Our everyday reactions to different stimuli that surround us, in a large degree depend on the proper recognition of the stimulus as familiar or novel. Neuronal mechanisms of appropriate recognition and reaction to novelty, a feature without which societies would not function, are still not fully understood.

Often unconscious, the ability to detect and correctly respond to novel stimuli is fundamental to survival, and atypical habituation and inappropriate responses to novelty are strongly related to a range of neuropsychiatric disorders, including autism, schizophrenia, attention-deficit-hyperactivity disorders (ADHD), addiction and anxiety disorders. One of the predisposing factors for the development of novelty response-related deficiencies is stress, and stress and anxiety associated disorders are among the most prevalent psychiatric conditions.

In the current project, the most modern experimental techniques in neuroscience will be used, including optogenetics and chemogenetic, to answer the question about the role and neuronal mechanisms of brainstem inputs to the interpeduncular nucleus (IPN), brain structure involved in novelty/familiarity signalling as well as in control of fear, stress and aversive effects of nicotine. Especially inputs to IPN from *nucleus incertus*, a stress-sensitive node of an ascending arousal network and a major source of relaxin-3 neuropeptide in the brain, will be analysed at the cellular, neural network and behavioural levels. It is anticipated that data from the proposed studies will contribute to a better understanding of the neuronal nature of brainstem-midbrain connection and its involvement in novelty related behaviours. A complete understanding of the neural processes and neurochemicals involved in novelty preference and social interactions, as well as mechanisms underlying stress-related impairment of novelty signalling is of biological importance and may lead to the development of improved treatments for related neurological and psychopathologies.