LETTER TO THE EDITOR

Platelet-derived growth factor-BB is involved in mesenchymal stem cell secretome-induced neuroprotection of retinal ganglion cells

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Sir, We read with interest the article by Johnson et al. (2014) about the mesenchymal stem cell (MSC) secretome and the significant neuroprotective effects of platelet-derived growth factor (PDGF)-AA and -AB on retinal ganglion cells. However, PDGF-BB was excluded from a major part of the study, without explanation. PDGF-BB (PDGF-AB/BB) was shown to be secreted at significantly higher levels by human MSCs with multiplexed xMAP factor arrays, and would be blocked in anti-PDGF experiments (anti-PDGF antibody recognizing PDGF-AA, -AB, and -BB) to completely eliminate the neuroprotection of both human MSC co-culture and treatment with purified PDGF protein.

As mentioned by Johnson et al. (2014), both the α and β PDGF receptors are expressed on retinal ganglion cells with significant neuroprotective functions via the GSK-3β or PI3 kinase/Akt signal pathway (Mekada et al., 1998; Biswas et al., 2008; Tang et al., 2010). PDGF-AA or -AB binds to the α receptor effectively, whereas -AB and β receptor binding affinity is very low. PDGF-BB gives a greater signal for stimulation of phosphorylation of the abundant β receptor (Hart et al., 1988; Heldin, 1992).

Consequently, we hypothesize that PDGF-AA/AB/BB may all be involved in human MSC induced retinal ganglion cell neuroprotection. Therefore, we suggest that PDGF-BB should be included in co-culture and intraocular injection experiments of MSC secreted proteins alone or in a cocktail to effectively stimulate the β receptor. After this, we will understand whether PDGF-BB is involved in retinal ganglion cell neuroprotection with mesenchymal stem cell co-culture and whether the effects are stronger with both PDGF α and β receptors activated than the α receptor activated only.

Indeed, PDGF β receptor and PDGF-BB are expressed highly on vascular tissues around the retina and retinal ganglion cells with vascular remodelling effects (Benjamin et al., 1998). MSC secretome co-culture study with retinal vascular tissues should be considered in further study.

References

Benjamin LE, Hemo I, Keshet E. A plasticity window for blood vessel remodelling is defined by pericyte coverage of the preformed endothelial network and is regulated by PDGF-B and VEGF. Development 1998; 125: 1591–8.


