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EFFECT OF REPERFUSION AFTER CEREBRAL ISCHEMIA IN NEONATAL RATS
USING DIFFUSION-WEIGHTED MRI MONITORING

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BACKGROUND AND AIMS:

Cerebral hypoxia-ischemia is an important cause of brain injury in the newborn infant. Our purpose was to investigate the role of the reperfusion using a model of neonatal permanent or reversible ischemia in P7 rat pups.

METHODS:

Ischemia was induced by permanent electro-cauterization of middle cerebral artery combined with a permanent or a transient (50 min) common carotid artery occlusion. The early events during ischemia and reperfusion were investigated by serial diffusion-weighted images (DWI) and T2-weighted images (T2WI) during 3 hours in a 7T magnet with a standard weighted diffusion sequence ($b = 1282.04$ s.mm⁻²) and a SEMS sequence, respectively.

RESULTS:

As soon as 15 min of ischemia, DWI showed in all animals a significant edema volume. The edema volume increased similarly in all animals up to 50 min after CCA occlusion. In permanent ischemia, the edema volume then increased more slowly from 50 min to 3 hours after CCA occlusion (+25%, n=5). In reversible ischemia, the edema volume either moderately decreased and reached a plateau (-8.4%, n=4) or dramatically decreased (-53.0 %, n=3). DWI evidenced a "patchy" pattern of edema recovery. At all steps of the development of ischemic insults both in permanent and reversible ischemia, T2WI data matched DWI data.

CONCLUSIONS:

Our data indicates that reperfusion is able to block edema evolution after neonatal stroke and that early DWI allows to distinguish between different patterns of injury in reversible ischemia. Experimentation in progress try to look further into this

work by studying later times and by correlating measurements of ADC, T2 and angiography to the histology.