

# CCLG: The Children & Young People's Cancer Association research: What are the effects of radiation and chemotherapy on children's developing brains?

**Project title:** Mechanisms of Neurotoxicity in Childhood Cancer Therapy

**Project stage:** Ongoing (planned end September 2027)

**Funded by:** Funded by CCLG and CCLG Special Named Fund, Ben Pavitt's Legacy of Love Fund

**Led by:** Professor Olaf Ansorge, University of Oxford

## About the project

The developing brain is very sensitive, so damage from cancer treatment can affect learning and mental health. Radiotherapy treatments can lead to physical changes in the brain, such as deformed blood vessels or secondary cancers. We do not know how these develop in different types of brain cells. This is an important topic for young people with cancer, their families, and doctors.

In this project, Professor Olaf Ansorge and his team at the University of Oxford will study the effects of radiation and chemotherapy on the brain. Ten families have generously donated their children's brain tissue for Prof Ansorge's research. This was only possible through close collaboration and communication with the families and the Oncology team, led by Dr Shaun Wilson at Oxford Children's Hospital. All children responded to treatment but later had their brain or spinal tumour grow back. Whole brain samples are very rare but essential for this type of research, as healthy brain samples are never taken during life.

The project hopes to understand how radio- or chemotherapy affects healthy nerve cells and blood vessels, and how these treatments affect any surviving cancer cells. Professor Ansorge's team will study multiple types of healthy brain cells, as they believe cancer treatments can affect each cell differently. They will look for changes in the DNA of the cells to find both DNA damage and changes to genes.

The researchers will also look at cancer cells that have survived treatment and new cancers caused by treatment. They will compare relapsed cancer cells and new ones after treatment to those from the original tumours, and then compare these to relevant healthy brain cells from the same individuals.

Professor Ansorge's project will create one of the first comprehensive datasets on how chemotherapy and radiotherapy affect human brain cells. It will help researchers understand what causes the long-term effects of childhood cancer treatment on healthy brains and what treatment strategies could prevent them.

## Progress

The team have combined analysis of whole brain samples with detailed clinical information, allowing them to link physical changes in the brain with treatment history and outcomes.

They found clear signs of long-term treatment effects. These included ongoing inflammation in the brain, changes to blood vessels, loss of important nerve cells in the cerebellum (a region involved in coordination and learning), as well as swelling and scar-like tissue.

These findings may help explain why some children who survive brain cancer treatment experience long-term effects such as learning difficulties, and potentially why some children develop secondary brain tumours years later.

### What's next?

The team will now study these changes in more detail, focusing on affected brain cells and blood vessels. This will help them understand how treatment causes this kind of damage and whether early signs of long-term effects or tumour development can be detected.

They will also investigate the early stages of treatment-related tumours, to see whether changes can be identified before these cancers develop.



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