Claims

[Claim 1] An *in vitro* method for diagnosing non-small cell lung cancer in a human, the method comprising:

providing a biomarker panel comprising N = 2- 7 biomarker proteins, wherein one of the biomarker proteins is carbonic anhydrase 6 (CA6) and the other biomarker proteins are selected from the group consisting of epidermal growth factor receptor 1 (EGFR1), matrix metalloproteinase 7 (MMP7), pleiotrophin (PTN), chordin-like protein 1 (CHRDL1), insulin-like growth factor binding protein 2 (IGFBP2), matrix metalloproteinase 12 (MMP12), carnosine dipeptidase 1 (CNDP1), stem cell growth factor receptor (KIT), alpha2-antiplasmin (SERPINF2), C-reactive protein (CRP), Complement component C9, L-selectin (SELL) and alpha1-antichymotrypsin (SERPINA3); and detecting the biomarker proteins, in a biological sample from the human, to give biomarker values that each corresponds to one of the N biomarker proteins in the panel, wherein the non-small cell lung cancer is diagnosed based on the biomarker values, wherein the biological sample is selected from a group consisting of a whole blood, a plasma, and a serum.

[Claim 2] The method of claim 1, wherein the detecting the biomarker values includes performing an in vitro assay.

[Claim 3] The method of claim 2, wherein the in vitro assay includes one capture reagent corresponding to each of the biomarker proteins, and wherein the method further comprises selecting the at least one capture reagent from a group consisting of aptamers, antibodies, and a nucleic acid probe.

[Claim 4] The method of claim 3, wherein the at least one capture reagent is an aptamer.

[Claim 5] The method of claim 1, wherein the biological sample is a serum.

[Claim 6] The method of claim 1, wherein the human is an Asian.

[Claim 7] The method of claim 1, wherein the human is a smoker.

[Claim 8] The method of claim 1, wherein the human has a pulmonary malignant nodule.

[Claim 9] The method of any one of the preceding claims, wherein the other biomarker proteins of the panel are selected from the group consisting of epidermal growth factor receptor 1 (EGFR1), a matrix metalloproteinase 7 (MMP7), stem cell growth factor receptor (KIT), C-reactive protein (CRP), Complement component C9 and alpha1-antichymotrypsin (SERPINA3).

[Claim 10] The method of claim 1, wherein the N is 3- 7.

[Claim 11] The method of claim 1, wherein the N is 4- 7.

[Claim 12] The method of claim 1, wherein the N is 5- 7.

[Claim 13] The method of claim 1, wherein the N is 6 or 7.

[Claim 14] The method of claim 1, wherein the N is 7.

[Claim 15] The method of claim 1, wherein the biomarker values have measured values of Complement component C9, carbonic anhydrase 6 (CA6), C-reactive protein (CRP), epidermal growth factor receptor 1 (EGFR1), matrix metalloproteinase 7(MMP7), alpha1-antichymotrypsin (SERPINA3), and stem cell growth factor receptor (KIT).

[Claim 16] The method of claim 1, wherein the biomarker values are measured from a group consisting of (i) real-time PCR (qPCR), (ii) microarray, and (iii) Luminex microbead assay.

[Claim 17] The method of claim 1, wherein the non-small cell lung cancer is diagnosed with a statistical method.

[Claim 18] The method of claim 17, wherein the statistical method is selected from a group comprising a linear discriminant analysis, a logistic regression, a naive Bayesian classification, a support vector machine, and a random forest.

[Claim 19] A protein biomarker panel to detect non-small cell lung cancer from a human, the panel comprising N = 2- 7 biomarker proteins, wherein one of the biomarker proteins is carbonic anhydrase 6 (CA6) and the other biomarker proteins are selected from the group consisting of epidermal growth factor receptor 1 (EGFR1), matrix metalloproteinase 7 (MMP7), pleiotrophin (PTN), chordin-like protein 1 (CHRDL1), insulin-like growth factor binding protein 2 (IGFBP2), matrix metalloproteinase 12 (MMP12), carnosine dipeptidase 1(CNDP1), stem cell growth factor receptor (KIT), alpha2-antiplasmin (SERPINF2), C-reactive protein (CRP), Complement component C9, L-selectin (SELL) and alpha1-antichymotrypsin (SERPINA3).

[Claim 20] The panel of claim 19, wherein the N is 3- 7.

[Claim 21] The panel of claim 19, wherein the N is 4- 7.

[Claim 22] The panel of claim 19, wherein the N is 5- 7.

[Claim 23] The panel of claim 19, wherein the N is 6 or 7.

[Claim 24] The panel of claim 19, wherein the N is 7.

[Claim 25] The panel of claim 19, wherein the other biomarker proteins of the panel are selected from the group consisting of epidermal growth factor receptor 1 (EGFR1), a matrix metalloproteinase 7 (MMP7), stem cell growth factor receptor (KIT), C-reactive protein (CRP), Complement component C9 and alpha1-antichymotrypsin (SERPINA3).

[Claim 26] The panel of claim 19, wherein the panel has a Complement component C9, a carbonic anhydrase 6 (CA6), a C-reactive protein (CRP), a epidermal growth

factor receptor 1 (EGFR1), a matrix metalloproteinase 7 (MMP7), an alpha1-antichymotrypsin (SERPINA3), and a stem cell growth factor receptor (KIT).

[Claim 27] The panel of claim 19, wherein the human is an Asian.

[Claim 28] The panel of claim 19, wherein the human is a smoker.

[Claim 29] The panel of claim 19, wherein the human has a pulmonary malignant nodule.