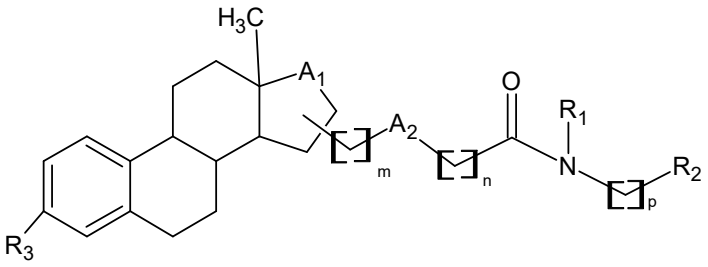
CLAIMS

1. A compound of formula (I), or a stereoisomer or salt thereof:



(I)

wherein:

A_1 is selected from C(O) and CHR_{z1};

A_2 is selected from CH_2 and O;

R_1 is selected from the group consisting of: hydrogen, (C_1-C_5)alkyl optionally substituted with one or more Z substituents, (C_1-C_5)alkoxy optionally substituted with one or more Z substituents, (C_2-C_5)alkenyl optionally substituted with one or more Z substituents, (C_2-C_5)alkynyl optionally substituted with one or more Z substituents; (C_3-C_8)cycloalkyl, aryl, and heteroaryl;

R_2 is a heterocyclic aromatic ring having 5, 6 or 7 members selected from the group consisting of: CR_{z2}, N, S, and O, provided that at least one of the members is N, S or O;

R_3 is (C_1-C_5)alkyl substituted with one or more Br, Br^{76}; I, I^{123}, I^{124}, or I^{131};

R_{z1} is selected from OH, $NR_{x1}R_{x2}$, =N-OR_{x3}, halogen, (C_1-C_5)alkoxy, OC(O)(C_1-C_5)alkyl, and $OSO_2NR_{x4}NR_{x5}$;

R_{z2} is selected from hydrogen, OH, (C_1-C_{10})alkyl optionally substituted with one or more Z substituents, and (C_1-C_{10})alkoxy optionally substituted by one or more Z substituents;

Z is selected from halogen, OH, (C_1-C_5)alkyl, (C_1-C_5)haloalkyl, (C_1-C_5)alkoxy, (C_1-C_5)haloalkoxy, and $NR_{x1}R_{x2}$;

R_{x1}, R_{x2}, R_{x4} and R_{x5} are the same or different and are selected from the group consisting of: hydrogen, (C_1-C_5)alkyl, (C_1-C_5)haloalkyl, (C_1-C_5)alkoxy, and (C_1-C_5)haloalkoxy;

R_{x3} is selected from H, and (C_1-C_5)alkyl;

m represents an integer value selected from 0 to 2;

n represents an integer value selected from 0 to 2;

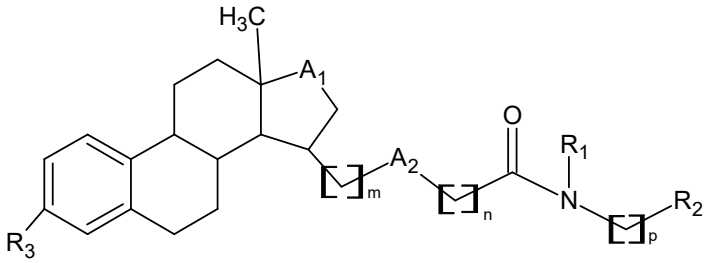
p represents an integer value selected from 0 to 5;

wherein:

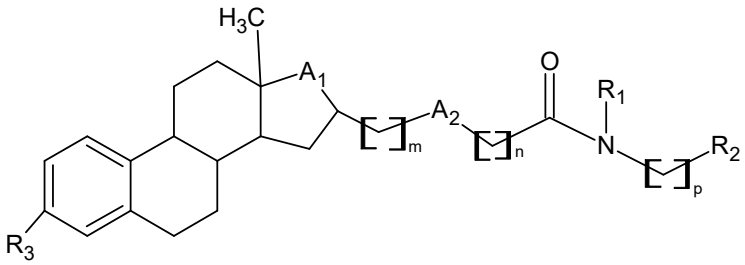
aryl is an aromatic ring system comprising 5 or 6 CR_c members, wherein R_c is selected from H, halogen, cyano, nitro, $(C_1\text{-}C_5)$alkyl, $(C_1\text{-}C_5)$haloalkyl, -O-$(C_1\text{-}C_5)$alkyl, and -O-$(C_1\text{-}C_5)$haloalkyl; and

heteroaryl is an aromatic ring system comprising 5 or 6 members selected from the group consisting of: CR_d, O, N, NH, and S; wherein R_d is selected from H, halogen, cyano, nitro, $(C_1\text{-}C_5)$alkyl, $(C_1\text{-}C_5)$haloalkyl, -O-$(C_1\text{-}C_5)$alkyl, and -O-$(C_1\text{-}C_5)$haloalkyl.

2. The compound of claim 1, which is one of formula (Ia) or (Ib):



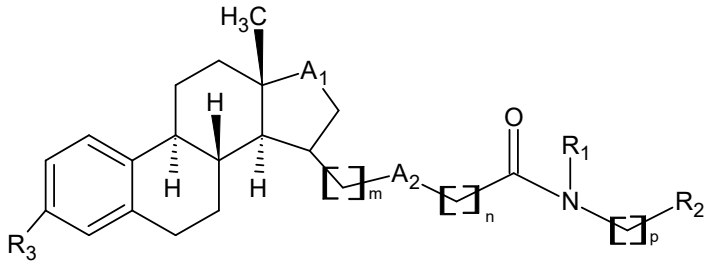
(Ia)



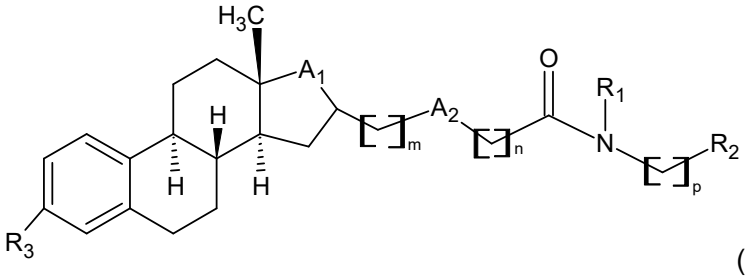
(Ib)

wherein R_1 to R_3, A_1, A_2, m, n, and p are as defined in claim 1.

3. The compound of claim 1 or 2, which is one of formula (Ic) or (Id):



(Ic)



(Id)

wherein R_1 to R_3, A_1, A_2, m, n, and p are as defined in claim 1.

4. The compound of any one of claims 1 to 3, wherein A_1 represents C(O) or CHOH.

5. The compound of any one of claims 1 to 4, wherein:

(i) m is other than 0, and $A_2 = CH_2$, particularly wherein m is 1, $A_2 = CH_2$ and n is 0; or

(ii) m = 0, and A_2= -O-, particularly wherein m = 0, and A_2= -O- and n is other than 0, particularly wherein n= 1.

6. The compound of any one of claims 1 to 5, wherein:

(i) R_1 is hydrogen; and/or

(ii) R_3 is bromoethyl, particularly 2-bromoethyl; and/or

(iii) R_2 is a heterocyclic aromatic ring having 5 or 6 members; and/or

(iv) R_2 is a heterocyclic aromatic ring having one or two heteroatoms, particularly wherein the one or two heteroatoms are N or S.

7. The compound of any one of claims 1 to 6, wherein:

(i) p is 0 when R_2 represents a 5-membered heterocyclic aromatic ring; or

wherein p is 1 when R_2 represents a 6-membered heterocyclic aromatic ring; or

(ii) R_2 represents a pyridinyl ring, wherein Rz_2 is as defined in claim 1, particularly wherein Rz_2 is selected from H and $(C_1$-$C_5)$alkyl; and/or

(iii) R_2 is a thiazolyl ring wherein Rz_2 is as defined in claim 1, particularly wherein Rz_2 is selected from H and $(C_1$-$C_5)$alkyl.

8. The compound of any one of claims 1 to 7, which is selected from the group consisting of:

3-[3-(2-bromoethyl)-17-oxoestra-1(10),2,4-trien-15β-yl]-N-(5-methyl-1,3-thiazol-2-yl)propanamide;

3-[3-(2-bromoethyl)-17β-hydroxyestra-1(10),2,4-trien-15β-yl]-N-(5-methyl-1,3-thiazol-2-yl)propanamide;

3-[3-(2-bromoethyl)-17-oxoestra-1(10),2,4-trien-16β-yl]-N-(5-methyl-1,3-thiazol-2-yl)propanamide;

3-[3-(2-bromoethyl)-17-oxoestra-1(10),2,4-trien-16β-yl]-N-(5-methyl-1,3-thiazol-2-yl)acetamide;

3-[3-(2-bromoethyl)-17β-hydroxyestra-1(10),2,4-trien-16β-yl]-N-(5-methyl-1,3-thiazol-2-yl)acetamide;

3-[3-(2-bromoethyl)-17-oxoestra-1(10),2,4-trien-16β-yl]-N-[(pyridin-3-yl)methyl]propanamide;

3-[3-(2-bromoethyl)-17-oxoestra-1(10),2,4-trien-16β-yl]-N-[(pyridin-3-yl)methyl]acetamide;

3-[3-(2-bromoethyl)-17β-hydroxyestra-1(10),2,4-trien-16β-yl]-N-[(pyridin-3-yl)methyl] propanamide;

3-[3-(2-bromoethyl)-17β-hydroxyestra-1(10),2,4-trien-16β-yl]-N-[(pyridin-3-yl)methyl] acetamide;

3-[3-(2-bromoethyl)-17-oxoestra-1(10),2,4-trien-15β-yl]-N-[(pyridin-3-yl)methyl]propanamide;

3-[3-(2-bromoethyl)-17β-hydroxyestra-1(10),2,4-trien-15β-yl]-N-[(pyridin-3-yl)methyl] propanamide;

2-{[3-(2-bromoethyl)-17-oxoestra-1(10),2,4-trien-15β-yl]oxy}-N-(5-methyl-1,3-thiazol-2-yl)acetamide; and

2-{[3-(2-bromoethyl)-17β-hydroxyestra-1(10),2,4-trien-15β-yl]oxy}-N-(5-methyl-1,3-thiazol-2-yl)acetamide;

or any salt or stereoisomer thereof.

9. A pharmaceutical composition comprising the compound as defined in any one of claims 1-8, and one or more pharmaceutically acceptable excipients or carriers.

10. A kit of parts comprising:

(i) the compound as defined in any one of claims 1-8 or the pharmaceutical composition of claim 9, and

(ii) a detectable label.

11. Use of the compound of formula (I) as defined in any one of claims 1-8 or the pharmaceutical composition as defined in claim 9 in the manufacture of a medicament for inhibiting the 17β-HSD1 enzyme in a subject.

12. Use of the compound of formula (I) as defined in any one of claims 1-8 or the pharmaceutical composition as defined in claim 9, in the manufacture of a medicament for the treatment and/or prophylaxis of an estrogen-dependent disease or disorder of a subject.

13. The use of claim 11 or 12, wherein the subject suffers from a malign steroid dependent disease or disorder, particularly, cancer.

14. The use of claim 11 or 12, wherein the subject suffers from a benign steroid dependent disease or disorder, particularly endometriosis, uterine fibroids, uterine leiomyoma, adenomyosis, dysmenorrhea, menorrhagia, metrorrhagia, prostadynia, benign prostatic hyperplasia, urinary dysfunction, polycystic ovarian syndrome, lower urinary tract syndrome, multiple sclerosis, obesity, rheumatoid arthritis, colon cancer, tissue wounds, skin wrinkles or cataracts.

15. The use of any one of the claims 11 to 14, wherein the medicament is to be administered in combination with one or more other therapeutic agents suitable in the treatment of steroid dependent diseases.