

Neural Mechanisms by which Fear of Falling Worsens Standing Balance - Focusing on Cortical Activity -

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The purpose of this study was to elucidate, from the perspective of cortical activity, how emotion-related processes associated with fear of falling influence standing postural control. Emotion is generally represented within a two-dimensional space defined by valence, which reflects pleasantness–unpleasantness, and arousal, which reflects the level of activation. Accordingly, we examined the effects of arousal and valence on cortical activity during standing postural control using electroencephalography. The results showed that, compared with low arousal, high arousal was associated with increased activation of a series of cortical regions involved in sensory feedback processing and motor execution required for balance regulation. In addition, unpleasant valence, compared with pleasant valence, was associated with increased activation of cortical regions related to somatosensory processing and motor execution. Furthermore, unpleasant emotional states were suggested to disrupt phase-dependent activity patterns in cortical regions involved in somatosensory processing and motor execution during postural sway. Taken together, these findings demonstrate that arousal and valence exert distinct influences on cortical activity related to standing postural control.