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

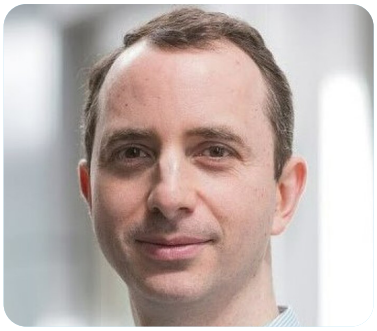
Mimicking the journey through the bloodstream: exploring how osteosarcoma cells spread and survive in the body

Project title: Using vasculature-mimicking microfluidic systems to identify molecular changes associated with circulating osteosarcoma cells

Project stage: Complete (ended December 2025)

Funded by: The Bone Cancer Research Trust, CCLG, and CCLG Special Named Fund, the Little Heroes Fund

Led by: Dr Olivier Pardo, Imperial College London



About the project

Treatment for osteosarcoma usually involves both surgery and chemotherapy, which collectively aim to remove the tumour and kill any remaining cancer cells. However, in some cases, these cells travel from the original (primary) tumour to other, distant parts of the body, most commonly the lungs. This process is known as metastasis. For patients with metastatic osteosarcoma, treatment is challenging and their chances of survival are much lower. Research to understand the process of metastasis and how this can be targeted and prevented is therefore crucial.

This pilot project, led by Dr Olivier Pardo at Imperial College London, aims to investigate the processes supporting the survival of osteosarcoma cells which escape into the bloodstream and spread elsewhere in the body. Dr Pardo and his team will use an innovative engineering device which mimics the conditions these so called 'circulating tumour cells' (CTCs) face as they journey through the blood vessels, investigating the changes they undergo in order to survive. They will perform in-depth analyses to compare 'stationary' osteosarcoma cells in the primary tumour with these CTCs, looking to identify any crucial adaptations which could represent a target for treatment.

With so little understood about the journey osteosarcoma cells take through the bloodstream and how they are able to survive, it is difficult to know how to target and prevent this. This research represents a vital first step towards the development of targeted treatment approaches, which are so urgently needed. Following on from this project, Dr Pardo and team plan to test different combinations of drugs to investigate their ability to prevent the survival adaptations identified in the CTCs, in the hopes of translating their laboratory research into a future treatment option for patients.

Results

The team's early results suggest that entering the bloodstream makes osteosarcoma cells better at

surviving than those in the tumour. The physical forces they experience in the blood, such as friction and pressure, appear to trigger changes that help the cells cope with stress. These changes include protecting important proteins and switching on processes that support cell survival. Although circulating tumour cells temporarily slow their growth while in the bloodstream, they seem to recover quickly and begin growing again once they settle in a new part of the body.

What's next?

The results so far will be combined with further protein analysis to better understand which genes and proteins are driving these survival-boosting changes. Based on these findings, Dr Pardo's team has highlighted existing drugs that may be able to reverse these changes, which they plan to explore in future research.

Further research is planned to look more closely at how these changes affect the behaviour of circulating tumour cells, such as whether they grow faster, spread more easily or become harder to treat.

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