Pierre MILPIED, PhD

Group leader:
Integrative B cell immunology

Background

After a multidisciplinary engineer degree from Ecole Polytechnique (2003-2007) and a M.Sc. in cancer science (2006), I trained as a PhD student in the lab of Pr Olivier Hermine (2007-2010, Necker Hospital, now Imagine Institute, Paris), working on mouse and human T cell subsets.

Then I moved to The Scripps Research Institute in La Jolla, USA, to work on B cell immunity as a postdoctoral scientist in the lab of Pr Michael McHeyzer-Williams (2011-2014).

In 2014, I joined the Centre d'Immunologie de Marseille-Luminy (CIML), in the team of Dr Bertrand Nadel, to apply single-cell analysis methods to the study of B cell immunity and lymphomas. Since then, I have been designing and leading original research at the crossroads of B cell immunology, cancer science, and bioinformatics.

I was recruited as junior scientist by Inserm in 2016 and have been selected to lead my own research group at CIML in 2018.

Awards

2017-2020	National Research Agency Young Investigator Program (ANR JCJC)
2015-2016	Postdoctoral fellowship from Fondation ARC
2012	Postdoctoral fellowship from Fondation Bettancourt-Schueller

Membership

Co-founding Member, French Society of Immunology's Germinal Center Club (GC club)

Member, Turing Centre for Living Systems (CenTuri), Engineering and Tech Transfer Committee

Main achievements

- During my PhD, I studied the expression of a cell surface molecule, neuropilin-1, in various T-cell subsets in mouse and human. Notably, we discovered that neuropilin-1 was a marker of mouse recent thymic emigrant iNKT cells, which were the only iNKT cells to produce IL-17 in peripheral lymphoid tissues upon activation.

- At the Scripps Research Institute, I studied the cellular and molecular dynamics of memory B cells at single cell resolution in mouse models of protein vaccination. We used integrative single-cell analysis of mouse

antigen-specific memory B cells to resolve a debated controversy on the fate of memory B cells upon re-activation. We unambiguously showed that IgG+ memory B cells re-diversify their BCR in secondary germinal centers (GC) upon antigen recall. During that time, I grew a deep interest in B cell biology and for single-cell data analysis.

- In the Nadel group at CIML, I started a line of research that involves using integrative single-cell analyses to model cellular heterogeneity in normal B cell immunity and neoplasia. We wanted to understand to what extent overt lymphoma B cells retain GC B cell functional dynamics or are blocked in a particular stage of the GC reaction. We tracked the characteristic human GC B cell program in follicular lymphoma (FL) B cells at single-cell resolution. By modeling the cyclic continuum of GC B cell transitional states, we identified characteristic patterns of synchronously expressed gene clusters. We found that GC-specific gene expression synchrony was lost in single lymphoma B cells. Yet, distinct FL-specific cell states co-existed within single patient biopsies. Our data showed that lymphoma B cells are not blocked in a GC B cell state but may adopt dynamic modes of functional diversity.

Selected publications

- Milpied P☒, Cervera-Marzal I, Mollichella ML, Tesson B, Traverse-Glehen A, Salles G, Spinelli L, Nadel B☒. Human germinal center transcriptional programs are desynchronized in B cell lymphoma. **Nature Immunology** 2018 Sep; 19(9):1013-1024. ☒ co-corresponding author
- McHeyzer-Williams LJ*, Milpied PJ*, Okitsu SL, McHeyzer-Williams MG. Class-switched memory B cells remodel BCRs within secondary germinal centers. **Nature Immunology** 2015 Mar;16(3):296-305. *co-first author
- Milpied P, Nadel B, Roulland S. Premalignant cell dynamics in indolent B-cell malignancies. **Current Opinion in Hematology** 2015 Jul;22(4):388-96.
- Milpied P, Massot B, Renand A, Diem S, Herbelin A, Leite-de-Moraes M, Rubio MT, Hermine O. IL-17-producing invariant NKT cells in lymphoid organs are recent thymic emigrants identified by neuropilin-1 expression. **Blood** 2011 Sep 15;118 (11):2993-3002.
- Milpied P*, Renand A*, Bruneau J, Mendes-da-Cruz DA, Jacquelin S, Asnafi V, Rubio MT, MacIntyre E, Lepelletier Y, Hermine O. Neuropilin-1 is not a marker of human Foxp3+ Treg. **European Journal of Immunology** 2009 Jun; 39 (6):1466-71. *co-first author

Past members

- Giulia Maria Pagano (M.Sc. 2017-2018), now PhD student at Luxemburg Institute of Health
- Cristiana Banila (summer intern 2017), now PhD student at Queen Mary University of London
- Stefan Dascalu (summer intern 2018), now PhD student at University of Oxford