ASMRM & ICMRI 2020
November 03 - 04, 2020 Virtual Congress http://2020.ksmrm.org

Pediatric

SY10-2

MRI tools for predicting neurodevelopmental outcomes in preterm neonates

Hyun Gi Kim

Department of Radiology, Eunpyeong St. Mary's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Korea

The number of preterm neonates is increasing. Preterm neonates have a higher risk of poor cognitive outcomes than term neonates. Since intervention services to high-risk preterm neonates can lead to a positive cognitive outcome, predicting the neurodevelopmental outcome is important. With the brain MRI of neonates, we could obtain the structural and functional characteristics of the brain which could be used to predict the developmental outcome.

(1) The well known macrostructural abnormality of preterm neonates is periventricular leukomalacia. Periventricular leukomalacia is a result of focal and regional necrosis, loss of oligodendrocytes, astrogliosis, and microgliosis of white matter. Diffuse white matter injury and decreased volumes of grey matter may show on MRI. These macrostructural changes can be qualitatively evaluated.

(2) Microstructural change of the brain tissue could be evaluated using diffusion tensor imaging (DTI). DTI measures water diffusion in tissues at a microstructural level and provides information on axon caliber changes or myelination degree. DTI parameters include the eigenvalues, the mean diffusivity, and the apparent diffusion coefficient. DTI parameters obtained in preterm neonates at term-equivalent age could provide useful prognostic data for cerebral palsy or other deficits.

(3) Functional characteristics of the brain can be evaluated using blood oxygen level dependent (BOLD)-based functional MRI. Several resting-state networks present in preterm neonates. The network includes the primary visual cortex, bilateral sensorimotor areas, and bilateral auditory cortex. The effect of preterm birth on resting-state functional connectivity networks has been studied.

(4) Computational analysis can be used to assess structural information of preterm neonates' brains. By clearly defining the cortical grey matter-CSF interface, the cortical surface of the developing brain can be evaluated. This morphological approach is used to evaluate the gyrification of brains and the measurements may predict the outcome.

Keywords: Preterm, Development, Brain, Outcome, Prediction