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Voxel-by-voxel analysis of brain SPECT perfusion in fibromyalgia

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Fibromyalgia (FM) syndrome is a chronic pain illness characterized by widespread musculoskeletal aches, pain and stiffness, soft tissue tenderness, general fatigue and sleep disturbances, without clinically demonstrable peripheral nociceptive cause. If a psychogenic trouble has been initially postulated, recent fMRI studies clearly demonstrated a global dysfunction of central pain processing: similar pressures in patients and controls resulted in no common cerebral regions of activation and greater effects in patients. We evaluated, in this prospective study, brain perfusion SPECT at rest (without noxious stimulation) in a homogenous group of severe FM patients using ^{99m}Tc -ECD. We performed a voxel-based analysis in comparison to a control group, matched for age and gender. In such conditions, we hypothesized that significant perfusion abnormalities could be highlighted, objectifying cerebral processing associated with spontaneous pain in FM patients.

Methods. 18 hyperalgesic FM women (48-years old; 25-63 yrs; ACR criteria; VAS for pain: 82 ± 4) and 10 healthy women matched for age were enrolled in the study. A voxel-by-voxel analysis was performed using SPM2 ($p < 0.001c$).

Results. Voxel-by-voxel perfusion analysis exhibited individual and collective brain SPECT abnormalities, including hyperperfusions of the somatosensory cortex and hypoperfusions of frontal, cingulate, medial temporal and cerebellar cortices.

Conclusions. In the present study performed at rest in hyperalgesic patients, we found significant hyperperfusions in regions known to be involved in the sensory dimension of pain and significant hypoperfusions in supposed affective dimension-related areas. As current pharmacological and non-pharmacological therapies act differently on both components of pain, we hypothesize that individual voxel-by-voxel SPECT analysis could be a valuable and easily available tool to adapt individual therapeutic strategy and perform an objective follow-up of pain processing recovery under treatment.

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