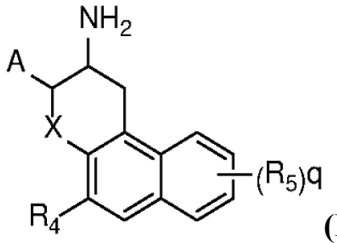
CLAIMS

1. A compound of general formula (II), or a pharmaceutically acceptable salt thereof, or an optically active isomer or solvate thereof:



(II)

Wherein,

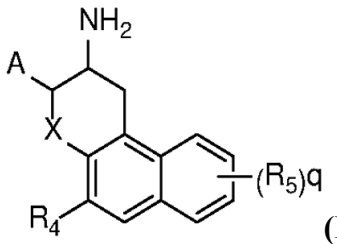
X is selected from CH_2, O, S and NH;

A is a benzene ring with 1 to 5 substituents, wherein each substituent is independently selected from a halogen, a cyano, a hydroxy, a C_{1-6} alkyl or a C_{1-6} alkyl substituted by a halogen, a C_{1-6} alkoxy or a C_{1-6} alkoxy substituted by a halogen;

R^4 is independently selected from H, a hydroxyl, F, a cyano;

R^5 is a halogen, a cyano, a hydroxyl, a mercapto, a C_{1-6} alkyl group or a C_{1-6} alkyl group containing 1 to 5 F atoms, a C_{1-6} alkoxy, a hydroxyl, a C_{1-10} alkylcarbonyloxy, a C_{1-3} alkoxymethyloxy, COOH, a C_{1-6} alkoxycarbonyl, a carbamoyl, a cyanomethylcarbonyl, an acetamidomethylcarbonyl, a 2-pyrrolecarbonyl, a methoxycarbonylmethyl, a 4-pyranylcarbonyl, a 4-morpholinecarbonyl, a 1-piperazinecarbonyl, a C_{1-6} alkylthio or a C_{1-6} alkylthio containing 1 to 5 F atoms, a C_{1-6} alkylsulfinyl, a C_{1-6} alkylsulfonyl, an amino, an acetylamino, a methanesulfonamido, a methylcarbamido, a N-propanesulfonyllactam group, a N-butanesulfonyllactam group, a 4-morpholinyl, a N-methylpiperazin-4-yl, a piperazinyl, a 3-methanesulfonylpiperazinyl, a 3,3-difluorotetrahydropyrrolyl, a 2-aminoformylpiperidyl, a 3-pyrazolylamino, q = 1-4.

2. The compound of claim 1, or a pharmaceutically acceptable salt thereof, or an optically active isomer or solvate thereof, wherein the compound is shown in general formula (II):



(II)

Wherein,

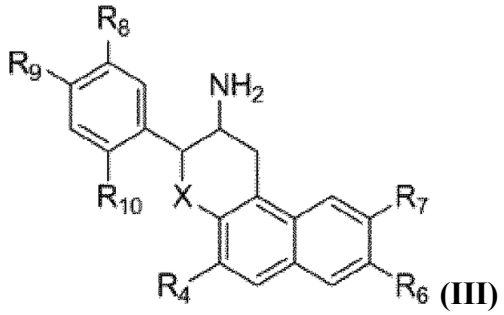
X is selected from CH_2, O, S and NH;

A is a benzene ring with 1 to 5 substituents, wherein each substituent is independently selected from a halogen, a cyano, a hydroxy, a C_{1-6} alkyl or a C_{1-6} alkyl substituted by a halogen, a C_{1-6} alkoxy or a C_{1-6} alkoxy substituted by a halogen;

R^4 is independently selected from H, a hydroxyl, F, a cyano;

R^5 is a halogen, a cyano, a hydroxyl, a mercapto, a C_{1-6} alkyl group or a C_{1-6} alkyl group containing 1 to 5 F atoms, a C_{1-6} alkoxy, a hydroxyl, a C_{1-3} alkoxymethyloxy, COOH, a C_{1-6} alkoxycarbonyl, a carbamoyl, a cyanomethylcarbonyl, an acetamidomethylcarbonyl, a 2-pyrrolecarbonyl, a methoxycarbonylmethyl, a 4-pyranylcarbonyl, a 4-morpholinecarbonyl, a 1-piperazinecarbonyl, a C_{1-6} alkylthio or a C_{1-6} alkylthio containing 1 to 5 F atoms, a C_{1-6} alkylsulfinyl, a C_{1-6} alkylsulfonyl, an amino, an acetylamino, a methanesulfonamido, a methylcarbamido, a N-propanesulfonyllactam group, a N-butanesulfonyllactam group, a 4-morpholinyl, a N-methylpiperazin-4-yl, a piperazinyl, a 3-methanesulfonylpiperazinyl, a 3,3-difluorotetrahydropyrrolyl, a 2-aminoformylpiperidyl, a 3-pyrazolylamino, q = 1-4.

3. The compound of claim 1, or a pharmaceutically acceptable salt thereof, or an optically active isomer or solvate thereof, wherein the compound is shown in general formula (III):



(III)

Wherein

X is selected from O, S and NH;

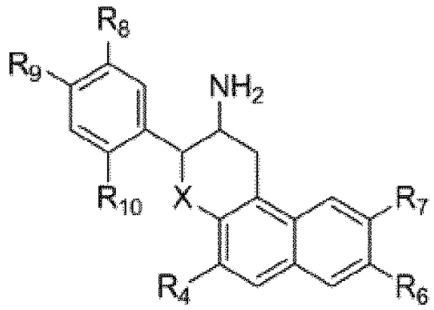
R^4 is independently selected from H, a hydroxyl;

R^6, R^7 are independently selected from a hydrogen, a halogen, a cyano, a hydroxy, a mercapto, a C_{1-2} alkoxy, a C_{1-2} alkylcarbonyloxy, a C_{1-3} alkoxymethoxy, COOH, a C_{1-2} alkoxycarbonyl, a carbamoyl, a cyanomethylcarbonyl, an acetamidomethylcarbonyl, a 2-pyrrolecarbonyl, a methoxycarbonylmethyl, a 4-

pyranylcarbonyl, a 4-morpholinecarbonyl, a 1-piperazinecarbonyl, a methylthio, a methylsulfinyl, a methanesulfonyl, an amino, acetamido, methanesulfonamido, a methylcarbamido, N-propanesulfonyllactam group, N-butanesulfonyllactam group, a 4-morpholinyl, a N-methylpiperazin-4-yl, a piperazinyl, a 3-methanesulfonylpiperazinyl, a 3,3-difluorotetrahydropyrrolyl, a 2-aminoformylpiperidyl, a 3-pyrazolylamino;

R^8, R^9 and R^{10} are independently selected from H, Cl, F, a cyano.

4. The compound of claim 1, or a pharmaceutically acceptable salt thereof, or an optically active isomer or solvate thereof, wherein the compound is shown in general formula (III):



(III)

Wherein

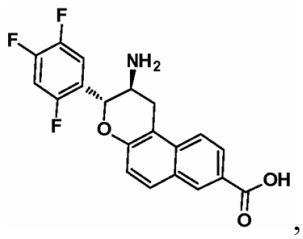
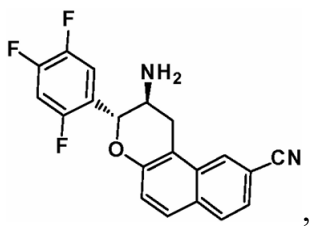
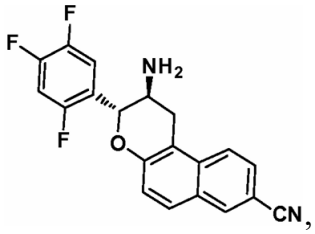
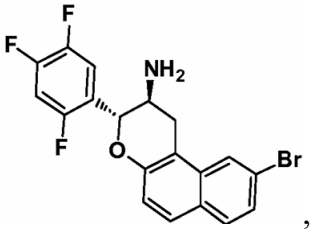
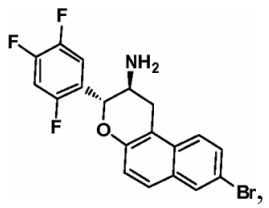
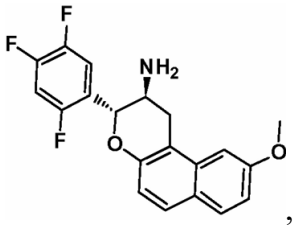
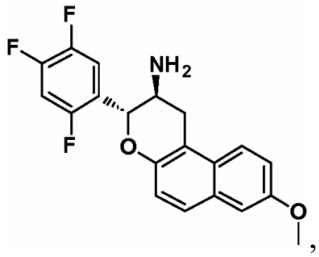
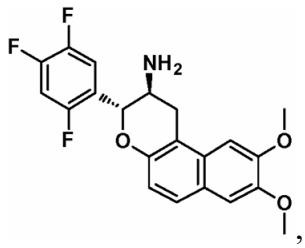
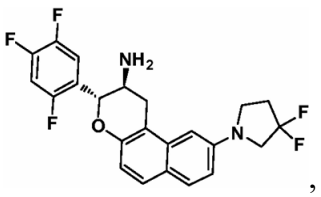
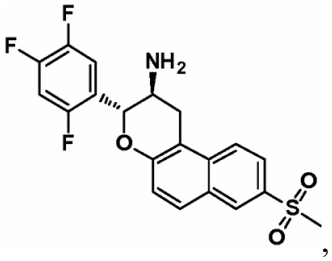
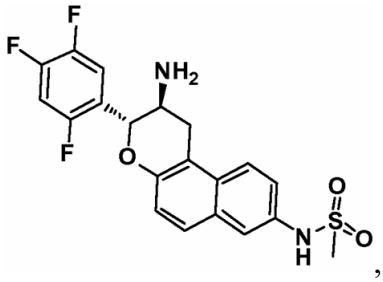
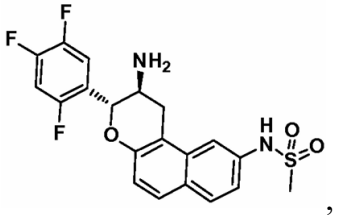
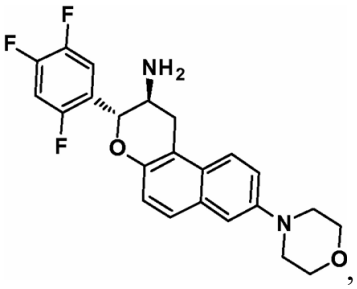
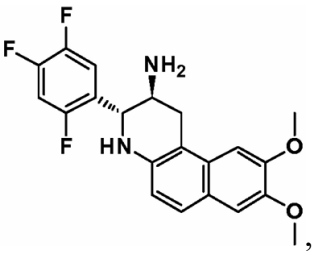
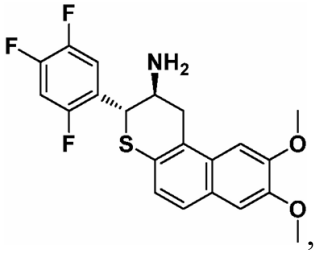
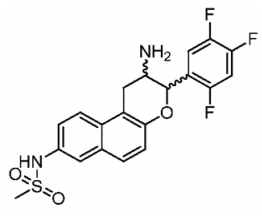
`X is selected from O, S and NH;

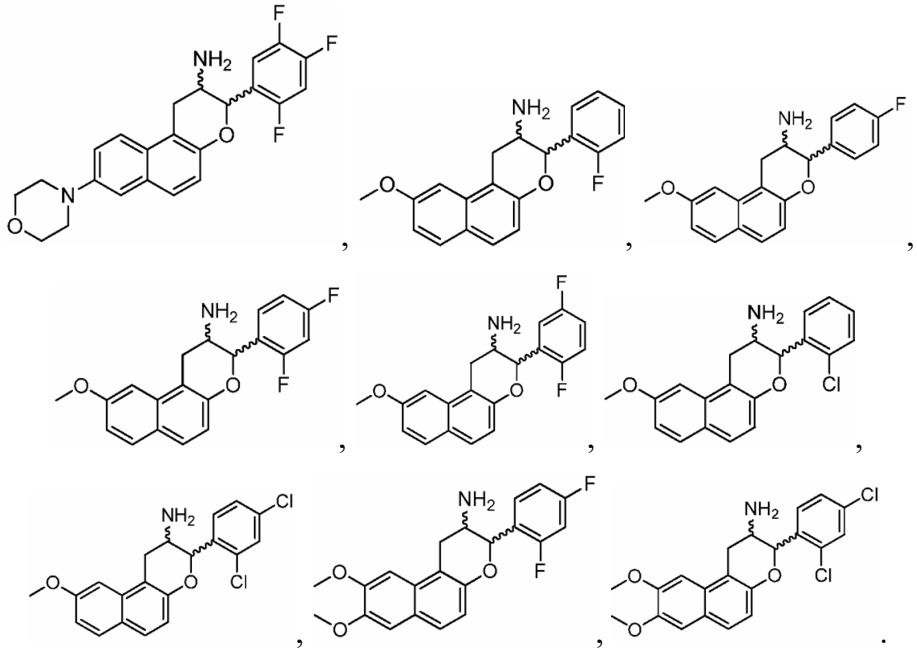
R^4 is independently selected from H, a hydroxyl;

R^6, R^7 are independently selected from a hydrogen, a halogen, a cyano, a hydroxy, a mercapto, a C_{1-2} alkoxy, a C_{1-3} alkoxymethoxy, COOH, a C_{1-2} alkoxycarbonyl, a carbamoyl, a cyanomethylcarbonyl, an acetamidomethylcarbonyl, a 2-pyrrolecarbonyl, a methoxycarbonylmethyl, a 4-pyranylcarbonyl, a 4-morpholinecarbonyl, a 1-piperazinecarbonyl, a methylthio, a methylsulfinyl, a methanesulfonyl, an amino, acetamido, methanesulfonamido, a methylcarbamido, N-propanesulfonyllactam group, N-butanesulfonyllactam group, a 4-morpholinyl, a N-methylpiperazin-4-yl, a piperazinyl, a 3-methanesulfonylpiperazinyl, a 3,3-difluorotetrahydropyrrolyl, a 2-aminoformylpiperidyl, a 3-pyrazolylamino;

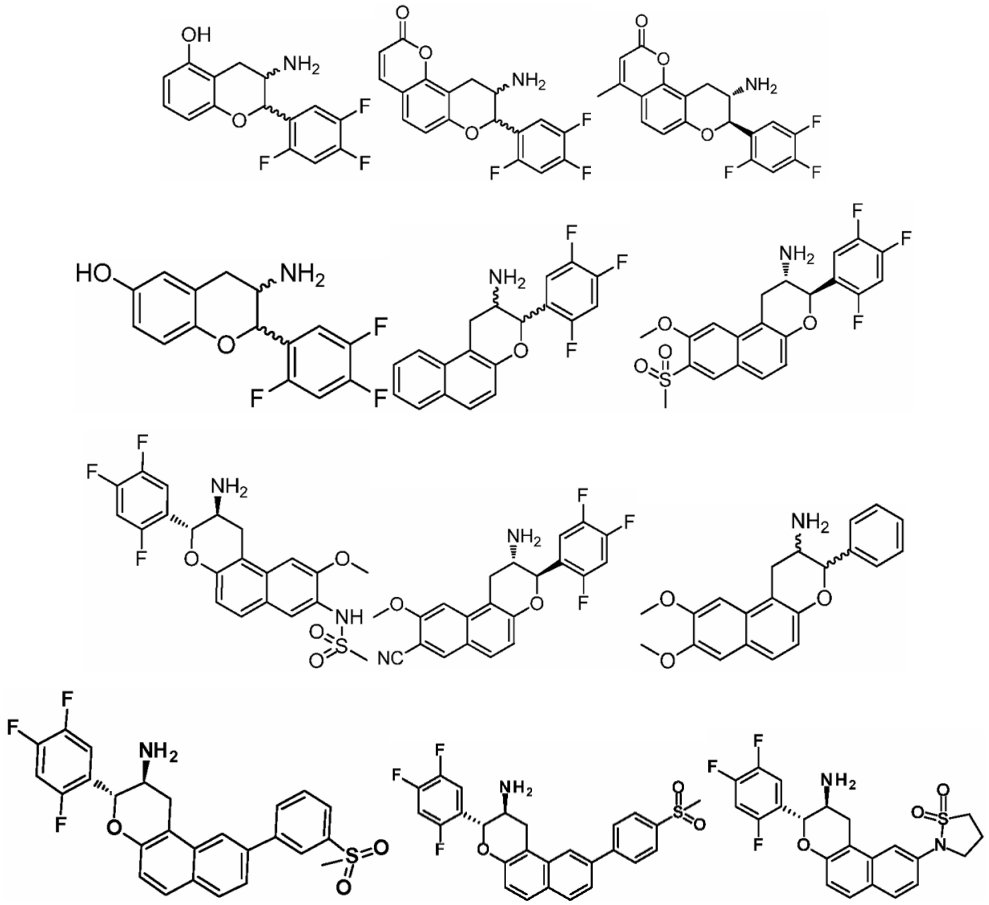
R^8, R^9 and R^{10} are independently selected from H, Cl, F, a cyano.

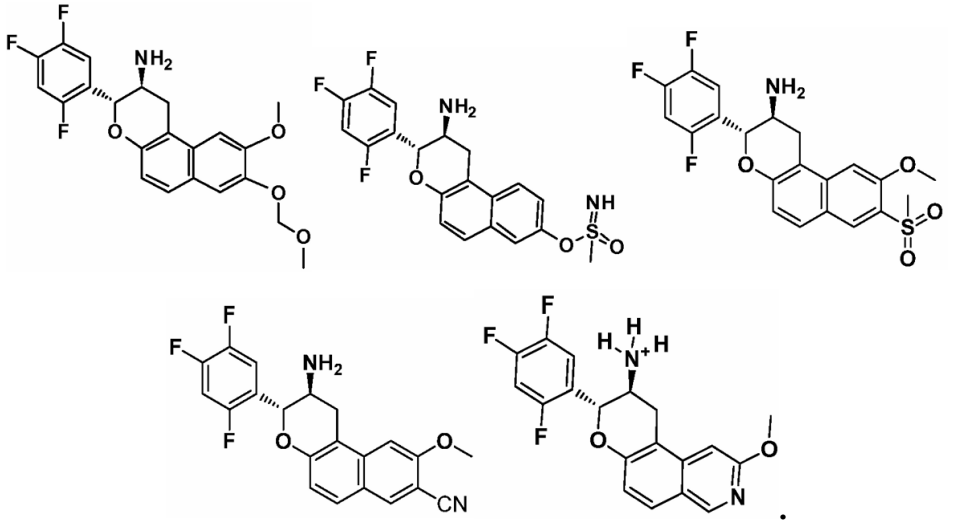
5. The compound of claim 1, or a pharmaceutically acceptable salt thereof, or an optically active isomer or solvate thereof, wherein the compound is selected from the following group, or a pharmaceutically acceptable salt thereof:


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6. A compound selected from the following group, or a pharmaceutically acceptable salt thereof:





7. A pharmaceutical composition comprising a compound of any one of claims 1-6 or a pharmaceutically acceptable salt thereof, and a pharmaceutically acceptable carrier or excipient.

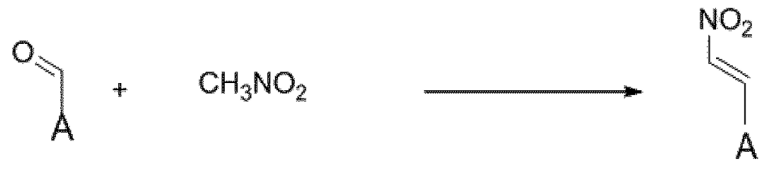
8. The pharmaceutical composition of claim 7, wherein the pharmaceutical composition is in a dosage form suitable for oral administration, including but not limited to a tablet, a solution, a suspension, a capsules, a granule, a powder.

9. Use of a compound of any one of claims 1-6 or use of a pharmaceutically acceptable salt thereof for preparing a medicament for inhibiting DPP-4, a medicament for treating to preventing dipeptidyl peptidase-4 (DPP-4)-related diseases, or used as a diuretic or for preparing a medicament for treating and preventing inflammation, and wherein the dipeptidyl peptidase-4 (DPP-4)-related diseases are diabetes, impaired glucose tolerance, intestinal disease, ulcerative colitis, Crohn's disease, obesity or metabolic syndrome.

10. Use of claim 9, wherein the diabetes is non-insulin dependent type 2 diabetes.

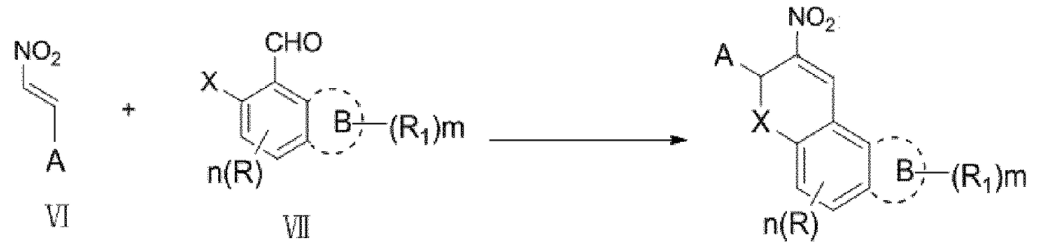
11. A preparation method of a compound of any one of claims 1-6, wherein the method includes following steps:

(1)



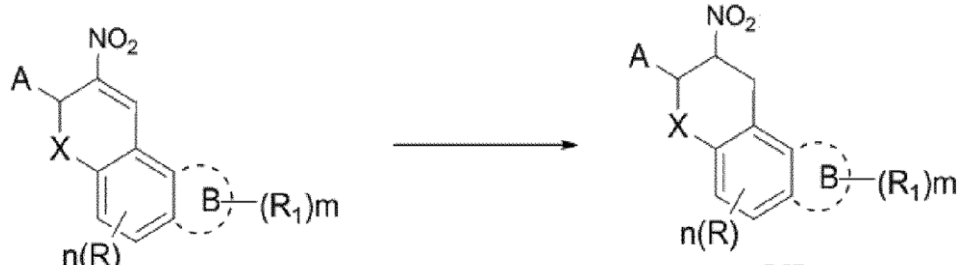
VI;

(2)



VI VII V ;

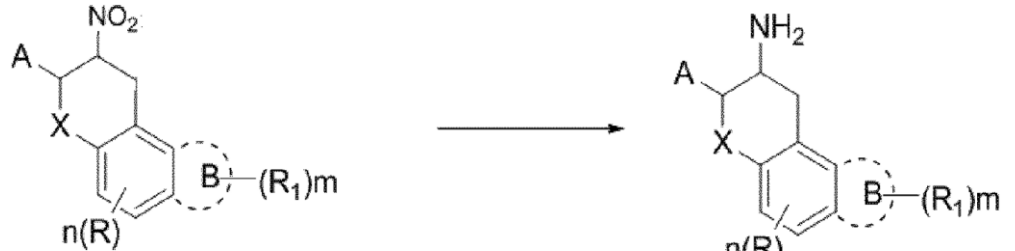
(3)



V VI ;

and

(4)



VI I ;

Wherein X, A, R, B, R^1 are defined as claims 1-6.