[0028] In particular, the most common treatment for AMD is intravitreal bevacizumab injection. Injections are administered every three to four weeks and can be a source of procedural risk and inconvenience for the patient.

[0029] Targeted delivery of drugs to other tissues, including but not limited to pancreatic tissue, lung tissue and liver tissue, localizes treatment to these tissues, and has potential benefits for the treatment of diseases specific to these tissues, including pancreatitis, diabetes, brain cancer, lung cancer, and hepatitis.

Summary

[0029a] In one aspect of the disclosure, there is provided a system for intratumoral injection, the system comprising: a lyophilized powder reconstitutable within 30 seconds to form a uniform viscous aqueous solution; the aqueous solution comprising a chitosan gel matrix and a plurality of microparticles embedded in the chitosan gel matrix; the microparticles comprising a therapeutic agent and a chitosan coating; wherein the microparticles form uniform colonies within pores of the chitosan gel matrix that prevent aggregation and provide controlled release; and wherein the combination of the chitosan gel matrix and the chitosan coating provides prolonged retention of the therapeutic agent in the tumor for at least 10 days following intratumoral injection.

[0029b] In another aspect of the disclosure, there is provided a use of the system according to the disclosure in the manufacture of a medicament for treating a cancer by intratumoral injection, wherein the medicament induces systemic antitumor immunity while reducing systemic toxicity compared to systemic administration of the therapeutic agen

[0030] In one example of the disclosure, there is provided a composition formulated for delivery by injection into a targeted population of cells of subject. In this example, the composition includes an aqueous solution including a chitosan gel and a plurality of particles, the particles containing a therapeutic agent and having a coating around the therapeutic agent, the coating including chitosan so as to provide controlled release of the agent from the particles.

[0031] One example of the disclosure provides a system for delivering a therapeutic treatment to a targeted population of cells of a subject. In this example, the system includes a vial enclosed with a septum that is penetrable by a needle of a syringe to be used for

administration of the therapeutic treatment. In this example, a therapeutic composition is disposed in the vial, the therapeutic composition provided for use in administration of the therapeutic treatment and comprising an aqueous solution including a chitosan gel and a plurality of particles embedded in the gel, the gel having a viscosity rendering it suitable for administration by injection. The particles in this example contain a therapeutic agent and have a coating around the therapeutic agent, the coating including chitosan so as to provide controlled release of the agent from the particles.

[0032] In a further related example, the aqueous solution further includes a compound selected from a group consisting of a hydration promotor, a particle adhesion inhibitor, a particle aggregation inhibitor, and combinations thereof.

[0033] The hydration promotor is selected from the group consisting of ethylene glycol, propylene glycol, beta-propylene glycol, glycerol and combinations thereof.

What is claimed is:

1. A system for intratumoral injection, the system comprising:

a lyophilized powder reconstitutable within 30 seconds to form a uniform viscous aqueous solution;

the aqueous solution comprising a chitosan gel matrix and a plurality of microparticles embedded in the chitosan gel matrix;

the microparticles comprising a therapeutic agent and a chitosan coating;

wherein the microparticles form uniform colonies within pores of the chitosan gel matrix that prevent aggregation and provide controlled release; and

wherein the combination of the chitosan gel matrix and the chitosan coating provides prolonged retention of the therapeutic agent in the tumor for at least 10 days following intratumoral injection.

2. The system according to claim 1, wherein microparticles have an average diameter between 500 nm and 2000 nm.

3. The system according to claim 1 or 2, wherein the system further includes sodium tripolyphosphate as a crosslinking agent.

4. The system according to any one of claims 1 to 3, further comprising:

(a) a hydration promotor selected from the group consisting of ethylene glycol, propylene glycol, beta-propylene glycol, and glycerol;

(b) a particle adhesion inhibitor selected from the group consisting of HPMC and poloxamer

(c) a particle aggregation inhibitor selected from the group consisting of sugars and sugar alcohols.

5. The system according to any one of claims 1 to 4, wherein the therapeutic agent is selected from a chemotherapeutic, an immunotherapeutic, a cytokine, or combinations thereof.

6. The system according to any of claims 1 to 6, wherein the therapeutic agent is a cytokine, the cytokine is IL-12, and the system retains IL-12 in the tumor for more than 10 days .

7. The system according to claim 7, wherein the therapeutic agent is a chemotherapeutic, and the chemotherapeutic is cisplatin or oxaliplatin.

8. The system according to any one of claims 1 to 7, wherein the system converts an immunologically cold tumor into a hot tumor, thereby enhancing susceptibility to immunotherapy.

9. Use of the system of any one of claims 1 to 8 in the manufacture of a medicament for treating a cancer by intratumoral injection, wherein the medicament induces systemic antitumor immunity while reducing systemic toxicity compared to systemic administration of the therapeutic agent.