**Development and Functioning of Very Low Birth Weight Infants from Infancy to School Age (PIPARI)**

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**Background**

The brain of a preterm infant is prone to biological injuries due to prematurity and related treatments. The final functional outcome is further modified by later environmental factors. Research of mechanisms causing and compensating these injuries opens an interesting view into brain development.

**Objectives**

Centralized care of very preterm infants (<32 weeks of gestation or birth weight <1501 g) provides a solid foundation for our multidisciplinary long-term follow-up study of the preterm infants. We follow a cohort of 232 very preterm infants who survived in Turku University Hospital during the years 2001-2006 and a group of 246 full term healthy control infants. The follow-up is carried out using standardized methods starting from fetal assessments and ending up to the functional outcome at school-age. As successful functioning at school is a sum of different skills and abilities, we have coordinated different approaches to get a full picture of the outcome, the risk factors for later functional deficits and also to find early diagnostic features of an abnormal development in preterm infants.

**Key findings by March, 2008**

One of our focuses is to study antenatal causes for brain injury. Of the harmful antenatal processes, placental insufficiency manifested as a redistribution of the blood flow in a fetus was shown to relate to reduced brain volumes at term (3). Inflammation itself, although a common cause for a preterm delivery, did not relate to brain pathology (7). However, differences in the genetic predisposition of an individual to mount inflammation related to the risks of both placental inflammation and neonatal infections (11). Genetic polymorphisms of IL-6 promoter region also seemed to affect regional brain volumes (Reiman et PIPARI Group, submitted). We will evaluate the predictive value of regional brain volumes as a tool to screen the infants with later neuropsychological problems.

The quality of early parent-child interaction has a central role in the overall development of a child. Our results show that the quality of mother-infant interaction in preterm group as a whole is comparable to that in the full term
infants (5). However, we identified protective factors such as physical contact (carrying the infant) and, on the other hand, risk factors, such as maternal depression (6). The later correlates of early mother-child interaction will be evaluated after the follow-up is completed.

Multidisciplinary clinical research with a long follow-up is necessary to learn to understand the causes and compensating mechanisms of brain injuries related to prematurity. Our aim is also to find early diagnostic predictors of abnormal development to focus the follow-up. We have been able to demonstrate that the size of the receptive lexicon at 1 year of age predicts the language skills at 2 years of age providing a potential way to screen a risk group for a delayed language development among preterm infants (Stolt et al, submitted). Diagnostic predictors can help to target rehabilitation in a cost-effective way for those who benefit of it most.

Understanding the primary origins of injuries and the potential ways to support the compensating mechanisms of the developing brain are crucial to improve the care and to achieve better developmental outcomes. The final goal is to learn to use treatments preventing brain injuries, and when this is not possible, to maximize the recruitment the compensatory mechanisms of the brain.

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Original publications:


