Hypoxia Inducible Factor-alpha Improves the Migratory Properties of Bone-Marrow Derived Mesenchymal cells.

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The efficacy of stem cell therapies for cardiac repair is underpinned by the need to induce appropriate migration and homing to the site of injury.
Furthermore, the benefit from self-renewal and differentiation capacities of stem cells is limited unless their migration to target tissues is appropriately orchestrated. Genetic manipulation of stem cells is a feasible approach for this purpose.
Hypoxia inducible factor (HIF) plays a pivotal role in controlling angiogenesis, erythropoiesis, vascular tone and cell motility.
Hence, we sought to investigate the effect of HIF1α and HIF2α on the migratory potential of bone-marrow derived Mesenchymal cells.
Mesenchymal cells were obtained from Wistar Rats and retrovirally modified to express stable forms of eGFP-hHIF1α and eGFP-hHIF2α. Concomitantly, total myocardial protein was extracted from adult rat heart. The migratory capacity of the transduced cells towards cardiac extract (1.7 ug/ml myocardial protein) was tested and compared to that of control mesenchymal cells transduced with eGFP only.
Interstingly, HIF2α transduced cells showed a >2-fold increase in migration capacity whereas eGFP-HIF1α or eGFP only-transduced cells showed no comparable increase.
Conclutions – HIF2α gene conferes an enhanced migratory capacity to Mesenchymal cells. This crucial functional property may enhance the therapeutic potential of stem cells in cell-based therapies for cardiac repair.