are effective. It is often that these cancers have already become advanced cancers when detected and at the same time, the prognosis of these cancers is bad. Accordingly, these cancers are termed intractable cancers and there is a strong demand for developing suitable screening methods for detecting these cancers.

[0012]

Moreover, in addition to pancreatic cancer and endometrial cancer, the number of male patients having prostate cancer and colorectal cancer and that of female patients having breast cancer and colorectal cancer have been increasing. For this reason, it is necessary to develop suitable screening methods for detecting these cancers also.

[0013]

Accordingly, the inventors found the possibility that makes it possible to develop a novel screening method for detecting a group of cancers, such as prostate cancer and colorectal cancer for male patients and breast cancer and colorectal cancer for female patients in addition to pancreatic cancer and endometrial cancer which are termed the intractable cancers, using a method of discriminating between cancer patients (a case group) and controls (a control group) that utilizes the concentration balance of trace elements contained in a serum which is disclosed in Patent Literature 2; thereafter, the inventors created the present invention.

[0013a] In one aspect, the present disclosure refers to a cancer risk evaluation method comprising: the correlation operating step of operating a correlation among concentrations of a set of evaluation elements contained in a serum which is taken concentrations of a set of evaluation elements contained in a serum which has been

taken age data of the subject to one or more discriminant functions for discriminating by automatic operation with a computer which of a case group and a control group the subject belongs to; and of a case group and a control group the subject belongs to; and whether or not the subject suffers from any type of cancer based on the correlation whether or not the subject suffers from any type of cancer based on the correlation wherein in the correlation operating step, a combination of 17 elements of Na, Mg, P, S, K, Ca, Fe, Cu, Zn, Se, Rb, Sr, As, Mo, Cs, Co, and Ag is used as the set of evaluation elements; and in the indicator obtaining step, the indicator is generated based on one or more discriminant scores calculated by applying the concentration data and the age data to the one or more discriminant functions which is/are used in the correlation operating step;

wherein in a case where the age data and the concentration data of the 9 elements of Na, P, S, Ca, Fe, Cu, Zn, Se, and Rb which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated in the correlation operating step, and the subject is male, an estimate that a type of cancer of the subject is pancreatic cancer is included into the indicator; or

wherein in a case where the age data and the concentration data of the 10 elements of Na, P, S, K, Ca, Fe, As, Sr, Rb, and Mo which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated in the correlation operating step, and the subject is male, an estimate that a type of cancer of the subject is prostate cancer is included into the indicator; or

wherein in a case where the age data and the concentration data of the 10 elements of Na, P, S, K, Cu, Zn, Rb, Se, Mo, and Co which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated in the correlation operating step, and the subject is male, an estimate that a type of cancer of the subject is colorectal cancer is included into the indicator; or

wherein in a case where the age data and the concentration data of the 6 elements of Mg, S, K, Ca, Fe, and Mo which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated in the correlation operating step, and the subject is female, an estimate that a type of cancer of the subject is endometrial cancer is included into the indicator; or

wherein in a case where the age data and the concentration data of the 6 elements of Mg, P, S, Fe, Zn, and Cs which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated in the correlation operating step, and the subject is female, an estimate that a type of cancer of the subject is breast cancer is included into the indicator; or

wherein in a case where the age data and the concentration data of the 10 elements of Na, P, S, Ca, Fe, Cu, Zn, As, Cs, and Ag which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated in the correlation operating step, and the subject is female, an estimate that a type of cancer of the subject is

colorectal cancer is included into the indicator.

[0013b] In another aspect, the present disclosure refers to a cancer risk evaluation system comprising: a data storage section for storing concentration data of a set of evaluation elements contained in a serum which has been taken from a subject and age data of the subject; a discriminant function generation section for generating a discriminant function or functions for discriminating which of a case group and a control group the subject belongs to; and function or functions for discriminating which of a case group and a control group the subject belongs to; and concentrations of the set of evaluation elements contained in the serum by applying the concentration data of the subject and the age data thereof stored in the data storage section to a discriminant function or functions generated by the discriminant function generation section, thereby outputting an evaluation result that discriminates whether or not the subject suffers from any type of cancer based on the correlation; wherein a combination of 17 elements of Na, Mg, P, S, K, Ca, Fe, Cu, Zn, Se, Rb, Sr, As, Mo, Cs, Co, and Ag is used as the set of evaluation elements; and in the evaluation result operation section, a discriminant score or scores is/are calculated by applying the concentration data and the age data which are stored in the data storage section to the discriminant function or functions which is/are generated by the discriminant function generation section, and the evaluation result is generated based on the discriminant score or scores; and

wherein in a case where the age data and the concentration data of the 9 elements of Na, P, S, Ca, Fe, Cu, Zn, Se, and Rb which are selected from the 17 elements used as the set of evaluation elements are judged significant for

discrimination based on the correlation which is operated by the evaluation result operation section, and the subject is male, an estimate that a type of cancer of the subject is pancreatic cancer is included into the evaluation result; or

wherein in a case where the age data and the concentration data of the 10 elements of Na, P, S, K, Ca, Fe, As, Sr, Rb, and Mo which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated by the evaluation result operation section, and the subject is male, an estimate that a type of cancer of the subject is prostate cancer is included into the evaluation result; or

wherein in a case where the age data and the concentration data of the 10 elements of Na, P, S, K, Cu, Zn, Rb, Se, Mo, and Co which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated by the evaluation result operation section, and the subject is male, an estimate that a type of cancer of the subject is colorectal cancer is included into the evaluation result; or

wherein in a case where the age data and the concentration data of the 6 elements of Mg, S, K, Ca, Fe, and Mo which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated by the evaluation result operation section, and the subject is female, an estimate that a type of cancer of the subject is endometrial cancer is included into the evaluation result; or

wherein in a case where the age data and the concentration data of the 6 elements of Mg, P, S, Fe, Zn, and Cs which are selected from the 17 elements used

as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated by the evaluation result operation section, and the subject is female, an estimate that a type of cancer of the subject is breast cancer is included into the evaluation result; or

wherein in a case where the age data and the concentration data of the 10 elements of Na, P, S, Ca, Fe, Cu, Zn, As, Cs, and Ag which are selected from the 17 elements used as the set of evaluation elements are judged significant for discrimination based on the correlation which is operated by the evaluation result operation section, and the subject is female, an estimate that a type of cancer of the subject is colorectal cancer is included into the evaluation result.

[0014]

An object of the present invention is to provide a cancer risk evaluation method and a cancer risk evaluation system that make it possible to estimate the risk of suffering from cancer of a subject with high accuracy, that do not have the disadvantages of early degeneration and high cost that arise in the case where the in-blood amino acid concentrations are utilized, and that are capable of estimating which site of cancer a subject has.

[0015]

Another object of the present invention is to provide a cancer risk evaluation method and a cancer risk evaluation system that can be easily applied to group or mass examinations.

[0016]

The other objects not specifically mentioned will become clear to those

skilled in the art from the following description and drawings attached.

MEANS FOR SOLVING THE PROBLEMS

[0017]

(1) According to a first aspect of the present invention, a cancer risk evaluation method is provided, which comprises:

the correlation operating step of operating a correlation among concentrations of a set of evaluation elements contained in a serum which is taken from a subject by applying concentration data of the set of evaluation elements and age data of the subject to a discriminant function or functions for discriminating which of a case group and a control group the subject belongs to; and

the indicator obtaining step of obtaining an indicator for discriminating whether or not the subject suffers from any type of cancer based on the correlation operated in the correlation operating step;