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# Application Strategies and Efficacy Evaluation of Immunotherapy in the Comprehensive Treatment of Advanced Ovarian Cancer

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**Abstract** This study explores the application strategies, efficacy evaluation, and future prospects of immunotherapy in advanced ovarian cancer. Advanced ovarian cancer is characterized by insidious onset, high recurrence rates, and frequent drug resistance, and the traditional treatment paradigm of cytoreductive surgery combined with platinum-based chemotherapy has limited long-term survival benefits. As an emerging therapeutic approach, immunotherapy-including immune checkpoint inhibitors, cancer vaccines, and adoptive cell therapies, has demonstrated potential efficacy in a subset of patients. Current evidence indicates that immune checkpoint inhibitor monotherapy has limited efficacy, whereas combination strategies with chemotherapy, anti-angiogenic agents, and PARP inhibitors may improve outcomes to some extent, albeit with increased toxicity. Efficacy evaluation still primarily relies on conventional endpoints such as ORR, PFS, and OS; the integration of biomarkers such as PD-L1, TMB, and BRCA/HRD may assist in patient selection, although their predictive value remains limited. Future efforts should focus on optimizing combination strategies, identifying novel immune targets, and advancing precision medicine and high-quality clinical research to further improve the role of immunotherapy in advanced ovarian cancer.

**Keywords** Advanced ovarian cancer; Immunotherapy; Immune checkpoint inhibitors; Combination therapy; Biomarkers

## 1 Introduction

Ovarian cancer is the most lethal gynecologic malignancy worldwide, with over 300 000 new cases and more than 200 000 deaths annually, and most patients are diagnosed at an advanced stage. Its onset is typically insidious: early symptoms are vague, such as abdominal discomfort, bloating, dyspepsia, altered bowel habits, and urinary frequency, and are easily misattributed to benign gastrointestinal or gynecologic conditions (Ghose et al., 2024). Population-wide screening strategies based on ultrasound and serum biomarkers such as CA-125 and HE4 have not yet demonstrated sufficient sensitivity and specificity to enable effective early detection, leading to approximately 70%-75% of women presenting with FIGO stage III–IV disease (Papageorgiou et al., 2025). This late-stage diagnosis translates into a sharp decline in prognosis, with 5-year survival falling from over 90% in early-stage disease to around 20%-30% in advanced stages, and overall survival remaining poor despite therapeutic progress (Hong and Ding, 2025). The biological heterogeneity of epithelial ovarian cancer, combined with frequent acquisition of chemoresistance and high recurrence rates, further compounds these adverse outcomes (Tavares et al., 2024).

For several decades, the cornerstone of advanced ovarian cancer management has been maximal cytoreductive surgery combined with platinum-based chemotherapy, often with taxanes, delivered either as primary debulking followed by adjuvant therapy or as neoadjuvant chemotherapy followed by interval debulking (Wang et al., 2025). Although these strategies achieve high initial response and complete remission rates, particularly when no visible residual disease is obtained, the majority of patients experience relapse, and recurrent disease is usually incurable. Real-world data indicate that only about 45%-50% of patients with stage III–IV disease remain alive at 5 years, and many will cycle through multiple lines of chemotherapy with progressively shorter response durations and accumulating toxicity. Targeted agents such as bevacizumab and poly (ADP-ribose) polymerase (PARP) inhibitors have improved progression-free survival in selected subgroups, notably those with BRCA mutations or homologous recombination deficiency, but their impact on long-term cure rates is limited and resistance