

## THE ROLE OF ANGIOGENESIS IN OSTEOARTHRITIS

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**Background.** *Osteoarthritis* (OA), a degenerative joint disease, involves synovial inflammation, subchondral bone erosion, and cartilage degeneration affecting nowadays more than 630M people worldwide for which there is currently no cure. The aim of the study was to elucidate the role of angiogenesis (ANG) in OA in order to find prevention and treatment methods of this disease.

**Materials and methods.** Literature review from 2016-2026 was performed, using 13 articles, including data from ScienceDirect, PubMed Central, MedScape, and others.

**Results.** ANG is regulated by the balance of proangiogenic and antiangiogenic factors, which is modulated by the presence of either a facilitating or inhibitory extracellular matrix environment. The articular cartilage and inner meniscus are avascular structures alimented via diffusion and convection by dense capillary networks of periosteum and synovium. During progressive inflammation in OA, chondrocytes, synovium and subchondral bone produce proangiogenic factors such as *vascular endothelial growth factor* (VEGF), *cysteine rich protein 61* (CYR61) and *wingless-type mouse mammary tumor virus integration site family 1* (WNT1) *inducible signalling pathway protein 3* (WISP3), contributing to synovitis, increased vascular penetration, disruption of the osteochondral junction, endochondral ossification, and increased sensory nerve densities. On other hand recently was shown good results of *platelet-rich plasma* (PRP) and *mesenchymal stem cells* (MSCs) transplantation which produce growth and angiogenic factors. *Transforming growth factor-β* (TGF-β) and *fibroblastic growth factor-2* (FGF-2) showed to enhance the expression of type-II collagen and aggrecan. But VEGF and the *platelet-derived growth factor* (PDGF) have shown to promote successful cartilage healing via induction of proteoglycan deposition. Also it have been shown greater metabolite buildup and ANG of *blood flow restriction* (BFR) training which present exercise technique in which blood flow to a muscle is partially restricted using a cuff or band while performing low-load resistance exercises.

**Conclusions.** To conclude both angiogenic and antiangiogenic therapies are potential in osteoarthritis, depending on stage and etiology of injury. Antiangiogenic methods are genicular artery embolization, VEGF-blocking antibodies (bevacizumab and ranibizumab) and receptor tyrosine kinase inhibitors (sunitinib, vandetanib and sorafenib). Then, angiogenic methods are *blood flow restriction* training, *platelet-rich plasma* and *mesenchymal stem cells* transplantation.

**Key-words:** Angiogenesis, osteoarthritis, MSCs, blood flow restriction training.