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Geoffrey Burnstock

University College Medical School, UK

The University of Melbourne, Australia

Purinergic signaling in the nervous system in health and disease

The concept of purinergic neurotransmission (i.e. neurally released ATP acting as an extracellular signaling molecule) was proposed in 1972. Later it was recognized as a co-transmitter in most, if not all, nerves in the peripheral and central nervous systems, acting on post and also pre-junctional membranes, at autonomic neuro-effector junctions and ganglionic and central synapses. ATP and its breakdown product adenosine also act as trophic factors during development and regeneration. Brief background information is given about ATP storage, release and ecto-enzymatic breakdown. Purines and pyrimidines have key roles in neurotransmission and neuro-modulation, with their effects being mediated by P1 (adenosine), P2X ion channel and P2Y G protein-coupled receptors. There is coverage of neuron-glia interactions and of purinergic neuro-effector transmission to non-muscular cells. Purinergic mechanisms and specific receptor subtypes have been shown to be involved in pathological conditions, including brain trauma and ischemia, epilepsy, visceral and neuropathic pain, neurodegenerative diseases associated with neuro-immune and neuro-inflammatory reactions, as well as neuropsychiatric diseases, including depression, anxiety and schizophrenia. Specific purinergic receptor subtypes, notably A_{2A}, P2X4 and P2X7 are being explored as therapeutic targets for the treatment of these conditions.

Biography

Geoffrey Burnstock completed his PhD at King's College and University College London. He was head of the Department of Zoology, Melbourne University (1964-1975) before moving to London to head the Department of Anatomy and Developmental Biology, UCL until 1997. He is currently the President of the Autonomic Neuroscience Centre, University College Medical School, UK. He is a Fellow of the Australian Academy of Sciences (1971), Royal Society (1986) and Academy of Medical Sciences (1998). He was awarded the Royal Society Gold Medal (2000) and has over 1520 publications and an H-index of 135.

g.burnstock@ucl.ac.uk

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