

## **Studying brain reorganisation during motor and language recovery using TMS, PET, fMRI and DTI-MRI.**

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Brain imaging in patients recovering from stroke has revealed a number interesting or reassuring results:

- modern imaging techniques allow in-vivo imaging of human brain functions;
- There is reorganisation of the adult human brain after injury;
- This reorganisation is individually highly variable and includes activation at or close to the border of cortical infarcts; adjacent to the original representation, redistribution of activity to the remaining parts of the network in the injured hemisphere; activation in the contralateral hemisphere and activation related to compensatory mechanisms;
- Reorganisation relates with improvement of function;
- Training or rehabilitation induced recovery correlates with reorganisation;
- Drugs, supporting rehabilitation may modify brain organisation;
- Reorganisation and recovery may be mediated by a temporary increase of cortical excitability.

Currently we are studying two aspects:

- Time course of brain reorganisation from the early postthrombolysis stage on;
- Mechanisms of changes in brain activation during recovery. In the motor system, improvement of lost function in the chronic stage can be associated with either a decrease or an increase of activity in M1 during training.

The former representing a more normal “relearning” with a favourable long term prognosis resulting from partially intact fibre connections. The latter representing a “pathological” overactivation to overcome disrupted fibres with variable prognosis. The differentiation between both types has an impact of the choice of rehabilitation and prognosis.