SCIENCES & BIOENGINEERING SCIENCES

The Research Group
Brussels Center for Immunology

has the honour to invite you to the public defence of the PhD thesis of

Pauline Bardet

to obtain the degree of Doctor of Bioengineering Sciences

Title of the PhD thesis:

The multi-omic landscape of lung cancer: from local to systemic responses

Supervisor:
Prof. dr. ir. Damya Laoui (VUB)

The defence will take place on
Thursday, September 24, 2026 at 4 p.m.

VUB Etterbeek campus, Pleinlaan 2, Elsene,
in Promotiezaal D.2.01

The defence will also be live streamed.

Members of the jury

Prof. dr. ir. Jo Van Ginderachter (VUB, chair)
Prof. dr. Cleo Goyvaerts (VUB)
Prof. dr. MD Willem Staels (VUB)
Prof. dr. Etienne Meylan (Centre Hospitalier Universitaire Vaudois, CH)
Prof. dr. Federica Benvenuti (International Centre for Genetic Engineering and Biotechnology, IT)

Curriculum vitae

In 2019, Pauline Bardet obtained the degree of MSc of Bio-engineering Sciences with great distinction at the VUB. She performed her MSc thesis at the Brussels Center for Immunology, for which she received two prizes. Pauline then joined the lab of Prof. Damya Laoui as a research assistant before enrolling as a doctoral student. She co-authored twelve peer-reviewed articles, including one as (co-)first author. Her research was supported by Fonds Wetenschappelijk Onderzoek, Kom Op Tegen Kanker, and Oncology Research Center VUB. Throughout her PhD, Pauline contributed to teaching activities, supervised three MSc students, was an active member of several academic committees, and engaged in various science communication initiatives.

Abstract of the PhD research

Immune cells can play a variety of roles in (lung) cancer; from combatting the disease to enabling its uncontrolled growth. Immunotherapy boosts the fighting skills of immune cells, rendering them more efficient in eliminating the cancer cells. Although the addition of immunotherapy to standard treatments has resulted in significant benefits, not all lung cancer patients respond to current treatments or do so for only a short period of time. Moreover, recent clinical trials in immuno-oncology have faced notable setbacks, highlighting the need for appropriate and extensive pre-clinical research. The overall aim of this research was to shed light on the immune landscape in the most common type of lung cancer; both within the tumour and outside of it.

To enable the effective translation of pre-clinical research to clinical applications, it is essential to use appropriate and representative (animal) models. In the first section of this research, a lung cancer mouse model was introduced that replicates key aspects of the human disease. Its immune landscape was exposed through different state-of-the-art technologies (scRNA-Seq and spatial transcriptomics) providing an in-depth characterisation and cell-to-cell correlation with patient data. We also provided a proof-of-concept for SEPARATE-Seq, a broadly applicable technique that enables the compartmentalisation of vascular and intratissue immune cells along with scRNA-Seq. We uncovered that cells adopt different characteristics, called phenotypes, and that these are dictated by the compartment in which they reside (vascular/intratissue and tumour/adjacent location). Moreover, certain immune populations were shown to be restricted to specialised, local niches within the tumour.

In the second section of this research, we shifted our attention to outside the tumour, as tumours do not only perturb immune cells within their immediate environment but also induce systemic immune alterations that extend to peripheral organs such as the spleen. We finely dissected the changes occurring in the immune compartment of the spleen of lung tumour-bearing mice using scRNA-Seq.

Overall, this thesis sheds light on the immune landscape of the most common and deadly type of cancer, namely lung cancer; both within the tumour and outside of it.