European School of Molecular Medicine

RESEARCH ACTIVITY SHEET

2025 PhD selections

YOUR DETAILS

* Name & Surname: Blagoje Soskic

* Affiliation HT

PHD PROJECT DETAILS

* Title of the proposed project

Investigating molecular and cellular determinants of B cell differentiation

* Short description of the project (up to 300 words)

B cells produce large amount of antibodies, playing a key role in immune defence. Upon antigen encounter, naïve B cells (i.e. a cell that has not previously encountered an antigen) divides multiple times and subsequently differentiate into antibody secreting cells known as plasma cells or memory B cells. In contrast, when memory B cells are re-exposed to the antigen, they proliferate and differentiate into plasma cells faster, eliciting a more robust immune response that enables long term protection.

Despite significant advances in understanding the key transcription factors that govern B cell activation, several fundamental questions remain unresolved. First, much of our current knowledge is derived from mouse models, and it is still not clear which regulatory pathways are conserved in human B cells. Additionally, the precise dynamics of transcription factors and the genes they regulate are not yet fully characterized. Furthermore, it is unclear whether the selection of naïve B cell fate is driven solely by transcriptional changes or additional intrinsic and extrinsic factors contribute to this process.

To address these critical gaps in knowledge, the student will leverage cutting-edge genomic technologies, advanced imaging techniques, computational modelling, and high-dimensional data analysis to dissect the molecular and cellular determinants of B cell differentiation and antibody production. This interdisciplinary research will provide exciting opportunities for a PhD student to develop expertise in both experimental and computational immunology while contributing to fundamental discoveries with direct implications for vaccine development and immunotherapy.

* Indicate the main research area for the project described above Immunology

If needed indicate a second research area for the project described above Computational biology

* Provide up to 3 key words for project:

B-cells, antibodies, immunogenomics

YOUR LABORATORY ACTIVITIES DETAILS

* Main topic/s of the lab

B cell immunology, antibody regulation, genomics, immunogenetics

* Short description of the lab activity (up to 500 words)

T and B cells are the two key players of adaptive immunity and their interaction and coordinated activation is critical for host defence. Their collaboration underpins the successful development of antibodies which have multiple roles in immune protection. Therefore, it is not surprising that impaired T and B cell interaction results in high susceptibility to infection and immune deficiency. On the other hand, dysregulation of T and B cell responses may lead to immune-mediated diseases such as multiple sclerosis (MS) and systemic lupus erythematosus (SLE).

The overarching aim of my group is to gain fundamental insights into the molecular and genetic control of T-B interaction, B cell activation and antibody diversification. We integrate the power of immunological and cellular readouts with cutting-edge genomic tools to dissect the pathways that regulate B cell activation, antibody production and their genetic variability.

* Recent bibliography (max 5 references)

Demela P, Pirastu N, Soskic B. Cross-disorder genetic analysis of immune diseases reveals distinct gene associations that converge on common pathways. Nat Commun. 2023 May 12;14(1):2743.

Lynall ME, Soskic B, Hayhurst J, Schwartzentruber J, Levey DF, Pathak GA, Polimanti R, Gelernter J, Stein MB, Trynka G, Clatworthy MR, Bullmore E. Genetic variants associated with psychiatric disorders are enriched at epigenetically active sites in lymphoid cells. Nat Commun. 2022 Oct 15;13(1):6102.

Kennedy A, Waters E, Rowshanravan B, Hinze C, Williams C, Janman D, Fox TA, Booth C, Pesenacker AM, Halliday N, Soskic B, Kaur S, Qureshi OS, Morris EC, Ikemizu S, Paluch C, Huo J, Davis SJ, Boucrot E, Walker LSK, Sansom DM. Differences in CD80 and CD86 transendocytosis reveal CD86 as a key target for CTLA-4 immune regulation. Nat Immunol. 2022 Sep;23(9):1365-1378.

Soskic B*, Cano-Gamez E*, Smyth DJ, Ambridge K, Ke Z, Matte JC, Bossini-Castillo L, Kaplanis J, Ramirez-Navarro L, Lorenc A, Nakic N, Esparza-Gordillo J, Rowan W, Wille D, Tough DF, Bronson PG, Trynka G. Immune disease risk variants regulate gene expression dynamics during CD4+T cell activation. Nat Genet. 2022 Jun;54(6):817-826.

Cano-Gamez E*, Soskic B*+, Roumeliotis TI, So E, Smyth DJ, Baldrighi M, Willé D, Nakic N, Esparza-Gordillo J, Larminie CGC, Bronson PG, Tough DF, Rowan WC, Choudhary JS, Trynka G+. Single-cell transcriptomics identifies an effectorness gradient shaping the response of CD4+ T cells to cytokines. Nat Commun. 2020 Apr 14;11(1):1801.

* Group composition: total members, and roles distribution (PhD, postdoc, technician, etc.)

2 Postdocs
2 PhD Students
1 MsC Student
1 Senior Technician

Institutional page link

https://humantechnopole.it/en/research-groups/soskic-group/

Lab website link, if any

Social media links, if any

If you prepare a video to promote your lab/project, please include the link below