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[\textsuperscript{11}C]- Flumazenil Positron Emission Tomography in Hemispheric Stroke

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Purpose
PET with C11 labelled Flumazenil (CFLU PET) allows the evaluation of cortical neuronal integrity by imaging benzodiazepine receptors (BZR) density and functional cortical changes, by measuring cerebral blood flow (CBF) variations. Using this method, we studied functional and structural cortical changes in the subacute stage of hemispheric infarction, and four months later.

Materials & Methods
Five patients (mean age: 60 years) with ischemic stroke in the deep middle cerebral artery (MCA) territory were evaluated with clinical scores (NIHSS and Barthel scores), standard cerebral MR imaging and CFLU PET, 5 to 18 days after the onset of symptoms. The PET images of each patient were compared with those of ten normal subjects. Imaging protocol was repeated 4 months later, and compared with clinical improvement.

Results
In all patients, CBF decrease and BZR density decrease were found co-localized in the clinically affected territories (p < 0.01), but extent of the abnormalities was not correlated with clinical scores. Four months later, extent of regions with BZR loss was correlated with clinical scores (p < 0.05), and the decrease of hypoperfused regions between the first and second PET examinations was correlated with clinical recovery (p < 0.05).

Conclusion
CFLU PET is a useful tool to assess functional and structural cortical changes in cerebral ischemia, even in the case of subcortical ischemic strokes. BZR density decrease may reflect permanent neuronal damage or deafferentation effects from subcortical infarction, and final extent of BZR loss is correlated with clinical scores.