NEONATAL PULMONARY RESEARCH

Preeclampsia enhances neuroglial marker expression in umbilical cord Wharton's jelly-derived mesenchymal stem cells

Background

Surviving premature infants of preeclampsia-caused preterm delivery have an elevated risk for neurological damage. Transplantation of (mesenchymal) stem cells or progenitor cells to support neuro-regeneration in the central nervous system of animal models of brain injury has already been investigated. Specifically, decreased white and grey matter loss as well as improved cognitive and sensomotoric function were achieved (most likely due to trophic function of MSCs).

Wharton's jelly-derived mesenchymal stem cells (WJ-MSCs) are suggested to be a primitive cell population with high curative potential and do not show any detrimental impact on their quality caused by preterm delivery.

Summary of results

WJ-MSCs from pregnancies complicated with preeclampsia (GA: 32 ± 2.0 weeks; n=7) and gestational age (GA: 34.2 ± 0.6 weeks; n=7) –matched controls were compared for their neuroglial phenotype (e.g. MSC and neuroglial marker expression at mRNA and protein level). Protein expression of neuronal (MAP2) and oligodendrocytic (MBP) markers were significantly increased in WJ-MSC from preeclamptic mothers.

Strength

The authors were the first showing that preeclampsia does not seem to have any disadvantageous impacts on the phenotype of WJ-MSCs, therefore making it a potential source for stem cells in autologous treatments.

Limitations

Too many factors potentially having an impact on the results were different between the groups, i.e. different GA at delivery (in weeks) and therefore different birth weights as well as different attributions for preterm birth (twin pregnancy, preterm contractions and cervix insufficiency) and maternal age. The causes for preterm delivery for GA-matched controls (n=7) were six preterm contractions and one cervix insufficiency. These conditions may also influence the characteristics of MSCs.

Practical conclusion

Significant increased protein expression of MAP-2 (marker for mature neurons) and MBP in WJ-MSCs derived from preeclamptic pregnancies might indicate that they are more committed to the neuronal and glial lineage than those from GA-matched controls. As a result of oxidative stress during pregnancy, neural stem/progenitor cells derived from placental tissue of preeclamptic mothers are probably committed to neural differentiation through activation of NfkB/TLR4 pathways.

Joerger-Messerli M et al., Preeclampsia enhances neuroglial marker expression in umbilical cord Wharton's jelly-derived mesenchymal stem cells. J Matern Fetal Neonatal Med. 2014 Jun 5:1-6.

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