adult cancers

One of the most common cancers in children is neuroblstoma, which affects developing nerve tissue. Less than two-thirds of children survive the disease, and those who do are often treated with old-fashioned chemotherapy designed for adults, which can leave them with devastating side-effects. But Institute of Cancer Research (ICR) researchers are now uncovering the specific molecular causes of neuroblastoma and devising better and safer new therapies to treat it.

Here at the ICR Professor Louis Chesler, an international leader in the field of paediatric cancers, is developing a simple blood test to help researchers understand the molecular make-up of a child's cancer. This blood test will mean children will no longer need to undergo the ordeal of painful biopsies – and will offer the added benefit that the child can be tested regularly to ensure that doctors continually prescribe the most suitable treatment.



Professor Louis Chesler

New more effective and less toxic treatment strategies are urgently required for young neuroblastoma patients.

Why the research is needed

Taking a direct biopsy is a very invasive, sometimes dangerous and a frightening operation for a small child – and their family – to undergo. The alternative is to remove multiple bone marrow samples from a child, but this is an extremely painful procedure. If a simple blood test could be developed, this would offer a quicker, cheaper and much less painful way to molecularly characterise a child's tumour.

Where your money goes

Thanks to Abbie's Fund, we are well on our way to developing a test which could help inform treatment strategies for children. We have started analysing blood from patients treated at our clinical partner, the Royal Marsden Hospital, to look for changes in the blood DNA signature for MYCN, ALK, and TP53, three specific genes, which, if mutated, vastly impact the survival of children with neuroblastoma. We are also using a very new technique called digital PCR (dPCR), which can detect DNA changes in very small volumes of blood.

This work is part of a promising programme of research developing diagnostic tests to rapidly detect and report – with high accuracy – genetic factors (mutations) within individual tumours. These tests, using a rapid next generation sequencing (rNGS) panel to look at tumour samples, have recently received ethical approval for the 'Tumour profiling for Biomarker Development' study at the Royal Marsden. This means that every child with a solid tumour treated at the Royal Marsden will be eligible to enrol in this study with the results being made available to the clinical team. We are also developing the infra-structure to enable the tests to be available for all children in the UK.

The first major results with rNGS indicate that children with neuroblastoma have very high levels of circulating DNA. This means we can efficiently test for hundreds of genes in tumour tissue. This is the first data of its kind in the UK and in SIOPEN, the cooperative clinical group responsible for shaping cancer therapy for all children in the EU, and is an exciting step forward for personalised treatments for children.

What's next?

Over the next 12 months) we aim to: 1) routinely test all children with solid tumours for multiple genetic mutations using rNGS nationally; and 2) routinely test blood initially for the three important genetic changes mentioned above.

For our second goal, through the generosity of Abbie's Fund and their supporters we are now looking for levels of circulating tumour cells in the blood, and also provide a list of altered genes in these cells, which might be targets for new drugs. We then seek to analyse whether these genes are active or inactive, and can add further information about whether a patient's disease is adequately or inadequately treated.

In the next 12 months we hope to show that rapid testing for the three most critical gene mutations that stratify patients with neuroblastoma will be possible in the clinic.

www.icr.ac.uk

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