Targeted drug delivery for anti-cancer therapeutics using soluble non-toxic carriers

Technology #cu15296

Targeted drug delivery is being explored as an alternative to chemotherapy in cancer treatment. While many anti-cancer agents have been identified, applications have been limited due in part to their insolubility, instability in plasma, and drug carrier toxicity. This technology describes a soluble and biodegradable polyacetal-based polymer-drug conjugate that selectively deposits unto solid tumors for targeted drug delivery. This technology provides pathways for delivery of a range of novel pharmaceutical agents.

Thermally responsive, pH degradable carrier conjugate for targeted non-toxic drug delivery

Existing polymer drug-conjugates approaches have failed to reach commercial application due to limitations in carrier design and target specificity. This technology utilizes a thermally responsive polymer carrier, which is soluble at normal body temperature to transport the conjugate through the bloodstream. Unlike many existing conjugates, it is able to effectively target the tumor. Tumors have a characteristic elevated temperature. This technology exploits the characteristic elevated local temperature of tumors. The polymer experience a phase transition at 42°C (the tumor local temperature), which allows the polymer carrier to be accumulated on the tumor. Additionally, this technology exploits the pH level around the tumor to initiate selective degradation of the polymer. This degradation occurs around mildly acidic conditions (pH 5-6.5) and allows for greater accumulation of the drug on the tumor surface. The smaller degraded byproducts can then be effectively removed from the body.

In vitro methods with HIF-1, a high-priority target to prevent rapid tumor growth, vascularization, and metastasis have validated the technology and work is underway to demonstrate its utility in mouse models.

Lead Inventor:

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Applications:

• Anti-cancer therapeutics
• Targeted drug delivery
• Therapeutics for crops, plants or seeds

Advantages:

• Reduced side-effects of cancer therapy
• Simple chemical synthesis methods
• Highly predictable and tunable release of cargo over a temperature range of 6-80°C
• Rapid phase transition and release of cargo within 3-5°C targets hyperthermic cancer environments
• Non-toxic byproducts after drug delivery
• Large library of compatible anti-cancer pharmaceuticals
• Controllable degradation conditions
• Polymer chain-end functionality for versatility beyond cancer therapies

Patent Information:

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Related Publications:


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