CLAIMS:

1. An *in vitro* and/or *ex vivo* method for diagnosing lung cancer in a mammalian subject, the method comprising the steps of:

a) determining, on the basis of a blood or plasma sample taken from the subject, parameters related to the reactivity of antibodies specifically binding to a combination of at least 11 different peptides comprising a stretch of the amino acid sequence of human BARD1 and/or of an isoform thereof;

b) diagnosing, on the basis of the parameters obtained in the previous step, whether said subject suffers or not from lung cancer;

wherein the combination of at least 11 different peptides is selected from a group of forty-one peptides, wherein each peptide of said group of forty-one peptides comprises and/or consists essentially of, respectively, one of the forty-one amino acid sequences of the group consisting of SEQ ID NO: 1 to 41 wherein step b) comprises the step of calculating a test value for the subject on the basis of said parameters and from a statistically determined coefficient specific to each peptide.

2. Use of a combination of at least 11 different peptides comprising a stretch of the amino acid sequence of human BARD1 and/or of an isoform thereof in an *in vitro* and/or *ex vivo* method for lung cancer screening, monitoring, diagnosis, and prognosis;

wherein the combination of at least 11 different peptides is selected from a group of forty-one peptides, wherein each peptide of said group of forty-one peptides comprises and/or consists essentially of, respectively, one of the forty-one amino acid sequences of the group consisting of SEQ ID NO: l to 41.

3. The method of any one of the preceding claim, wherein a parameter related to the reactivity of antibodies is determined separately for each peptide, so as to obtain a plurality of said parameters in which each individual parameter is related to the reactivity of antibodies binding to one specific peptide of said different peptides.

4. The method of claim 1, further comprising the step of diagnosing, by comparing said test value with a threshold value, whether said subject suffers or not from lung cancer.

5. The method of any one of the preceding claims, wherein said peptides have, independently, a length of 4 to 300, or 8 to 250 amino acids.

6. The method of any one of the preceding claims, wherein said different peptides consist of 11 to 35, or 11 to 30, or 17 to 28 different peptides.

7. The method of any one of the preceding claims, wherein said different peptides comprise several groups of peptides, a group A of peptides, a group B of peptides, a group C of peptides, a group D of peptides and a group E of peptides, wherein said group A comprises one or more peptides comprising or consisting of amino acid sequences selected from the group consisting of: SEQ ID NO: l; SEQ ID NO: 2; SEQ ID NO: 3; SEQ ID NO: 4; SEQ ID NO: 5; SEQ ID NO: 6; SEQ ID NO: 7; and SEQ ID NO: 8; SEQ ID NO: 9; and SEQ ID NO: 10, said group B comprises one or more peptides comprising amino acid sequences selected from the group consisting of: SEQ ID NO: 11; SEQ ID NO: 12; SEQ ID NO: 13; SEQ ID NO: 14 and SEQ ID NO: 15; SEQ ID NO: 16; and SEQ ID NO: 17, said group C comprises one or more peptides comprising amino acid sequences selected from the group consisting of: SEQ ID NO: 18; SEQ ID NO: 19; SEQ ID NO: 20; SEQ ID NO: 21; SEQ ID NO: 22 and SEQ ID NO: 23; SEQ ID NO: 24; and SEQ ID NO: 25, said group D comprises one or more peptides comprising amino acid sequences selected from the group consisting of: SEQ ID NO: 26; SEQ ID NO: 27; SEQ ID NO: 28; SEQ ID NO: 29 and SEQ ID NO: 30; SEQ ID NO: 31; SEQ ID NO: 32; SEQ ID NO: 33 and SEQ ID NO: 34, said group E comprises one or more peptides comprising amino acid 30 sequences selected from the group consisting of: SEQ ID NO: 35; SEQ ID NO: 36; SEQ ID NO: 37; SEQ ID NO: 38; SEQ ID NO: 39; SEQ ID NO: 40 and SEQ ID NO: 41, said combination of peptides comprises one or more peptides selected from said group A and one or more peptides selected from said any one of said groups B, C, D, and/or E.

8. The method of claim 7, wherein said different peptides comprise five or more peptides selected from said group A; two or more peptides selected from group B, and two or more peptides selected from group C.

9. An *in vitro* and/or *ex vivo* method of claim 1 for diagnosing lung cancer in a female human subject, the method comprising the steps of:

a) determining, on the basis of a blood or plasma sample taken from the female subject, parameters related to the reactivity of antibodies specifically binding to at least 19 different peptides, wherein said peptides are peptides comprising the amino acid sequences SEQ ID NO: l to SEQ ID NO: 6; SEQ ID NO: 11 to SEQ ID NO: 14; SEQ ID NO: 18 to SEQ ID NO: 21; SEQ ID NO: 26 to SEQ ID NO: 30, respectively;

b) diagnosing, on the basis of the parameters obtained in the previous step, whether said female subject suffers or not from lung cancer wherein step b) comprises the step of calculating a test value for the subject on the basis of said parameters and from a statistically determined coefficient specific to each peptide.

10. An *in vitro* and/or *ex vivo* method of claim 1 for diagnosing lung cancer in a male human subject, the method comprising the steps of:

a) determining, on the basis of a blood or serum sample taken from the female subject, parameters related to the reactivity of antibodies specifically binding to at least 22 different peptides, wherein said peptides are peptides comprising the amino acid sequences SEQ ID NO: l to SEQ ID NO: 5; SEQ ID NO: 7; SEQ ID NO: 8; SEQ ID NO: 11 to SEQ ID NO: 13; SEQ ID NO: 15; SEQ ID NO: 18 to SEQ ID NO: 20; SEQ ID NO: 22; SEQ ID NO: 23; SEQ ID NO: 26; SEQ ID NO: 27; and SEQ ID NO: 31 to SEQ ID NO: 34, respectively;

b) diagnosing, on the basis of the parameters obtained in the previous step, whether said male subject suffers or not from lung cancer wherein step b) comprises the step of calculating a test value for the subject on the basis of said parameters and from a statistically determined coefficient specific to each peptide.