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Opinion Article

Unraveling Molecular Mechanisms in Ovarian Cancer: Targeting Novel Signaling Pathways for Improved Prognosis

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DESCRIPTION

Ovarian cancer is one of the most lethal gynecological malignancies worldwide, with a high mortality rate and poor prognoses. Despite extensive research efforts to identify the molecular mechanisms underlying ovarian carcinogenesis, the pathogenesis of this disease remains largely unknown. In recent years, several lesser-known molecules have emerged as potential targets for ovarian cancer therapy.

Lysophosphatidic Acid (LPA) is a bioactive lipid that has been shown to play a role in ovarian cancer development and progression. LPA is synthesized by lysophospholipase D and binds to its receptors, LPA1-6, on the cell surface. LPA signaling promotes tumor growth, metastasis, angiogenesis, and chemotherapy resistance by activating various signaling pathways, including MAPK/ERK, PI3K/Akt, and Rho GTPase. LPA levels are elevated in the ascites of ovarian cancer patients, suggesting that LPA contributes to tumor progression and aggressiveness. In addition, LPA has been shown to promote the Epithelial-To-Mesenchymal Transition (EMT), a process in which cancer cells acquire a more invasive phenotype, leading to metastasis [1]. Therefore, targeting LPA signaling may represent a potential therapeutic strategy for ovarian cancer.

MicroRNAs (miRNAs) are small non-coding RNAs that regulate gene expression post-transcriptionally. Dysregulation of miRNAs has been implicated in various cancers, including ovarian cancer [2]. Several studies have identified specific miRNAs that are differentially expressed in ovarian cancer, including *miR-200*, *miR-21*, and *miR-214*.

MiR-200 family members have been shown to inhibit EMT and promote the epithelial phenotype in ovarian cancer cells. In addition, miR-21 is overexpressed in ovarian cancer and has been shown to promote tumor growth and metastasis by inhibiting apoptosis and promoting angiogenesis. *MiR-214* has been shown to promote chemotherapy resistance in ovarian cancer cells by regulating the expression of *PTEN* [3].

Therefore, targeting dysregulated miRNAs may represent a promising approach for ovarian cancer therapy.

Glypican-3 (GPC3) is a cell surface heparan sulfate proteoglycan that is overexpressed in various cancers, including ovarian cancer. GPC3 has been shown to promote tumor growth and metastasis by activating the Wnt/β-catenin signaling pathway, which regulates cell proliferation and differentiation [4]. GPC3 is overexpressed in ovarian cancer tissues and is associated with poor prognosis. In addition, GPC3 expression has been shown to be a predictor of chemotherapy resistance in ovarian cancer patients. Therefore, targeting GPC3 signaling may represent a potential therapeutic strategy for ovarian cancer [5].

Heat Shock Proteins (HSPs) are a family of highly conserved proteins that play a role in protein folding and cellular homeostasis. HSPs are upregulated in response to cellular stress, such as heat shock, oxidative stress, and chemotherapy. In addition, HSPs have been shown to promote tumor growth and chemotherapy resistance in various cancers, including ovarian cancer [6]. HSPs are overexpressed in ovarian cancer tissues and are associated with poor prognosis. In addition, HSPs have been shown to promote chemotherapy resistance in ovarian cancer cells by inhibiting apoptosis and promoting cell survival. Therefore, targeting HSPs may represent a potential therapeutic strategy for ovarian cancer [7].

Fibroblast Growth Factor Receptor (FGFR) is a transmembrane receptor that is activated by Fibroblast Growth Factors (FGFs). The FGFR signaling pathway plays a crucial role in ovarian cancer development and progression by regulating cell proliferation, survival, and angiogenesis [8]. FGFR is overexpressed in ovarian cancer tissues and is associated with poor prognosis. In addition, aberrant activation of FGFR signaling has been shown to promote chemotherapy resistance in ovarian cancer cells. Therefore, targeting FGFR signaling may represent a potential therapeutic strategy for ovarian cancer.

Chitinase 3-like 1 (*CHI3L1*), also known as YKL-40, is a secreted glycoprotein that plays a role in inflammation, tissue

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remodeling, and cell proliferation. *CHI3L1* has been shown to be overexpressed in various cancers, including ovarian cancer [9]. *CHI3L1* is overexpressed in ovarian cancer tissues and is associated with poor prognosis. In addition, *CHI3L1* has been shown to promote tumor growth and metastasis by activating various signaling pathways, including PI3K/Akt and MAPK/ERK. Therefore, targeting *CHI3L1* may represent a potential therapeutic strategy for ovarian cancer [10].

Lactate Dehydrogenase A (LDHA) is a metabolic enzyme that catalyzes the conversion of pyruvate to lactate in the cytoplasm. LDHA is overexpressed in various cancers, including ovarian cancer, and plays a role in tumor metabolism, angiogenesis, and chemotherapy resistance. LDHA is overexpressed in ovarian cancer tissues and is associated with poor prognosis. In addition, LDHA has been shown to promote tumor growth and chemotherapy resistance in ovarian cancer cells by promoting the Warburg effect, a metabolic switch that favors glycolysis over oxidative phosphorylation.

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