Role of epidermal intercellular communication in the development of pruritus (Bíró-lab)

Team leader: Dr. Szöllősi Attila Gábor
Participants: Angyal Ágnes, Shahrzad Alimohammadi
Collaborative partners: Prof. Dr. Martin Steinhoff, University College Dublin

Itch is the most common dermatological symptom that affects the quality of life of millions worldwide. In the last few decades our knowledge of the molecular mechanisms driving acute itch has increased greatly, however chronic itch (lasting longer than 6 weeks) is less described and as such the treatment of pruritus is still one of the leading challenges in the dermatological practice. Acute itch is most commonly initiated by some exogenous pruritic signal, which is transduced on sensory nerves fibres through the complex interplay of ion channels (for example transient receptor potential [TRP] ion channels, which are considered multimodal cellular sensors), and metabotropic pruritic receptors (for example histamine receptors, protease activated receptors, etc.). It is less clear how chronic itch is initiated, and more importantly maintained in the absence of exogenous stimuli as is commonly the case in clinical conditions characterized by chronic itch. One possible explanation is the dysregulation of communication between the pruriceptive sensory fibres and non-neuronal cells of the epidermis.

Based on the above the goal of the current project is to examine intercellular communication in the epidermis in relation to pruriceptive signal transduction, in particular to the role of TRP ion channels which are expressed on both neural and non-neural elements of the skin. The main questions to be addressed in our research: (i) which pruritic signals can non-neuronal cells of the skin such as keratinocytes or Langerhans cells be the targets of, and do TRP channels play a role in these putative processes; (ii) does the activation of non-neural TRP channels change the secretome of these cells; (iii) how can secreted mediators activate sensory nerves; (iv) does an inflammatory milieu change this pruritic “dialogue”, and (v) how does the expression of TRP channels change in inflammatory skin diseases.