LABORATORY OF

IMMUNOBIOLOGY

Central and peripheral immune tolerance, extrathymic function of Aire, TCR signalling, TLR signalling, embryonic haematopoiesis

Dominik Filipp

In the picture: 1. Faltýnková Petra | 2. Petrusová Jana | 3. Sakanwi Joy | 4. Jančovičová Kristýna | 5. Tahtahová Valérie | 6. Petrezselyová Silvia | 7. Čepková Adéla | 8. Machač David | 9. Sýkora Vojtěch | 10. Ballek Ondřej | 11. Puskeiler Matůš | 12. Březina Jiří | 13. Filipp Dominik

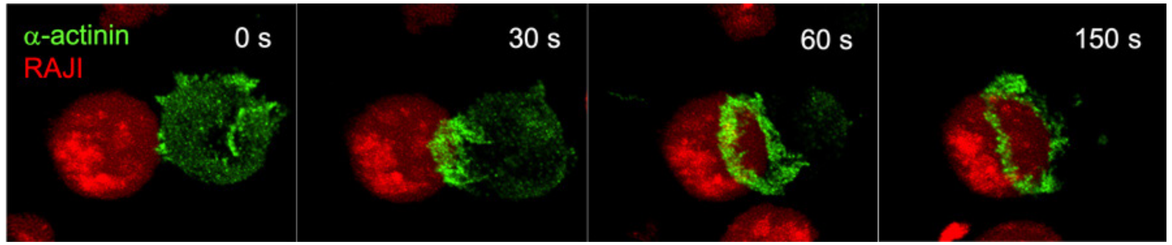
Our research mainly concerns:

1. the mechanisms guiding the process of immune central and peripheral T-cell tolerance and autoimmunity;
2. initiation of T-cell activation;
3. embryonic haematopoiesis, and
4. the role of Toll-like receptors in these processes.

In the last decade, we dedicated our effort to improve the impact of our research activity by implementing the following four strategies:

1. in general, we strictly set up our priorities and select those areas of research that are highly novel, promising, competitive, and yet close to our expertise and interest;
2. particularly, we focused on a deeper and more comprehensive understanding of the cellular, molecular and signalling aspects of the mechanisms of central and peripheral tolerance, embryonic homeostasis and T-cell signalling. Towards this end, we utilized the strategy of generating several knock-out and knock-in transgenic mouse strains, which allowed us to observe the biological correlates and consequences of these mechanisms under perturbed and unperturbed conditions;
3. we heavily invested in the acquisition of a battery of commercially or academically available transgenic mouse models and created an experimental panel of mutated strains, which allowed us to accelerate the rate of discovery; and
4. we further deepen our ties with collaborating laboratories abroad and locally, organize regular meetings and exchanges of ideas, materials and reagents.

In this context, we take pride in our highly motivated, smart and hard-working students and young scientists and the fact that all lab members are actively involved in shaping the research via discussions at lab meetings, preparing talks for conferences and students' seminars.



Kinetics of immunological synapse formation between RAJI B-cell (red) and Jurkat T-cell expressing the cytoskeletal component a-actinin-1 (green). Microscopy was performed using an Andor Dragonfly Spinning disc confocal microsope.

Selected publications:

1. Vobořil M, Brabec T, Dobeš J, Šplíchalová I, Březina J, Čepková A, Dobešová M, Aidarova M, Kubovčiak J, Tsyklauri O, Štěpánek O, Beneš V, Sedláček R, Klein L, Kolář M, and Filipp D. Toll-like receptor signaling in thymic epithelium controls monocyte-derived dendritic cell recruitment and Treg generation. 2020. Nature Communication, 11:2361, 1-16.
2. Vobořil M, Březina J, Brabec T, Dobeš J, Ballek O, Dobešová M, Manning J, Blumberg RS, Filipp D. A model of preferential pairing between epithelial and dendritic cells in thymic antigen transfer. 2022. eLIFE, 11:e71578, 1-18.
3. Dobes J, Binyamin A, Oftedal B, Goldfarb Y, Kadouri N, Gropper Y, Giladi T, Filipp D, Husebye ES, Abramson J. Aire-expressing ILC3 like cells are essential for induction of Candida-specific Th17 response. 2022. Nature Immunology, 23(7):1098-1108.
4. Březina J, Vobořil M and Filipp D. Mechanisms of direct and indirect presentation of self-antigens in the thymus. 2022, Frontiers in Immunology, 13:926625, 1-13.
5. Petrusová J, Manning J, Kubovčiak J, Kolář M and Filipp D. Two complementary approaches for efficient isolation of Sertoli cells for transcriptomic analysis. Front. Cell Dev. Biol. 10:972017, 1-12.
6. Petrusová J, Manning J and Filipp D. AIRE in male fertility: a new hypothesis. 2022, Cells, 11, 3168, 1-11.