

Claims

1. A method for qualitatively or quantitatively analyzing a methionyl-tRNA synthetase (MRS) protein in a bile duct sample collected from a latent patient in order to provide information necessary for diagnosis of a bile duct cancer,

wherein the method comprises: (a) measuring the expression level of the methionyl-tRNA synthetase protein in the bile duct sample collected from the patient; and (b) determining that the patient is a bile duct cancer patient if the expression level of the methionyl-tRNA synthetase protein measured in step (a) is increased in comparison with that of a normal control.

2. The method of claim 1, wherein the sample is bile duct cells.

3. The method of claim 1, wherein the method further comprises the following steps before, simultaneously with, or after step (a): (i) staining bile duct cells collected from the patient with: at least one nucleus-staining solution selected from the group consisting of 4',6-diamidino-2-phenylindole (DAPI), methylene blue, acetocarmine, toluidine blue, hematoxylin, and Hoechst, and at least one cytoplasm-staining solution selected from the group consisting of eosin, crystal violet, and Orange G; and (ii) determining by said cell staining that the bile duct cells are malignant tumor cells, atypical cells, or normal cells.

4. The method of claim 2 or 3, wherein the bile duct cells are bile duct cells collected by brush cytology.

5. The method of claim 1, wherein the expression level of the protein is measured using any one of Western blotting, ELISA, radioimmunoassay, radioimmunodiffusion, Ouchterlony immunodiffusion, rocket immunoelectrophoresis, immunostaining,

immunoprecipitation assay, complement fixation assay, FACS, or protein chip assay.

6. The method of claim 1, wherein in step (a) the expression level of the methionyl-tRNA synthetase protein is measured by using an antibody or aptamer specifically binding to the methionyl-tRNA synthetase (MRS) protein, or a primer or probe specifically binding to the methionyl-tRNA synthetase mRNA.

7. The method of claim 6, wherein the antibody is an antibody or a functional fragment thereof which specifically binds to an epitope region of MRS containing the amino acid sequence defined by SEQ ID NO: 20.

8. The method of claim 3, wherein in step (ii), it is determined by cell-staining results of step (i) that: the bile duct cells are malignant cells when there are two or more types of morphological abnormality selected from the group consisting of: three-dimensional smear of cells, a high nucleus/cytoplasm ratio (N/C ratio), an appearance of chromatin agglomeration; a rough-shaped nuclear membrane, an appearance of nucleoli, and an appearance of mitosis; the bile duct cells are normal cells when the cells are smeared in one layer, the nucleus/cytoplasm ratio (N/C ratio) is low, and the nuclear membrane has a smooth shape; and the bile duct cells are atypical cells when the extent of a cell change does not reach that of malignant cells but cannot be diagnosed as normal.

9. A method for improving sensitivity and specificity in cytodiagnosis or biopsy for a bile duct cancer in comparison with conventional cytodiagnosis or biopsy, the method comprising the steps of: (a) measuring the expression level of a methionyl-tRNA synthetase protein in a bile duct sample collected from a latent patient; and (b) determining that the patient is a bile duct cancer patient if the expression level of the methionyl-

tRNA synthetase protein in step (a) is increased in comparison with that of a normal control.

10. The method of claim 9, wherein the sensitivity and specificity are 90% or higher.

11. The method of claim 9, wherein the cytodiagnosis is conducted on bile duct cells collected by brush cytology.

12. A method for providing information necessary for diagnosis of a bile duct cancer in cytodiagnosis or biopsy for a bile duct cancer, wherein an adjuvant method is performed in combination with a morphological examination on bile duct cells collected by brush cytology, the adjuvant method comprising: (a) measuring the expression level of a methionyl-tRNA synthetase protein in a bile duct sample collected from a latent patient; and (b) determining that the patient is a bile duct cancer patient if the expression level of the methionyl-tRNA synthetase protein in step (a) is increased in comparison with that of a normal control,

wherein the morphological examination is performed by examining at least one selected from the group consisting of cell clustering, the nucleus/cytoplasm ratio (N/C ratio), the shape of the nuclear membrane, chromatin agglomeration, an appearance of nucleoli in a nucleus, and an appearance of mitosis in the bile duct cells.

13. The method of claim 12, wherein the adjuvant method is performed simultaneously with, separately from, or sequentially with the morphological examination.

14. The method of claim 7, wherein the antibody comprises: a light chain variable region (VL) containing the amino acid sequence defined by SEQ ID NO: 14; and a heavy chain variable region (VH) containing the amino acid sequence defined by SEQ ID NO: 16.

15. Use of a composition in the manufacture of a medicament for diagnosis of a bile duct cancer, wherein the composition comprises an agent for measuring the expression level of a methionyl-tRNA synthetase (MRS) protein.

16. An *in vitro* method for diagnosing a bile duct cancer, the method comprising the steps of:

(a) measuring the expression level of the methionyl-tRNA synthetase protein in a bile duct sample collected from a latent patient; and

(b) determining that the patient is a bile duct cancer patient if the expression level of the methionyl-tRNA synthetase protein measured in step (a) is increased in comparison with that of a normal control.