Humboldt Kolleg
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Global Challenges of the 21st Century
1) Technological development and human health/ quality of life
2) Climate change and environmental sustainability
3) Democracy and cohesion in Europe

Transient Receptor Potential Channels Involved in Human Painful Photosensitivity Disorders

Several human genetic diseases, such as cutaneous porphyrias and the Smith-Lemli-Opitz syndrome, are associated with pain and itch upon brief exposure to sunlight or even artificial light. In addition, certain therapeutical approaches, including photodynamic therapy and PUVA (psoralen UVA) therapy, are accompanied by adverse effects due to phototoxicity, including severe pain. Our recent work has identified two ion channels from the Transient Receptor Potential (TRP) super-family, namely TRPA1 and TRPV1, which largely account for the pathological photosensitivity in some of these diseases and therapies. Evidence gathered from in vitro models (heterologous expression of human TRPA1 and TRPV1 and cultured dorsal root ganglion neurons), transgenic animals (TRPA1-/-, TRPV1-/- and double TRPA1/TRPV1 knockout mice) as well as psyschophysical experiments has been provided to confirm the functional involvement of these pain-signaling ion channels in the adverse effects induced by light exposure. The mechanistic implications as well as the consequencs for novel therapeutical approaches will be discussed.

Alexandru Babes completed a Bachelor in Physics and a Master of Science in Neurobiology at the University of Bucharest. In 2002, he also received his doctorate in biology from the University of Bucharest with “Summa cum laude”. After his doctorate, worked at the Department of Pharmacology at Cambridge University as a post-doctoral research associate for more than half a year. Since 2008, Prof. Babes has been teaching and doing research at the Department for Animal Physiology and Biophysics at the University of Bucharest as a Professor for Neurobiology. His research currently focuses on the molecular mechanisms of sensory transduction in peripheral mammalian thermoreceptors and nociceptors. Using a combination of electrophysiological and imaging techniques, he has been involved in the characterization of cold-sensitive neurons in rodent dorsal root ganglia. Together with other

researchers, he has shown that more than one neuronal population is involved in cold detection and they have described a novel type of cold-sensitive neuron with rapid adaptation to cooling stimuli for the first time.