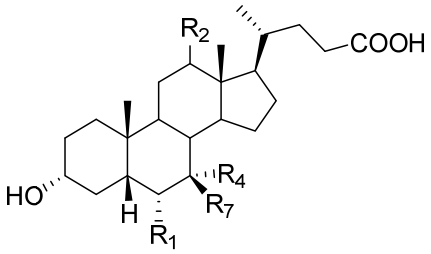
SUMMARY

In one aspect of the present disclosure, there is provided a use of a compound of formula I:



(I),

or a pharmaceutically acceptable salt, or amino acid conjugate thereof, wherein:

R_1 is unsubstituted C_1-C_6 alkyl;

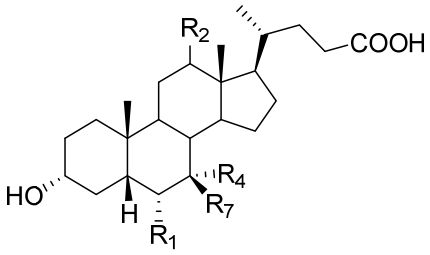
R_2 is hydrogen or α-hydroxyl;

R_4 is hydroxyl or hydrogen; and

R_7 is hydroxyl or hydrogen,

in the manufacture of a medicament for inducing osteogenesis or bone growth in a subject in need of treatment thereof, wherein the compound of formula I, or a pharmaceutically acceptable salt or amino acid conjugate thereof, is to be administered in a total daily amount of 1-25 mg.

In another aspect of the present disclosure, there is provided a use of a compound of formula I:



(I),

or a pharmaceutically acceptable salt or amino acid conjugate thereof, wherein:

R_1 is unsubstituted C_1-C_6 alkyl;

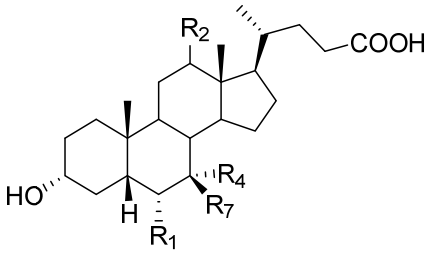
R_2 is hydrogen or α-hydroxyl;

R_4 is hydroxyl or hydrogen; and

R_7 is hydroxyl or hydrogen,

in the manufacture of a medicament for slowing, preventing, or reversing the reduction in bone density in a subject in need of treatment thereof, wherein the compound of formula I, or a pharmaceutically acceptable salt or amino acid conjugate thereof, is to be administered in a total daily amount of 1-25 mg.

In yet another aspect of the present disclosure, there is provided a use of a compound of formula I:



(I),

or a pharmaceutically acceptable salt or amino acid conjugate thereof, wherein:

R_1 is unsubstituted C_1-C_6 alkyl;

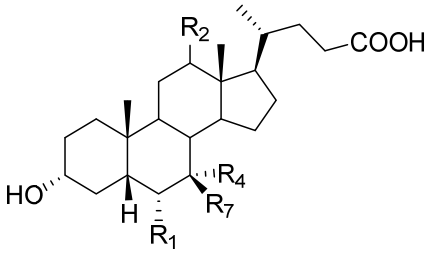
R_2 is hydrogen or α-hydroxyl;

R_4 is hydroxyl or hydrogen; and

R_7 is hydroxyl or hydrogen,

in the manufacture of a medicament for treating or preventing osteoporosis, osteopenia, Paget's disease of bone, osteomalacia, and osteopetrosis.

The present disclosure relates to a method of treating, reducing the risk of, preventing, or alleviating a symptom of a disease or condition associated with changes in bone density in a subject in need of treatment thereof, comprising administering to the subject a therapeutically effective amount of a compound of formula I:



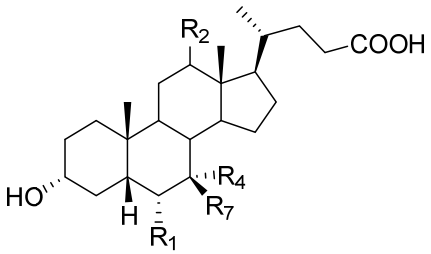
(I),

or a pharmaceutically acceptable salt or amino acid conjugate thereof, wherein R_1, R_2, R_4, and R_7 are as defined herein. In one embodiment, the subject is suffering from a liver disease, such as primary biliary cirrhosis.

The present disclosure also relates to a method of treating, reducing the risk of, preventing, or alleviating a symptom of osteoporosis or an osteopenic disease in a subject in need of treatment thereof, comprising administering to the subject a therapeutically effective amount of a compound of formula I, or a pharmaceutically acceptable salt or amino acid conjugate thereof, wherein R_1, R_2, R_4, and R_7 are as defined herein. In one embodiment, the subject is suffering from a liver disease, such as primary biliary cirrhosis.

CLAIMS

1. Use of a compound of formula I:



(I),

or a pharmaceutically acceptable salt, or amino acid conjugate thereof, wherein:

R_1 is unsubstituted C_1-C_6 alkyl;

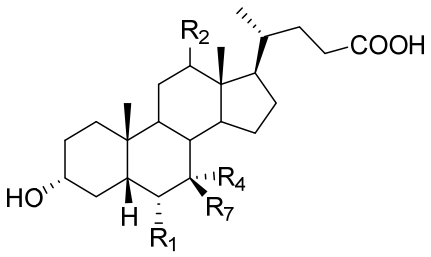
R_2 is hydrogen or α-hydroxyl;

R_4 is hydroxyl or hydrogen; and

R_7 is hydroxyl or hydrogen,

in the manufacture of a medicament for inducing osteogenesis or bone growth in a subject in need of treatment thereof, wherein the compound of formula I, or a pharmaceutically acceptable salt or amino acid conjugate thereof, is to be administered in a total daily amount of 1-25 mg.

2. Use of a compound of formula I:



(I),

or a pharmaceutically acceptable salt or amino acid conjugate thereof, wherein:

R_1 is unsubstituted C_1-C_6 alkyl;

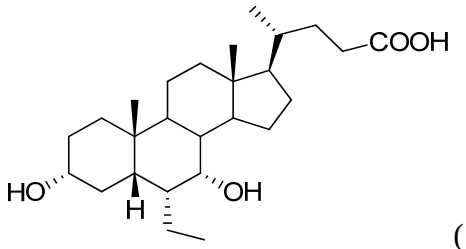
R_2 is hydrogen or α-hydroxyl;

R_4 is hydroxyl or hydrogen; and

R_7 is hydroxyl or hydrogen,

in the manufacture of a medicament for slowing, preventing, or reversing the reduction in bone density in a subject in need of treatment thereof, wherein the compound of formula I, or a pharmaceutically acceptable salt or amino acid conjugate thereof, is to be administered in a total daily amount of 1-25 mg.

3. The use of claim 1 or 2, wherein the compound is



(1),

or a pharmaceutically acceptable salt or amino acid conjugate thereof.

4. The use of any one of claims 1-3, wherein the subject suffers from an FXR mediated disease or condition.

5. The use of claim 4, wherein the FXR mediated disease or condition is a liver disease.

6. The use of claim 5, wherein the liver disease is a cholestatic liver disease.

7. The use of claim 6, wherein the cholestatic liver disease is primary biliary cirrhosis or primary sclerosing cholangitis.

8. The use of claim 5, wherein the liver disease is a non-cholestatic liver disease.

9. The use of any one of the claims 1-8, wherein the compound of formula I, or a pharmaceutically acceptable salt or amino acid conjugate thereof, is to be administered in an amount of about 5 mg or about 10 mg.

10. The use of any one of claims 1-9, wherein the compound of formula I, or a pharmaceutically acceptable salt or amino acid conjugate thereof, is to be administered at a first dose for a first time period, and at a second dose for a second time period.

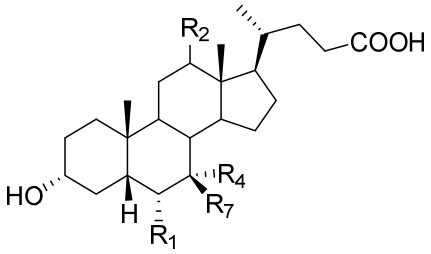
11. The use of claim 10, wherein the first time period is from 1 month to 24 months.

12. The use of claim 11, wherein the first time period is about 6 months.

13. The use of claim 10, wherein the second time period is from 1 month to 24 months.

14. The use of claim 13, wherein the second time period is about 6 months.

15. Use of a compound of formula I:



(I),

or a pharmaceutically acceptable salt or amino acid conjugate thereof, wherein:

R_1 is unsubstituted C_1-C_6 alkyl;

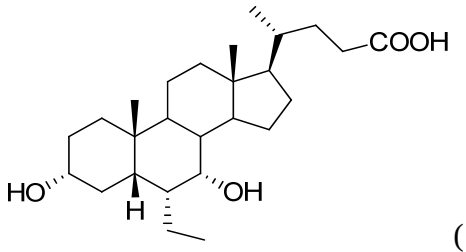
R_2 is hydrogen or α-hydroxyl;

R_4 is hydroxyl or hydrogen; and

R_7 is hydroxyl or hydrogen,

in the manufacture of a medicament for treating or preventing osteoporosis, osteopenia, Paget's disease of bone, osteomalacia, and osteopetrosis.

16. The use of claim 15, wherein the compound is



(1),

or a pharmaceutically acceptable salt or amino acid conjugate thereof.

17. The use of claim 15 or 16, wherein the compound of formula I, or a pharmaceutically acceptable salt or amino acid conjugate thereof, is to be administered in a total daily amount of 1-25 mg.