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MEETING ABSTRACT

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**Role of the galanin peptide system in behavior, food intake, metabolism and inflammation**

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**Background:** The neuropeptide galanin (GAL) is a neurotransmitter/neuromodulator/regulatory peptide widely distributed in the central and peripheral nervous systems. In the brain, GAL mRNA is extensively expressed in the hypothalamic and brainstem areas. It is a modulator of various physiological and pathological processes and mediates its effects via three G protein-coupled receptors (GAL<sub>1-3</sub>). The GAL receptor subtypes have substantial differences in their functional coupling and signaling activities. GAL<sub>1</sub> and GAL<sub>2</sub> are expressed in various brain regions whereas expression of GAL<sub>3</sub> receptor is more limited and preferably detected in the hypothalamus. The GAL system is also widely expressed in peripheral tissues including epithelia and immune cells.

**Methods:** The involvement of signalling via galanin receptors was tested in various behavioural tests and disease animal model systems using galanin receptor knockout (KO) animals. Furthermore, functions of galanin in the immune system were analysed on isolated primary human immune cells.

**Results:** GAL<sub>3</sub>-KO mice exhibited an anxiety-like phenotype in the elevated plus maze, open field and light/dark box tests and were less socially affiliated than wild-type (WT) animals to a stranger mouse in a social interaction test. Furthermore, GAL<sub>3</sub>-KO mice exhibited an alcohol-preferring phenotype. Studies in various preclinical disease models revealed that GAL<sub>3</sub>, but not GAL<sub>2</sub>, receptors play a role in inflammatory diseases like psoriasis, arthritis and inflammatory bowel disease. The involvement of GAL<sub>3</sub> receptors is depending on the tissue and immune cell types involved. GAL is highly expressed in myeloid cells, especially in macrophages. The most prominent galanin receptor expressed in human immune cells is GAL<sub>2</sub>. GAL<sub>1</sub> mRNA is present in skin mast cells and macrophages. Dendritic cells express GAL<sub>2</sub> and GAL<sub>3</sub> receptors. Treatment of different types of immune cells leads to significant changes of the expression of cytokines and chemokines.

**Discussion:** Our studies indicate that galanin peptides not only act as classical neuropeptides in the brain but also as components of the neuro-immune axis. Yet, it is not clear whether the effects on inflammatory diseases are due to local functions only or are also involving brain signalling.

**Keywords:** galanin – galanin receptors – cytokines – hypothalamus – neuroimmunology

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