

FIG. 1

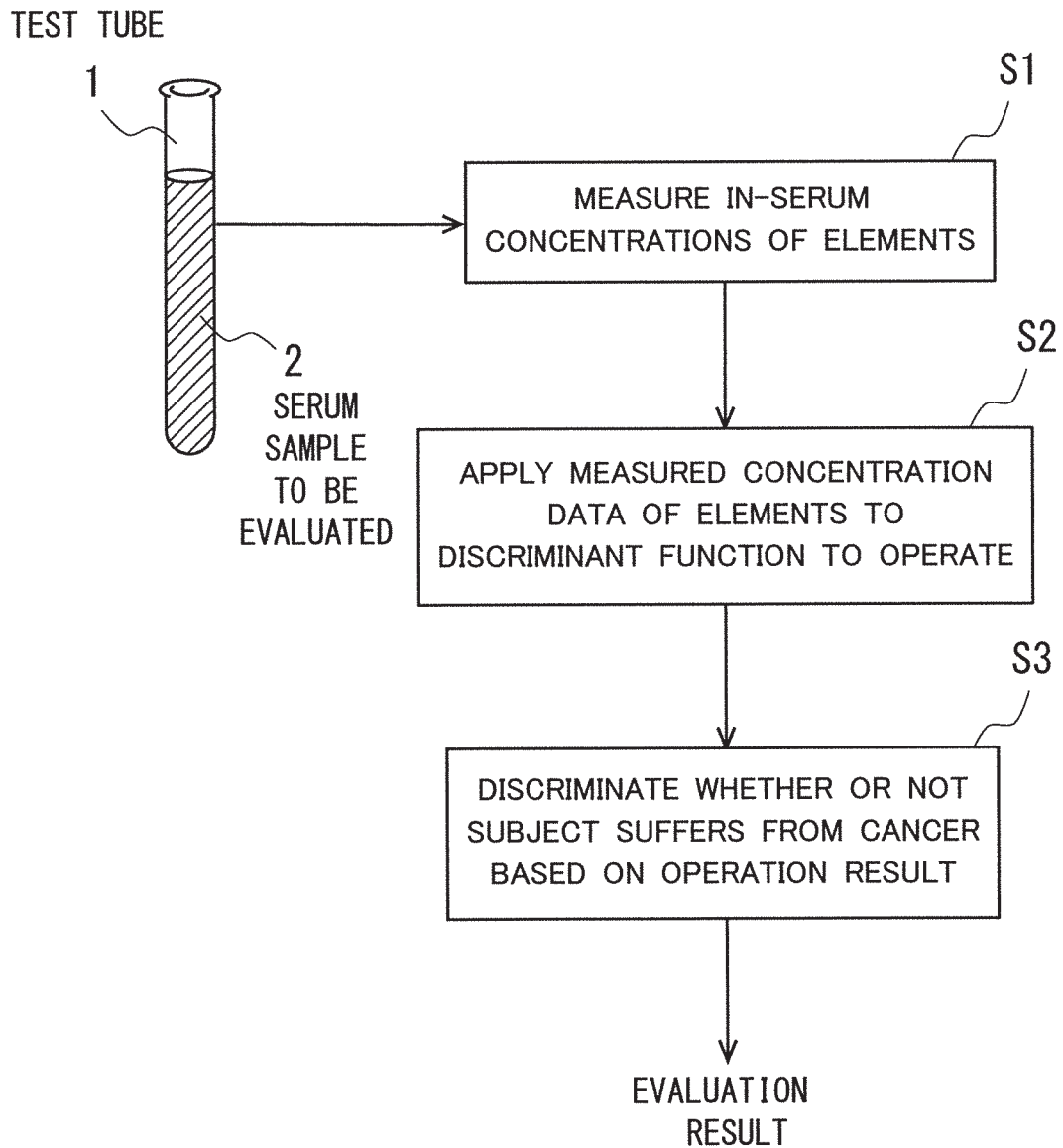
BASIC PRINCIPLE OF
CANCER EVALUATION METHOD OF INVENTION

FIG. 2

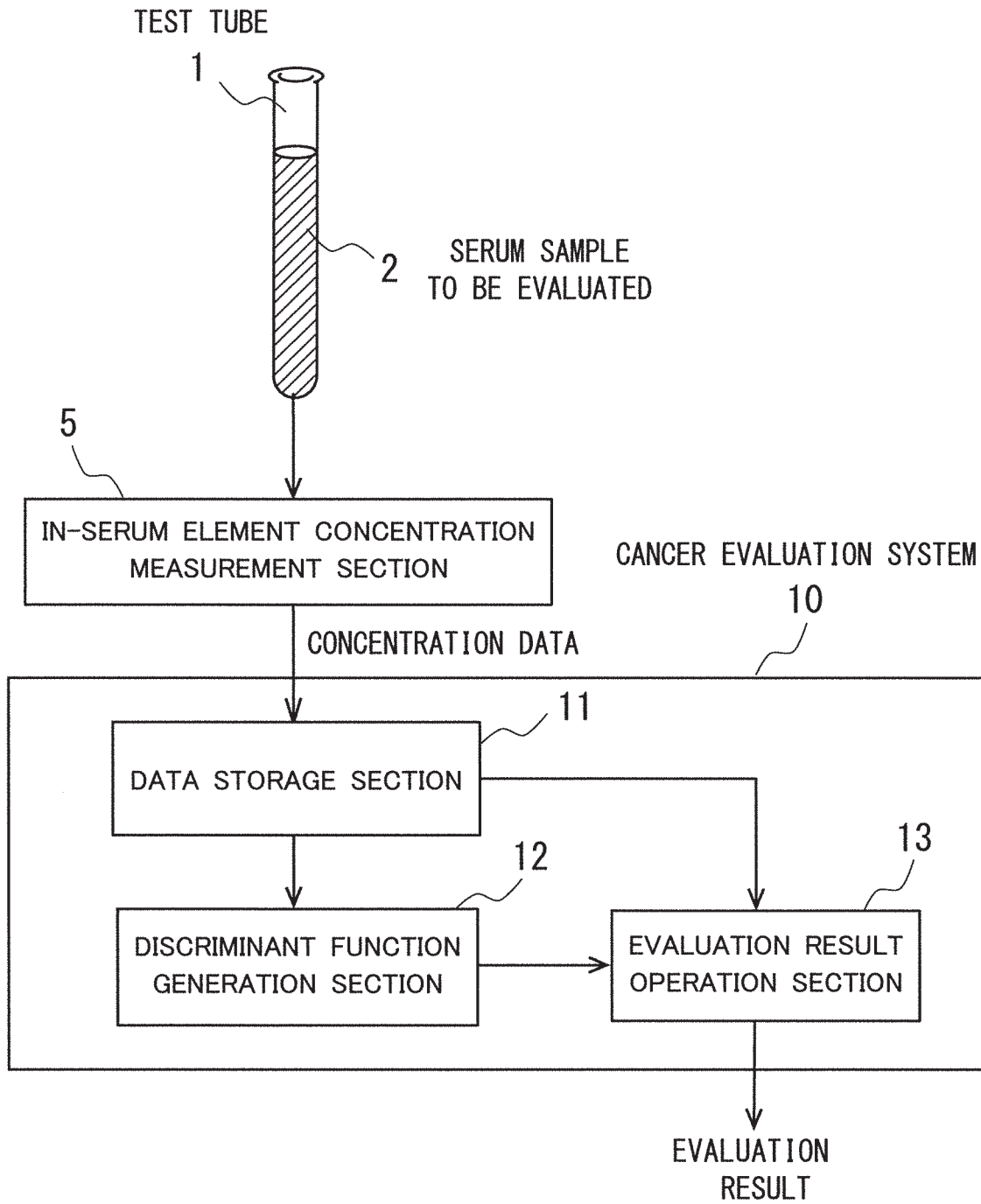
BASIC STRUCTURE OF
CANCER EVALUATION SYSTEM OF INVENTION

FIG. 3

ESSENTIAL ELEMENTS LIST

MAJOR ELEMENTS	TRACE ELEMENTS
hydrogen H	boron B
carbon C	fluorine F
nitorogen N	aluminium Al
oxygen O	silicon Si
sodium Na	vanadium V
magnesium Mg	chromium Cr
phosphorus P	manganese Mn
sulfur S	cobalt Co
chlorine Cl	nickel Ni
potassium K	copper Cu
calcium Ca	zinc Zn
iron Fe	arsenic As
	selenium Se
	molybdenum Mo
	iodine I
	bromine Br

FIG. 4

ELEMENT	BIOLOGICAL SIGNIFICANCE	RELATED MATTERS WITH CANCER
Na	important electrolyte; pH control of body fluid; osmotic pressure?control in cells; transfers information by changing membrane potential of nerve cells; excessive intake causes hypertension	No Report
Mg	relates to enzymes for biosynthesis of proteins, nucleic acids, and lipids; distributed in bones, and muscles as phosphate and carbonate; deficiency causes muscle tremors and/or turbulence of pulse	in-serum concentration decreases with development of cancer
P	constituent element of nucleic acids (DNA, RNA); constitutes ATP and relates to energy metabolism; main component of teeth and bones	No Report
S	constitutes amino acids (methionine, cysteine, etc.); constitutes thiamine essential for growth; thiamine has anti-beriberi action and anti-neuritis action	No Report
K	important electrolyte; pH control of body fluid; metabolism promotion of cells; control of neural transmission function; functional control of muscles and heart	No Report
Ca	90% exists in bones; activate various enzymes; relates to signal transmission among cells; deficiency causes rachitis, osteomalacia, and osteoporosis	No Report
Fe	essential for life; combined with proteins; hemoglobin in blood and myoglobin in muscles; conveys oxygen; deficiency causes anemia	in-serum concentration decreases with development of cancer
Cu	constitutes cytochrome c and caeruloplasmin; prevents arteriosclerosis and myocardial infarction; assists enzymes for maintaining normal structure of blood vessels; excess causes accumulation in liver etc. resulting in hepatitis or liver cancer	in-serum concentration increases with development of cancer
Zn	relates to growth, gustation and olfaction; constitutes zinc finger proteins relating with cell generation and cytodifferentiation	in-serum concentration decreases with development of cancer
Se	cardiac insufficiency patient often have selenium deficiency; anti-inflammatory, immune enhancement, and metal detoxication action	in-serum concentration of cancer patients is lower than ordinary person
Rb	replaceable with potassium ions; deficiency causes decreased growth and ataxy	No Report
Ti	extremely small in living body; coexists with other elements (Pb, Al, Ba, Fe)	No Report
Ag	having sterilization action; significance in living body is unknown	new relationship is expected
Sn	physiological role in living body is unknown	new relationship is expected

FIG. 5

QUALITATIVE ANALYSIS RESULT	SAMPLE NAME	S1B	S3B	S6B	S8B	S9B	S10B	S11B	S12B	S13B	S14B
Na	ppb	3160275.5	3213014.3	4689103.9	3170319.0	3180544.1	3289703.4	3227521.9	3251257.8	3234121.1	4525415.6
Cl	ppb	1368474.5	1595080.6	1628207.2	1284095.9	950244.1	1438225.2	1342256.8	1367756.5	1123481.6	2524278.5
S	ppb	1256663.7	1295221.2	1994250.5	1264261.4	1365403.1	1484463.4	1177543.9	1323441.2	1356605.8	1900193.0
P	ppb	247779.3	301612.9	329554.2	234640.7	221736.2	222647.1	228775.2	268165.5	230885.8	344754.4
K	ppb	148780.4	159583.3	211429.4	133070.1	145812.4	144222.0	139640.2	155988.0	152671.5	211359.1
Ca	ppb	69758.2	53599.9	89595.6	45667.3	54882.0	53846.6	51795.1	67363.2	65856.8	69225.5
Mg	ppb	20705.0	20453.9	28041.9	19136.4	20315.0	19562.5	21559.7	21795.2	20753.8	28925.8
Br	ppb	2155.8	18269.1	8598.9	3453.3	1787.3	2460.2	2201.4	2617.7	3019.8	119256.3
Si	ppb	6154.5	5787.6	11080.7	5693.3	7485.7	3501.5	27253.2	8875.2	3320.7	12132.1
Fe	ppb	1545.7	1385.9	2818.6	1267.7	1657.8	1587.7	994.4	1413.3	1890.8	3241.4
Zn	ppb	1284.5	830.4	1404.2	795.9	923.9	904.3	1141.2	1663.7	923.2	1588.1
Cu	ppb	965.6	714.0	1183.7	908.3	1115.7	742.7	1090.7	692.9	842.5	1407.5
Ti	ppb	366.6	306.3	1514.0	2551.0	1671.3	1283.5	565.8	295.9	1902.6	
Pb	ppb	125.1	166.3	245.1	116.6	149.3	133.1	115.7	180.0	148.5	209.7
B	ppb		141.8				174.2	94.2	144.2	148.1	
Se	ppb		107.1						62.3		
Li	ppb		96.9			164.8			131.5	101.2	236.4
Al	ppb	306.4	47.5	187.6	98.2	77.5		29.2		69.4	
I	ppb	39.7	43.9	125.2	45.0	37.1	31.6	58.9	55.7	30.4	73.3
Sr	ppb	42.2	22.4	30.4	36.7	20.4	21.7	46.5	35.8	25.7	18.8
Ge	ppb	16.9	12.6	26.7	29.8	22.1	24.2	7.4	12.8	7.5	43.9
Ba	ppb		11.7								
Ni	ppb	5.1	4.5	18.0	0.8	2.5	8.8	15.0	19.0	384.8	15.8
As	ppb		4.3						4.4		
Sb	ppb		2.4		1.4	0.7	2.5	1.4			
Mo	ppb	1.4	1.7	24.7	2.7	3.5	4.0	6.2	2.6	9.1	16.9
Hg	ppb	2.2	1.4	1.2	2.7	1.5	0.7		0.2	0.8	2.3
Mn	ppb		1.4	1.7	0.4		1.4	1.8	2.8	10.6	6.8
Cs	ppb	0.1	1.2	1.2	0.7	1.1	0.4	0.2	1.2	1.1	1.6
Pt	ppb	1.7	1.1		0.5	1.1	2.4	1.7	1.8	0.6	
Co	ppb	0.7	0.2	0.5		0.1	0.3			0.1	2.9
W	ppb		0.2			0.0	0.4			0.3	
Th	ppb	1.5	0.2		1.8		0.3				4.0
Tl	ppb		0.1	0.1	0.2					0.4	0.2
U	ppb		0.0		0.1				0.0		

FIG. 6A

(DOF: Degree of Freedom)

【TEST FOR POPULATION MEAN DIFFERENCE BETWEEN 2 GROUPS】

In Parentheses: Upper Row: DOF, Lower Row: Significance Probability

Group Variable: Subject (0: Control. 1: Case)

Variable Name Group (Group Variable Value)	Sample No.	Mean	Unbiased Standard Deviation	Test for Equal Variance F-value	Test for Equal Variance t-valuez	Welch's Test t-value
N a	30	2925.312	529.655	28.423	2.518	3.058
1 (0.0 ~ 0.0)	18	3108.021	617.663	(17, 11)	(28)	(18.76)
2 (1.0 ~ 1.0)	12	2651.250	115.855	(0.0000)	(0.0178)	(0.0068)
C l	30	1532.867	304.694	2.635	0.049	0.053
1 (0.0 ~ 0.0)	18	1535.111	356.568	(17, 11)	(28)	(27.89)
2 (1.0 ~ 1.0)	12	1529.500	219.648	(0.1063)	(0.9616)	(0.9579)
S	30	1101.533	412.233	20.472	3.885	4.693
1 (0.0 ~ 0.0)	18	1297.389	427.294	(17, 11)	(28)	(19.42)
2 (1.0 ~ 1.0)	12	807.750	94.437	(0.0000)	(0.0006)	(0.0002)
P	30	251.467	85.761	1.911	0.603	0.565
1 (0.0 ~ 0.0)	18	243.667	74.416	(11, 17)	(28)	(18.55)
2 (1.0 ~ 1.0)	12	263.167	102.873	(0.2229)	(0.5511)	(0.5788)
K	30	142.633	21.426	5.524	2.602	3.004
1 (0.0 ~ 0.0)	18	150.222	23.760	(17, 11)	(28)	(24.67)
2 (1.0 ~ 1.0)	12	131.250	10.110	(0.0063)	(0.0147)	(0.0061)
C a	30	59.667	10.300	1.238	1.014	1.036
1 (0.0 ~ 0.0)	18	61.222	10.708	(17, 11)	(28)	(25.44)
2 (1.0 ~ 1.0)	12	57.333	9.623	(0.7335)	(0.3195)	(0.3101)
M g	30	18.633	3.528	6.637	3.407	3.972
1 (0.0 ~ 0.0)	18	20.167	3.698	(17, 11)	(28)	(23.68)
2 (1.0 ~ 1.0)	12	16.333	1.435	(0.0028)	(0.0020)	(0.0006)
B r	30	8.237	21.327	1784.614	1.029	1.268
1 (0.0 ~ 0.0)	18	11.506	27.338	(17, 11)	(28)	(17.03)
2 (1.0 ~ 1.0)	12	3.333	0.647	(0.0000)	(0.3122)	(0.2220)
F e	30	3.134	5.784	42.434	1.516	1.239
1 (0.0 ~ 0.0)	18	1.856	1.361	(11, 17)	(28)	(11.35)
2 (1.0 ~ 1.0)	12	5.053	8.868	(0.0000)	(0.1407)	(0.2411)

FIG. 6B

Zn			30	1.057	0.271	1.819	1.671	1.774
1 (0.0 ~ 0.0)			18	1.122	0.290 (17, 11)	(28)	(27.60)	
2 (1.0 ~ 1.0)			12	0.958	0.215 (0.3150)	(0.1060)	(0.0873)	
Cu			30	0.953	0.236	1.887	0.405	0.380
1 (0.0 ~ 0.0)			18	0.939	0.206 (11, 17)	(28)	(18.64)	
2 (1.0 ~ 1.0)			12	0.975	0.283 (0.2319)	(0.6888)	(0.7087)	
Ti			30	0.696	0.669	3.079	1.508	1.676
1 (0.0 ~ 0.0)			18	0.843	0.764 (17, 11)	(28)	(27.51)	
2 (1.0 ~ 1.0)			12	0.475	0.435 (0.0627)	(0.1428)	(0.1053)	
Rb			30	0.160	0.047	1.601	1.845	1.759
1 (0.0 ~ 0.0)			18	0.173	0.041 (11, 17)	(28)	(19.84)	
2 (1.0 ~ 1.0)			12	0.142	0.051 (0.3713)	(0.0757)	(0.0948)	

【DISCRIMINANT ANALYSIS】

CRITERION VARIABLE NAME: (1)SUBJECT

FIG. 7A

GROUP	CRITERION VARIABLE VALUE/RANGE
1	0.00
2	1.00

TABLE 1: CORRELATION COEFFICIENT MATRIX AMONG VARIABLES
【OVERALL】

VARIABLE NAME	1)	2)	3)	4)	5)	6)	7)
1) S	1.000	0.097	0.712	0.206	0.234	0.128	0.347
2) P	0.097	1.000	0.325	0.089	0.185	-0.094	0.308
3) M _g	0.712	0.325	1.000	0.376	0.231	0.121	0.360
4) Z _n	0.206	0.089	0.376	1.000	0.264	-0.081	0.187
5) C _u	0.234	0.185	0.231	0.264	1.000	-0.035	0.247
6) T _i	0.128	-0.094	0.121	-0.081	-0.035	1.000	0.036
7) R _b	0.347	0.308	0.360	0.187	0.247	0.036	1.000

TABLE 2: 2-GROUP DISCRIMINATION:
LINEAR DISCRIMINANT COEFFICIENT

VARIABLE NAME	DISCRIMINANT COEFFICIENT	
1) S	0.004019	
2) P	-0.013291	
3) M _g	0.333628	
4) Z _n	3.363696	
5) C _u	-5.308847	
6) T _i	1.183276	
7) R _b	20.703250	
CONSTANT	-9.936799	• Mahalanobis' Dis.: Mahalanobis'
		generalize Distance
Mahalanobis' Dis.	5.328012	
Misclass. rate	12.422 %	• Misclass. rate: Misclassification
F-VALUE	4.306	Rate (Estimate Value)
(DOF. 1, DOF. 2)	(7, 22)	
p-VALUE	0.003888	• DOF: Degree of Freedom

TABLE 3: BOX'S M TEST

χ^2 -VALUE	51.270
(DOF)	(28)
p-VALUE	0.004651

FIG. 7B

TABLE 4: SIGNIFICANCE OF VARIABLES USED IN
DISCRIMINANT ANALYSIS

VARIABLE	WILK' S Λ	INCREMENT OF Λ	F-VALUE (DOF1, DOF2)	p-VALUE
1) S	0.479362	0.057432	2.995 (1, 22)	0.097549
2) P	0.469399	0.047468	2.475 (1, 22)	0.129937
3) M g	0.446403	0.024473	1.276 (1, 22)	0.270804
4) Z n	0.453106	0.031176	1.626 (1, 22)	0.215618
5) C u	0.485918	0.063988	3.336 (1, 22)	0.081364
6) T i	0.449938	0.028008	1.460 (1, 22)	0.239699
7) R b	0.457081	0.035151	1.833 (1, 22)	0.189540
OVERALL	0.421930			

(WILKS' Λ AND ITS VARIATION ARE SHOWN, WHEREIN EACH VARIABLE IS EXCLUDED.)

TABLE 5: SPRIIOUS PERCENTAGE OF CORRECT CLASSIFICATIONS
(VERTICAL.: ACTUAL GROUP, HORIZONTAL.: GROUP BY DISCRIMINANT FUNCTION)

GROUP	1)	2)	TOTAL
1)	16	2	18
2)	1	11	12

PERCENTAGE OF CORRECT CLASSIFICATIONS: 86.667%

TABLE 6: BARYCENTER OF EACH GROUP IN
DISCRIMINANT SPACE

GROUP	1ST AXIS
1)	2.131205
2)	-3.196807

FIG. 8

No.	SUBJECT	Na	Cl	S	P	K	Ca	Mg	Br	Fe	Zn	Cu	Ti	Rb
1	CANCER	2,958	1,737	893	510	138	64	18	3.6	19.0	0.9	1.0	0.7	0.20
2	CANCER	2,753	1,752	863	242	127	60	19	4.5	1.8	0.8	0.8	0.2	0.10
3	CANCER	2,682	1,572	850	441	137	48	17	3.9	1.0	0.9	1.0	0.5	0.20
4	CANCER	2,638	1,645	973	255	117	72	16	3.2	0.5	0.7	1.2	0.2	0.10
5	CANCER	2,649	1,536	876	247	131	53	17	3.6	1.1	0.9	0.9	0.1	0.10
6	CANCER	2,586	1,527	760	219	140	66	16	2.8	0.9	0.7	0.8	0.2	0.20
7	CANCER	2,558	1,267	695	239	148	58	14	2.7	1.2	1.3	1.1	0.4	0.10
8	CANCER	2,639	1,071	671	180	137	48	16	2.3	0.2	1.1	1.7	1.1	0.20
9	CANCER	2,650	1,539	873	214	125	63	17	2.9	2.1	0.9	0.9	0.5	0.20
10	CANCER	2,563	1,870	798	185	122	39	16	4.2	3.5	0.9	0.7	0.2	0.10
11	CANCER	2,632	1,460	740	219	138	66	14	3.2	28.0	1.4	1.0	0.1	0.10
12	CANCER	2,507	1,378	701	207	115	51	16	3.1	1.3	1.0	0.6	1.5	0.10
13	CONTROL	3,160	1,368	1,256	247	148	69	21	2.2	1.5	1.3	1.0	0.4	0.13
14	CONTROL	3,213	1,595	1,295	301	159	53	20	18.3	1.4	0.8	0.7	0.3	0.17
15	CONTROL	4,689	1,628	1,994	329	211	89	28	8.6	2.8	1.4	1.2	1.5	0.25
16	CONTROL	3,170	1,284	1,264	234	133	45	19	3.4	1.3	0.8	0.9	2.6	0.12
17	CONTROL	3,180	950	1,365	221	145	54	20	1.8	1.7	0.9	1.1	1.7	0.15
18	CONTROL	3,289	1,438	1,484	222	144	53	20	2.5	1.6	0.9	0.7	1.3	0.13
19	CONTROL	3,227	1,342	1,177	228	139	51	22	2.2	1.0	1.1	1.1	0.6	0.12
20	CONTROL	3,251	1,367	1,323	268	155	67	22	2.6	1.4	1.7	0.7	0.3	0.18
21	CONTROL	3,234	1,123	1,356	230	152	65	21	3.0	1.9	0.9	0.8	1.9	0.15
22	CONTROL	4,525	2,524	1,900	344	211	69	30	119.3	3.2	1.6	1.4	0.0	0.21
23	CONTROL	2,589	1,431	813	169	127	64	17	2.7	2.3	1.2	0.9	0.3	0.10
24	CONTROL	2,600	2,137	718	188	143	66	17	3.9	1.6	1.4	0.8	0.9	0.20
25	CONTROL	2,668	1,598	1,667	257	133	52	19	17.3	1.1	0.8	0.9	0.2	0.20
26	CONTROL	2,593	1,608	922	197	139	55	17	5.0	6.6	1.2	0.9	1.8	0.20
27	CONTROL	2,667	1,617	767	174	143	62	18	4.4	0.8	0.7	0.8	0.1	0.20
28	CONTROL	2,683	1,364	942	450	128	67	19	2.7	0.7	1.3	1.1	0.4	0.20
29	CONTROL	2,579	1,460	920	170	143	72	16	2.9	0.7	1.1	0.7	0.6	0.20
30	CONTROL	2,627	1,798	2,190	157	151	49	17	4.3	1.8	1.1	1.2	0.3	0.20

FIG. 9

DATA ANALYSIS RESULT OF THIS TIME (SECOND BLODD SAMPLING)

TRACE ELEMENT (ppm)	CONTROL (8 PERSONS)		CANCER (12 PERSONS)		P-VALUE
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	
Na	2625.8	41.44	2651.3	115.86	0.497
Cl	1626.6	246.73	1529.5	219.65	0.384
S	1117.4	525.82	807.8	94.44	0.143
P	220.3	97.84	263.2	102.87	0.361
K	138.4	8.37	131.3	10.11	0.105
Ca	60.9	8.04	57.3	9.62	0.386
Mg	17.5	1.07	16.3	1.44	0.053
Br	5.4	4.88	3.3	0.65	0.273
Fe	1.95	1.97	5.05	8.87	0.265
Zn	1.10	0.24	0.96	0.22	0.198
Cu	0.91	0.16	0.98	0.28	0.541
Ti	0.57	0.56	0.48	0.44	0.689
Rb	0.19	0.04	0.14	0.05	0.031

FIG. 10

DATA ANALYSIS RESULT OF FIRST AND SECOND BLOOD SAMPLING

TRACE ELEMENT (ppm)	CONTROL (18 PERSONS)		CANCER (12 PERSONS)		P-VALUE
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION	
Na	3108.0	617.67	2651.3	115.86	0.001
Cl	1535.1	356.57	1529.5	219.65	0.958
S	1297.4	427.29	807.8	94.44	0.0002
P	243.7	74.42	263.2	102.87	0.579
K	150.2	23.76	131.3	10.11	0.006
Ca	61.22	10.71	57.3	9.62	0.310
Mg	20.17	3.70	16.3	1.44	0.006
Br	11.51	27.34	3.3	0.65	0.222
Fe	1.86	1.36	5.05	8.87	0.241
Zn	1.12	0.29	0.96	0.22	0.087
Cu	0.94	0.21	0.98	0.28	0.709
Ti	0.84	0.76	0.48	0.44	0.105
Rb	0.17	0.04	0.14	0.05	0.095

FIG. 11

DISCRIMINANT ANALYSIS RESULT

1)SECOND TIME DATA (CONTROL: 8, CANCER PATIENT: 12)

METAL :S、P、Mg、Zn、Cu、Ti、Rb

	CON (PRED)	PAT (PRED)	TOTAL
CONTROL (ACTUAL)	8	0	8
PATIENT (ACTUAL)	1	11	12
TOTAL	9	11	20

SENSITIVITY=91.7%(11/12), SPECIFICITY=100%(8/8)

2)FIRST & SECOND TIMES DATA (CONTROL: 18, CANCER PATIENT: 12)

METAL :S、P、Mg、Zn、Cu、Ti、Rb

	CON (PRED)	PAT (PRED)	TOTAL
CONTROL (ACTUAL)	16	2	18
PATIENT (ACTUAL)	1	11	12
TOTAL	17	13	30

SENSITIVITY=91.7%(11/12), SPECIFICITY=88.9%(16/18)

CON (PRED)=CONTROL (PREDICTIVE)

PAT (PRED)=PATIENT (PREDICTIVE)

FIG. 12

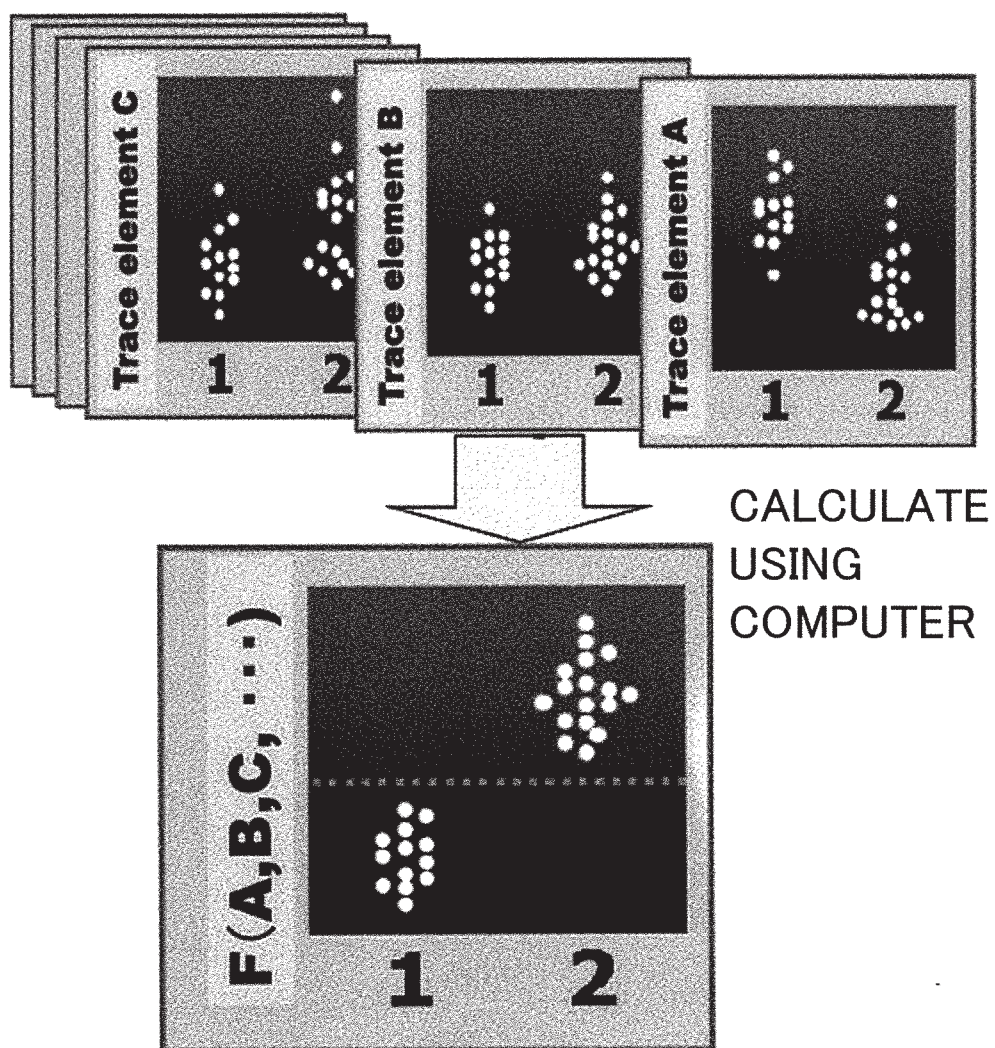


FIG. 13

DISCRIMINANT SCORE

GROUP	CRITERION VARIABLE VALUE/RANGE
1	CONTROL
2	CASE

【DISCRIMINANT SCORE LIST】

No.	GROUP: ACTUAL	GROUP: PREDICTIVE	DISCRIMINANT SCORE
1	1	1	1.062593
2	1	1	0.788588
3	1	1	8.334459
4	1	1	1.845479
5	1	1	1.588518
6	1	1	3.289605
7	1	1	0.157278
8	1	1	5.241326
9	1	1	3.595670
10	1	1	5.432528
11	2	2	-4.433830
12	2	2	-2.595352
13	2	2	-4.259839
14	2	2	-5.786881
15	2	2	-3.589664
16	2	2	-1.970507
17	2	2	-4.572897
18	2	2	-4.177352
19	2	2	-0.619484
20	2	2	-2.232609
21	2	2	-3.613970
22	2	1	-0.509301
23	1	2	-1.560380
24	1	1	1.789240
25	1	1	1.975683
26	1	1	2.350742
27	1	1	-0.430854
28	1	2	-2.646223
29	1	1	1.673400
30	1	1	4.274034

FIG. 14

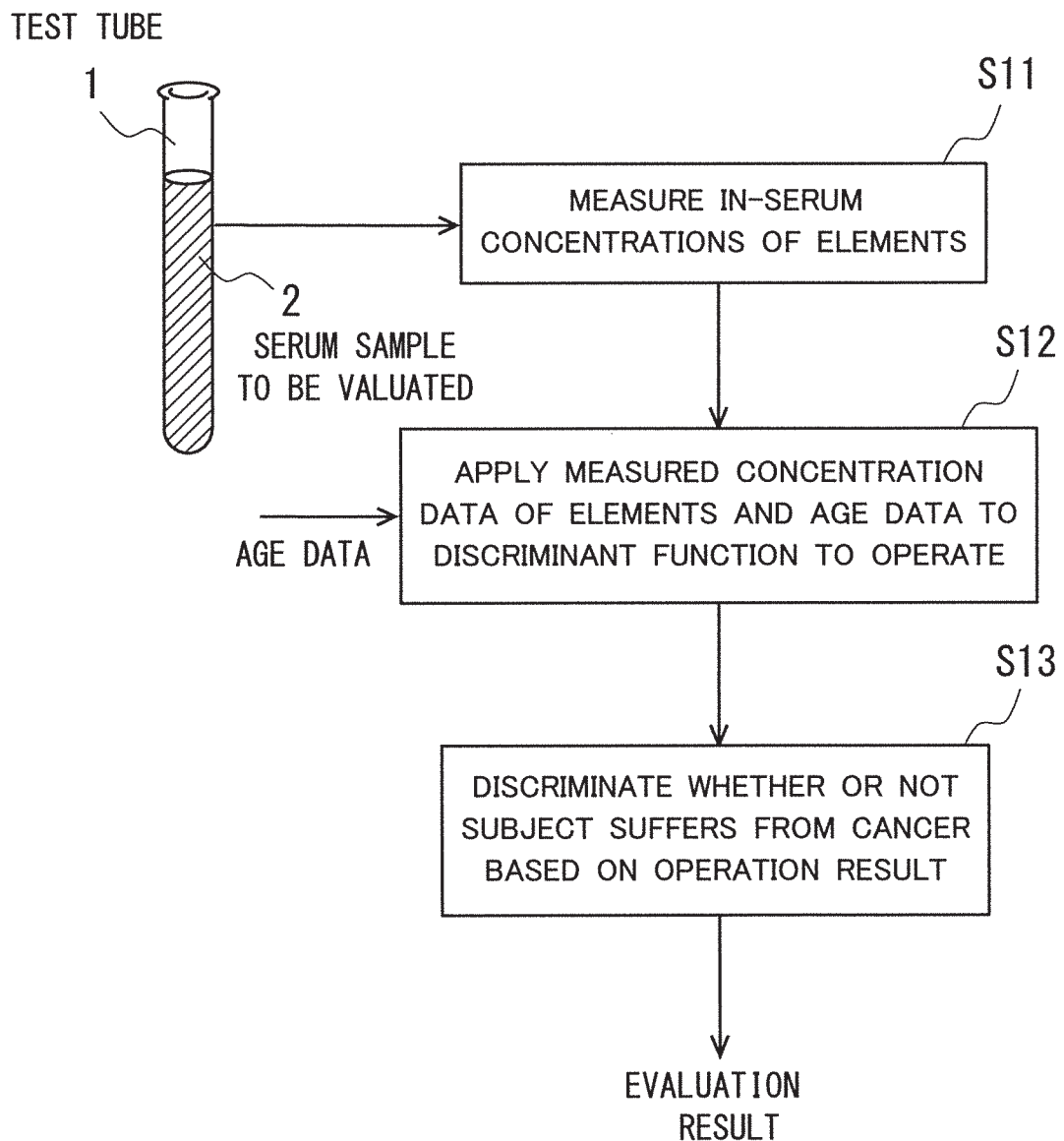
MODIFICATION OF
CANCER EVALUATION METHOD OF INVENTION

FIG. 15

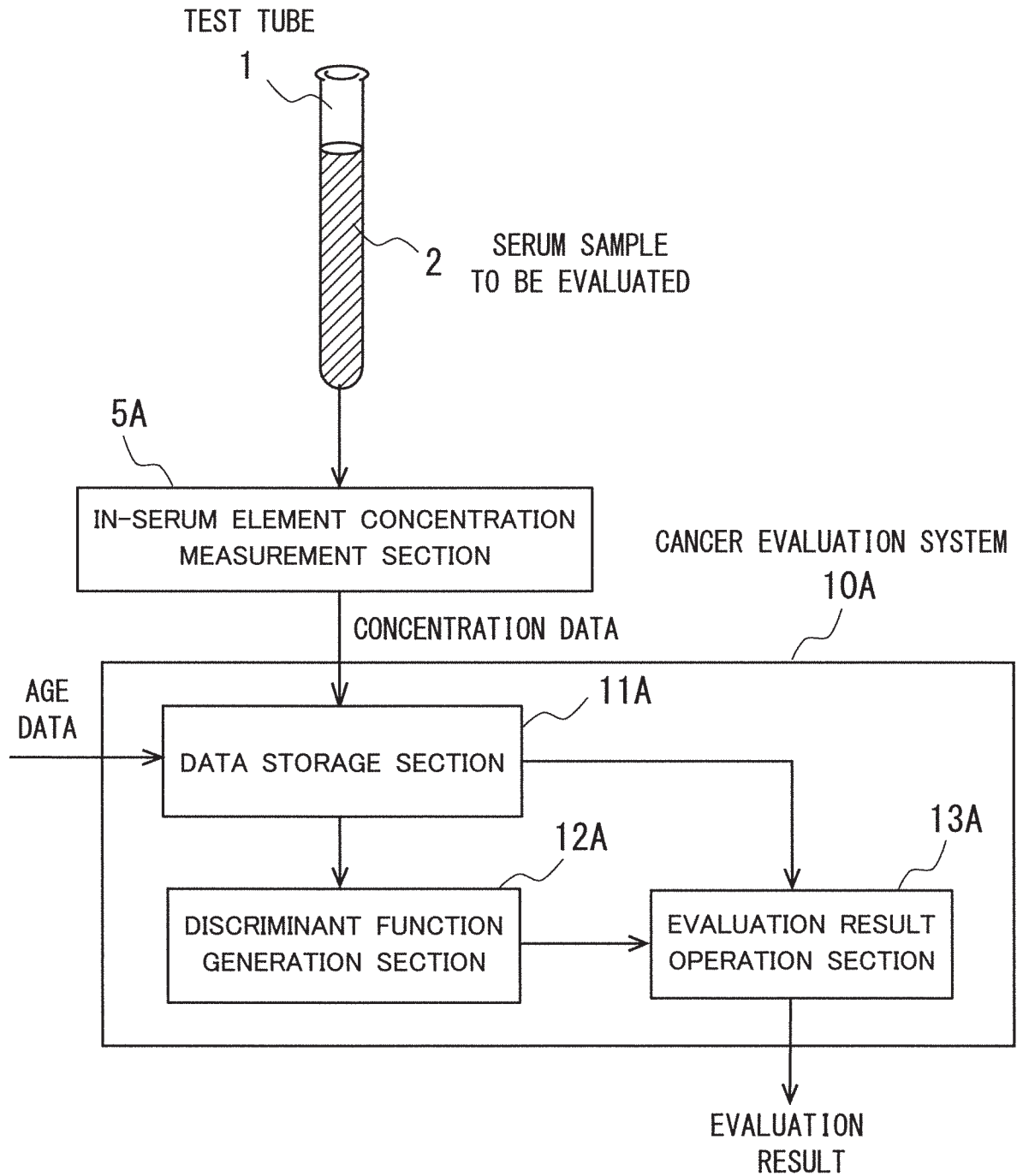
MODIFICATION OF
CANCER EVALUATION SYSTEM OF INVENTION

FIG. 16
BY-GROUP, BY-PART, BY-GENDER SUBJECT NUMBER

DIVISION	GENDER	ORDINARY PERSON	COLON CANCER	BREAST CANCER	PROSTATE CANCER	TOTAL
CONTROL	MALE	30				30
	FEMALE	30				30
CASE	MALE		43		18	61
	FEMALE		20	30		50
TOTAL		60	63	30	18	171

FIG. 17

ESSENTIAL ELEMENTS LIST

	MALE		FEMALE	
	COLON CANCER	PROSTATE CANCER	COLON CANCER	BREAST CANCER
Na				
Mg				
Al				
P	↑	↓	↓	
K				
Ca		↓	↓	↑
Ti				↑
Mn			↑	↑
Fe				↑
Cu				
Zn		↑		↑
Se				
Rb			↓	↓
Ag	↑			
Sn	↑	↑	↑	
S	↑	↓		

↑ : CANCER PATIENT IS SIGNIFICANTLY HIGHER
(P<0. 05)

↓ : CANCER PATIENT IS SIGNIFICANTLY LOWER
(P<0. 05)

FIG. 18

DISCRIMINANT ANALYSIS RESULT (MALE)

1. MALE/PROSTATE CANCER

■PRIOR PROBABILITY OF GROUPS

CASE2 CONTROL1	PRIOR PROB.	CASES USED **	
		UNWEIGHTED	WEIGHTED
CONTROL	. 500	30	30. 000
CANCER P.	. 500	19	19. 000
TOTAL	1. 000	49	49. 000

■CLASSIFICATION RESULT

			PREDICTION *		TOTAL
			CONTROL	CANCER P.	
ACTUAL DATA	FREQ.	CASE2 CONTROL1			
		CONTROL	30	0	30
		CANCER P.	2	16	18
	%	CONTROL	100. 0	. 0	100. 0
		CANCER P.	11. 1	88. 9	100. 0

a. 95.8% OF GROUPED ORIGINAL CASES WERE CLASSIFIED CORRECTLY.

2. MALE/COLON CANCER

■PRIOR PROBABILITY OF GROUPS

CASE2 CONTROL1	PRIOR PROB.	CASES USED **	
		UNWEIGHTED	WEIGHTED
CONTROL	. 500	30	30. 000
CANCER P.	. 500	43	43. 000
TOTAL	1. 000	73	73. 000

■CLASSIFICATION RESULT

			PREDICTION *		TOTAL
			CONTROL	CANCER P.	
ACTUAL DATA	FREQ.	CASE2 CONTROL1			
		CONTROL	26	4	30
		CANCER P.	4	39	43
	%	CONTROL	86. 7	13. 3	100. 0
		CANCER P.	9. 3	90. 7	100. 0

a. 89.0% OF GROUPED ORIGINAL CASES WERE CLASSIFIED CORRECTLY.

(**) CASES USED IN
ANALYSIS

(*) PREDICTION BY
DISCRIMINANT

CANCER P.: CANCER PATIENT

FREQ.: FREQUENCY

PRIOR PROB.: PRIOR PROBABILITY

FIG. 19

DISCRIMINANT ANALYSIS RESULT (FEMALE)

1. FEMALE/COLON CANCER

■PRIOR PROBABILITY OF GROUPS

CASE2 CONTROL1	PRIOR PROB.	CASES USED **	
		UNWEIGHTED	WEIGHTED
CONTROL	. 500	30	30. 000
CANCER P.	. 500	20	20. 000
TOTAL	1. 000	50	50. 000

■CLASSIFICATION RESULT

			PREDICTION *		TOTAL
			CONTROL	CANCER P.	
ACTUAL	FREQ.	CONTROL	29	1	30
		CANCER P.	2	18	20
DATA	%	CONTROL	96. 7	3. 3	100. 0
		CANCER P.	10. 0	90. 0	100. 0

a. 94.0% OF GROUPED ORIGINAL CASES WERE CLASSIFIED CORRECTLY.

2. FEMALE/BREAST CANCER

■PRIOR PROBABILITY OF GROUPS

CASE2 CONTROL1	PRIOR PROB.	CASES USED **	
		UNWEIGHTED	WEIGHTED
CONTROL	. 500	30	30. 000
CANCER P.	. 500	30	30. 000
TOTAL	1. 000	60	60. 000

■CLASSIFICATION RESULT

			PREDICTION *		TOTAL
			CONTROL	CANCER P.	
ACTUAL	FREQ.	CONTROL	30	0	30
		CANCER P.	2	28	30
DATA	%	CONTROL	100. 0	. 0	100. 0
		CANCER P.	6. 7	93. 3	100. 0

a. 96.7% OF GROUPED ORIGINAL CASES WERE CLASSIFIED CORRECTLY.

(**) CASES USED IN
ANALYSIS

(*) PREDICTION BY
DISCRIMINANT

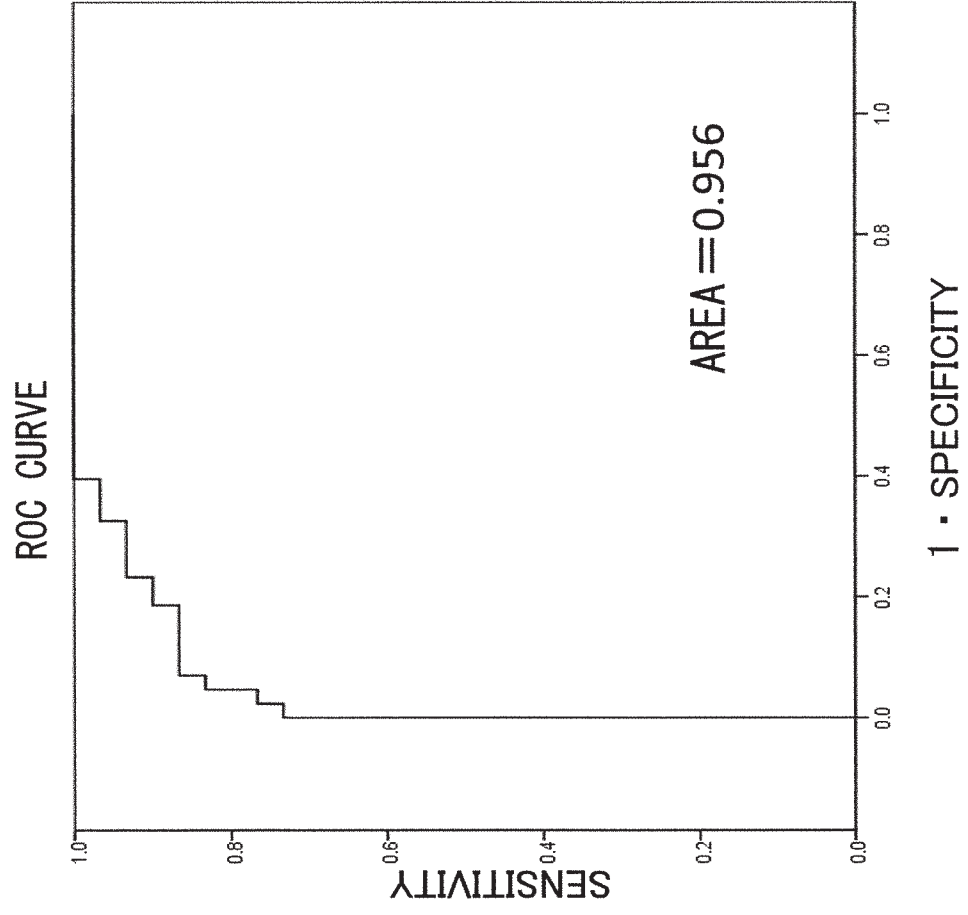
CANCER P.: CANCER PATIENT

FREQ.: FREQUENCY

PRIOR PROB.: PRIOR PROBABILITY

FIG. 20

COLON CANCER (MALE)



PROSTATE CANCER

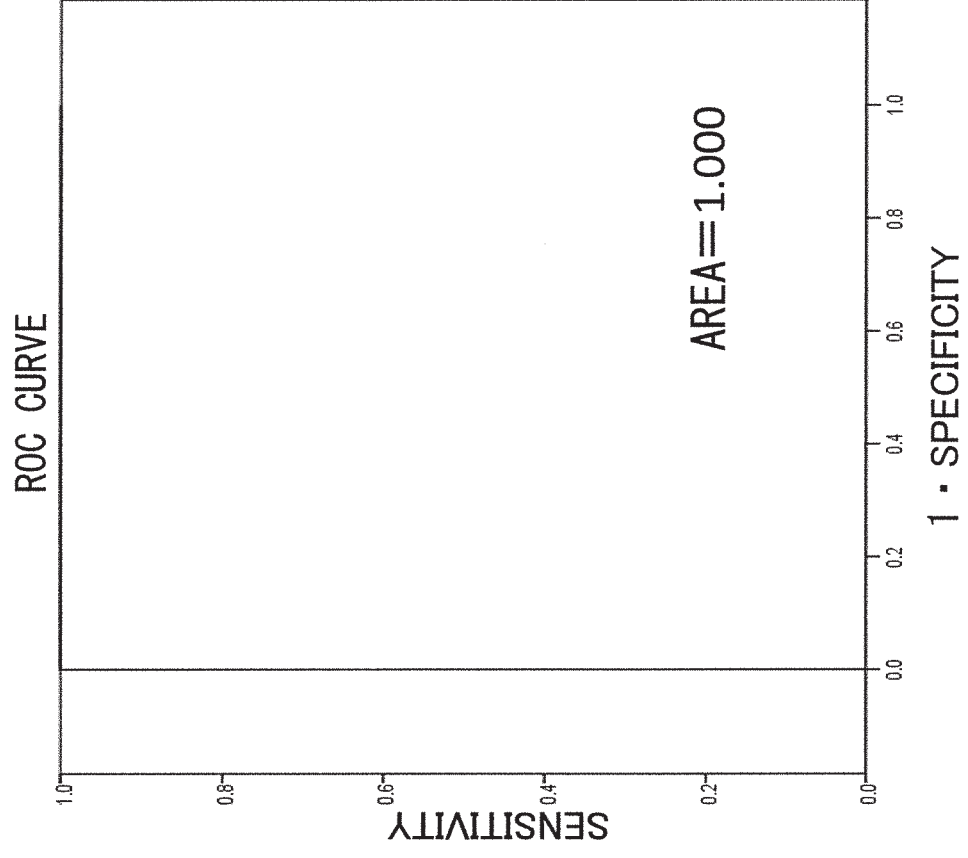
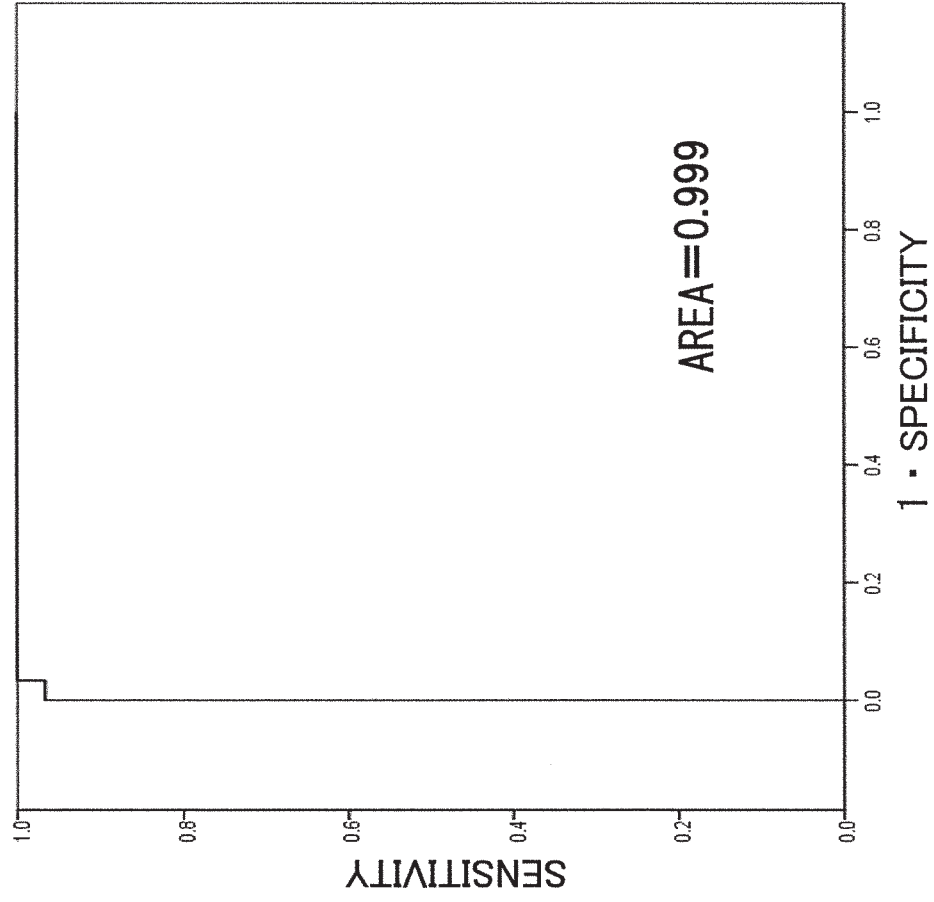


FIG. 21

BREAST CANCER

ROC CURVE



COLON CANCER (FEMALE)

ROC CURVE

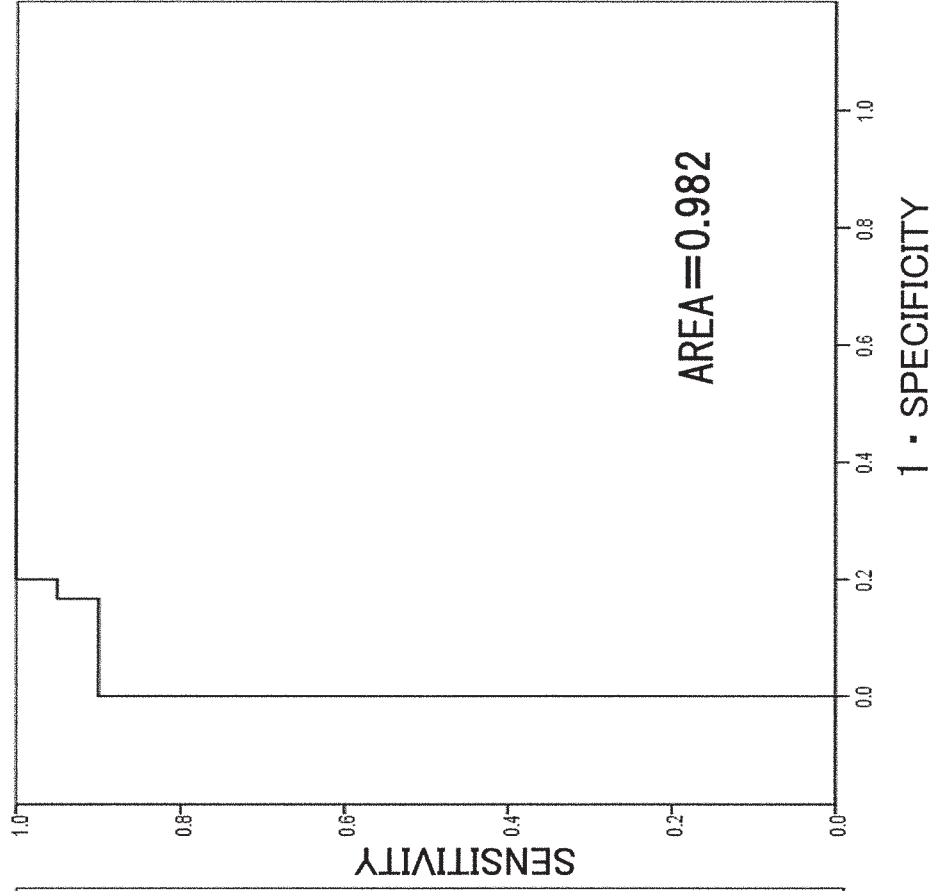


FIG. 22

■ PROSTATE CANCER

$D = +0.0903949 \times \text{AGE}$
 $+0.0000053 \times \text{Na}$
 $-0.0002593 \times \text{Mg}$
 $+0.0000492 \times \text{Al}$
 $-0.0000252 \times \text{P}$
 $+0.0000105 \times \text{K}$
 $+0.0000466 \times \text{Ca}$
 $+0.0006909 \times \text{Ti}$
 $+0.0154933 \times \text{Mn}$
 $-0.0001292 \times \text{Fe}$
 $-0.0027147 \times \text{Cu}$
 $-0.0002606 \times \text{Zn}$
 $+0.0166826 \times \text{Se}$
 $-0.0077824 \times \text{Rb}$
 $-0.0019460 \times \text{Ag}$
 $+0.0193273 \times \text{Sn}$
 $-0.0000003 \times \text{S}$
 $-21.5837825 \text{ (CONSTANT)}$

■ COLON CANCER (MALE)

$D = +0.0136123 \times \text{AGE}$
 $-0.0000011 \times \text{Na}$
 $+0.0002178 \times \text{Mg}$
 $-0.0000481 \times \text{Al}$
 $+0.0000408 \times \text{P}$
 $-0.0000249 \times \text{K}$
 $-0.0000070 \times \text{Ca}$
 $+0.0028095 \times \text{Ti}$
 $+0.0115894 \times \text{Mn}$
 $-0.0000653 \times \text{Fe}$
 $-0.0001918 \times \text{Cu}$
 $+0.0003566 \times \text{Zn}$
 $+0.0127215 \times \text{Se}$
 $+0.0050739 \times \text{Rb}$
 $-0.0015596 \times \text{Ag}$
 $-0.0154606 \times \text{Sn}$
 $+0.0000001 \times \text{S}$
 $-2.5979361 \text{ (CONSTANT)}$

FIG. 23

■ BREAST CANCER

$D = +0.0068043$ × AGE
 $+0.0000002$ × Na
 -0.0001247 × Mg
 -0.0001381 × Al
 -0.0000210 × P
 $+0.0000046$ × K
 $+0.0001442$ × Ca
 $+0.0093363$ × Ti
 $+0.0043409$ × Mn
 $+0.0000187$ × Fe
 -0.0004532 × Cu
 -0.0007009 × Zn
 $+0.0013783$ × Se
 -0.0124300 × Rb
 $+0.0006647$ × Ag
 $+0.0001697$ × Sn
 $+0.0000008$ × S
 -10.0235054 (CONSTANT)

■ COLON CANCER (FEMALE)

$D = +0.0136123$ × AGE
 -0.0000011 × Na
 -0.0002178 × Mg
 $+0.0000481$ × Al
 -0.0000408 × P
 $+0.0000249$ × K
 $+0.0000070$ × Ca
 $+0.0028095$ × Ti
 $+0.0115894$ × Mn
 -0.0000653 × Fe
 $+0.0001918$ × Cu
 -0.0003566 × Zn
 -0.0127215 × Se
 -0.0050739 × Rb
 -0.0015596 × Ag
 $+0.0154606$ × Sn
 -0.0000001 × S
 $+2.5979361$ (CONSTANT)

FIG. 24

COLON CANCER (MALE)

DISCRIMINANT SCORE	NORMALITY PROBABILITY	CANCER PROBABILITY
4.26113	0.99994	0.00006
2.71075	0.99755	0.00245
2.64777	0.99715	0.00285
2.62824	0.99701	0.00299
2.51741	0.99610	0.00390
2.34878	0.99416	0.00584
2.32378	0.99380	0.00620
2.15556	0.99074	0.00926
2.13823	0.99035	0.00965
2.09675	0.98935	0.01065
1.72989	0.97462	0.02538
1.63823	0.96855	0.03145
1.52412	0.95902	0.04098
1.50855	0.95752	0.04248
1.40987	0.94674	0.05326
1.36239	0.94067	0.05933
1.25759	0.92493	0.07507
1.25529	0.92454	0.07546
1.18552	0.91196	0.08804
1.18157	0.91119	0.08881
1.13851	0.90244	0.09756
1.07806	0.88885	0.11115
0.77816	0.79530	0.20470
0.73266	0.77690	0.22310
0.70921	0.76696	0.23304
0.70274	0.76417	0.23583
0.59413	0.71386	0.28614
0.45574	0.64132	0.35868
0.31203	0.55852	0.44148
0.22743	0.50788	0.49212

0.04211	0.39782	0.60218
-0.02762	0.35838	0.64162
-0.04219	0.35036	0.64964
-0.05852	0.34146	0.65854
-0.10601	0.31624	0.68376
-0.12809	0.30486	0.69514
-0.18557	0.27636	0.72364
-0.34736	0.20553	0.79447
-0.39093	0.18894	0.81106
-0.39535	0.18732	0.81268
-0.42743	0.17584	0.82416
-0.54597	0.13822	0.86178
-0.56432	0.13305	0.86695
-0.57239	0.13082	0.86918
-0.69106	0.10162	0.89838
-0.69409	0.10095	0.89905
-0.88548	0.06615	0.93385
-0.91651	0.06168	0.93832
-1.03413	0.04719	0.95281
-1.06483	0.04398	0.95602
-1.07075	0.04338	0.95662
-1.08313	0.04216	0.95784
-1.14333	0.03669	0.96331
-1.15770	0.03548	0.96452
-1.19916	0.03222	0.96778
-1.20195	0.03201	0.96799
-1.29571	0.02571	0.97429
-1.30046	0.02543	0.97457
-1.32663	0.02391	0.97609
-1.33421	0.02349	0.97651
-1.33555	0.02341	0.97659
-1.35808	0.02221	0.97779
-1.37049	0.02157	0.97843
-1.39854	0.02019	0.97981
-1.40132	0.02005	0.97995
-1.53728	0.01454	0.98546
-1.60681	0.01233	0.98767
-1.79754	0.00782	0.99218
-1.87906	0.00644	0.99356
-2.37682	0.00195	0.99805
-2.90785	0.00054	0.99946
-2.90865	0.00054	0.99946
-3.58334	0.00011	0.99989

FIG. 25

PROSTATE CANCER

DISCRIMINANT SCORE	NORMALITY PROBABILITY	CANCER PROBABILITY
-3.91828	1.00000	0.00000
-2.83060	1.00000	0.00000
-2.55968	1.00000	0.00000
-2.42911	0.99999	0.00001
-2.41444	0.99999	0.00001
-2.40018	0.99999	0.00001
-2.26829	0.99999	0.00001
-2.20148	0.99998	0.00002
-2.06408	0.99997	0.00003
-1.99179	0.99996	0.00004
-1.96462	0.99996	0.00004
-1.93831	0.99995	0.00005
-1.91920	0.99995	0.00005
-1.84619	0.99993	0.00007
-1.79468	0.99991	0.00009
-1.72974	0.99988	0.00012
-1.64717	0.99983	0.00017
-1.58259	0.99978	0.00022
-1.45881	0.99964	0.00036
-1.35360	0.99944	0.00056
-1.12337	0.99856	0.00144
-1.09644	0.99839	0.00161
-0.87852	0.99605	0.00395
-0.75881	0.99355	0.00645
-0.74684	0.99323	0.00677
-0.74559	0.99319	0.00681
-0.29466	0.95786	0.04214
-0.26188	0.95205	0.04795
0.11325	0.80871	0.19129
0.13739	0.79283	0.20717
0.32381	0.63954	0.36046
0.58782	0.37395	0.62605
0.60800	0.35468	0.64532
1.62390	0.00826	0.99174
1.77860	0.00438	0.99562
2.28952	0.00054	0.99946
2.47050	0.00025	0.99975
2.56395	0.00017	0.99983
2.76845	0.00007	0.99993
2.77136	0.00007	0.99993
2.88942	0.00005	0.99995
2.92863	0.00004	0.99996
3.06737	0.00002	0.99998
3.11103	0.00002	0.99998
3.14389	0.00002	0.99998
3.18904	0.00001	0.99999
3.25524	0.00001	0.99999
3.82273	0.00000	1.00000
4.77506	0.00000	1.00000

FIG. 26

BREAST CANCER (FEMALE)

DISCRIMINANT SCORE	NORMALITY PROBABILITY	CANCER PROBABILITY
-2.98095	0.99998	0.00002
-2.95453	0.99998	0.00002
-2.93045	0.99997	0.00003
-2.63524	0.99992	0.00008
-2.61017	0.99992	0.00008
-2.42915	0.99984	0.00016
-2.30177	0.99975	0.00025
-2.11123	0.99949	0.00051
-2.04521	0.99936	0.00064
-2.02333	0.99931	0.00069
-1.87751	0.99883	0.00117
-1.86025	0.99875	0.00125
-1.81894	0.99856	0.00144
-1.81507	0.99854	0.00146
-1.80756	0.99850	0.00150
-1.73916	0.99808	0.00192
-1.70252	0.99781	0.00219
-1.65372	0.99739	0.00261
-1.59426	0.99677	0.00323
-1.53140	0.99595	0.00405
-1.48036	0.99514	0.00486
-1.42753	0.99413	0.00587
-1.39318	0.99336	0.00664
-1.32500	0.99153	0.00847
-1.24259	0.98865	0.01135
-1.15700	0.98462	0.01538
-1.13063	0.98311	0.01689
-1.05834	0.97821	0.02179
-0.86211	0.95685	0.04315
-0.76118	0.93913	0.06087
-0.42056	0.81932	0.18068
-0.03411	0.53061	0.46939
0.08686	0.42257	0.57743
0.60041	0.10356	0.89644
0.73449	0.06659	0.93341

0.82726	0.04863	0.95137
0.86243	0.04310	0.95690
0.96700	0.03000	0.97000
0.99958	0.02678	0.97322
1.20722	0.01287	0.98713
1.22653	0.01202	0.98798
1.27632	0.01007	0.98993
1.37279	0.00714	0.99286
1.50423	0.00446	0.99554
1.79234	0.00159	0.99841
1.79358	0.00158	0.99842
2.01836	0.00071	0.99929
2.01972	0.00070	0.99930
2.06475	0.00060	0.99940
2.20638	0.00036	0.99964
2.28913	0.00027	0.99973
2.44711	0.00015	0.99985
2.53880	0.00011	0.99989
2.54333	0.00011	0.99989
2.54798	0.00011	0.99989
3.08437	0.00002	0.99998
3.15597	0.00001	0.99999
3.20250	0.00001	0.99999
3.65667	0.00000	1.00000
5.68891	0.00000	1.00000

COLON CANCER (FEMALE)

DISCRIMINANT SCORE	NORMALITY PROBABILITY	CANCER PROBABILITY
-3.24529	0.99997	0.00003
-2.38315	0.99961	0.00039
-2.13943	0.99921	0.00079
-2.07780	0.99905	0.00095
-2.06346	0.99901	0.00099
-2.01036	0.99884	0.00116
-1.75176	0.99753	0.00247
-1.70081	0.99713	0.00287
-1.65313	0.99671	0.00329
-1.64231	0.99660	0.00340
-1.53382	0.99533	0.00467
-1.51476	0.99506	0.00494
-1.35965	0.99224	0.00776
-1.35369	0.99210	0.00790
-1.25995	0.98963	0.01037
-1.21155	0.98807	0.01193
-1.20203	0.98773	0.01227
-1.07693	0.98239	0.01761
-0.89926	0.97069	0.02931
-0.87592	0.96868	0.03132
-0.82688	0.96400	0.03600
-0.73886	0.95388	0.04612
-0.66504	0.94336	0.05664
-0.64175	0.93960	0.06040
-0.27008	0.83939	0.16061
-0.22095	0.81899	0.18101
-0.08299	0.75113	0.24887
-0.01011	0.70906	0.29094
0.00790	0.69803	0.30197
0.14702	0.60580	0.39420
0.26482	0.52099	0.47901
0.42470	0.40488	0.59512
0.60649	0.28524	0.71476
0.78774	0.18992	0.81008
0.98665	0.11566	0.88434
1.06033	0.09531	0.90469
1.09377	0.08718	0.91282
1.13290	0.07847	0.92153
1.20094	0.06519	0.93481
1.47117	0.03059	0.96941
1.64857	0.01840	0.98160
1.89601	0.00899	0.99101
2.23132	0.00338	0.99662
2.31515	0.00264	0.99736
2.34141	0.00245	0.99755
2.70948	0.00083	0.99917
3.16372	0.00022	0.99978
3.47359	0.00009	0.99991
3.59696	0.00006	0.99994
3.85111	0.00003	0.99997

FIG. 28

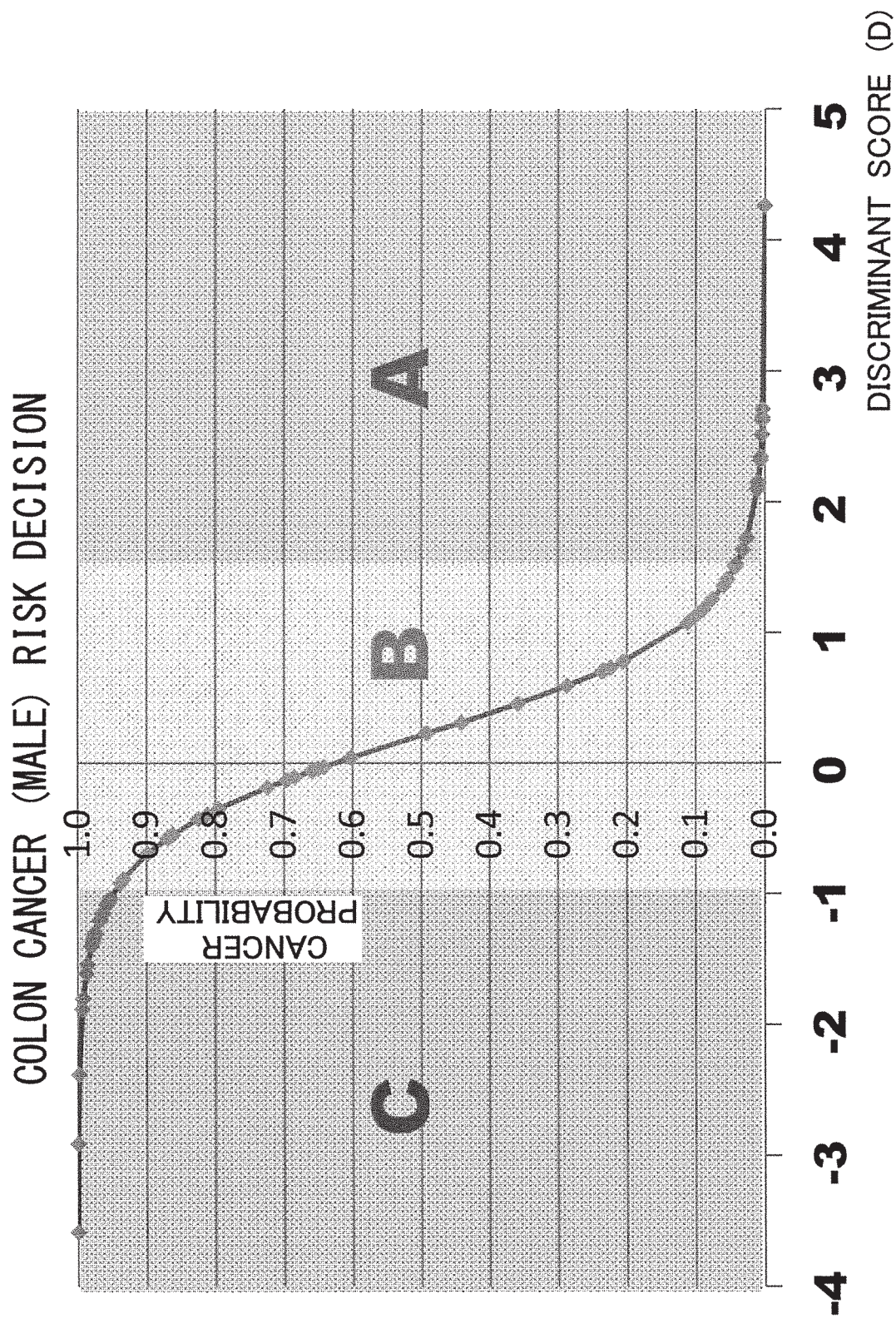


FIG. 29
PROSTATE CANCER RISK DECISION

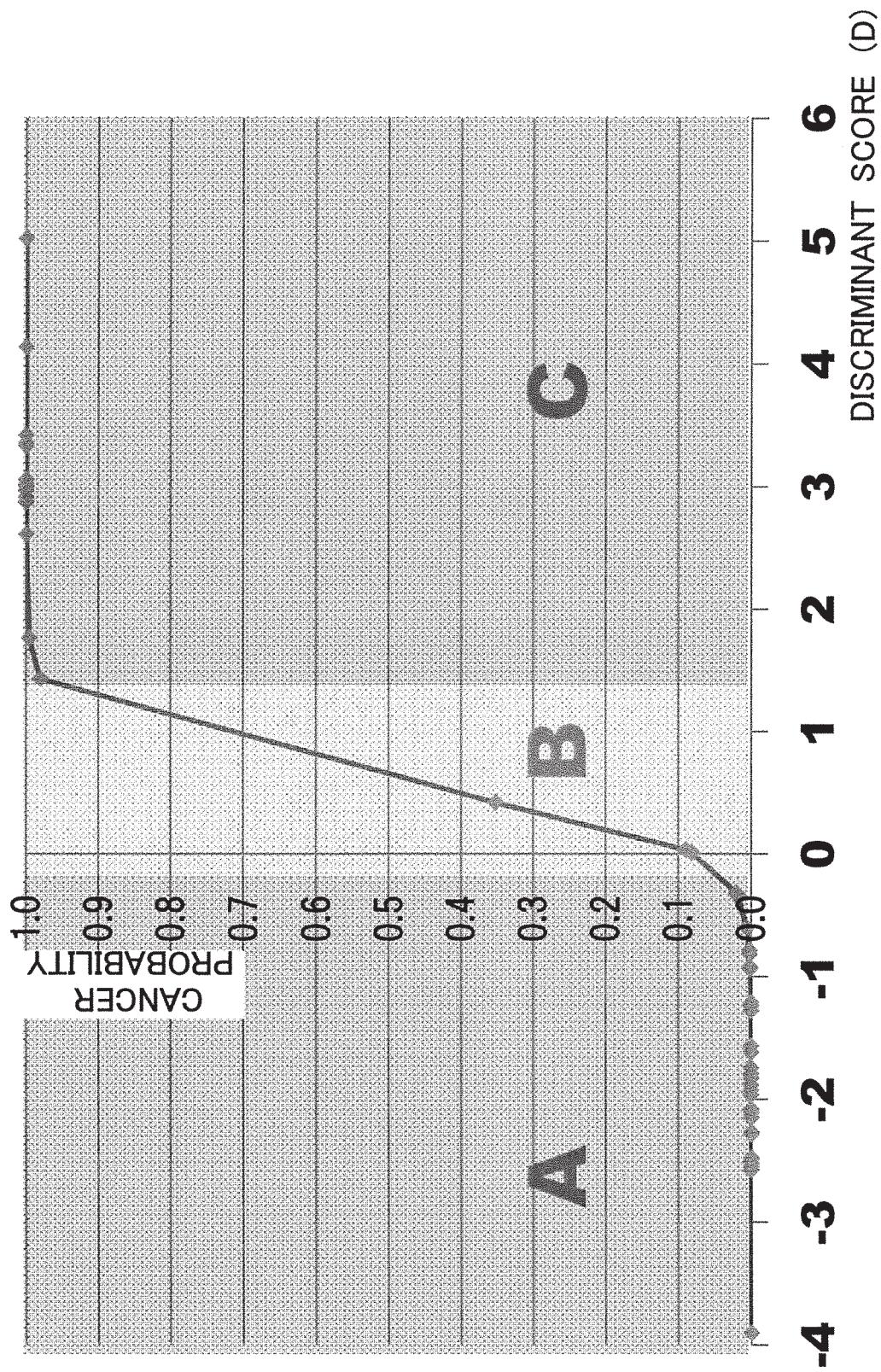


FIG. 30

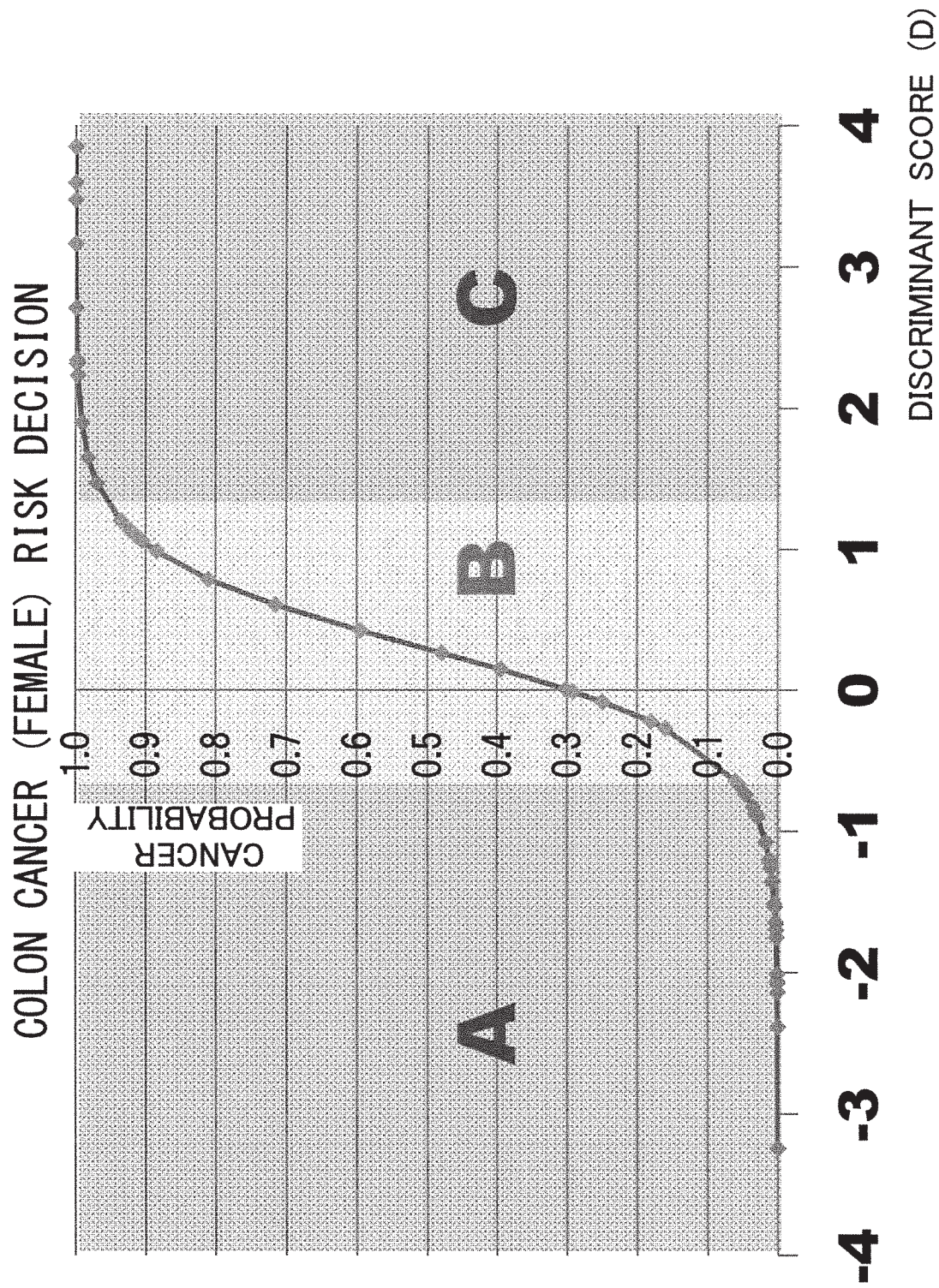


FIG. 31
BREAST CANCER RISK DECISION

