

wherein each of X and Y independently is oxygen, NR_5 or sulfur;

R is a hydrogen or $C(=O)C_1$-C_8alkyl;

each of R_1, R_2 and R_3 independently is a hydrogen, methyl or $(CH_2)_m$—CH_3;

R_4 is NR_5R_6, OR_5, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, halogen, 5 or 6-membered lactone, C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, aryl, glucosyl, wherein 5 or 6-membered lactone, C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, aryl, and glucosyl are optionally substituted with one or more substituents selected from NR_5R_6, OR_5, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, C_1-C_8 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_3-C_8 cycloalkyl, and C_1-C_8 haloalkyl;

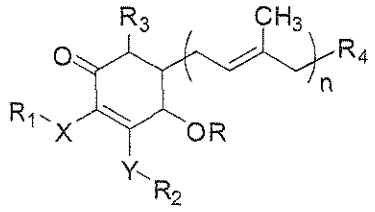
each of R_5 and R_6 is independently a hydrogen or C_1-C_8alkyl;

R_7 is a C_1-C_8alkyl, OR_5 or NR_5R_6;

m = 1-12; and

n=1-12; or a pharmaceutically acceptable salt, metabolite, solvate or prodrug thereof.

[0005a] In another aspect, there is provided the use of a cyclohexenone compound having the structure:



wherein each of X and Y independently is oxygen, NR_5 or sulfur;

R is a hydrogen or $C(=O)C_1$-C_8alkyl;

each of R_1, R_2 and R_3 independently is a hydrogen, methyl or $(CH_2)_m$—CH_3;

R_4 is C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, glucosyl, optionally substituted with one or more substituents selected from NR_5R_6, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, C_1-C_8 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_3-C_8 cycloalkyl, and C_1-C_8 haloalkyl;

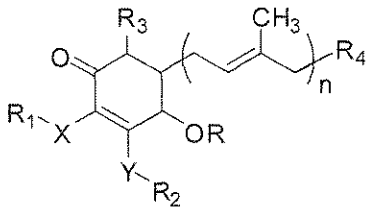
each of R_5 and R_6 is independently a hydrogen or C_1-C_8alkyl;

R_7 is a C_1-C_8alkyl, OR_5 or NR_5R_6;

m = 1-12; and

n=1-12; or a pharmaceutically acceptable salt, metabolite, or solvate thereof in the manufacture of a medicament for treating lung cancer in a subject.

[0005b] In another aspect, there is provided the use of a cyclohexenone compound having the structure:



wherein each of X and Y independently is oxygen, NR_5 or sulfur;

R is a hydrogen or $C(=O)C_1$-C_8alkyl;

each of R_1, R_2 and R_3 independently is a hydrogen, methyl or $(CH_2)_m$—CH_3;

R_4 is C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, glucosyl,

optionally substituted with one or more substituents selected from NR_5R_6, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, C_1-C_8 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_3-C_8 cycloalkyl, and C_1-C_8 haloalkyl;

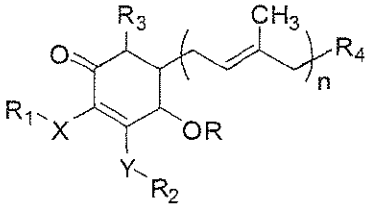
each of R_5 and R_6 is independently a hydrogen or C_1-C_8alkyl;

R_7 is a C_1-C_8alkyl, OR_5 or NR_5R_6;

m = 1-12; and

n=1-12; or a pharmaceutically acceptable salt, metabolite, or solvate thereof in the manufacture of a medicament for treating a cell proliferative disorder of the lung in a subject.

[0005c] In another aspect, there is provided the use of a cyclohexenone compound having the structure:



wherein each of X and Y independently is oxygen, NR_5 or sulfur;

R is a hydrogen or $C(=O)C_1$-C_8alkyl;

each of R_1, R_2 and R_3 independently is a hydrogen, methyl or $(CH_2)_m$—CH_3;

R_4 is C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, glucosyl, optionally substituted with one or more substituents selected from NR_5R_6, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, C_1-C_8 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_3-C_8 cycloalkyl, and C_1-C_8 haloalkyl;

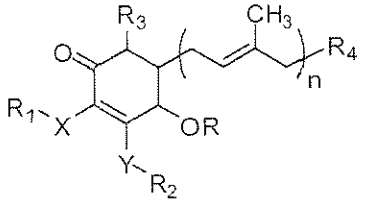
each of R_5 and R_6 is independently a hydrogen or C_1-C_8alkyl;

R_7 is a C_1-C_8alkyl, OR_5 or NR_5R_6;

m = 1-12; and

n=1-12; or a pharmaceutically acceptable salt, metabolite, or solvate thereof in the manufacture of a medicament for inhibiting lung cancer cells.

[0006] In another aspect provides herein methods of treating or preventing a cell proliferative disorder of the lung, comprising administering to a subject in need a therapeutically effective amount of a cyclohexenone compound having the structure:



wherein each of X and Y independently is oxygen, NR_5 or sulfur;

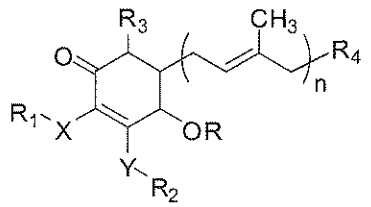
R is a hydrogen or $C(=O)C_1$-C_8alkyl;

each of R_1, R_2 and R_3 independently is a hydrogen, methyl or $(CH_2)_m$—CH_3;

R_4 is NR_5R_6, OR_5, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, halogen, 5 or 6-membered lactone, C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, aryl, glucosyl, wherein 5 or 6-membered lactone, C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, aryl, and glucosyl are optionally substituted with one or more substituents selected from

CLAIMS:

1. Use of a cyclohexenone compound having the structure:



wherein each of X and Y independently is oxygen, NR_5 or sulfur;

R is a hydrogen or $C(=O)C_1$-C_8alkyl;

each of R_1, R_2 and R_3 independently is a hydrogen, methyl or $(CH_2)_m$—CH_3;

R_4 is ~~NR_5R_6, OR_5, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, halogen, 5 or 6-membered lactone,~~ C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, ~~aryl,~~ glucosyl, ~~wherein 5 or 6-membered lactone, C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, aryl, and glucosyl are~~ optionally substituted with one or more substituents selected from NR_5R_6, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, C_1-C_8 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_3-C_8 cycloalkyl, and C_1-C_8 haloalkyl;

each of R_5 and R_6 is independently a hydrogen or C_1-C_8alkyl;

R_7 is a C_1-C_8alkyl, OR_5 or NR_5R_6;

m = 1-12; and

n=1-12; or a pharmaceutically acceptable salt, metabolite, or solvate thereof in the manufacture of a medicament for treating lung cancer in a subject.

2. The use according to claim 1, wherein said compound reduces lung cancer tumor size or tumor volume.

3. The use according to claim 1, wherein said compound decreases lung cancer tumor growth rate.

4. The use according to claim 1, wherein said lung cancer is adenocarcinoma lung cancer.

5. The use according to claim 1, wherein said lung cancer is small cell lung cancer.

6. The use according to claim 1, wherein said lung cancer is non-small cell lung cancer.

7. The use according to claim 1, wherein said cyclohexenone compound induces cell death in said lung cancer.

8. The use according to claim 7, wherein said cell death is apoptosis.

9. The use according to claim 1, wherein said compound is used parenterally or intravenously.

10. The use according to claim 1, wherein said compound is used by injection.

11. The use according to claim 1, wherein said compound is used orally.

12. The use of claim 1, wherein said subject is human.

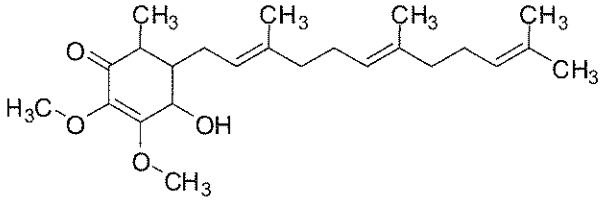
13. The use of claim 1, wherein R is a hydrogen or $C(=O)CH_3$.

14. The use of claim 1, wherein R_1 is a hydrogen or methyl.

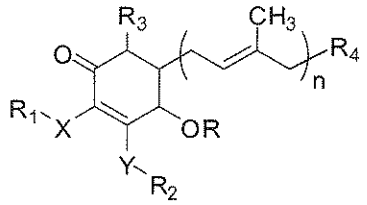
15. The use of claim 1, wherein R_2 is a hydrogen or methyl.

16. The use of claim 1, wherein R_4 is $CH_2CH=C(CH_3)_2$.

17. The use of claim 1, wherein said compound is



18. Use of a cyclohexenone compound having the structure:



wherein each of X and Y independently is oxygen, NR_5 or sulfur;

R is a hydrogen or $C(=O)C_1$-C_8alkyl;

each of R_1, R_2 and R_3 independently is a hydrogen, methyl or $(CH_2)_m$—CH_3;

R_4 is ~~NR_5R_6, OR_5, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, halogen, 5 or 6-membered lactone,~~ C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, ~~aryl,~~ glucosyl, ~~wherein 5 or 6-membered lactone, C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, aryl, and glucosyl are~~

optionally substituted with one or more substituents selected from NR_5R_6, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, C_1-C_8 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_3-C_8 cycloalkyl, and C_1-C_8 haloalkyl;

each of R_5 and R_6 is independently a hydrogen or C_1-C_8alkyl;

R_7 is a C_1-C_8alkyl, OR_5 or NR_5R_6;

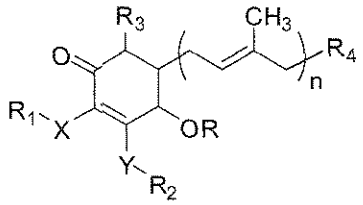
m = 1-12; and

n=1-12; or a pharmaceutically acceptable salt, metabolite, or solvate thereof in the manufacture of a medicament for treating a cell proliferative disorder of the lung in a subject.

19. The use according to claim 18, wherein said cell proliferative disorder of the lung is lung cancer or a precancerous condition of the lung.

20. The use according to claim 18, wherein said cell proliferative disorder of the lung is hyperplasia of the lung or metaplasia of the lung.

21. Use of a cyclohexenone compound having the structure:



wherein each of X and Y independently is oxygen, NR_5 or sulfur;

R is a hydrogen or $C(=O)C_1$-C_8alkyl;

each of R_1, R_2 and R_3 independently is a hydrogen, methyl or $(CH_2)_m$—CH_3;

R_4 is ~~NR_5R_6, OR_5, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, halogen, 5 or 6-membered lactone,~~ C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, ~~aryl,~~ glucosyl, ~~wherein 5 or 6-membered lactone, C_1-C_8alkyl, C_2-C_8alkenyl, C_2-C_8alkynyl, aryl, and glucosyl are~~ optionally substituted with one or more substituents selected from NR_5R_6, $OC(=O)R_7$, $C(=O)OR_5$, $C(=O)R_5$, $C(=O)NR_5R_6$, C_1-C_8 alkyl, C_2-C_8 alkenyl, C_2-C_8 alkynyl, C_3-C_8 cycloalkyl, and C_1-C_8 haloalkyl;

each of R_5 and R_6 is independently a hydrogen or C_1-C_8alkyl;

R_7 is a C_1-C_8alkyl, OR_5 or NR_5R_6;