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Angiogenesis, heroine, or villain? The expression and significance of vascular endothelial growth factor when dealing with the prognosis of patients with breast cancer

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Objective: Vascular endothelial growth factor (VEGF) is an important signaling protein that acts in muscle and tissue regeneration and promotes angiogenesis. However, it can help spread the tumor through metastases. Therefore, the objective of this review was to evaluate the expression and significance of VEGF when dealing with the prognosis of patients with breast cancer. **Methodology:** We comprehensively searched the PubMed database for studies and trials that included expression of VEGF and breast cancer prognosis in their papers. Our systematic review followed the PRISMA statement guidelines. **Results:** VEGF is a signaling protein and appears to be an effective direct pro-angiogenic factor that increases vascular permeability and promotes neoangiogenesis, playing a crucial role in the development and progression of vascularization and tumor growth. Furthermore, it stimulates the proliferation and migration of endothelial cells in a way that promotes tumor survival, invasion, and metastasis through the inhibition of endothelial cell apoptosis. It also shows a suppressive function in antitumor immune activity by promoting the recruitment and proliferation of immunosuppressive cells such as Treg cells and myeloid-derived suppressor cells. Thus, in several types of breast cancers, such as locally advanced breast cancer, the edematous inflammatory form, and subtypes, such as triple-negative breast cancer, increased VEGF levels were observed resulting from secretion by cancer cells and a significant correlation between inflammatory cytokines and VEGF due to the activation of signaling pathways in the tumor microenvironment. In turn, in breast cancer metastases, mainly bone, lung, brain, and lymph nodes, there was high expression of VEGF due to its role in the recruitment of tumor-associated macrophages (TAMs) and metastasis-associated macrophages, contributing to cancer severity and worse prognosis. **Conclusion:** Therefore, the use of VEGF as a prognostic biomarker and therapeutic target is relevant, as factors related to angiogenesis may have significant prognostic value for patients with breast cancer and/or metastatic disease.

Keywords: breast cancer; vascular endothelial growth factor; oncology.