

Editorial

Tonic Immobility Behavior: A Model to Fear, Anxiety or Depression?

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Tonic immobility [TI] behavior is a reversible innate defense response characterized by profound physical inactivity and a relative lack of responsiveness to external stimuli [1,2]. The TI response is emitted by the prey in a confrontation with the predator as a last resource to increase its chances of survival [2,3] and is therefore of high adaptive value. This behavior is shown during situations of extreme, inescapable threat [4] and is observed in many species of invertebrate and vertebrate animals [1,2], including humans [5]. In laboratory, TI can be induced by postural inversion and manual restriction of movements, maneuvers that emphasize the tactile and proprioceptive sensations, which are important in the induction of this behavior. Furthermore, a state of intense fear is a determinant for the triggering of this response [1,4]. For several years we have been interested in the study of the neural substrate involved in the modulation of TI and of the participation of the neurotransmitters systems associated with these central structures [6-14].

It is relevant to note that there appears to be a correlation between human defensive behavior and fear- and anxiety-related defensive patterns in non-human mammals [15], because of this, many studies have used animal models to study the fear and anxiety in humans. In fact, TI reaction has been more often associated with a defensive reaction against predation, a hypothesis supported by various experiments involving manipulations that presumably generate innate fear. However, some reports have correlated the model of TI to study fear and anxiety, or maybe, TI model can be used in conjunction with other measures of the fear and anxiety to clarify the effects of anxiolytic drugs [16,17]. Indeed, the knowledge about the brain's defense circuitry come primarily from neuroscience research with animals, using relatively simple experimental procedures in which nociceptive events [e.g. electric shock] are paired with previously innocuous lights and tones [18,19] and few reports used ethological strategies for study of the defensive behavior, in particular the predator-prey confrontation or innate fear [20,21]. In this way, TI is well established as a fear response, which can be elicited in a wide range of vertebrates and invertebrates, and is established most easily through some form of restraint or physical inversion. In addition, some reports

have been hypothesized to relate to animal defense responses in general, and TI in particular, with catatonia [16], and also depression [22,23]. Olsen et al. [17] have investigated the validity of the TI model in guinea pigs for detection of anxiolytic and/or antidepressant drug activity. But, the potential of TI as a behavior for detecting anxiolytic-like effect may be questioned due to the contradictory effect of the benzodiazepine ligands, which may be attributed to the sedative and/or ataxic effects of the compounds. Recently, previous studies have suggested that tonic immobility can predict the severity of posttraumatic stress disorder [PTSD] symptoms [5,24-26].

In this way, every experimental model has limitations and to expand the knowledge is necessary a critical analysis of the methodology and the data. So, it is difficult to decide on what type of emotional behavior the tonic immobility in guinea pigs models is, however, it is one good strategy to investigate the emotional circuitry puzzle.

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