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Stem cells in neonatal medicine: An update

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Stems cells are pluripotential cells that have the ability to differentiate into cell lineages that are determined by trophic factors and other biological cues. There is growing evidence in neonatal medicine which suggests understanding stem cell physiology may offer a unique pathway leading to decreased pathology. Researchers have proposed bone marrow-derived stem cell use in the treatment of chronic lung disease (Alphonse et al., 2012). In a similar fashion, mesenchymal stem cells also protected against lung disease (Tian et al., 2008). In these studies stem cells show a reparative mechanism that is currently not well described. Mesenchymal stem cells have also been shown to decrease cellular insults in an animal model of necrotizing enterocolitis (Tayman et al 20011). Stem cells have been administered intranasally and shown to have a protective effect on brain injury (van Velthaven 2010). Our laboratory has uncovered a potentially beneficial pathway that involves the biosynthesis of glutathione in stem cells. Most neonatal diseases involve some form of oxidative stress. Glutathione, a tripeptide, is the endogenous tool used to combat oxidative stress. This pathway involves the regulation of the cystine glutamate exchanger (System Xc) which controls the most critical step in glutathione biosynthesis. This pathway is one of the mechanisms that stem cells use to exert its' protective effect.

Biography

Brian Sims has completed his MD, Ph. D from the University of Alabama at Birmingham in 2000. He completed a Pediatrics Residency and postdoctoral studies from Washington University-St. Louis School of Medicine. He completed his Neonatology Fellowship from UAB. He is a Neonatologist at UAB and an Assistant Professor of Pediatrics and Cell Biology. He has published several recent papers on cellular protection in neural stem cells.

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