

CLAIMS

1. A method for detecting the presence of a BARD1 isoform specific to lung cancer and colorectal cancer in a biological sample obtained from a subject comprising the step of detecting in the sample at least one of the BARD1 isoforms specific to lung cancer and
5 colorectal cancer selected from the group comprising
 - isoform π comprising SEQ ID NO: 1, or a sequence having at least 95% homology to SEQ ID NO: 1, and
 - isoform κ comprising SEQ ID NO: 2, or a sequence having at least 95% homology to SEQ ID NO: 2,
- 10 in which the presence of the BARD1 isoforms specific to lung cancer and colorectal cancer in a sample from the subject is an indication that the subject is afflicted with lung cancer and/or colorectal cancer, has an increased risk of lung cancer and/or colorectal cancer, and/or has a risk of recurrence after a treatment for lung cancer and/or colorectal cancer.
- 15 2. A method according to Claim 1, in which the method comprises the step of detecting in the biological sample BARD1 isoform π consisting of SEQ ID NO: 1 and BARD1 isoform κ consisting of SEQ ID NO: 2.
3. A method according to Claim 1 or 2, in which the method further comprises detecting in the biological sample at least one of the BARD1 isoforms selected from the group comprising
 - 20 isoform π' comprising SEQ ID NO: 105, or a sequence having at least 95% homology to SEQ ID NO: 105,
 - isoform β comprising SEQ ID NO: 5, or a sequence having at least 95% homology to SEQ ID NO: 5,
 - isoform δ comprising SEQ ID NO: 6, or a sequence having at least 95% homology to
25 SEQ ID NO: 6, and
 - isoform γ comprising SEQ ID NO: 7, or a sequence having at least 95% homology to SEQ ID NO: 7,
 - isoform β' comprising SEQ ID NO: 106, or a sequence having at least 95% homology to SEQ ID NO: 106,

4. A method according to Claim 3, in which the method comprises detecting in the biological sample BARD1 isoform π consisting of SEQ ID NO: 1, BARD1 isoform κ consisting of SEQ ID NO: 2 and BARD1 isoform β consisting of SEQ ID NO: 5.
5. A method according to any preceding claim, in which the biological sample is selected from the group comprising a biopsy sample, a histology sample, lung liquids, frozen tissue sample, tumor tissue sample, feces sample, cerebrospinal fluid (CSF), circulating tumour cells (CTC) and blood sample.
6. A method according to any preceding claim, in which the subject is a human.
7. A method according to any preceding claim, in which the presence of the BARD1 isoforms is detected by using antibodies specific to the BARD1 isoforms.
8. A method according to Claim 7, in which the antibodies are a combination of antibodies or fragments thereof that specifically bind to different epitopes of at least one of the BARD1 isoforms comprising amino acid sequences selected from the group comprising SEQ ID NOs: 1-7, 105-106, or sequences having at least 95% homology to SEQ ID NOs: 1-7, 105-106.
9. A method according to any of Claims 1 to 6, in which the presence of the BARD1 isoforms is detected by detecting the level of mRNA that encodes at least one of the BARD1 isoforms comprising amino acid sequences selected from the group comprising SEQ ID NOs: 1-7, 105-106, or sequences having at least 95% homology to SEQ ID NOs: 1-7, 105-106.
10. A method according to any of Claims 1 to 6, in which presence of the BARD1 isoforms is detected by detecting the presence of autoimmune antibodies specific to the BARD1 isoforms in the blood sample obtained from the subject, and in which at least four antigens selected from the group comprising SEQ ID NOs: 13 – 80 are used for detecting the autoimmune antibodies specific to the BARD1 isoforms.
11. A method according to any of Claims 1 to 6, in which the presence of the BARD1 isoforms is detected by

detecting the level of mRNA that encodes at least one of the BARD1 isoforms comprising amino acid sequences selected from the group comprising SEQ ID NOs: 1-7, 105-106, or sequences having at least 95% homology to SEQ ID NOs: 1-7, 105-106, and

detecting the presence of autoimmune antibodies specific to the BARD1 isoforms in the blood sample obtained from the subject, and in which at least four antigens selected from the group comprising SEQ ID NOs: 13 – 80 are used for detecting the autoimmune antibodies specific to the BARD1 isoforms.

- 5 12. A biomarker specific to lung cancer and colorectal cancer consisting of an isolated and/or purified polypeptide, BARD1 isoform π , comprising SEQ ID NO: 1, or a sequence having at least 95% homology to SEQ ID NO: 1, or of an mRNA that encodes the polypeptide.
- 10 13. A biomarker specific to lung cancer and colorectal cancer consisting of an isolated and/or purified polypeptide, BARD1 isoform κ , comprising SEQ ID NO: 2, or a sequence having at least 95% homology to SEQ ID NO: 2, or of an mRNA that encodes the polypeptide.
- 15 14. A kit for detecting the presence of BARD1 isoforms π or κ specific to lung cancer and colorectal cancer in a sample obtained from a subject, comprising
15 at least one polynucleotide primer or probe in which the polynucleotide primer or probe is specific for a polynucleotide that encodes at least one of the BARD1 isoforms comprising amino acid sequences selected from the group comprising SEQ ID NOs: 1 or 2, and/or sequences having at least 95% homology to SEQ ID NOs: 1 or 2, and/or
20 combination of antibodies or fragments thereof that specifically binds to different epitopes of at least one of the BARD1 isoforms comprising amino acid sequences selected from the group comprising SEQ ID NOs: 1 or 2, or sequences having at least 95% homology to SEQ ID NOs: 1 or 2, and/or
at least one peptide selected from the group comprising SEQ ID NOs: 16, 17, 18, 23, 59-67, 68, 69, 74, 75, 76-80.
- 25 15. A method for discriminating lung cancer and colorectal cancer from gynecological cancers, the method comprising the step of detecting in a biological sample obtained from a subject at least one of the BARD1 isoforms specific to lung cancer and colorectal cancer selected from the group comprising
30 isoform π comprising SEQ ID NO: 1, or a sequence having at least 95% homology to SEQ ID NO: 1, and

isoform κ comprising SEQ ID NO: 2, or a sequence having at least 95% homology to SEQ ID NO: 2.

in which the presence of the BARD1 isoforms specific to lung cancer and colorectal cancer is an indication for lung cancer and/or colorectal cancer.

- 5 16. A biomarker specific to lung cancer and colorectal cancer consisting of an antibody specific to BARD1 isoform π which binds to an epitope as set forth in SEQ ID NO: 144 comprised specifically in BARD1 isoform π .