This technology is a personalized interferon-prodrug cancer therapeutic that undergoes activation at the tumor microenvironment. This is also a platform technology that can be applied to other therapeutics which exert severe toxicity in the clinic.

The interferons (IFNs) are a family of cytokines that protect against disease by direct effects on target cells and by activating immune responses. Type I IFNs have important roles in preventing cancer proliferation and migration, and promoting cancer cell apoptosis as well as promoting antitumor immunity. Unfortunately, IFN therapy has major dose-limiting adverse side effects that often require to reduce or even stop treatment due to the severe clinical toxicity. These toxicities include influenza-like symptoms (fatigue, fever, headache and muscle aches), hepatotoxicity, leukopenia, nausea, dizziness, anorexia, and severe depression. This invention describes an IFN-prodrug that undergoes activation at the tumor microenvironment in vivo. This IFN-prodrug can be used as a potential antitumor reagent to treat several types of human cancers with minimal adverse effects. Therapy personalization is achieved depending on specific properties of the tumor microenvironment.

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