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Editorial

pHLIP Technology and Early Diagnosis of Bladder Cancers

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HIGHLIGHTS

- The pHLIP technology suggests numerous methods for progressive urinary tract cancer management.
- The pHLIP- ICG is used for diagnosis and transurethral resection of bladder cancer.
- The pHLIP- ICG is utilized to inhibit the growth of bladder cancer cells.

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ABSTRACT

Fluorescence imaging is being used in a variety of new surgical uses. Many innovative fluorescent probes and imaging plans are also being advanced as part of the technology. The Low-pH insertion peptide (pHLIP) technology may offer numerous methods for progressively managing urinary tract cancers. For diagnosis and transurethral resection of bladder cancer, pHLIP-Indocyanine green (pHLIP-ICG) has been used inside the bladder, and pHLIP-amanitin has been utilized to inhibit the growth of bladder tumor cells.

Keywords: pHLIP; Bladder Cancer; Fluorescent Imaging

Editorial: As early as 1948, surgeons used fluorescent imaging to recognize and focus on intracranial neoplasms through neurosurgery when they observed that fluorescein concentration improved in neoplastic tissue (1). They targeted tumor cells with therapeutic and investigative causes due to the physiological alterations between wild and tumor tissues (1). In addition to providing a novel and advanced method for evaluating cancer prognosis, pHLIP demonstrates differential binding of metastatic and non-metastatic cancers. A pHLIP peptide is specific to the acidic microenvironment of cancer cells (0.2-0.3) and high rates of glucose metabolism, diagnose cancers, metastatic lesions, and lipid bodies in necrotic tissues, and the use of pHLIP-amanitin for treating superficial bladder cancers through intra-vesical induction (2-4).

A lack of mixtures with properties that alter dramatically when pH 6.0–7.5 is probably why the acidic extracellular environment in cancers has not been adequately exploited. This novel and innovative technique is proposed for targeting malignant tumors based on a physiological property - the acidic extracellular environment - that addresses a significant issue in diagnosing cancers, monitoring their treatment response, and identifying potential complications. Utilization of pHLIP peptides as both diagnostics and therapeutics with imaging label (N-terminus) and chemotherapeutic cargo (C-terminus)

would permit medicine delivery to be monitored, which would serve as an essential tool for predicting prostate and bladder cancer treatment outcome (3, 5).

This new technology is frequently updated, and many novel fluorescent probes and imaging plans are being developed to diagnose prostate and bladder cancer (1). Researchers use a water-soluble Near-infrared fluorescent (NIRF) to target the low pH of extracellular and enable visualization of high-grade urinary tract cancers such as muscle invasive and non-muscle invasive in human bladder cancer and upper urinary tracts under ambient dye-like conditions ICG and as pHLIP (2, 3).

In addition to enabling surgeons to visualize fluorescence wavelengths otherwise invisible to the naked eye and to improve contrast against auto-fluorescence, NIRF contrast agents allow deeper tissue penetration and more excellent contrast in the presence of a fluorescent signal and targets injury or biopsy and treatment (2, 6). As a result, pHLIP targeting urinary tract cancers improves diagnostic imaging and injuries resection and can be supported by treatments with targeted pHLIP delivery of cytotoxic causes to bladder cancer cells (2, 7, 8).

The Fluorescent pHLIP-ICG can successfully identify non-invasive injuries, dysplasia, and Urothelial Carcinoma in Situ with a sensitivity and specificity of 98% and 100%, respectively, although analysis and treatment using traditional white light methods may be very problematic (2, 9). The pHLIP technology may offer numerous prospects for the progressive management of urinary tract cancers (1). For diagnosis and transurethral resection of bladder cancer, pHLIP- ICG has been utilized inside the bladder, and pHLIP-amanitin has been utilized to prevent the growth of bladder cancer cells (2).

Conclusions

Imaging with the pHLIP-ICG peptide enhances early diagnosis of cancers such as bladder and may permit new treatment alternatives.

Authors' contributions

All authors contributed equally.

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Conflict of interest

The author declares that there is no conflict of interest.

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Ethics statement

Not Applicable.

Data availability

None.

Abbreviations

ICG	Indocyanine green
NIRF	Near-infrared fluorescent
pHLIP	Low-pH insertion peptide

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