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Characterization of signal transduction pathways in Muller Glial cells and retinal progenitor cells

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Introduction:
Recent studies demonstrate that Muller glial cells (MGCs) are capable of dedifferentiation into retinal progenitor cells (RPCs). Therefore we isolated MGCs and RPCs and characterized the activation state of selected pathways by quantitative real-time reverse transcription (qRT) PCR.

Materials and Methods:
RPCs and MGCs were isolated from retinas of C57/BL6 mice between postnatal days P0 to P10 (for RPCs) and P8 to P12 (for MGCs). Isolated cells were cultured and used for analysis after passage four. We performed a reverse transcription (RT)-PCR for Nestin, Musashi 1, Sox 2 as RPC specific markers and for the gene expression of GFAP and Vimentin as MGC specific markers. To analyze mRNA profiles, a qRT-PCR array was established for signal transduction pathways Wnt, FGF, Hedgehog, Notch and TGF-β.

Results:
We proved successful isolation of RPCs and MGCs. Gene expression was determined for specific markers for the Wnt, FGF, Hedgehog, Notch and TGF β signal transduction pathways. However gene expression levels for WNT5, Gli3, Shh, Dll1, Hes5, BMP2 and BMP7 were upregulated in RPCs compared to MGCs, but no differentially gene expression was observed for MGCs.

Discussion and Conclusion:
We demonstrate successful isolation of RPCs and MGCs from the postnatal murine retina. All investigated signal transduction pathways seem to be activated in RPCs and MGCs. Interestingly enough, gene expression of selected signal transduction pathways were increased in RPCs in comparison to MGCs. These data may suggest that MGCs have more restricted capacities for cell differentiations than RPCs.