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Is Charcot's disease a primarily inflammatory condition?

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Aim: The pathogenesis of acute Charcot is still enigmatic. The local signs of inflammation in Charcot are thought to be the consequence of bone/joint abnormalities. However, these latter abnormalities may also be the consequence of an exaggerated inflammatory response to external stimuli. We performed ^{18}F -FDG-PET-CT scanning in (early) acute Charcot; by fusing PET and CT-images, we were able to obtain new information about the anatomical relation between the inflammatory response and the bone abnormalities. **Methods:** In 10 consecutive patients with an acute Charcot (9 with diabetic neuropathy and 1 with alcoholic neuropathy), we performed PET-CT scanning of both feet. All patients had neuropathy and unilateral acute Charcot, based on history, a left-right foot skin temperature difference $\geq 2^\circ\text{C}$ (infra-red thermometer), and a positive $^{99\text{m}}\text{Tc}$ bone scan. None had a foot ulcer. The CT-scans were examined (blinded) by a radiologist and the scintigrams by a nuclear medicine physician. Subsequently, the number and the locations of the PET lesions were assessed on fused PET-CT images. **Results:** Seven men (aged 35 - 60) and 3 women (aged 46 - 64) participated. There were no bone abnormalities in 3 patients; the other patients had Charcot related bone abnormalities (erosions, cysts, sclerosis, periosteal reaction), only 4 had fractures. Nine patients had in total 37 PET lesions in the affected foot; increased uptake was seen in multiple areas throughout the foot. Of these PET lesions, 14 were localized in bone structures without bone/joint abnormalities on CT, 12 lesions in areas of bone abnormalities and 11 in soft tissue. All but one patient had PET lesions in soft tissue not related to bone abnormalities. **Conclusions:** Increased uptake on ^{18}F -FDG PET scanning indicates increased metabolic activity which is usually caused by inflammation or malignancy. With ^{18}F -FDG PET-CT scanning and by using an image fusing technique, we found signs of inflammation in multiple soft tissue areas throughout the foot, with and without concurrent bone abnormalities. These findings lead us to the hypothesis that Charcot's disease may also originate as an inflammatory process in soft tissue, with secondary involvement of bone structures resulting in bone resorption.