

CLAIMS:

1. A microsphere for delivery to a target area in a patient's body, the microsphere:
 - containing a mucin-affecting protease loaded therein, and
 - adapted to elute the mucin-affecting protease in a sustained manner when exposed to physiological conditions.
2. The microsphere of claim 1, wherein the microsphere comprises a hydrogel into which the mucin-affecting proteases are loaded.
3. The microsphere of claim 1 or claim 2, wherein the microsphere comprises a polyvinyl alcohol hydrogel, a poly(vinyl alcohol-co-sodium acrylate) hydrogel, a hydrogel network of poly(ethylene glycol) and 3-sulfopropyl acrylate, poly(lactic-co-glycolic acid) or polylactic acid-containing hydrogels or a hydrogel core consisting of sodium poly(methacrylate) and an outer shell of poly(bis[trifluoroethoxy]phosphazene).
4. The microsphere of any one of claims 1 to 3, wherein the microsphere comprises an outer coating.
5. The microsphere of any one of claims 1 to 4, wherein the microsphere comprises an alginate outer coating.
6. The microsphere of any one of claims 1 to 5, wherein the microsphere has a diameter of between about 30 and about 700 micrometres.
7. The microsphere of any one of claims 1 to 6, wherein the microsphere is adapted to elute the mucin-affecting protease over a period of time of between about 5 hours to about 120 hours.
8. The microsphere of any one of claims 1 to 7, wherein the microsphere is adapted for delivery to the patient intra-arterially, intralesionally, intra-abdominally or intracavitarily.
9. The microsphere of claim 8, wherein the microsphere is adapted to be delivered to the patient's peritoneum or pleural cavity.
10. The microsphere of any one of claims 1 to 9, wherein the mucin-affecting protease is selected from one or more of the group consisting of plant derived proteases, fungal proteases and bacterial proteases.

11. The microsphere of claim 10, wherein the plant derived protease is selected from one or more of the group consisting of Bromelain, Papain, Ficin, Actinidain, Zingibain and Fastuosain.
12. The microsphere of any one of claims 1 to 11, wherein the microsphere contains a further agent.
13. The microsphere of claim 12, wherein the further agent is selected from one or more of the group consisting of a chemotherapeutic agent, a radiotherapeutic agent, a mucolytic agent and a contrast agent.
14. The microsphere of claim 12 or claim 13, wherein the further agent is a chemotherapeutic agent selected from one or more of the group consisting of gemcitabine, paclitaxel, docetaxel, doxorubicin, irinotecan, mitomycin C, oxaliplatin, carboplatin, 5-fluorouracil and cisplatin.
15. A pharmaceutical composition comprising:
 - microspheres for delivery to a target area in a patient's body, the microspheres containing a mucin-affecting protease loaded therein and being adapted to elute the mucin-affecting protease in a sustained manner when exposed to physiological conditions; and
 - a pharmaceutically acceptable carrier.
16. A pharmaceutical composition comprising the microspheres of any one of claims 1 to 14 and a pharmaceutically acceptable carrier.
17. A method for loading a mucin-affecting protease into microspheres, the method comprising:
 - adding the microspheres to a solution having an acidic pH and, optionally, an ionic strength similar to that at a target area in a patient's body;
 - mixing the solution comprising the microspheres with a solution comprising the mucin-affecting protease;
 - agitating the mixture for a time sufficient for the mucin-affecting protease to be loaded into the microspheres.
18. The method of claim 17, wherein the pH of the solution is between about 2 and about 6.
19. A method for the treatment of a mucin-producing cancer, pseudomyxoma peritonei, cystic fibrosis or chronic obstructive pulmonary disease, the method comprising:

administering to a patient a therapeutically effective amount of microspheres containing a mucin-affecting protease loaded therein, wherein the microspheres are adapted to elute the mucin-affecting protease in a sustained manner following administration.

20. A method for the treatment of a mucin-producing cancer, pseudomyxoma peritonei, cystic fibrosis or chronic obstructive pulmonary disease, comprising administering a therapeutically effective amount of the microspheres of any one of claims 1 to 14 or a pharmaceutical composition of claim 15 or 16 to a patient in need thereof.
21. The method of claim 19 or claim 20, wherein the therapeutically effective amount of the microspheres containing mucin-affecting proteases loaded therein are administered to the patient intra-arterially, intralesionally, intra-abdominally or intracavitarily.
22. The method of any one of claims 19 to 21, further comprising co-administering a therapeutically effective amount of a further therapeutically effective agent.
23. The method of claim 22, wherein the further therapeutically effective agent is selected from one or more of the group consisting of a chemotherapeutic agent, a radiotherapeutic agent, a mucolytic agent and a contrasting agent.
24. The method of claim 22 or claim 23, wherein the further therapeutically effective agent is co-administered within the same microspheres as those containing the mucin-affecting proteases.
25. The method of claim 22 or claim 23, wherein the further therapeutically effective agent is co-administered separately from the microspheres containing the mucin-affecting proteases.
26. The method of claim 25, wherein the further therapeutically effective agent is co-administered simultaneously or sequentially from the microspheres containing the mucin-affecting proteases and, when sequentially, either before or after the microspheres.
27. The method of any one of claims 19 to 26, wherein the mucin-producing cancer is selected from the group consisting of liver cancer (primary or secondary), pancreatic cancer, lung cancer, thyroid cancer, stomach cancer, cancer of the appendix, peritoneal cancer, hepatocellular cancer, prostate cancer, breast cancer, colorectal cancers, ovarian cancers, mesothelioma, neuroblastoma, small bowel cancer, lymphoma and leukaemia.
28. Use of the microspheres of any one of claims 1 to 14 for the manufacture of a medicament for the treatment of a mucin-producing cancer, pseudomyxoma peritonei, cystic fibrosis or chronic obstructive pulmonary disease.

29. Use of the microspheres of any one of claims 1 to 14 for the treatment of a mucin-producing cancer, pseudomyxoma peritonei, cystic fibrosis or chronic obstructive pulmonary disease.
30. The microspheres of any one of claims 1 to 14 for use as a medicament.
31. The microspheres of any one of claims 1 to 14 for use in the treatment of a mucin-producing cancer, pseudomyxoma peritonei, cystic fibrosis or chronic obstructive pulmonary disease.
32. A composition comprising microspheres into which a mucin-affecting protease has been loaded, the microspheres being adapted to elute the mucin-affecting protease in a sustained manner when exposed to physiological conditions.
33. An injectable composition comprising microspheres into which a mucin-affecting protease has been loaded, the microspheres being adapted to elute the mucin-affecting protease in a sustained manner when exposed to physiological conditions.
34. A sustained release formulation comprising microspheres into which a mucin-affecting protease has been loaded, the microspheres being adapted to elute the mucin-affecting protease in a sustained manner when exposed to physiological conditions.