

WHAT IS CLAIMED IS:

1. Crystalline 25HC3S sodium.
2. A hydrate of crystalline 25HC3S sodium.
3. Form I of crystalline 25HC3S sodium.
4. Form II of crystalline 25HC3S sodium.
5. Form XI of crystalline 25HC3S sodium.
6. Anhydrous crystalline 25HC3S sodium.
7. Form XIII crystalline 25HC3S sodium.
8. Form IX crystalline 25HC3S sodium.
9. A method of treating one or more of hypercholesterolemia, hypertriglyceridemia, and conditions related to fat accumulation and inflammation, comprising administering to a patient in need thereof an effective amount of a compound of 25HC3S sodium of any one of claims 1-8.
10. A pharmaceutical composition comprising 25HC3S sodium of any one of claims 1-8, and at least one pharmaceutically acceptable excipient.
11. A method of treating one or more of hypercholesterolemia, hypertriglyceridemia, and conditions related to fat accumulation and inflammation, comprising administering to a patient in need thereof an effective amount of a pharmaceutical composition of 25HC3S sodium of claim 10.

12. The method of claim 9 for treating nonalcoholic fatty liver disease (NAFLD), nonalcoholic steatohepatitis (NASH), alcoholic hepatitis, acute kidney injury (AKI), psoriasis, and atherosclerosis, comprising administering to a patient in need thereof an effective amount of a compound of 25HC3S sodium of any one of claims 1-8.
13. The method of claim 11 for treating nonalcoholic fatty liver disease (NAFLD), nonalcoholic steatohepatitis (NASH), alcoholic hepatitis, acute kidney injury (AKI), psoriasis, and atherosclerosis, comprising administering to a patient in need thereof an effective amount of a pharmaceutical composition of 25HC3S sodium of claim 10.
14. A composition comprising two or more of Form I 25HC3S sodium, Form II 25HC3S sodium, Form III 25HC3S sodium, Form V 25HC3S sodium, Form IX 25HC3S sodium, Form XI 25HC3S sodium, and Form XIII 25HC3S sodium.
15. A method of producing a 5-cholesten-3 β ,25-diol-3-sulfate metal salt, the method comprising:
 contacting 25-hydroxy-(3 β)-cholest-5-en-3-ol with at least one sulfating agent in at least one solvent to produce a 25-hydroxy-(3 β)-cholest-5-en-3-sulfate organic cationic salt, wherein the 25-hydroxy-(3 β)-cholest-5-en-3-sulfate organic cationic salt has low solubility in the at least one solvent; and
 contacting the 25-hydroxy-(3 β)-cholest-5-en-3-sulfate organic cationic salt with at least one metal salt to produce the 5-cholesten-3 β ,25-diol 3-sulfate metal salt.
16. A method of producing a 5-cholesten-3 β ,25-diol 3-sulfate sodium salt, the method comprising:
 contacting 25-hydroxy-(3 β)-cholest-5-en-3-ol with a sulfur trioxide-pyridine complex in at least one solvent to produce a 25-hydroxy-(3 β)-cholest-5-en-3-sulfate pyridinium salt, wherein the 25-hydroxy-(3 β)-cholest-5-en-3-sulfate pyridinium salt has low solubility in the at least one solvent; and
 contacting the 25-hydroxy-(3 β)-cholest-5-en-3-sulfate pyridinium salt with a sodium salt to produce the 5-cholesten-3 β ,25-diol 3-sulfate sodium salt.

17. A method of producing a 5-cholesten-3 β ,25-diol 3-sulfate metal salt, the method comprising:
- contacting (3 β)-cholest-5-en-3-ol with at least one sulfating agent to produce a first (3 β)-cholest-5-en-3-sulfate organic cationic salt;
 - contacting the first (3 β)-cholest-5-en-3-sulfate organic cationic salt with an organic base to produce a second (3 β)-cholest-5-en-3-sulfate organic cationic salt;
 - oxidizing the second (3 β)-cholest-5-en-3-sulfate organic cationic salt in the presence of at least one surfactant to produce a 25-hydroxy-(3 β)-cholest-(5,6-epoxy)-3-sulfate organic cationic salt;
 - generating a 25-hydroxy-(3 β)-cholest-5-en-3-sulfate organic cationic salt from the 25-hydroxy-(3 β)-cholest-(5,6-epoxy)-3-sulfate organic cationic salt by deoxygenation; and
 - contacting the 25-hydroxy-(3 β)-cholest-5-en-3-sulfate organic cationic salt with at least one metal salt to produce the 5-cholesten-3 β ,25-diol 3-sulfate metal salt.
18. A composition comprising:
- 25-hydroxy-(3 β)-cholest-5-en-3-sulfate; and
 - sulfated desmosterol.
19. A composition comprising:
- 25-hydroxy-(3 β)-cholest-5-en-3-sulfate; and
 - 5-cholesten-3 β ,25-diol-disulfate.
20. A method comprising:
- sulfating 25-hydroxy-(3 β)-cholest-5-en-3-ol to produce 25-hydroxy-(3 β)-cholest-5-en-3-sulfate in at least one solvent, wherein 25-hydroxy-(3 β)-cholest-5-en-3-sulfate has low solubility in the at least one solvent; and
 - precipitating 25-hydroxy-(3 β)-cholest-5-en-3-sulfate in the solvent.

21. A composition comprising:
25-hydroxy-(3 β)-cholest-5-en-3-sulfate; and
byproducts from sulfating 25-hydroxy-(3 β)-cholest-5-en-3-ol comprising a first compound comprising a high-pressure liquid chromatography (HPLC) retention time of about 18.3 minutes, a second compound comprising an HPLC retention time of about 37.7 minutes, or any combination thereof, and the 25-hydroxy-(3 β)-cholest-5-en-3-sulfate comprising an HPLC retention time of about 7.7 minutes,
wherein the first compound, the second compound, and the 25-hydroxy-(3 β)-cholest-5-en-3-sulfate are separated by HPLC comprising a C8 stationary phase operating at about 45 °C with a first mobile phase comprising a buffer and a second mobile phase comprising one or more organic solvents.