Abstract:
A century after the discovery of acetylcholine (ACh), we recognize both ACh receptors, transporters, and synthesizing and degrading enzymes and regulators of their expression as contributors to cognition, metabolism, and immunity. Recent discoveries indicate that pre- and post-transcriptional ACh signaling controllers coordinate the identity, functioning, dynamics, and brain-to-body communication of cholinergic cells. Checks and balances including epigenetic mechanisms, alternative splicing, and miRNAs may all expand or limit the diversity of these cholinergic components by consistently performing genome-related surveillance. This regulatory network enables homeostatic maintenance of brain-to-body ACh signaling as well as reactions to nicotine, Alzheimer's disease anticholinesterase therapeutics, and agricultural pesticides. Here I review recent reports on the functional implications of these controllers of cholinergic signaling in and out of the brain.

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