The link between facial feedback and neural activity within central circuitries of emotion--new insights from botulinum toxin-induced denervation of frown muscles.

Abstract: Afferent feedback from muscles and skin has been suggested to influence our emotions during the control of facial expressions. Recent imaging studies have shown that imitation of facial expressions is associated with activation in limbic regions such as the amygdala. Yet, the physiological interaction between this limbic activation and facial feedback remains unclear. To study if facial feedback effects on limbic brain responses during intentional imitation of facial expressions, we applied botulinum toxin (BTX)-induced denervation of frown muscles in combination with functional magnetic resonance imaging as a reversible lesion model to minimize the occurrence of afferent muscular and cutaneous input. We show that, during imitation of angry facial expressions, reduced feedback due to BTX treatment attenuates activation of the left amygdala and its functional coupling with brain stem regions implicated in autonomic manifestations of emotional states. These findings demonstrate that facial feedback modulates neural activity within central circuitries of emotion during intentional imitation of facial expressions. Given that people tend to mimic the emotional expressions of others, this could provide a potential physiological basis for the social transfer of emotion.