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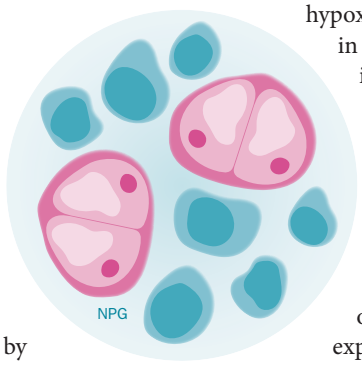
REGENERATIVE MEDICINE

PBMCs stimulate chondrocyte migration and cartilage repair

Two new studies have shown that peripheral blood-derived mononuclear cells (PBMCs) induce chondrocyte migration and could be a source of cells to promote healing of osteochondral defects.

In a study published in *Arthritis Research & Therapy*, Niina Hopper and colleagues showed that both direct and indirect contact between isolated chondrocytes and PBMCs increased the migration rate and total number of migrating chondrocytes without affecting their chondrogenic phenotype. Likewise, PBMCs stimulated chondrocytes to migrate in full-thickness articular cartilage explants. Cell migration in *ex vivo* tissue explants was regulated by PBMC-secreted chemokines rather than by cell–cell contact; furthermore, PBMC stimulation upregulated the expression of two chondrogenic genes, *COL2A1* and *SOX9*, as well as genes involved in cell motility, notably *MMP9* and *IGF1*. "This novel and encouraging finding both challenges our basic understanding of chondrocyte biology and presents an opportunity for clinical translation," says Hopper.



The results of a separate study by the same researchers published in *PLoS ONE* suggest that culture in a hypoxic environment (as found in osteochondral defects) induces PBMCs to acquire a mesenchymal stem cell (MSC) phenotype, and that PBMC-derived MSCs promote cartilage repair *in vivo*. Adherent PBMCs grown in monolayer cultures under reduced oxygen tension had increased expression of MSC phenotype markers, a concomitant loss of haematopoietic markers, and trilineage multipotency. Expression of genes involved in musculoskeletal repair (*BMP2*, *BMP6*, *GDF5* and *COL1*) was also upregulated in PBMCs cultured in hypoxic versus normoxic conditions. In full-thickness osteochondral defects in sheep, treatment with PBMCs or MSCs delivered on a biphasic scaffold resulted in similar healing at 6 months. "In the future," claims Hopper, "autologous PBMCs could be utilized in a point-of-care treatment to attract native chondrocytes or chondrogenic progenitor cells from the affected tissue to aid in cartilage repair via single or multiple PBMC intra-articular injections."

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Original articles Hopper, N. *et al.* Peripheral blood derived mononuclear cells enhance osteoarthritic human chondrocyte migration. *Arthritis Res. Ther.* **17**, 199 (2015) | Hopper, N. *et al.* Peripheral blood mononuclear cells enhance cartilage repair in *in vivo* osteochondral defect model. *PLoS ONE* **10**, e0133937 (2015)