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Chemotherapy Resistance in Ovarian Cancer: Molecular Mechanisms, Biomarkers and Therapeutic Strategies

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ABSTRACT

Ovarian cancer is a leading cause of death among gynecological malignancies, primarily due to late-stage diagnosis and frequent chemoresistance. Standard treatment involves maximal cytoreductive surgery followed by platinum- and taxane-based chemotherapy. Despite initial tumor regression, long-term control is limited by resistant tumor cells. Mechanisms of resistance include drug efflux, enhanced DNA repair, apoptosis evasion, epigenetic changes, tumor microenvironment interactions, and cancer stem cell survival.

Molecular profiling has identified predictive and prognostic biomarkers—circulating tumor DNA (ctDNA), extracellular vesicles (EVs), plasma proteins and gene expression signatures—that guide personalized therapies. Strategies to overcome resistance include combination therapies, targeted and epigenetic treatments, immunotherapy and novel drug delivery systems. Precision medicine approaches informed by biomarkers and resistance mechanisms are promising for improving patient outcomes.

Keywords: Ovarian cancer, Chemoresistance, Biomarkers, Targeted therapy, Precision medicine, DNA repair, Tumor microenvironment

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