EDEMA FORMATION AND GLUCOSE UPTAKE CHANGES IN A RAT MODEL FOR INTRACEREBRAL HEMORRHAGE

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Little is known about metabolic changes and edema development in tissue surrounding an intracerebral hemorrhage (ICH) in the acute phase following ICH. We investigated the extent and localisation of glucose uptake and diffusion changes in the perihematomal region (PHR) at different time points, and correlated these changes with functional motor deficits in an animal model for ICH. In 10 Sprague-Dawley rats, ICH was induced by striatal collagenase (0.6U) injection. 18F-FDG-PET and magnetic resonance T2 and DWI imaging were performed one day before and 1, 3 and 7 days after ICH induction. PET and MR images were analyzed in voxel-wise and ROI-based manners for changes in glucose uptake and apparent diffusion coefficient (ADC) in the PHR. At baseline and day 8, motor function tests were performed to assess ICH-induced motor deficits, and their link with PET and ADC changes in the PHR. Perihematomal areas of decreased glucose uptake were found in all animals, with larger volumes on day 1 and 3 compared to day 7 (D1 vs D7: $p=0.016$, D3 vs. D7: $p=0.002$). Similarly, areas of increased ADC were seen in the PHR (D1 vs. D7: $p=0.002$). PET hypometabolism was variable across animals in volume (mean ± SD day 1: 7.5 ± 10.07 mm^3), but was consistently located in and around the piriform cortex. There was a significant correlation between more severe motor deficit on day 8 and increased mean ADC value in the 1 mm rim around the ICH on day 7. We found PET hypometabolism and increased ADC in the PHR of ICH and these changes were maximal at day 1 and 3 post-stroke. Hypometabolism was most pronounced in the piriform cortex. Increased perihematomal ADC on day 7 was correlated with worse motor deficit on day 8. Further research is needed on the cause and mechanisms of these phenomena.