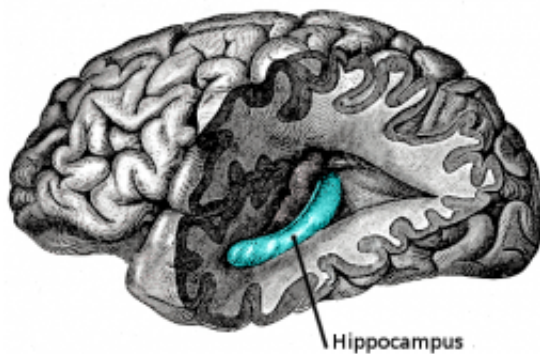


Researchers reveal how nicotine influences hippocampal-dependent cognition

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The hippocampus is located in the medial temporal lobe of the brain. Image via Wikipedia.

Nicotine ingested from smoking exerts neuroprotection and developmental neurotoxicity in the central nervous system. It can produce changes of cognitive behaviors through regulating the release of different neurotransmitters in the brain.

However, the effects of [nicotine](#) exposure or withdrawal on neurotransmitter metabolism of hippocampal neurons still remain unclear.

Dr. Luo Qian's group from the Shenzhen Institute of Advanced Technology (SIAT) of the Chinese Academy of Sciences has revealed

the possible mechanism of nicotine on hippocampal-dependent cognition.

Their study was published in *Chinese Chemical Letters* on Sept. 24.

Through a microfluidic chip coupled with liquid chromatography-mass spectrometry (MC-LC-MS) system, the researchers used mice in real-time to evaluate the dynamic alterations induced by nicotine exposure and withdrawal at relevant exposure levels of smoking and secondhand smoke in the neurotransmitter metabolism of hippocampal neuron (HT22) cells.

The MC-LC-MS system showed an advantage in detecting unstable metabolites over the conventional method of using in vitro model. "We found that HT22 cells mainly released related neurotransmitters of tryptophan and choline metabolism," said Dr. Luo.

Moreover, exposure to nicotine at relevant levels of smoking and secondhand smoke significantly altered the metabolism and secretion of serotonin, kynurenic acid, choline and acetylcholine of HT22 cells, and their alterations were closely associated with the exposure dose and duration.

These results suggested the acute exposure to nicotine was beneficial to protect the [neurons](#), especially [cognitive](#) enhancement, and the elevated picolinic acid continually protected neuronal cognitive function after nicotine withdrawal.

Furthermore, the dynamic alterations of neurotransmitter metabolism induced by nicotine might be a possible protective mechanism of nicotine on hippocampal dependent cognition.

More information: Zhiyu Chen et al, Real-time effects of nicotine

exposure and withdrawal on neurotransmitter metabolism of hippocampal neuronal cells by microfluidic chip-coupled LC-MS, *Chinese Chemical Letters* (2021). [DOI: 10.1016/j.ccl.2021.09.060](https://doi.org/10.1016/j.ccl.2021.09.060)

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