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Fluorescence Theranostic PROTACs: A New Frontier for Real-Time ERα Degradation and Breast Cancer Therapy

Xiaohua Wang[1,2], Xiaofei Deng[3], Lilan Xin3, Chune Dong[3], Guoyuan Hu*[1] and Hai-Bing Zhou*[3]

[1]School of Environmental Ecology and Biological Engineering, Wuhan Institute of Technology, Wuhan 430205, China

[2]College of Life Sciences, Wuchang University of Technology, Wuhan, Hubei Province 430223, China

[3]Department of Hematology, Zhongnan Hospital of Wuhan University, State Key Laboratory of Virology, Frontier Science Center for Immunology and Metabolism, Hubei Province Engineering and Technology Research Center for Fluorinated Pharmaceuticals, Wuhan University School of Pharmaceutical Sciences, Wuhan 430071, China

Corresponding author: Guoyuan Hu, School of Environmental Ecology and Biological Engineering, Wuhan Institute of Technology, Wuhan 430205, China

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Introduction

Breast cancer, particularly ERα-positive (ERα+) breast cancer, remains a major clinical challenge despite advancements in targeted therapies. Traditional treatments are limited by drug resistance and side effects, necessitating the development of novel therapeutic strategies. PROTACs (Proteolysis Targeting Chimeras) have emerged as a groundbreaking approach, offering targeted protein degradation. The recent development of fluorescence theranostic PROTACs opens new possibilities for both real-time imaging and therapeutic intervention in ERα+ breast cancer.

Key Findings

This research introduces a novel class of fluorescence theranostic PROTACs designed for real-time visualization and degradation of ERα. These compounds exhibit dual functionality, allowing for simultaneous monitoring of ERα levels and degradation within live cells. Key features include:

- High specificity for ERα, ensuring minimal off-target effects.
- Real-time imaging capability, enabling dynamic monitoring of ERα degradation in live cells.
- Enhanced degradation efficiency, overcoming limitations of existing ERα-targeting therapies.

Significance

The integration of fluorescence imaging with targeted degradation represents a significant advancement in theranostics, particularly for breast cancer. This approach not only facilitates precise treatment but also provides critical insights into the dynamics of protein degradation in cancer cells. Moreover, the potential to monitor therapeutic efficacy in real time could revolutionize personalized cancer treatment.

Future Directions

Future research will focus on optimizing the pharmacokinetics of these theranostic PROTACs and exploring their application in vivo. Additionally, expanding this approach to target other oncogenic proteins could broaden its therapeutic potential across various cancer types.

Conclusion

Fluorescence theranostic PROTACs offer a promising new tool for the treatment and study of ERα+ breast cancer. By combining diagnostic and therapeutic functions, they represent a significant step toward more effective and personalized cancer therapies.

Citation:

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