Claims:

1. A high-molecular-weight fucan wherein the high-molecular-weight fucan consists essentially of a molecular weight distribution wherein at least 92% w/w of the molecular weight distribution of the fucan is greater than 100 kDa when measured using an aqueous gel permeation chromatography set up consisting essentially of:

one 300 mm analytical gel permeation chromatography column with a 7.8 mm inner diameter packed with hydroxylated polymethacrylate-based gel, having an effective molecular weight range of between about 50 kDa and about 5,000 kDa, one 300 mm analytical gel permeation chromatography column with a 7.8 mm inner diameter packed with hydroxylated polymethacrylate-based gel, having an effective molecular weight range of between about 1 kDa and about 6,000 kDa and one 40 mm guard column with a 6 mm inner diameter packed with hydroxylated polymethacrylate-based gel, the two analytical gel permeation chromatography columns and the one guard column contained in a column compartment at about 30 ºC;

a refractive index detector at about 30 ºC;

0.1M sodium nitrate mobile phase run at 0.6 mL/min; and

quantification against a peak molecular weight standard curve consisting essentially of a first dextran standard with a peak molecular weight of about 2,200 kDa, a second dextran standard with a peak molecular weight of between about 720 kDa and about 760 kDa, a third dextran standard with a peak molecular weight between about 470 kDa and about 510 kDa, a fourth dextran standard with a peak molecular weight between about 370 kDa and about 410 kDa, a fifth dextran standard with a peak molecular weight between about 180 kDa and about 220 kDa, and a sixth dextran standard with a peak molecular weight between about 40 kDa and 55 kDa.

2. The high-molecular-weight fucan of claim 1, comprising a weight average molecular weight between about 100 kDa and 10,000 kDa.

3. The high-molecular-weight fucan of claim 2, wherein the weight average molecular weight is between about 370 kDa and 1900 kDa.

4. The high-molecular-weight fucan of any one of claims 1 to 3, comprising a number average molecular weight between about 50 kDa and 3,000 kDa.

5. The high-molecular-weight fucan of any one of claims 1 to 4, wherein at least 55% w/w of the distribution is greater than about 200 kDa.

6. The high-molecular-weight fucan of any one of claims 1 to 5, wherein at least 22% w/w of the distribution is greater than about 500 kDa.

7. A high-molecular-weight fucan wherein the high-molecular-weight fucan consists essentially of a molecular weight distribution wherein between about 61% w/w and 80% w/w of the molecular weight distribution of the fucan is between about 200 kDa and 1600 kDa when measured using an aqueous gel permeation chromatography set up consisting essentially of:

one 300 mm analytical gel permeation chromatography column with a 7.8 mm inner diameter packed with hydroxylated polymethacrylate-based gel, having an effective molecular weight range of between about 50 kDa and about 5,000 kDa, one 300 mm analytical gel permeation chromatography column with a 7.8 mm inner diameter packed with hydroxylated polymethacrylate-based gel, having an effective molecular weight range of between about 1 kDa and about 6,000 kDa and one 40 mm guard column with a 6 mm inner diameter packed with hydroxylated polymethacrylate-based gel, the two analytical gel permeation chromatography columns and the one guard column contained in a column compartment at about 30 ºC;

a refractive index detector at about 30 ºC;

0.1M sodium nitrate mobile phase run at 0.6 mL/min; and

quantification against a peak molecular weight standard curve consisting essentially of a first dextran standard with a peak molecular weight of about 2,200 kDa, a second dextran standard with a peak molecular weight of between about 720 kDa and about 760 kDa, a third dextran standard with a peak molecular weight between about 470 kDa and about 510 kDa, a fourth dextran standard with a peak molecular weight between about 370 kDa and about 410 kDa, a fifth dextran standard with a peak molecular weight between about 180 kDa and about 220 kDa, and a sixth dextran standard with a peak molecular weight between about 40 kDa and 55 kDa.

8. A high-molecular-weight fucan wherein the high-molecular-weight fucan consists essentially of a molecular weight distribution wherein at least 60% w/w of the molecular weight distribution of the fucan is greater than about 1600 kDa when measured using an aqueous gel permeation chromatography set up consisting essentially of:

one 300 mm analytical gel permeation chromatography column with a 7.8 mm inner diameter packed with hydroxylated polymethacrylate-based gel, having an effective molecular weight range of between about 50 kDa and about 5,000 kDa, one 300 mm analytical gel permeation chromatography column with a 7.8 mm inner diameter packed with hydroxylated polymethacrylate-based gel, having an effective molecular weight range of between about 1 kDa and about 6,000 kDa and one 40 mm guard column with a 6 mm inner diameter packed with hydroxylated polymethacrylate-based gel, the two analytical gel permeation chromatography columns and the one guard column contained in a column compartment at about 30 ºC;

a refractive index detector at about 30 ºC;

0.1M sodium nitrate mobile phase run at 0.6 mL/min; and

quantification against a peak molecular weight standard curve consisting essentially of a first dextran standard with a peak molecular weight of about 2,200 kDa, a second dextran standard with a peak molecular weight of between about 720 kDa and about 760 kDa, a third dextran standard with a peak molecular weight between about 470 kDa and about 510 kDa, a fourth dextran standard with a peak molecular weight between about 370 kDa and about 410 kDa, a fifth dextran standard with a peak molecular weight between about 180 kDa and about 220 kDa, and a sixth dextran standard with a peak molecular weight between about 40 kDa and 55 kDa.

9. The high-molecular-weight fucan of any of claim 1 to 8, wherein the sulfate content is between about 20% w/w and 60% w/w.

10. The high-molecular-weight fucan of any one of claims 1 to 9, wherein the total carbohydrate content is between about 27% w/w and 80% w/w.

11. The high-molecular-weight fucan of claim 10, wherein the total fucose content as a percentage of the total carbohydrate content is at least about 30% w/w.

12. The high-molecular-weight fucan of claim 10, wherein the total galactose content as a percentage of the total carbohydrate content is below about 60% w/w.

13. The high-molecular-weight fucan of claim 10, wherein the total of glucuronic acid, mannose, rhamnose, glucose and xylose content as a percentage of the total carbohydrate content is below about 30% w/w.

14. The high-molecular-weight fucan of any one of claims 1 to 13 wherein the high-molecular-weight fucan when dissolved in water at a concentration of 50 mg/mL has a viscosity of between about 4 cP and 50 cP.

15. The high-molecular-weight fucan of any one of claims 1 to 14 wherein the high-molecular-weight fucan is a white solid.

16. The high-molecular-weight fucan of any one of claims 1 to 15 wherein the high-molecular-weight fucan when dissolved in water at a concentration from 1 mg/mL through 100 mg/mL forms a solution that is clear and colorless.

17. The high-molecular-weight fucan of any one of claims 1 to 16 wherein the fucan comprises less than 5% w/w acetyl content.

18. The high-molecular-weight fucan of any one of claims 1 to 17 wherein the fucan comprises an acetyl content of substantially 0% w/w when measured by 2D 1H-13C heteronuclear multiple quantum coherence at 70 °C with solvent signal suppression on a 600 MHz spectrometer equipped with 5-mm cold probe, in the range from 10-30 ppm in the carbon dimension, in 8 increments of 256-512 scans each.

19. A medically acceptable fucan composition comprising a therapeutically effective amount of the high-molecular-weight fucan of any one of claims 1 to 18 in a medically acceptable buffer or diluent.

20. A medical composition comprising between about 0.02 mg/mL and 100 mg/mL of the high-molecular-weight fucan of any one of claims 1 to 19, wherein the medical composition is configured and composed to treat a disease or condition in an animal wherein the disease or condition is a fibrous adhesion.