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Symposium

Stress-induced responses in the central-peripheral associations

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Peripheral organ functions such as cardiovascular and respiratory activity are controlled by the nervous system. Though most early studies have mainly focused on physiological events within a single organ, it remains largely unknown how the central nervous system and peripheral organs interact with each other. To address this issue, we hereby developed a recording method that comprehensively monitors electrical biosignals representing cardiac rhythm, breathing rhythm, awake/sleep-related muscle contraction, and collective neuronal activity of multiple brain regions. Using this novel technique, we examined physiological changes in central-peripheral activity in rats that were subject to social defeat stress. Rats were classified into stress-susceptible and stress-resilient groups, based on cardiac and respiratory signals. Multi-dimensional discriminant analysis revealed that certain activity patterns of cortical oscillations could predict future animal's susceptibility against stress. Furthermore, stress-susceptible animals exhibited decreases in activity levels in multiple brain regions, including the hippocampus, the somatosensory cortex, and the thalamus. Such dynamic changes in cortical activity is a possible mechanism to cause abnormal activity of the peripheral organs in response to mental stress episodes.