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学 位 論 文 内 容 の 要 旨

博士の専攻分野の名称　博士（生命科学）　氏　名　斉　嘉俊

学 位 論 文 題 名

A Study on a New Caging Method Aimed at Visible Light-Activable Anticancer Drugs
（可視光活性化抗がん剤を目指した新しいケージド手法の研究）

Triarylimidazoles are crucial structural components in a variety of small-molecule inhibitors designed to target different kinases in anticancer treatment. However, the effectiveness of such inhibitors is often hampered by non-specific effects and the development of resistance. Photopharmacology provides a compelling solution by enabling external control over drug activity with spatiotemporal precision. Herein, we introduce a novel strategy for caging bioactive triarylimidazole-based drug molecules. This approach involves introducing a dialkylamino group as a photoremovable group on the carbon atom of the imidazole ring, which intrinsically modulates the core structure from planar imidazole to tetrahedral 2H-imidazole, enabling the caged compound to be selectively uncaged upon visible light exposure. We applied this innovative caging technique to SB431542, an imidazole-based small-molecule inhibitor that targets the pivotal TGF-β signaling pathway, the dysregulation of which is linked to several human diseases, including cancer. Our results demonstrated the selective inhibition of human breast cancer cell migration in vitro upon light activation, highlighting the potential of our approach to transform triarylimidazole-based drug molecules into visible light–activatable drugs, thereby facilitating spatiotemporal regulation of their pharmacological activity.