CLAIMS

What is claimed is:

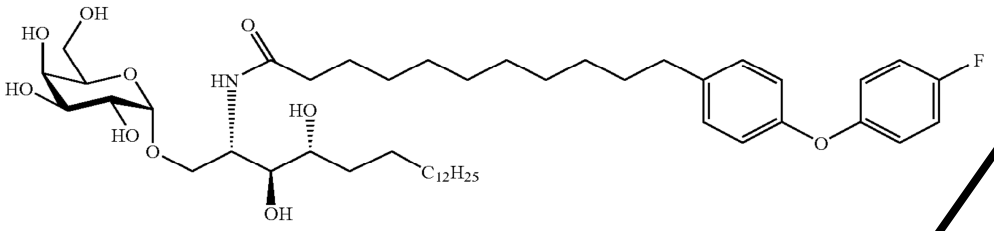
1. A vaccine, comprising

   (a) a carbohydrate antigen or its immunogenic fragment; and

   (b) a toxoid protein,

   wherein the ratio of carbohydrate antigen to toxoid protein ranges from 7:1 to 39:1.

2. The vaccine of claim 1, wherein the toxoid protein is diphtheria toxin (DT).
3. The vaccine of claim 2, wherein the ratio of carbohydrate antigen and DT ranges from 5:1 to 39:1.
4. The vaccine of claim 1, wherein the toxoid protein is tetanus toxoid (TT).
5. The vaccine of claim 4, wherein the ratio of carbohydrate antigen and TT ranges from 7:1 to 39:1
6. The vaccine of claim 1, wherein the carbohydrate antigen is selected from Globo H, SSEA-3, SSEA-4 or Gb-4.
7. The vaccine of claim 2, wherein the DT is diphtheria toxin cross-reacting material or diphtheria toxoid.
8. The vaccine of claim 7, wherein the diphtheria toxin cross-reacting material is selected from CRM 30, CRM 45, CRM 176, CRM 197 or CRM 228.
9. The vaccine of claim 1, further comprises a saponin adjuvant.
10. The vaccine of claim 1, further comprises an α-galactosyl-ceramide (α-GalCer) adjuvant.
11. The vaccine of claim 10, wherein the α-GalCer adjuvant has the following structure:



12. A vaccine, comprising

(a) carbohydrate antigen or its immunogenic fragment;

(b) a diphtheria toxin (DT); and

(c) an adjuvant,

wherein the ratio of carbohydrate antigen to DT ranges from 5:1 to 39: 1.

13. The vaccine of claim 12, wherein the carbohydrate antigen is selected from Globo H, SSEA-3, SSEA-4 or Gb-4.

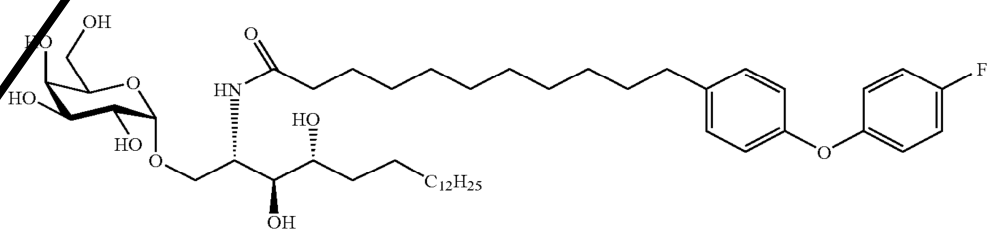
14. The vaccine of claim 12, wherein the DT is diphtheria toxin cross-reacting material or diphtheria toxoid.

15. The vaccine of claim 14, wherein the diphtheria toxin cross-reacting material is selected from CRM 30, CRM 45, CRM 176, CRM 197 or CRM 228.

16. The vaccine of claim 12, wherein the adjuvant is a saponin adjuvant.

17. The vaccine of claim 12, wherein the adjuvant is an α-galactosyl-ceramide (α-GalCer) adjuvant.

18. The vaccine of claim 17, wherein the α-GalCer adjuvant has the following structure:



19. A pharmaceutical composition, comprising

(a) the vaccine of claim 1 or 12 ; and

(b) a pharmaceutically acceptable carrier.

20. The use of vaccine of claim 1 or 12 in the manufacture of a medicament for the treatment of cancer, wherein the cancer is breast cancer, lung cancer, esophageal cancer, rectal cancer, biliary cancer, liver cancer, buccal cancer, gastric cancer, colon cancer, nasopharyngeal cancer, kidney/renal cancer, prostate cancer, ovarian cancer, cervical cancer, endometrial cancer, pancreatic cancer, testicular cancer, bladder cancer, head and neck cancer, oral cancer, neuroendocrine cancer, adrenal cancer, thyroid cancer, bone cancer, skin cancer, basal cell carcinoma, squamous cell carcinoma, melanoma, or brain tumor.

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CLAIMS

What is claimed is:

1. A cancer vaccine, comprising

   (a) a tumor-associated carbohydrate antigen or its immunogenic fragment; and

   (b) a diphtheria toxin (DT),

   wherein the ratio of tumor-associated carbohydrate antigen to DT ranges from 5:1 to 39: 1.

2. The vaccine of claim 1, wherein the tumor-associated carbohydrate antigen is selected from Globo H, SSEA-3, SSEA-4 or Gb-4.

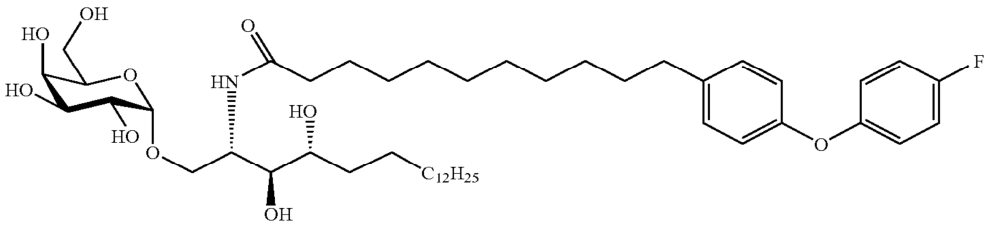
3. The vaccine of claim 1, wherein the DT is diphtheria toxin cross-reacting material or diphtheria toxoid.

4. The vaccine of claim 3, wherein the diphtheria toxin cross-reacting material is selected from CRM 30, CRM 45, CRM 176, CRM 197 or CRM 228.

5. The vaccine of claim 1, further comprises a saponin adjuvant.

6. The vaccine of claim 1, further comprises an α-galactosyl-ceramide (α-GalCer) adjuvant.

7. The vaccine of claim 6, wherein the α-GalCer adjuvant has the following structure:



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8. A cancer vaccine, comprising

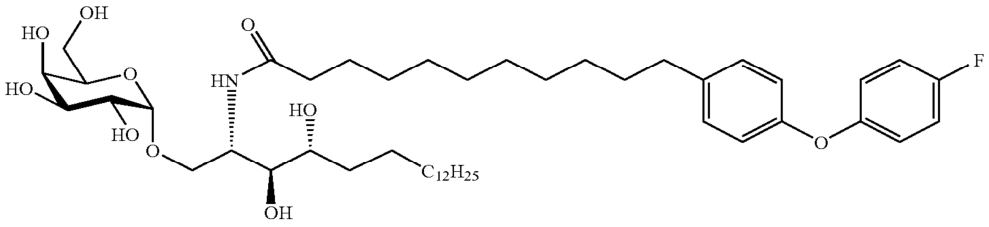
   (a) a tumor-associated carbohydrate antigen or its immunogenic fragment;

   (b) a diphtheria toxin (DT); and

   (c) an adjuvant,

wherein the ratio of carbohydrate antigen to DT ranges from 5:1 to 39:1.

9. The vaccine of claim 8, wherein the tumor-associated carbohydrate antigen is selected from Globo H, SSEA-3, SSEA-4 or Gb-4.
10. The vaccine of claim 8, wherein the DT is diphtheria toxin cross-reacting material or diphtheria toxoid.
11. The vaccine of claim 10, wherein the diphtheria toxin cross-reacting material is selected from CRM 30, CRM 45, CRM 176, CRM 197 or CRM 228.
12. The vaccine of claim 8, wherein the adjuvant is a saponin adjuvant.
13. The vaccine of claim 8, wherein the adjuvant is an α-galactosyl-ceramide (α-GalCer) adjuvant.
14. The vaccine of claim 13, wherein the α-GalCer adjuvant has the following structure:



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15. A pharmaceutical composition, comprising
    (a) the cancer vaccine of claim 1 or 8; and
    (b) a pharmaceutically acceptable carrier.
16. The use of cancer vaccine of claim 1 or 8 in the manufacture of a medicament for the treatment of cancer, wherein the cancer is breast cancer, lung cancer, esophageal cancer, rectal cancer, biliary cancer, liver cancer, buccal cancer, gastric cancer, colon cancer, nasopharyngeal cancer, kidney cancer, prostate cancer, ovarian cancer, cervical cancer, endometrial cancer, pancreatic cancer, testicular cancer, bladder cancer, head and neck cancer, oral cancer,

neuroendocrine cancer, adrenal cancer, thyroid cancer, bone cancer, skin cancer, basal cell carcinoma, squamous cell carcinoma, melanoma, or brain tumor.

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