



Neural Plasticity

Special Issue on
**Adaptation and Plasticity of Breathing during
Behavioral and Cognitive Tasks**

CALL FOR PAPERS

The vital function of respiration is to supply oxygen to the body and to release carbon dioxide. The focus of interest of the present special issue is not these gaseous exchanges *per se* but rather the neurobiological processes related to the ventilatory movements by which these exchanges are made possible and their modulation in different environmental contexts.

Breathing function is controlled by a network of structures located in the brainstem. As any motor act, respiratory rhythm can be voluntary controlled but is also modulated by a number of internal or external factors. First, breathing must be coordinated with many other orofacial functions like exploratory sniffing, whisking, licking, chewing, suckling, and speech/vocalizations. Second, respiration rate is strongly modulated during sensory exploration, particularly in olfaction. Indeed odor sampling is achieved through sniffing behavior allowing the odorant molecules to enter the mucosa and bind to the olfactory receptors. Third, breathing can be modulated by higher brain functions related to cognition, emotion, and attention.

At the reverse, breathing is also able to modulate other functions. For instance, deep breathing can slow down the heart rate and reduce stress levels. In addition, brain neuronal network dynamics can be strongly influenced by respiratory dynamics as the periodical nature of breathing can interact with cerebral rhythms and may in turn facilitate sensory and/or cognitive processes.

Finally, alterations in breathing pattern are often observed in neurological disorders in association with cognitive deficits. The development of remediation tools based on breathing retraining could open the door to the development of new therapeutic avenues.

All these aspects place the respiratory act at a crossroad between many “main stream” neurobiological questions. Thereby, the question of respiration-related neurobiological processes is a highly multidisciplinary field, involving very different scientific communities. The purpose of this special issue is to gather these communities, thus providing a unique opportunity to enhance multidisciplinary research efforts which could favor the emergence of new concepts in the field.

Potential topics include, but are not limited to:

- ▶ Respiratory rhythm and pattern generation
- ▶ Respiration and orofacial coordination
- ▶ Respiration and olfaction
- ▶ Respiration and emotion
- ▶ Respiration and cognitive processes
- ▶ Respiration and autonomic nervous system regulation
- ▶ Respiratory rhythm and brain oscillatory activities
- ▶ Respiratory neuropathology

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