## CLAIMS

1. Use of a conjugate comprising:

i) a polypeptide comprising the sequence SEQ ID NO: 1 or a functionally equivalent variant thereof, and

ii) a detectable label,

in the manufacture of a diagnostic reagent for diagnosing lung cancer, wherein the diagnostic reagent is to be administered by pulmonary administration.

2. The use according to claim 1, wherein the functionally equivalent variant of SEQ ID NO: 1 is selected from the group consisting of SEQ ID NO: 4, SEQ ID NO: 5, SEQ ID NO; 6, SEQ ID NO: 7, SEQ ID NO: 8, SEQ ID NO: 9, and SEQ ID NO: 10.

3. The use according to any one of claims 1 to 2, wherein the detectable label is selected from the group consisting of $^{18}F$, $^{32}P$, $^{33}P$, $^{45}Ti$, $^{47}Sc$, $^{52}Fe$, $^{59}Fe$, $^{62}Cu$, $^{64}Cu$, $^{67}Ga$, $^{68}Ga$, $^{75}Sc$, $^{77}As$, $^{86}Y$, $^{89}Sr$, $^{89}Zr$, $^{94}Tc$, $^{94}Tc$, $^{99}mTc$, $^{99}Mo$, $^{105}Pd$, $^{105}Rh$, $^{111}Ag$, $^{123}I$, $^{124}I$, $^{142}Pr$, $^{143}Pr$, $^{149}Pm$, $^{153}Sm$, $^{154}$-$^{1581}Gd$, $^{161}Tb$, $^{166}Dy$, $^{166}Ho$, $^{169}Er$, $^{175}Lu$, $^{186}Re$, $^{189}Re$, $^{194}Ir$. $^{198}Au$, $^{199}Au$, $^{211}Pb$, $^{212}Bi$, $^{212}Pb$, $^{223}Ra$ and $^{225}Ac$ and $^{89}Zr$.

4. The use according to any one of claims 1 to 3, wherein the detection of the cancer cells after the administration of the diagnostic reagent is carried out via mPET/mCT imaging.

5. The use according to any one of claims 1 to 4, wherein the lung cancer is a primary tumor selected from small cell lung cancer (SCLC) and non- small cell lung cancer (NSCLC), or is a cancer metastasis.

6. The use according to any one of claims 1 to 5, wherein the lung cancer is adenocarcinoma.

7. The use according to claim 6, wherein the lung adenocarcinoma is a KRAS-mutant adenocarcinoma.

8. The use according to any one of claims 1 to 7, wherein the detection of the conjugate is to be carried out between 30 minutes and 96 hours after the administration of the diagnostic reagent to a subject in need thereof.

9. The use according to any one of claims 1 to 8, wherein the pulmonary administration is to be carried out by nasal instillation, nasal inhalation or oral inhalation.

10. The use according to any one of claims 1 to 9, wherein the dose of the conjugate ranges from 0.04 to 0.8 mg/Kg, or from 1.48 to 30 mg/$m^2$, more preferably 0.19 mg/kg or 7 mg/$m^2$.

11. The use according to any one of claims 1 to 10, wherein after the diagnosis step, the diagnostic reagent is to be administered at least one more time for monitoring the progression of the lung cancer or the effect of a therapy administered to a subject suffering from lung cancer.

12. A method for detecting or imaging lung cancer cells in a subject comprising:

i) administering pulmonary a conjugate comprising a polypeptide comprising the sequence SEQ ID NO: 1 or a functionally equivalent variant thereof, and a detectable label;

ii) waiting a sufficient time to allow for the conjugate to enter into the proliferating lung cells; and

iii) detecting the proliferating lung cells by applying an imaging technique to the subject to detect the site of accumulation of the conjugate in the subject, thereby detecting or imaging the site of proliferation.

13. Kit for the diagnosis of lung cancer comprising:

i) a conjugate comprising a polypeptide comprising the sequence SEQ ID NO: 1 or a functionally equivalent variant thereof, and a detectable label,

ii) a device for the pulmonary administration of the conjugate of item i); and

iii) means for packaging items i) and ii).

14. Use of a kit according to claim 13 for diagnosing lung cancer or for monitoring the progression of lung cancer or for monitoring the effect of a therapy.

15. A conjugate comprising:

i) a polypeptide comprising the sequence SEQ ID NO: 1 or a functionally equivalent variant thereof, and

ii) a detectable label selected from the group consisting of a contrast agent or an imaging agent.

16. A method for monitoring the progression of lung cancer in a subject, the method comprising:

i) administering pulmonary a conjugate comprising a polypeptide comprising the sequence SEQ ID NO: 1 or a functionally equivalent variant thereof, and a detectable label;

ii) waiting a sufficient time to allow for the conjugate to enter into the proliferating lung cells;

iii) detecting the proliferating lung cells by applying an imaging technique to the subject to detect the site of accumulation of the conjugate in the subject, thereby detecting or imaging the site of proliferation; and

iv) comparing the site of accumulation obtained in iii) with the site of accumulation obtained in a previous measure,

wherein a significant decrease or lack of change in the site of accumulation in comparison with the previous measure is indicative that the lung cancer is not progressing, or

wherein a significant increase in the site of accumulation in comparison with the previous measure is indicative that the lung cancer is progressing.

17. A method for monitoring the response to a therapy in a subject suffering from lung cancer, the method comprising:

i) administering pulmonary a conjugate comprising a polypeptide comprising the sequence SEQ ID NO: 1 or a functionally equivalent variant thereof, and a detectable label;

ii) waiting a sufficient time to allow for the conjugate to enter into the proliferating lung cells;

iii) detecting the proliferating lung cells by applying an imaging technique to the subject to detect the site of accumulation of the conjugate in the subject, thereby detecting or imaging the site of proliferation; and

iv) comparing the site of accumulation obtained in iii) with the site of accumulation obtained in a previous measure prior to administration of the therapy,

wherein a significant decrease or lack of change in the site of accumulation in comparison with the previous measure is indicative that the therapy administered to the subject is efficacious, or

wherein a significant increase in the site of accumulation in comparison with the previous measure is indicative that the therapy administered to the subject is inefficacious.

18. Use of a conjugate comprising a polypeptide comprising sequence SEQ ID NO: 1 or a functionally equivalent variant thereof, and a detectable label, in a method for monitoring the progression of lung cancer or for monitoring the response to a therapy in a subject suffering from lung cancer.

19. Use according to claim 18, wherein the conjugate is to be administered pulmonary.