Novel prodrugs for selective anticancer therapy

Faculty at Stony Brook University have developed novel methods and compositions to make anticancer prodrugs with improved selectivity of cancer cells

Background
Currently, there is a significant market need for anticancer drug therapy. Anticancer drug sales exceeded $50 billion worldwide in 2009 with impressive growth; however, chemotherapeutic agents’ lack of selectivity is a major challenge in cancer treatment. The limitation of current chemotherapy is in delivering high enough concentrations of cytotoxic drug to the target site in order to completely eradicate the tumor without harming healthy cells. Successful development of highly selective anticancer agents would significantly improve clinical outcomes as well as quality of life for patients and thus have the potential to create novel drugs that can take over and dominate the market.

Technology
Dr. Nobuhide Ueki & Dr. Michael Hayman at Stony Brook University have developed novel methods and compositions to make anticancer prodrugs by conjugating unique dual-substrate biochemical modules to known or novel chemotherapeutic drugs. The requirement of sequential activation by two independent key enzymes acting in tumor cells makes the prodrugs highly selective, resulting in fewer side effects compared to existing anticancer drugs in clinical use. In addition, these novel prodrugs have been shown to be much more stable and resistant to non-specific activation by ubiquitous proteases in cytoplasm or plasma than existing prodrugs. Anticancer efficacy has been further confirmed by the ability to inhibit tumor growth without severe adverse effects in mice bearing human cancer xenografts. This technology has broad applications in cancer therapy by modifying many novel and existing anticancer drugs for improved selectivity.

Patent number/Publication:
- Patent Pending

Advantages
- better selectivity on cancer cells with minimal adverse effects
- minimize nonspecific activation by ubiquitous proteases in cytoplasm or plasma, the known drawbacks of peptide-based prodrugs road application in cancer therapy
- ability to “repackage” existing generic chemotherapeutic drugs to improve selectivity and regain market share

Applications
- Anticancer drug therapy-use in existing or novel chemotherapeutic drugs

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