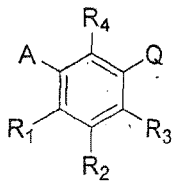
CLAIMS

1. A method for preventing and/or slowing progression of and/or treating a fibrotic disease in a subject in need thereof, wherein the fibrotic disease is pulmonary fibrosis, liver fibrosis, skin fibrosis or cardiac fibrosis, comprising the administration of a therapeutically effective amount of a compound represented by the formula:



or a pharmaceutically acceptable salt thereof, wherein

A is C_5 alkyl, C_6 alkyl, C_5 alkenyl, C_6 alkenyl, $C(O)-(CH_2)_n-CH_3$ or $CH(OH)-(CH_2)_n-CH_3$ wherein n is 3 or 4;

R_1 is H, OH or F;

R_2 is H, OH, F or CH_2-OH;

R_3 is H, OH, F or CH_2Ph;

R_4 is H, OH or F;

Q is

1) $(CH_2)_mC(O)OH$ wherein m is 1 or 2,

2) $CH(CH_3)C(O)OH$,

3) $C(CH_3)_2C(O)OH$,

4) CH(F)-C(O)OH,

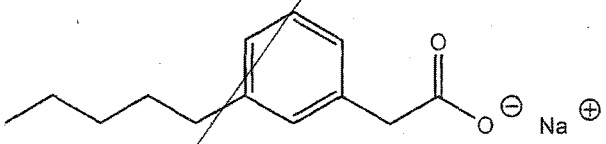
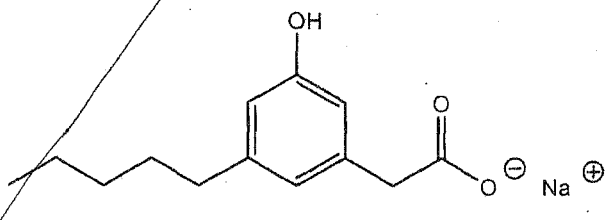
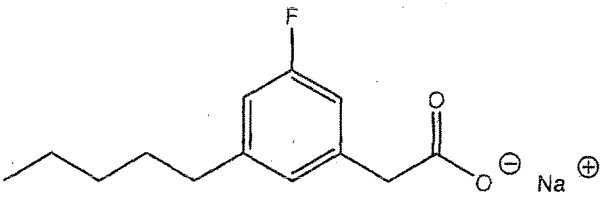
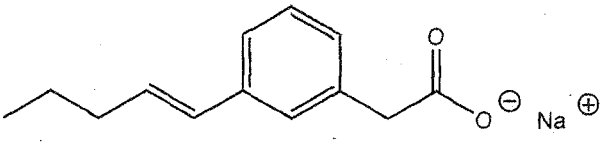
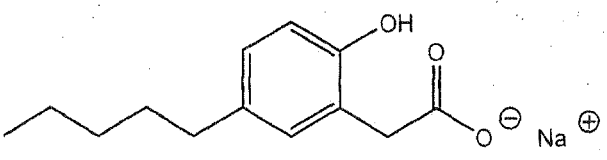
5) CF_2-C(O)OH, or

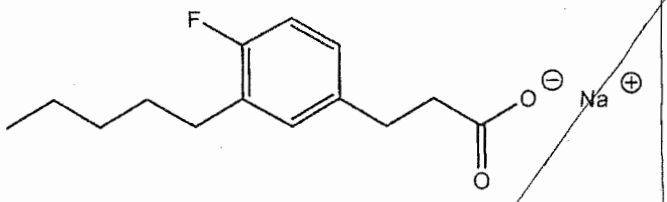
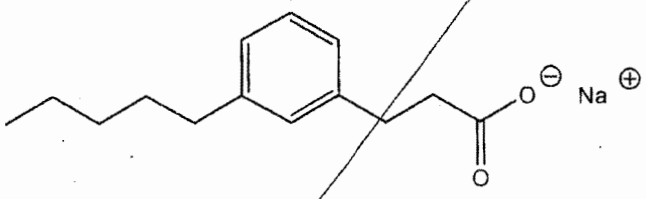
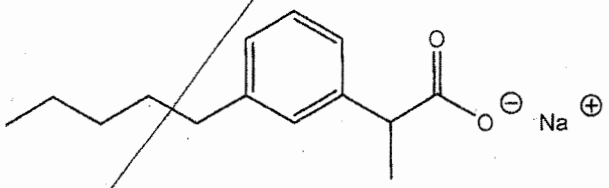
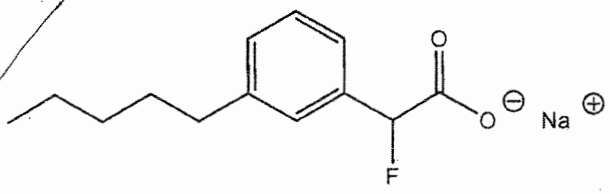
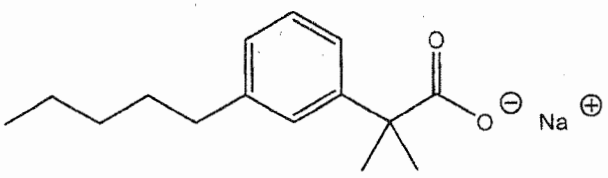
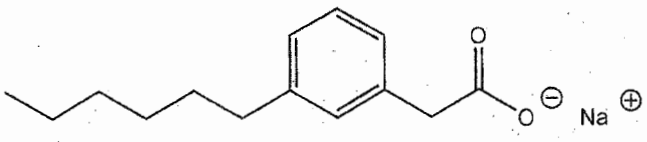
6) C(O)-C(O)OH.

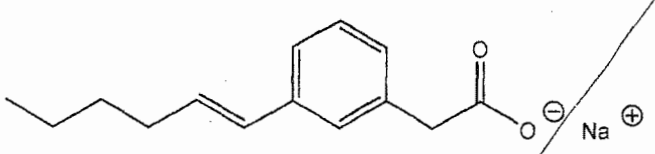
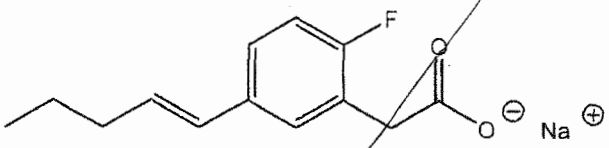
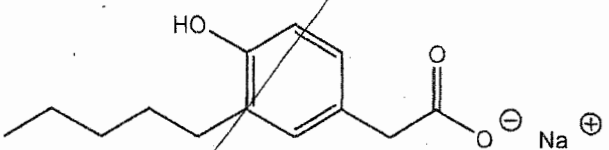
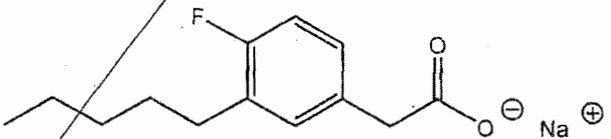
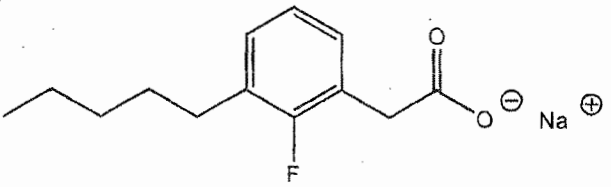
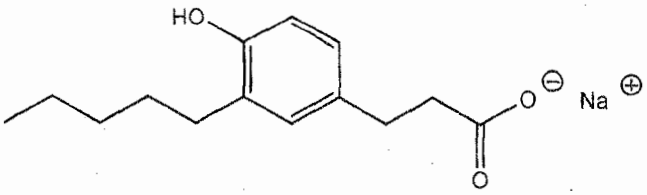
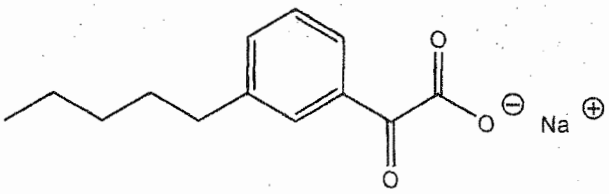
2. The method according to claim 1, wherein the pharmaceutically acceptable salt of said compound is sodium, potassium, lithium, ammonium, calcium, magnesium, manganese, zinc, iron, or copper.

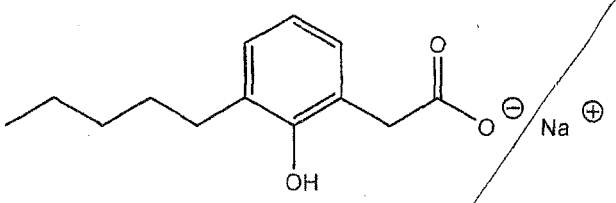
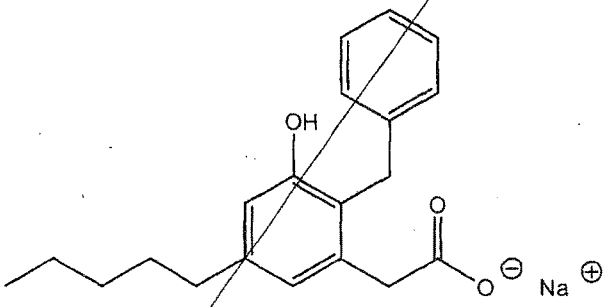
3. The method of claim 2, wherein the pharmaceutically acceptable salt of said compound is sodium.

4. The method according to claim 1 wherein said compound is one of the following compounds:

Compound I	
Compound II	
Compound III	
Compound IV	
Compound V	

Compound VI	
Compound VII	
Compound VIII	
Compound IX	
Compound X	
Compound XI	

Compound XII	
Compound XIII	
Compound XIV	
Compound XV	
Compound XVI	
Compound XVII	
Compound XVIII	

Compound XIX	
Compound XX	

5. A method according to any one of claims 1-4, wherein the fibrotic disease is pulmonary fibrosis.

6. The method of claim 5, wherein the therapeutically effective amount is between about 1 to about 50 mg/kg, the compound is administered orally, and the subject is human.

7. The method of claim 6, wherein the therapeutically effective amount is between about 1 to about 20 mg/kg.

8. The method according to claim 5, wherein the pulmonary fibrosis is idiopathic pulmonary fibrosis, sarcoidosis, cystic fibrosis, familial pulmonary fibrosis, silicosis, asbestosis, coal worker's pneumoconiosis, carbon pneumoconiosis, hypersensitivity pneumonitides, pulmonary fibrosis caused by inhalation of inorganic dust, pulmonary fibrosis caused by an infectious agent, pulmonary fibrosis caused by inhalation of noxious gases, aerosols, chemical dusts, fumes or vapors, drug-induced interstitial lung disease, pulmonary hypertension, or chronic obstructive pulmonary disease.

9. A method according to any one of claims 1-4, wherein the fibrotic disease is liver fibrosis.

10. The method of claim 9, wherein the therapeutically effective amount is between about 1 to about 50 mg/kg, the compound is administered orally, and the subject is human.

11. The method of claim 10, wherein the therapeutically effective amount is between about 1 to about 20 mg/kg.

12. A method according to claim 10, wherein the liver fibrosis is resulting from a chronic liver disease, hepatitis B virus infection, hepatitis C virus infection, hepatitis D virus infection, schistosomiasis, alcoholic liver disease or non-alcoholic steatohepatitis, obesity, diabetes, protein malnutrition, coronary artery disease, auto-immune hepatitis, cystic fibrosis, alpha-1-antitrypsin deficiency, primary biliary cirrhosis, drug reaction and exposure to toxins.

13. A method according to any one of claims 1-4, wherein the fibrotic disease is skin fibrosis.

14. The method of claim 13, wherein the compound is administered topically.

15. The method of claim 14, wherein the therapeutically effective amount is between about 0.01 to about 10% (w/w) and the subject is human.

16. The method of claim 13, wherein the compound is administered orally.

17. The method of claim 16, wherein the therapeutically effective amount is between about 1 to about 50 mg/kg and the subject is human.

18. A method according to claim 14, wherein the skin fibrosis is scarring, hypertrophic scarring, keloid scarring, dermal fibrotic disorder, wound healing, delayed wound healing, psoriasis or scleroderma.

19. The method of claim 18, wherein said scarring derives from a wound, a burn, a scar, wrinkles, stretch marks, sun damage, chemical damage, heat damage, cold damage, a trauma, a surgical injury, a radiation or an ulcer.

20. The method of claim 19, wherein said ulcer is diabetic foot ulcer, venous leg ulcer or pressure ulcer.

21. A method according to any one of claims 1-4, wherein the fibrotic disease is cardiac fibrosis.

22. A method of claim 21, wherein the cardiac fibrosis is cardiomyopathy, congestive heart failure.

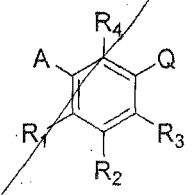
23. A method for antagonizing collagen secretion or collagen deposition in an organ of a mammal comprising administering a therapeutically effective amount of a compound as defined in any one of claims 1-4, to the mammal in need thereof, wherein the organ is lung, liver, skin or heart.

24. A method for reducing the collagen production in cells, comprising contacting the cells with a therapeutically effective amount of a compound as defined in any one of claims 1-4.

25. The method according to any one of claims 1-22, wherein the compound is administered in combination with a therapeutically effective amount of second compound, the second compound is an immunosuppressive drug, an anti-inflammatory drug, a cytokine, a monoclonal antibody, a multiple receptor tyrosine kinase inhibitor, an antioxidant, an enzyme inhibitor, an integrin inhibitor, a lipid receptor modulator or a thiazolindione.

26. The method according to claim 25, wherein the fibrotic disease is pulmonary fibrosis, and wherein the compound is administered in combination with a therapeutically effective amount of pirfenidone.

27. A kit for preventing and/or slowing progression of and/or treating fibrotic disease in a subject in need thereof, comprising a compound represented by the formula:



or a pharmaceutically acceptable salt thereof, wherein

A is C_5 alkyl, C_6 alkyl, C_5 alkenyl, C_6 alkenyl, $C(O)-(CH_2)_n-CH_3$ or $CH(OH)-(CH_2)_n-CH_3$ wherein n is 3 or 4;

R_1 is H, OH or F;

R_2 is H, OH, F or CH_2-OH;

R_3 is H, OH, F or CH_2Ph;

R_4 is H, OH or F;

Q is

1) $(CH_2)_mC(O)OH$ wherein m is 1 or 2,

2) $CH(CH_3)C(O)OH$,

3) $C(CH_3)_2C(O)OH$,

4) CH(F)-C(O)OH,

5) CF_2-C(O)OH, or

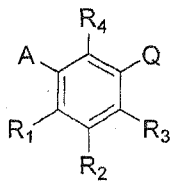
6) C(O)-C(O)OH;

and instructions for administering a therapeutically effective amount of the compound to the subject suffering from said fibrotic disease, wherein the fibrotic disease is pulmonary fibrosis, liver fibrosis, skin fibrosis or cardiac fibrosis.

28. The kit of claim 27, further comprises instructions for administering between about 1 to about 50 mg/kg of the compound daily and orally to the subject who is a human.

29. The kit of claim 27, further comprises instructions for administering between about 0.01 to about 10 % (w/w) of the compound daily and topically to the subject who is a human, and wherein the fibrotic disease is skin fibrosis.

30. A compound represented by the formula:



or a pharmaceutically acceptable salt thereof, wherein

A is C_5 alkyl, C_6 alkyl, C_5 alkenyl, C_6 alkenyl, $C(O)-(CH_2)_n-CH_3$ or $CH(OH)-(CH_2)_n-CH_3$ wherein n is 3 or 4;

R_1 is H, OH or F;

R_2 is H, OH, F or CH_2-OH;

R_3 is CH_2Ph;

R_4 is H, OH or F;

Q is

7) $(CH_2)_mC(O)OH$ wherein m is 1 or 2,

8) $CH(CH_3)C(O)OH$,

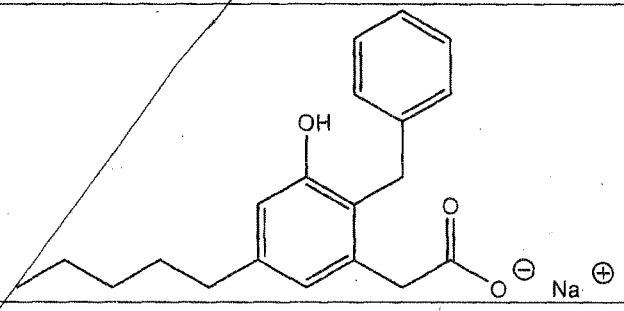
9) $C(CH_3)_2C(O)OH$,

10) CH(F)-C(O)OH,

11) CF_2-C(O)OH, or

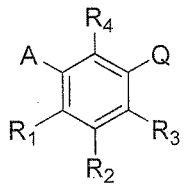
12) C(O)-C(O)OH.

31. The compound of claim 30, wherein the compound is:

Compound XX	

CLAIMS

1. Use of a therapeutically effective amount of a compound represented by the formula:



or a pharmaceutically acceptable salt thereof, wherein

A is C_5 alkyl, C_6 alkyl, C_5 alkenyl, C_6 alkenyl, $C(O)-(CH_2)_n-CH_3$ or $CH(OH)-(CH_2)_n-CH_3$ wherein n is 3 or 4;

R_1 is H, OH or F;

R_2 is H, OH, F or CH_2-OH;

R_3 is H, OH, F or CH_2Ph;

R_4 is H, OH or F;

Q is

1) $(CH_2)_mC(O)OH$ wherein m is 1 or 2,

2) CH(F)-C(O)OH,

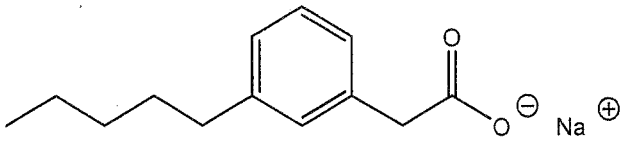
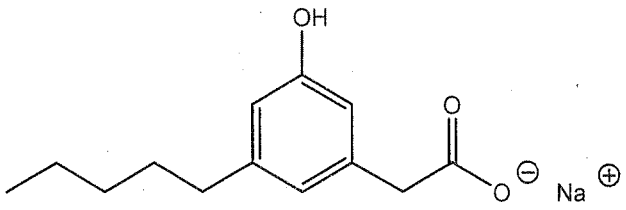
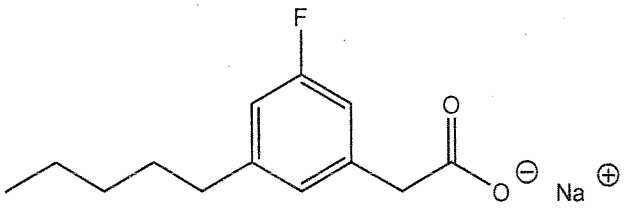
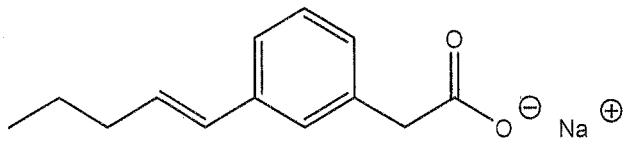
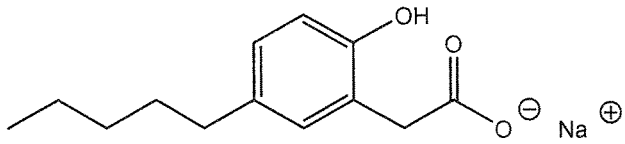
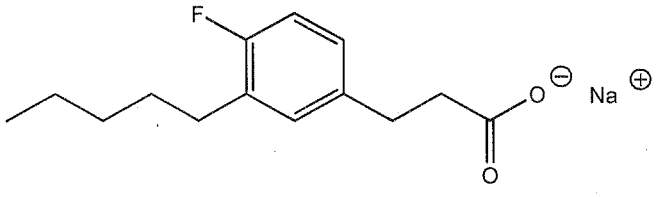
3) CF_2-C(O)OH, or

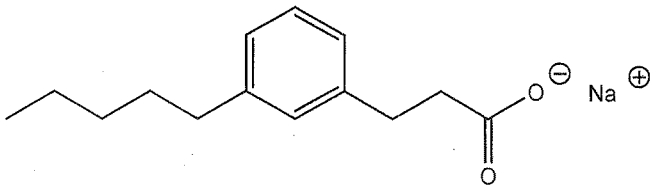
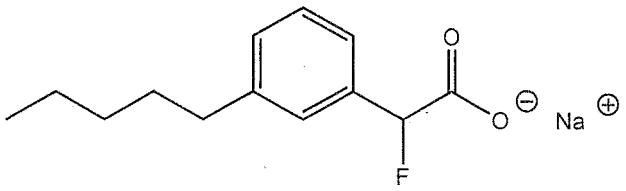
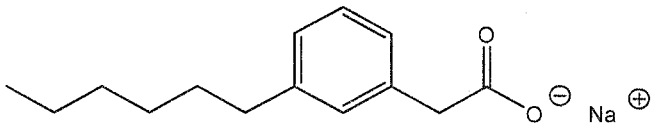
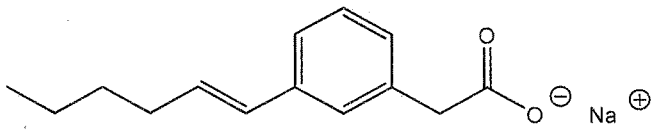
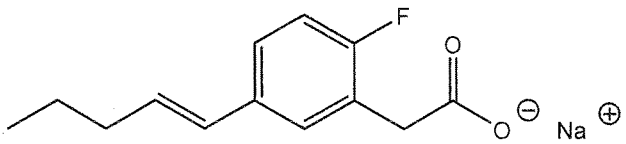
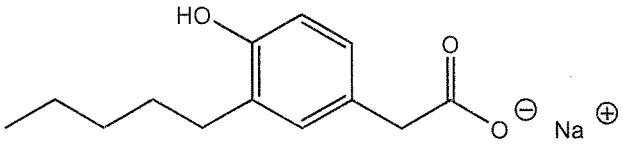
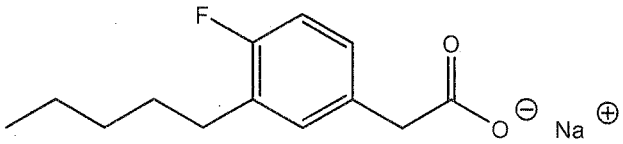
4) C(O)-C(O)OH; in the manufacture of a medicament for preventing and/or slowing progression of and/or treating a fibrotic disease in a subject in need thereof, wherein the fibrotic disease is pulmonary fibrosis, liver fibrosis, skin fibrosis or cardiac fibrosis.

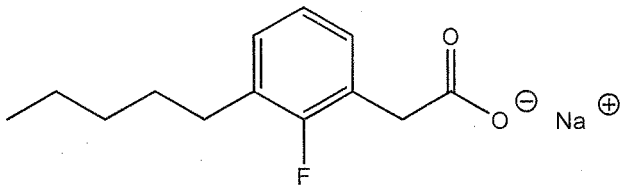
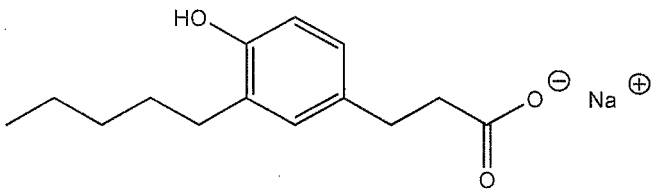
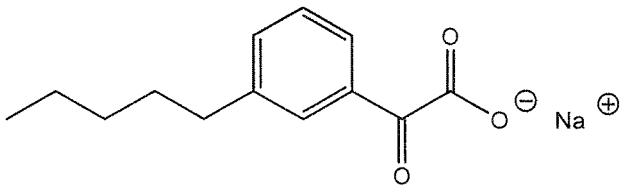
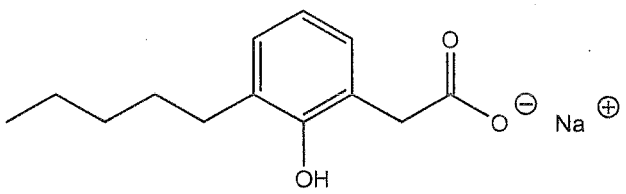
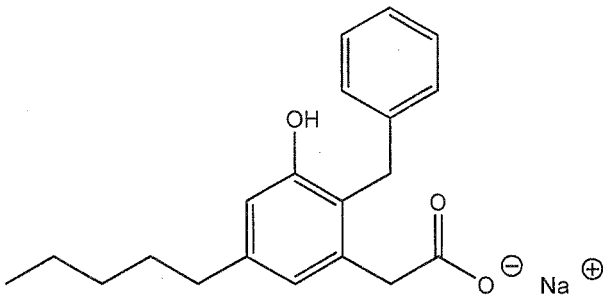
2. The use according to claim 1, wherein the pharmaceutically acceptable salt of said compound is sodium, potassium, lithium, ammonium, calcium, magnesium, manganese, zinc, iron, or copper.

3. The use of claim 2, wherein the pharmaceutically acceptable salt of said compound is sodium.

4. The use according to claim 1 wherein said compound is one of the following compounds:

Compound I	
Compound II	
Compound III	
Compound IV	
Compound V	
Compound VI	

Compound VII	
Compound IX	
Compound XI	
Compound XII	
Compound XIII	
Compound XIV	
Compound XV	

Compound XVI	
Compound XVII	
Compound XVIII	
Compound XIX	
Compound XX	

5. A use according to any one of claims 1-4, wherein the fibrotic disease is pulmonary fibrosis.

6. The use of claim 5, wherein the therapeutically effective amount is between about 1 to about 50 mg/kg, the compound is administered orally, and the subject is human.

7. The use of claim 6, wherein the therapeutically effective amount is between about 1 to about 20 mg/kg.

8. The use according to claim 5, wherein the pulmonary fibrosis is idiopathic pulmonary fibrosis, sarcoidosis, cystic fibrosis, familial pulmonary fibrosis, silicosis, asbestosis, coal worker's pneumoconiosis, carbon pneumoconiosis, hypersensitivity pneumonitides, pulmonary fibrosis caused by inhalation of inorganic dust, pulmonary fibrosis caused by an infectious agent, pulmonary fibrosis caused by inhalation of noxious gases, aerosols, chemical dusts, fumes or vapors, drug-induced interstitial lung disease, pulmonary hypertension, or chronic obstructive pulmonary disease.

9. A use according to any one of claims 1-4, wherein the fibrotic disease is liver fibrosis.

10. The use of claim 9, wherein the therapeutically effective amount is between about 1 to about 50 mg/kg, the compound is administered orally, and the subject is human.

11. The use of claim 10, wherein the therapeutically effective amount is between about 1 to about 20 mg/kg.

12. The use according to claim 10, wherein the liver fibrosis is resulting from a chronic liver disease, hepatitis B virus infection, hepatitis C virus infection, hepatitis D virus infection, schistosomiasis, alcoholic liver disease or non-alcoholic steatohepatitis, obesity, diabetes, protein malnutrition, coronary artery disease, auto-immune hepatitis, cystic fibrosis, alpha-1-antitrypsin deficiency, primary biliary cirrhosis, drug reaction and exposure to toxins.

13. The use according to any one of claims 1-4, wherein the fibrotic disease is skin fibrosis.

14. The use of claim 13, wherein the compound is to be administered topically.

15. The use of claim 14, wherein the therapeutically effective amount is between about 0.01 to about 10% (w/w) and the subject is human.

16. The use of claim 13, wherein the compound is to be administered orally.

17. The use of claim 16, wherein the therapeutically effective amount is between about 1 to about 50 mg/kg and the subject is human.

18. The use according to claim 14, wherein the skin fibrosis is scarring, hypertrophic scarring, keloid scarring, dermal fibrotic disorder, wound healing, delayed wound healing, psoriasis or scleroderma.

19. The use of claim 18, wherein said scarring derives from a wound, a burn, a scar, wrinkles, stretch marks, sun damage, chemical damage, heat damage, cold damage, a trauma, a surgical injury, a radiation or an ulcer. 20. The method of claim 19, wherein said ulcer is diabetic foot ulcer, venous leg ulcer or pressure ulcer.

21. The use according to any one of claims 1-4, wherein the fibrotic disease is cardiac fibrosis.

22. The use of claim 21, wherein the cardiac fibrosis is cardiomyopathy, congestive heart failure.

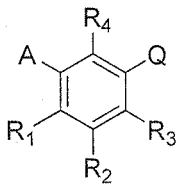
23. Use of a therapeutically effective amount of a compound as defined in any one of claims 1-4, in the manufacture of a medicament for antagonizing collagen secretion or collagen deposition in an organ of a mammal, wherein the organ is lung, liver, skin or heart.

24. Use of a therapeutically effective amount of a compound as defined in any one of claims 1-4 in the manufacture of a medicament for reducing the collagen production in cells, wherein said compound is to be contacted with the cells.

25. The use according to any one of claims 1-22, wherein the compound is to be administered in combination with a therapeutically effective amount of second compound, the second compound is an immunosuppressive drug, an anti-inflammatory drug, a cytokine, a monoclonal antibody, a multiple receptor tyrosine kinase inhibitor, an antioxidant, an enzyme inhibitor, an integrin inhibitor, a lipid receptor modulator or a thiazolindione.

26. The use according to claim 25, wherein the fibrotic disease is pulmonary fibrosis, and wherein the compound is administered in combination with a therapeutically effective amount of pirfenidone.

27. A kit for preventing and/or slowing progression of and/or treating fibrotic disease in a subject in need thereof, comprising a compound represented by the formula:



or a pharmaceutically acceptable salt thereof, wherein

A is C_5 alkyl, C_6 alkyl, C_5 alkenyl, C_6 alkenyl, $C(O)-(CH_2)_n-CH_3$ or $CH(OH)-(CH_2)_n-CH_3$ wherein n is 3 or 4;

R_1 is H, OH or F;

R_2 is H, OH, F or CH_2-OH;

R_3 is H, OH, F or CH_2Ph;

R_4 is H, OH or F;

Q is

1) $(CH_2)_mC(O)OH$ wherein m is 1 or 2,

2) $CH(CH_3)C(O)OH$,

3) $C(CH_3)_2C(O)OH$,

4) CH(F)-C(O)OH,

5) CF_2-C(O)OH, or

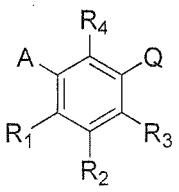
6) C(O)-C(O)OH;

and instructions for administering a therapeutically effective amount of the compound to the subject suffering from said fibrotic disease, wherein the fibrotic disease is pulmonary fibrosis, liver fibrosis, skin fibrosis or cardiac fibrosis.

28. The kit of claim 27, further comprises instructions for administering between about 1 to about 50 mg/kg of the compound daily and orally to the subject who is a human.

29. The kit of claim 27, further comprises instructions for administering between about 0.01 to about 10 % (w/w) of the compound daily and topically to the subject who is a human, and wherein the fibrotic disease is skin fibrosis.

30. A compound represented by the formula:



or a pharmaceutically acceptable salt thereof, wherein

A is C_5 alkyl, C_6 alkyl, C_5 alkenyl, C_6 alkenyl, $C(O)-(CH_2)_n-CH_3$ or $CH(OH)-(CH_2)_n-CH_3$ wherein n is 3 or 4;

R_1 is H, OH or F;

R_2 is H, OH, F or CH_2-OH;

R_3 is CH_2Ph;

R_4 is H, OH or F;

Q is

1) $(CH_2)_mC(O)OH$ wherein m is 1 or 2,

2) $CH(CH_3)C(O)OH$,

3) $C(CH_3)_2C(O)OH$,

4) CH(F)-C(O)OH,

5) CF_2-C(O)OH, or

6) C(O)-C(O)OH.

31. The compound of claim 30, wherein the compound is:

Compound XX	