

## **PREFRONTAL CONTROL OF RESPIRATION**

V. G. Aleksandrov<sup>1</sup>, T. G. Ivanova<sup>1</sup>, and N. P. Aleksandrova<sup>2</sup>

<sup>1</sup>Alexander I. Herzen State Pedagogical University of Russia, St. Petersburg, Russia; <sup>2</sup>Pavlov Institute of Physiology, Russian Academy of Science, St. Petersburg, Russia

A fundamental fact is that the cerebral cortex takes part in the control of respiration and disturbed interactions between some cortical area may provide the basis for respiratory manifestations of psychosomatic disorders. Identification of cortical areas involved in the respiratory control remain to be a problem but infralimbic region (IL) and insular area (IC) are considered to be implicated in general autonomic control in the rat. We hypothesized that IL and IC may be involved in the control of respiration. This hypothesis was tested by examining the influence of low intensity electrical stimulation of IL and IC on the respiratory pattern. The experiments were performed on the rats anaesthetized with urethane. Pneumotachography had been used to measure and compare peak respiratory flow, tidal volume, and parameters of respiratory cycles before and after electrical microstimulation of IL and IC which was performed via wire microelectrode. Inspiratory swings of esophageal pressure were registered to estimate the force of inspiratory muscles contractions. Besides, blood pressure and heart rate was recorded in the same experiments. It had been found that responsive sites for different kinds of respiratory responses localized within IC and IL. Stimulation of the anterior parts of the IC produced inhibitory responses which manifested themselves in decrease in inspiratory air flow and tidal volume, but respiratory rate remained stable. The increase in inspiratory air flow and respiratory rate accompanied by a decrease of tidal volume was identified as the excitatory response which was localized in IC at more caudal levels. Stimulation of IL produced similar kind of responses. These respiratory reactions were usually accompanied by the specific changes in blood pressure and heart rate. This finding suggest that both IL and IC stimulation produces particular alterations in the respiratory pattern of anaesthetized rats and support the hypothesis that these parts of the prefrontal cortex actively participate in the respiratory control.