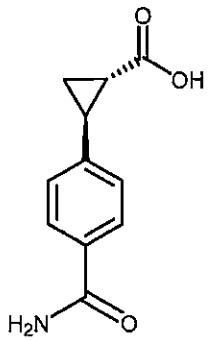
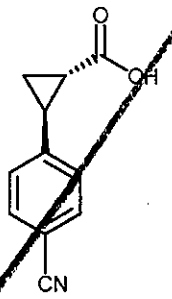
What is claimed is:

1. A compound of formula Ia, or a pharmaceutically acceptable salt thereof:



(Ia).

2. A process for preparing a compound according to claim 1, comprising reacting a compound of formula IX



(IX)

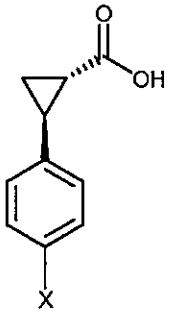
with (1) a base and a peroxide, and then (2) an acidic solution.

3. The process of claim 2, wherein said base is sodium hydroxide.

4. The process of claim 2 or 3, wherein said peroxide is hydrogen peroxide.

5. The process of any one of claims 2-4, wherein said acidic solution is an aqueous solution of sodium hydrogen sulfate.

6. The process of claim 2, wherein the compound of formula IX is prepared by reacting a compound of formula VIII



(VIII)

wherein X is Cl, Br, or I; with a metal, a metal cyanide, and a catalyst.

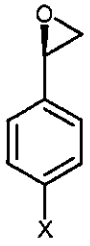
7. The process of claim 6, wherein X is Br.

8. The process of any one of claims 6 or 7, wherein said metal is zinc.

9. The process of any one of claims 6-8, wherein said metal cyanide is zinc-(II) cyanide.

10. The process of any one of claims 6-9, wherein said catalyst is bis(tri-*t*-butylphosphine)palladium(0).

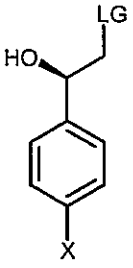
11. The process of claim 6, wherein the compound of formula VIII is prepared by reacting a compound of formula VII



(VII)

wherein X is Cl, Br, or I; with (1) a mixture of a first base and a triC_{1-6}alkyl phosphonoacetate; and then (2) a second base.

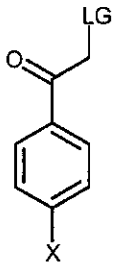
12. The process of claim 11, wherein the compound of formula VII is prepared by reacting a compound of formula VI



(VI)

with a base; wherein X is Cl, Br, or I and LG is Cl, Br, I, tosylate, brosylate, nosylate, mesylate, or triflate.

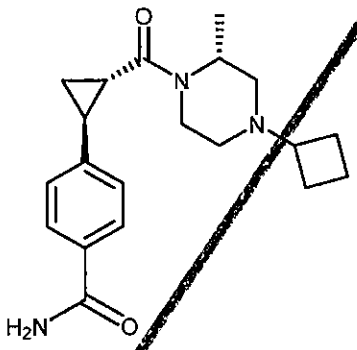
13. The process of claim 12, wherein the compound of formula VI is prepared by reacting a compound of formula V



(V)

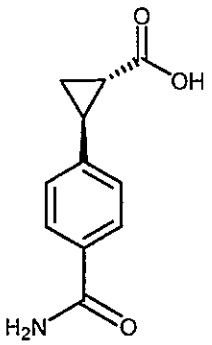
with a reducing agent and a chiral oxazaborolidine; wherein X is Cl, Br, or I and LG is Cl, Br, I, tosylate, brosylate, nosylate, mesylate, or triflate.

14. A process for preparing a compound of formula Ib, or a pharmaceutically acceptable salt thereof,



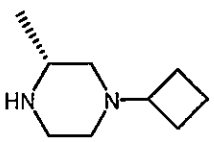
(Ib)

which process comprises reacting a compound of formula Ia



(Ia)

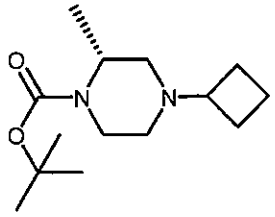
with (1) an activating agent and (2) a compound of formula IVa, or a suitable salt thereof



(IVa).

15. The process of claim 14, wherein said activating agent is 1,1'-carbonyldiimidazole.

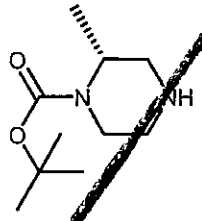
16. The process of claim 14, wherein the compound of formula IVa, or suitable salt thereof is prepared by reacting a compound of formula IIIa



(IIIa)

with an acid.

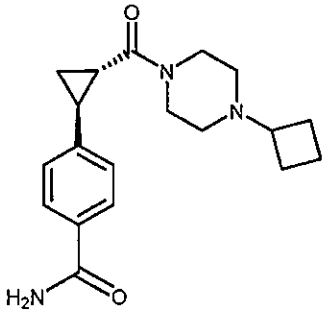
17. The process of claim 16, wherein the compound of formula IIIa is prepared by reacting a compound of formula IIa



(IIa)

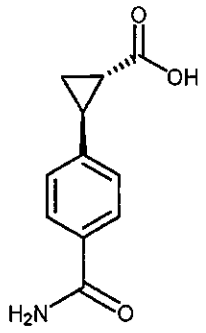
with cyclobutanone and a reducing agent.

18. A process for preparing a compound of formula Ic, or a pharmaceutically acceptable salt thereof,



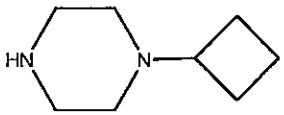
(Ic)

which process comprises reacting a compound of formula Ia



(Ia)

(1) with an activating agent and a compound of formula IVb, or a suitable salt thereof

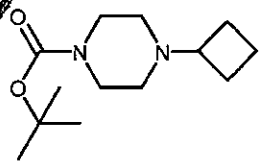


(IVb)

and (2) a base.

19. The process of claim 18, wherein the activating agent is a mixture of 1-hydroxybenzotriazole and 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride.

20. The process of claim 18, wherein the compound of formula IVb is prepared by reacting a compound of formula IIIb

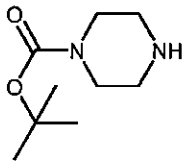


(IIIb)

with an acid.

21. The process of claim 16 or 20, wherein said acid is hydrochloric acid.

22. The process of claim 20, wherein the compound of formula IIIb is prepared by reacting a compound of formula IIb



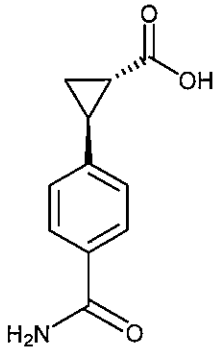
(IIb)

with cyclobutanone and a reducing agent.

23. The process of claim 17 or 22, wherein said reducing agent is sodium triacetoxy borohydride.

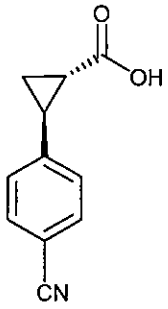
What is claimed is:

1. A process for preparing a compound of formula Ia, or a pharmaceutically acceptable salt thereof:



(Ia),

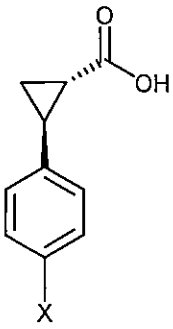
comprising reacting a compound of formula IX:



(IX)

with (1) a base and a peroxide; and then (2) an acidic solution.

2. The process of claim 1, wherein said base is sodium hydroxide.
3. The process of claim 1 or 2, wherein said peroxide is hydrogen peroxide.
4. The process of any one of claims 1-3, wherein said acidic solution is an aqueous solution of sodium hydrogen sulfate.
5. The process of claim 1, wherein the compound of formula IX is prepared by reacting a compound of formula VIII:



(VIII),

wherein X is Cl, Br, or I;

with a metal, a metal cyanide, and a catalyst.

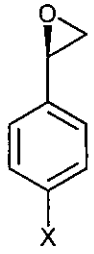
6. The process of claim 5, wherein X is Br.

7. The process of claim 5 or 6, wherein said metal is zinc.

8. The process of any one of claims 5-7, wherein said metal cyanide is zinc-(II)-cyanide.

9. The process of any one of claims 5-8, wherein said catalyst is bis(tri-*t*-butylphosphine)palladium(0).

10. The process of claim 5, wherein the compound of formula VIII is prepared by reacting a compound of formula VII:

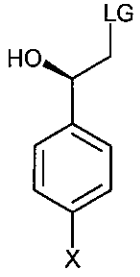


(VII),

wherein X is Cl, Br, or I;

with (1) a mixture of a first base and a triC_{1-6}alkyl phosphonoacetate; and then (2) a second base.

11. The process of claim 10, wherein the compound of formula VII is prepared by reacting a compound of formula VI:

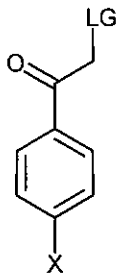


(VI),

with a base;

wherein X is Cl, Br, or I and LG is Cl, Br, I, tosylate, brosylate, nosylate, mesylate, or triflate.

12. The process of claim 11, wherein the compound of formula VI is prepared by reacting a compound of formula V:

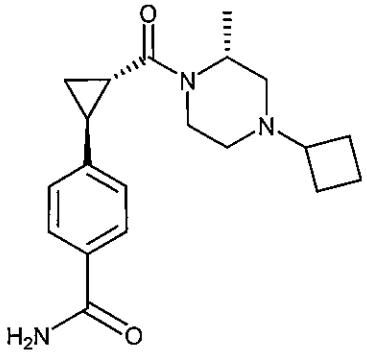


(V)

with a reducing agent and a chiral oxazaborolidine;

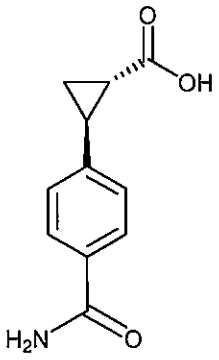
wherein X is Cl, Br, or I and LG is Cl, Br, I, tosylate, brosylate, nosylate, mesylate, or triflate.

13. A process for preparing a compound of formula Ib, or a pharmaceutically acceptable salt thereof,



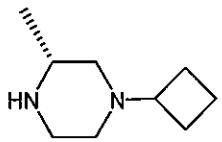
(Ib)

which process comprises reacting a compound of formula Ia



(Ia)

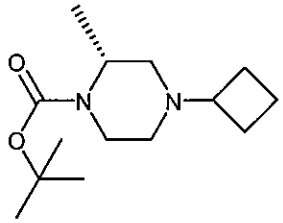
with (1) an activating agent and (2) a compound of formula IVa, or a suitable salt thereof



(IVa).

14. The process of claim 13, wherein said activating agent is 1,1'-carbonyldiimidazole.

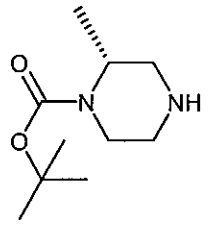
15. The process of claim 13, wherein the compound of formula IVa, or suitable salt thereof is prepared by reacting a compound of formula IIIa:



(IIIa),

with an acid.

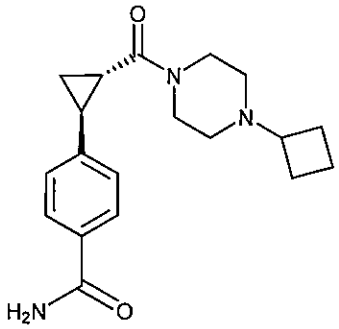
16. The process of claim 15, wherein the compound of formula IIIa is prepared by reacting a compound of formula IIa:



(IIa),

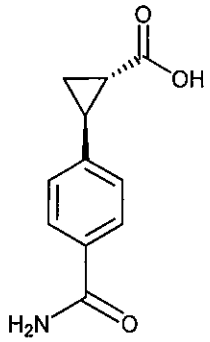
with cyclobutanone and a reducing agent.

17. A process for preparing a compound of formula Ic, or a pharmaceutically acceptable salt thereof,



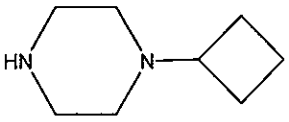
(Ic)

which process comprises reacting a compound of formula Ia



(Ia)

(1) with an activating agent and a compound of formula IVb, or a suitable salt thereof

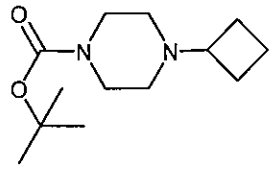


(IVb)

and (2) a base.

18. The process of claim 17, wherein the activating agent is a mixture of 1-hydroxybenzotriazole and 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide hydrochloride.

19. The process of claim 17, wherein the compound of formula IVb is prepared by reacting a compound of formula IIIb:

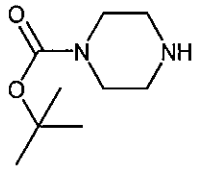


(IIIb)

with an acid.

20. The process of claim 15 or 19, wherein said acid is hydrochloric acid.

21. The process of claim 19, wherein the compound of formula IIIb is prepared by reacting a compound of formula IIb



(IIb)

with cyclobutanone and a reducing agent.

22. The process of claim 16 or 21, wherein said reducing agent is sodium triacetoxy borohydride.