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

Developing ways to identify chemotherapy resistant B-cell acute lymphoblastic leukaemia cells

Project title: Validating an immunophenotype of chemotherapy resistance in childhood B-ALL – towards tailored treatment and improved outcomes

Project stage: Complete (Ended May 2025)

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Led by: Dr Elitza Deltcheva, University College London Cancer Institute

About the project

B-cell acute lymphoblastic leukaemia (B-ALL) is the most common cancer in children. Although around 90% of children can be cured, they have to undergo harsh chemotherapy treatments. These can leave children with long term, debilitating side-effects. Unfortunately, the cancer grows back for around 10% of children and is even harder to treat. The best way to predict whether a child with B-ALL can be cured is to look at whether cancer cells are still alive after the first 4 weeks of treatment. If we could understand more about the properties of these cells, it could lead to new strategies to eradicate them and higher cure rates.

Dr Elitza Deltcheva and her team from University College London believe that, if they can identify specific vulnerabilities of these cells, it could lead to targeted treatments. This would help lower the reliance on existing chemotherapies and reduce toxicity for patients.

In her project, Dr Deltcheva plans to use her team's understanding of chemotherapy resistance to predict which leukaemia cells will survive treatment. She will then develop strategies to identify and isolate those cells using a technique called flow cytometry. This can separate mixtures of cells into groups based on proteins on the cell surface, called 'markers', that differ between cell types. Flow cytometry is already used to help diagnose different types of leukaemia, so Dr Deltcheva can start by working with known leukaemia markers.

She will then add her team's chemotherapy resistance markers and, using samples from the VIVO biobank, test whether her panel of markers can identify chemotherapy resistant leukaemia cells. By testing the panel with multiple leukaemia samples, Dr Deltcheva will refine the panel to only include the more informative markers.

Dr Deltcheva ultimately hopes to identify groups of markers that can identify chemotherapy resistant cells. This would provide the foundations for research into to new treatments and diagnostic tools, allowing doctors to monitor a patient's response to chemotherapy and adapt their treatment accordingly.

Results

The researchers developed a panel of 40 different antibodies to help identify cancer cells that are resistant to chemotherapy. This panel revealed several new markers of resistance, which could in future be added to the tests doctors use to guide treatment decisions.

Because B-ALL samples are rare, the researchers made full use of those provided by the VIVO Biobank. They collected detailed data on cancer cells both at diagnosis and at minimal residual disease — when only a small number of cancer cells remain after treatment, but the patient is considered in remission. This helped the team create an unmatched resource for B-ALL researchers, containing information on genes, proteins, and DNA structure in cancer cells.

What's next?

Dr Deltcheva hopes to use the results of this project to apply for further research funding to confirm which resistance markers are the most reliable and, working with hospital diagnostic labs, explore how these could be added to clinical tests. The ultimate goal is to improve early detection of chemotherapy-resistant cells and guide treatment before the cancer returns.

The Children & Young People's Cancer Association

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