Polymer Coated Nanoparticles For Selective Cytoprotection

Advantages
• Protects only healthy non-cancerous tissue, while sensitizing tumor masses
• Methods of synthesis are efficient and commercially scalable, conforming with FDA and GMC standards
• Increases desired effects of current cancer treatments while stifling the undesired side effects

Invention
Methods, systems and compositions of a biocompatible nanoparticle wherein normal, non-transformed, healthy cells are protected from oxidative stress, radiation therapy and chemotherapy while cancer cells are provided no protection.

Background
Current treatments for cancer such as radiation and chemotherapy utilize the effects of oxidative stress and other reactive oxygen species to kill off diseased cancerous tissue. While these treatments are effective, they are also quite toxic to the rest of the body. The high level of toxicity can often limit the amount of treatment a patient can receive without experiencing extremely negative effects, often leading to undertreatment and relapse of the disease.

Polymer coated nanoceria has already been reported to exhibit antioxidant and autocatalytic activities in similar technology produced by University of Central Florida nanoscientists. Additional investigations have noted, however, that the antioxidant properties of these particles are dependant on the pH of the sample. While submerged in a physiological pH the particles exhibited free radical scavenging properties, but when introduced to lower pH levels these properties were reversed showing prominent oxidase activity. It is well established that cancerous tissues (such as tumors) have a far lower pH than the surrounding tissue. This phenomenon presented a method in which an agent could selectively protect healthy non-cancerous tissue from the effects of the treatments, while sensitizing that which is cancerous. Thus by introducing UCF’s coated nanoceria particles to a tumor, one would protect the areas of normal pH (healthy cells) from the effects of the chemotherapeutic treatment, while intensifying the effects in areas of lower pH (cancerous cells).

Application
Polymer coated nanoceria have a wide range of biomedical applications, but is aimed towards cancer treatment in this particular technology. Such particles could be produced on a large scale and utilized in combination with current radiation and chemotherapeutic treatments to greatly increase effectiveness and efficiency.

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Selected References

For more information, see ID #31005