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Recent advances in hormone-based biopharmaceuticals for cancer therapy

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Abstract

Hormone-dependent cancers, particularly estrogen receptor-positive breast cancer and androgen receptor-driven prostate cancer, contribute substantially to global cancer-related morbidity and mortality. Endocrine therapy has long been the mainstay of treatment for these tumors because of its specific mechanism and good safety profile. The long-term success of common hormone-based treatments is often undermined by resistance, both intrinsic and acquired, disease recurrence, and the activation of compensatory pathways that tumor cells have adapted to. To overcome these challenges, it has been necessary to develop high-quality hormone-based biopharmaceuticals that target the molecular level, enhance pharmacokinetics, and apply precision medicine strategies. The goal of this literature review is to provide an update on progress in hormone-based biopharmaceuticals for cancer management, with a particular focus on preventing endocrine

resistance in hormone-dependent cancers. Among the treatments mentioned in the review, most are oral selective estrogen receptor degraders (SERDs) for ER-positive breast cancer, oral gonadotropin-releasing hormone antagonists for prostate cancer, genomically guided combination therapy that integrates inhibitors of the CDK4/6 and PI3K/AKT/mTOR signaling pathways, and next-generation androgen receptor (AR) degraders based on proteolysis-targeting chimera (PROTAC) technology. There is new evidence that these biopharmaceutical methods may be able to treat patients better over longer periods. For those who are less responsive, these approaches are even more effective when paired with proper biopharmaceutical methods, as in the case of hormone therapy. While targeted protein degradation and biomarker-driven combination therapies are repositioning drug development away from receptor blockade, the latter remains the mainstay of treatment. However, these developments do not eliminate concerns related to long-term safety, cost-effectiveness, appropriate patient selection, and resistance to novel agents. The path for hormone-based biopharmaceuticals in personalized cancer therapy requires continuous translational research and clinical validation to determine the best place. © The Author(s) 2026.

Author keywords

Endocrine resistance; Endocrine therapy; GnRH antagonists; Oral SERDs; PROTAC technology

Indexed keywords

MeSH

Antineoplastic Agents, Hormonal; Biological Products; Breast Neoplasms; Drug Resistance, Neoplasm; Female; Humans; Male; Neoplasms; Prostatic Neoplasms; Receptors, Androgen; Receptors, Estrogen

EMTREE drug terms

androgen receptor; biological marker; gonadorelin antagonist; mammalian target of rapamycin; proteolysis targeting chimera; antineoplastic hormone agonists and antagonists; biological product; estrogen receptor

EMTREE medical terms

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