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Delivery of imaging and therapeutic agents to tumor using pHLIP

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We are developing a novel technology for selective delivery of imaging probes and membrane-impermeable molecules to cancer cells. It is based on action of water-soluble membrane peptide, pHLIP® (pH [Low] Insertion Peptide), which has ability to insert and fold in cellular membrane at slightly acidic environment, which is a characteristic for various pathological states including cancer. The insertion of the peptide is unidirectional: C-terminus moves inside the cell across membrane, while N-terminus flags outside. Thus pHLIP possess dual delivery capability. Imaging agents (fluorescent, PET, SPECT or MRI) could be attached to the N-terminus of the peptide to mark tumor mass and tumor margins with high precision. At the same time, therapeutic molecules attached to the C-inserting end, could be moved across membrane to reach cytoplasmic target. Among translocated molecules are synthetic cyclic peptides, gene regulation agent (peptide nucleic acid) and phalla- and amanita toxins with hydrophobicity tuned by attachment of fatty acids for optimum delivery. Currently we have family of pHLIP peptides for various applications.
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