Neural correlates of textured stimuli using a discrimination task: An electrophysiological study*

Francisco Muñoz, Manuel Sebastián, José Manuel Reales & Soledad Ballesteros

Universidad Nacional de Educación a Distancia, Madrid (Spain)

In the present study, we investigate the cortical modulations involved in tactile roughness perception using a tactile texture discrimination task. Twenty-two volunteers were presented with rough and smooth surfaces using a classical odd-ball paradigm (target, P=0.2 and standard, P=0.8). The textured surfaces were mounted on a specifically designed apparatus (the *Haptic Spinning* Wheel) which moved at a constant velocity under the static index fingertip of the perceiver. Participants counted mentally the number of targets perceived. The ERP results showed an increased P300-like component for attended compared to unattended stimuli. A time-frequency analysis yielded strong synchronization in the theta band (3-7 Hz) at an early time window (around 200 ms), followed by desynchronization in the alpha band (8-12 Hz) along the 400-800 ms interval. LORETA source analysis showed a higher neural activation when processing targets compared to standard stimuli at somatosensory, occipital, and frontal cortices. These findings suggest that top-down processes may modulate the information processing of tactile stimuli by increasing and decreasing particular brain oscillations in different cortical areas.

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