

Near-Universal Cure For Malignant Tumors

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ABSTRACT

A crucial limitation of current tumor therapies is their inadequate specificity for tumors. This inadequate specificity regularly leads to severe toxicity in patients during the course of radiotherapy and chemotherapy. Further, this severe toxicity often precludes use of a sufficiently high treatment dose to completely destroy the entire tumor - including particularly the treatment-resistant quiescent cells in hypoxic/acidic areas of tumors. As a consequence, post-treatment relapses commonly occur and ultimately kill the patient.

In 1930 the famous physiologist Otto Warburg reported that one of the most universal characteristics of malignant tumors larger than microscopic size is their hypoxic/acidic areas. Onco-tool therapeutics now under development are designed to be selectively sequestered in such acidic areas. Because onco-tools exploit this near-universal property of tumors (acidic areas), onco-tool therapeutics are expected to effectively treat essentially all types of malignant tumors and all sizes larger than about 1 millimeter in diameter (tumors begin to develop hypoxic/acidic areas when less than 1 mm in diameter). Further, by virtue of the onco-tools' novel multi-acid structures, unique engineered pKa values, and adjusted pH-dependent lipophilicities, they are designed to provide an unprecedented many-fold greater specificity for tumors than is afforded by current tumor therapeutics. Still further, special methods of use can provide a further large increase in the specificity of onco-tool therapeutics.

Prior to use, alpha-emitting and beta-emitting radioisotopes are attached to the onco-tool therapeutics. The emitted alpha particles serve to destroy the treatment-resistant quiescent cells in hypoxic/acidic areas, while the emitted beta particles serve to destroy the better-oxygenated fast-dividing cells closer to tumor capillaries. Together they are designed to completely destroy the entire tumor in which the onco-tool therapeutics are sequestered.

As a consequence of their expected activity against all types of tumors and their unprecedented specificity for acidic areas, it is predicted that onco-tool therapeutics will be effective for treating essentially all malignant tumors and that the dual-radioisotope strategy will achieve complete destruction of the entire tumor - without causing the severe toxicity that commonly plagues current cancer treatments. More important, this complete destruction of the entire tumor by high-specificity onco-tool therapeutics, including particularly the complete destruction of treatment-resistant quiescent cells in hypoxic/acidic areas of tumors, is expected to reliably prevent the post-treatment relapses that are currently responsible for most deaths from malignant tumors.

[The first onco-tool will be available as a research reagent in 2008.]

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