Targeting Topics: Recent Scientific References

Reviewed by Matthew Kohls

Photostimulation of retrotrapezoid nucleus phox2b-expressing neurons in vivo produces long-lasting activation of breathing in rats
Abbott SB, Stornetta RL, Fortuna MG, Depuy SD, West GH, Harris TE, Guyenet PG

The retrotrapezoid nucleus (RTN) contains a subpopulation of cells that are thought to function as central respiratory chemoreceptors. The authors used bilateral 22-ng injections of anti-DBH-SAP (Cat. #IT-03) into the lateral horn of the second thoracic segment to investigate this hypothesis. Coupled with data generated by lentivirus-driven transgenic expression of a light-activated cationic channel, it is demonstrated that noncatecholaminergic neurons in the RTN function as central respiratory chemoreceptors.

Anti-amnesic properties of (+/-)-PPCC, a novel sigma receptor ligand, on cognitive dysfunction induced by selective cholinergic lesion in rats
Antonini V, Prezzavento O, Coradazzi M, Marrazzo A, Ronisvalle S, Arena E, Leanza G

Sigma-1 receptors are found throughout the central nervous system, and are thought to be a target for regenerative therapy in Alzheimer’s disease. Rats received 3.0 µg or 5.0 µg of 192-IgG-SAP (Cat. #IT-01) injected intracerebroventricularly. The lesioned animals displayed dose-dependent deficits in water maze performance. Treatment with the sigma-1 receptor agonist (±)-PPCC significantly improved both reference and working memory performance in treated animals, indicating that (±)-PPCC-mediated positive effects are probably a function of the sigma-1 receptor.

Cholinergic deafferentation of the neocortex using 192 IgG-saporin impairs feature binding in rats
Botly LC, De Rosa E

It has been hypothesized that the nucleus basalis magnocellularis (NBM) is the source of cholinergic input to the neocortex that is responsible for incorporating different features of an object into a unified neural representation of said object. Rats received 0.04-µg bilateral injections of 192-IgG-SAP (Cat. #IT-01) into the NBM. In lesioned animals modes of learning requiring feature binding were impaired, while processes not using feature binding were left intact.

Severe Scene Learning Impairment, but Intact Recognition Memory, after Cholinergic Depletion of Inferotemporal Cortex Followed by Fornix Transection
Browning PG, Gaffan D, Croxon PL, Baxter MG
Cereb Cortex [Epub], 2009.

In this work the authors investigated the link between connections carried by the fornix and cholinergic input to the inferotemporal cortex in scene learning. Monkeys received 56-64 0.02-µg injections of ME20.4-SAP (Cat. #IT-15) into the inferotemporal cortex, and entorhinal cortices. There was a marked impairment in memory for lesioned animals that also received a fornix transection, indicating a synergistic interaction between connections carried by the fornix and cholinergic input to the inferotemporal cortex for episodic memory.

Substance P neurotransmission and violent aggression: the role of tachykinin NK1 receptors in the hypothalamic attack area
Halasz J, Zelena D, Toth M, Tulogdi A, Mikics E, Haller J

Stimulation of the hypothalamic attack area elicits biting attacks in rats. The authors eliminated NK1 receptor-expressing neurons in this area with bilateral 6.25-ng injections of SP-SAP (Cat. #IT-07). Violent attacks were dramatically reduced while milder forms of aggression remained unchanged, indicating that these two forms of aggression are controlled via different pathways. Lesioned animals also displayed reduced anxiety-like behavior in the elevated plus-maze, suggesting a connection between the hypothalamic attack area and brain areas controlling anxiety.

Partial ablation of mu-opioid receptor rich striosomes produces deficits on a motor-skill learning task
Lawnth C, Smith DM, Brown LL
Neuroscience [Epub], 2009.

The functional role of basal ganglia striosomes is not well understood. In order to examine these cells in the context of motor behavior the authors injected 8.5 ng of dermorphin-SAP (Cat. #IT-12) into several areas of the striatum of mice (saporin, Cat. #PR-01, was used as a control). The animals were then evaluated in complex motor tasks involving the use of striatal circuitry. Animals receiving dermorphin-SAP showed deficits in specific motor tasks corresponding to the extent of the lesion.

Targeted ablation of cardiac sympathetic neurons reduces resting, reflex and exercise-induced sympathetic activation in conscious rats
Lujan HL, Palani G, Chen Y, Peduzzi JD, Dicarlo SE

Excessive sympathetic activity contributes to most cardiovascular diseases. Thoracic sympathectomy is a non-specific treatment that can alleviate some sympathetic activity, but produces undesirable side effects. The authors lesioned a subset of sympathetic preganglionic neurons with 10 µg of CTB-SAP (Cat. #IT-14) into the left and right stellate ganglion of rats. Treated animals displayed several types of reduced cardiac sympathetic neuronal activity indicating that this may be a useful approach for treating these types of conditions.

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