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The more someone smokes, the smaller the number of gray cells

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Is there a relation between the structure of specific regions of the brain and nicotine dependence? This is the question researchers of the Physikalisch-Technische Bundesanstalt (PTB) Berlin, Germany, have been investigating lately. The results of these investigations extend and specify those of preceding studies: A specific region of the cerebral cortex of smokers is thinner than that of people who have never smoked in their lives. This region is decisive for reward, impulse control, and the making of decisions. The questions of whether smoking leads to this cerebral region becoming thinner - or whether people who have a thinner cortex region by nature are more frequently inclined to become smokers - can only be clarified by further investigations.

To investigate the relation between cortical thickness and nicotine dependence, the brains of 22 smokers and 21 people who have never smoked in their lives were investigated with the aid of a magnetic resonance tomograph. The measurements were carried out at PTB in Berlin and furnished high-resolution three-dimensional images of the brain structure.

On the basis of these data, the individual thickness of the cortex could be determined at the Charité by means of a special evaluation procedure. A comparison of the two groups showed that in the case of smokers, the thickness of the medial orbito-frontal cortex is, on average, smaller than in the case of people who have never smoked. The thickness of this region decreased in relation to the increase in the daily consumption of cigarettes, and depending on how long in their lives the participants in

the study had been smokers.

Cause and effect are, however, still not clear. Although it is known from animal experiments that nicotine changes the development of the brain and leads to a damaging of neurocytes, it cannot be ruled out that the reduced thickness of the frontal cortex region found in the case of the participants in the study already existed before they started smoking. Possibly, it is a genetically conditioned predisposition for nicotine dependence. Scientists want to find out in future studies whether the brain structure of smokers can become normal again after they have given up smoking.

More information: Kühn, S.; Schubert, F.; Gallinat, J.: Reduced thickness in medial orbitofrontal cortex in smokers. Biological Psychiatry, 2010 Sept 25 (Epub ahead of print)

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