

EDITORIAL

Ultrasonic Vocalizations in Rats: A Tool for the Investigation of Psychoactive Drugs and Neuropsychiatric Conditions

Ultrasonic vocalizations (USVs) are a major means of communication in rats, and can be emitted by rat pups, as well as by young and adult rats. Several lines of evidence indicate that the emission of USVs has behavioral significance, and may reflect either euphoric (positive) or dysphoric (negative) emotional states in the rat [1, 2]. This renders rat USVs an appealing behavioral parameter to be considered in studies of emotion, motivation, and reward. Moreover, rat USVs have recently begun to be investigated in pharmacological studies associated with effects of drugs of abuse, in the light of previous findings showing that certain addictive drugs can influence the emission of USVs by rats [3-5]. Finally, evidence also exists that altered emission of USVs by rats may be linked to either neurological abnormalities [6, 7], or to genotypes/phenotypes that may exhibit behaviors reminiscent of certain neuropsychiatric conditions [8, 9]. Based on these considerations, rat USVs have recently attracted attention as a complementary, non invasive, behavioral measure in neuropharmacological studies.

The aim of this special issue is to present an updated overview of the behavioral significance of rat USVs and to discuss the relevance of these USVs to neuropharmacological studies. Behavioral significance of rat USVs is presented in the review by Brudzynski [10], which contains an exhaustive overview of the behavioral and pharmacological studies of basic emotional states signaled by USVs, and a thorough discussion on the relevance of rat USVs as experimental tools in studies of emotional states. This paper also includes information about neurochemical bases of these states expressed by emission of relevant USVs. The review by Simola [11] discusses possible use of rat USVs measurements in neuropharmacological and drug discovery studies, by reviewing the current evidence that shows how rat USVs may be a suited tool for investigating properties of certain classes of agents (e.g., anxiolytics, antidepressants, drugs of abuse) and as correlates of behaviors reminiscent of psychiatric syndromes (e.g., anxiety, autism, depression). More specific aspects of rat USVs are covered by the other reviews in the issue. Barker *et al.*, [12] review the current evidence of using rat USVs to study the affective components of drug abuse and drug withdrawal. This paper includes critical discussion on how rat USVs may complement the current experimental paradigms of drug abuse and reveal the affective processes that may promote drug taking and/or relapse. The review by Johnson *et al.*, [13] presents evidence that changes in the emission of rat USVs and in their acoustic features occur in models of neurodegenerative disorders, which suggests that the study of USVs could represent a new complementary behavioral measure in investigations of neuronal death. Finally, Rippberger *et al.*, [14] provide an updated overview of the

neurochemical mechanisms and experimental conditions that promote the emission of rat USVs in response to amphetamine, a prototype drug able to stimulate reward-related USVs in the rat. This paper also suggests that emission of these USVs may have some relevance to the experimental study of mania.

By gathering high-quality and updated reviews, this special issue should contribute to an increased awareness of the scientific community as to the significance and use of rat USVs as a new complementary behavioral measure in neuropharmacology.

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Nicola Simola
(Guest Editor)

Department of Biomedical Sciences
Section of Neuropsychopharmacology
University of Cagliari
Via Ospedale, 72, 09124, Cagliari
Italy
Tel: +39-070-6758687
Fax: + 39-070-6758665
E-mail: nicola.simola@gmail.com