

CLAIMS

1. Use of a primer pair in combination with a probe in the detection of a tumor, wherein the tumor is a bladder cancer or a urothelial tumor; and wherein the primer pair and the probe respectively comprises nucleotide sequences of

SEQ ID NOs: 31–32 and SEQ ID NO: 33,

SEQ ID NOs: 34–35 and SEQ ID NO: 36,

SEQ ID NOs: 37–38 and SEQ ID NO: 39,

SEQ ID NOs: 40–41 and SEQ ID NO: 42,

SEQ ID NOs: 43–44 and SEQ ID NO: 45, or

SEQ ID NOs: 46–47 and SEQ ID NO: 48.

2. Use of a probe in combination with a primer pair in the detection of a tumor, wherein the tumor is a bladder cancer or a urothelial tumor; and wherein the primer pair and the probe respectively comprises nucleotide sequences of

SEQ ID NOs: 31–32 and SEQ ID NO: 33,

SEQ ID NOs: 34–35 and SEQ ID NO: 36,

SEQ ID NOs: 37–38 and SEQ ID NO: 39,

SEQ ID NOs: 40–41 and SEQ ID NO: 42,

SEQ ID NOs: 43–44 and SEQ ID NO: 45, or

SEQ ID NOs: 46–47 and SEQ ID NO: 48.

3. Use of a combination of a primer pair and a probe for detection of a tumor, wherein the tumor is a bladder cancer or a urothelial tumor; and wherein the primer pair and the probe respectively comprises nucleotide sequences of

SEQ ID NOs: 31–32 and SEQ ID NO: 33,

SEQ ID NOs: 34–35 and SEQ ID NO: 36,
SEQ ID NOs: 37–38 and SEQ ID NO: 39,
SEQ ID NOs: 40–41 and SEQ ID NO: 42,
SEQ ID NOs: 43–44 and SEQ ID NO: 45, or
SEQ ID NOs: 46–47 and SEQ ID NO: 48.

4. Use of a primer pair in combination with a probe, the probe in combination with the primer pair, or the combination of the primer pair and the probe, in preparation of a tumor detection reagent or a tumor detection kit,

wherein the tumor is a bladder cancer or a urothelial tumor; and

wherein the primer pair and the probe respectively comprises nucleotide sequences of

SEQ ID NOs: 31–32 and SEQ ID NO: 33,
SEQ ID NOs: 34–35 and SEQ ID NO: 36,
SEQ ID NOs: 37–38 and SEQ ID NO: 39,
SEQ ID NOs: 40–41 and SEQ ID NO: 42,
SEQ ID NOs: 43–44 and SEQ ID NO: 45, or
SEQ ID NOs: 46–47 and SEQ ID NO: 48.

5. A method for detecting the methylation of a nucleotide sequence in a sample to be detected, comprising:

treating the sample to be detected with a hydrosulfite or a bisulfite or a hydrazine salt to obtain a modified sample to be detected; and

using a combination of a primer pair and a probe to detect a methylation level of the nucleotide sequence in the modified sample to be detected,

wherein the primer pair and the probe respectively comprises nucleotide sequences of

SEQ ID NOs: 31–32 and SEQ ID NO: 33,

SEQ ID NOs: 34–35 and SEQ ID NO: 36,
SEQ ID NOs: 37–38 and SEQ ID NO: 39,
SEQ ID NOs: 40–41 and SEQ ID NO: 42,
SEQ ID NOs: 43–44 and SEQ ID NO: 45, or
SEQ ID NOs: 46–47 and SEQ ID NO: 48.

6. A method for detecting a tumor in a subject, comprising:

detecting a methylation level of a nucleotide sequence of SEQ ID NO: 4 in a sample to be detected from a subject by the method according to claim 5; and

indicating whether the subject has or is at risk of having a tumor according to a deviation of the methylation level of the nucleotide sequence of SEQ ID NO: 4 in the sample to be detected from the subject from a methylation level of a nucleotide sequence of SEQ ID NO: 4 in a normal control sample,

wherein the tumor is a bladder cancer or a urothelial tumor.

7. Use of a tumor detection reagent in the detection of a tumor,

wherein the tumor is a bladder cancer or a urothelial tumor; and

wherein the reagent comprises a combination of a primer pair and a probe respectively comprises nucleotide sequences of

SEQ ID NOs: 31–32 and SEQ ID NO: 33,
SEQ ID NOs: 34–35 and SEQ ID NO: 36,
SEQ ID NOs: 37–38 and SEQ ID NO: 39,
SEQ ID NOs: 40–41 and SEQ ID NO: 42,
SEQ ID NOs: 43–44 and SEQ ID NO: 45, or
SEQ ID NOs: 46–47 and SEQ ID NO: 48.

8. Use of a kit in the detection of a tumor,
wherein the tumor is a bladder cancer or a urothelial tumor; and
wherein the kit comprises a combination of a primer pair and a probe respectively comprises
nucleotide sequences of

SEQ ID NOs: 31–32 and SEQ ID NO: 33,

SEQ ID NOs: 34–35 and SEQ ID NO: 36,

SEQ ID NOs: 37–38 and SEQ ID NO: 39,

SEQ ID NOs: 40–41 and SEQ ID NO: 42,

SEQ ID NOs: 43–44 and SEQ ID NO: 45, or

SEQ ID NOs: 46–47 and SEQ ID NO: 48.

9. The method according to claim 5 or claim 6, wherein the sample to be detected is selected
from tissue, body fluid, and excrement.

10. The method according to claim 5 or claim 6, wherein the sample to be detected is a bladder
tissue.

11. The method according to claim 5 or claim 6, wherein the sample to be detected is selected
from at least one of blood, serum, plasma, extracellular fluid, tissue fluid, lymph fluid,
cerebrospinal fluid, and aqueous humor.

12. The method according to claim 5 or claim 6, wherein the sample to be detected is selected
from at least one of sputum, urine, saliva, and faeces.

13. The method according to claim 5 or claim 6, wherein the sample to be detected is urine.

14. A tumor detection system, comprising:

a. a component for detecting a methylation level of a nucleotide sequence of SEQ ID NO: 4;

and

b. a result determination system;

wherein the tumor is a bladder cancer or a urothelial tumor; and

wherein the methylation level detection component comprising a combination of a primer and a probe respectively comprises nucleotide sequences of

SEQ ID NOs: 31–32 and SEQ ID NO: 33,

SEQ ID NOs: 34–35 and SEQ ID NO: 36,

SEQ ID NOs: 37–38 and SEQ ID NO: 39,

SEQ ID NOs: 40–41 and SEQ ID NO: 42,

SEQ ID NOs: 43–44 and SEQ ID NO: 45, or

SEQ ID NOs: 46–47 and SEQ ID NO: 48.

15. The tumor detection system according to claim 14, wherein the result determination component is configured to output a risk of having the tumor according to the methylation level of the nucleotide sequence of SEQ ID NO: 4 that is detected by the tumor detection system.

16. The tumor detection system according to claim 15, wherein the risk of having the tumor is determined by a deviation of the methylation level of the nucleotide sequence of SEQ ID NO: 4 in the sample to be detected and the methylation level of the nucleotide sequence of SEQ ID NO: 4 in a normal control sample.

17. The use according to any one of claims 1–4 and 7–8, the method according to any one of claims 5–6 and 9–13, or the tumor detection system according to any one of claims 14–16, wherein the primer pair and the probe respectively comprises nucleotide sequences of

SEQ ID NOs: 34–35 and SEQ ID NO: 36,
SEQ ID NOs: 43–44 and SEQ ID NO: 45, or
SEQ ID NOs: 46–47 and SEQ ID NO: 48.

18. The use according to any one of claims 1–4 and 7–8, the method according to any one of claims 5–6 and 9–13, or the tumor detection system according to any one of claims 14–16, wherein the primer pair and the probe respectively comprises nucleotide sequences of SEQ ID NOs: 43–44 and SEQ ID NO: 45.

19. The use according to any one of claims 1–4, 7–8 and 17–18, the method according to any one of claims 5–6, 9–13 and 17–18, or the tumor detection system according to any one of claims 14–18, wherein the tumor is a urothelial tumor.

20. The use according to any one of claims 1–4, 7–8 and 17–18, the method according to any one of claims 5–6, 9–13 and 17–18, or the tumor detection system according to any one of claims 14–18, wherein the tumor is bladder cancer, ureteral cancer, renal pelvis cancer, or urethral cancer.

21. The use according to any one of claims 1–4, 7–8 and 17–18, the method according to any one of claims 5–6, 9–13 and 17–18, or the tumor detection system according to any one of claims 14–18, wherein the tumor is bladder cancer.