表7-3 都道府県別風疹HI抗体保有状況 [女性＋男性]

Table 7-3 DISTRIBUTION OF RUBELLA HEMAGGLUTINATION INHIBITION (HI) ANTIBODY ACQUISITION RATE BY PREFECTURE [FEMALE+MALE]

年齢群 (歳) AGE GROUP (YEARS)	合計 TOTAL	HI抗体価 HI ANTIBODY TITER										
		<8	8 / 15	16 / 31	32 / 63	64 / 127	128 / 255	256 / 511	512 / 1023	1024 /	G.M.	Log2 (G.M.)
宮城 04-MIYAGI												
合計 TOTAL	308	29	3	15	39	75	60	74	9	4	98.4	6.6
0	1	0	0	0	0	0	1	0	0	0	128.0	7.0
1-4	32	6	0	0	4	6	4	12	0	0	121.4	6.9
5-9	39	3	0	2	5	9	7	11	1	1	107.6	6.7
10-14	23	3	1	2	4	5	4	4	0	0	66.3	6.1
15-19	92	6	2	3	7	21	23	25	3	2	113.4	6.8
20-24	26	1	0	2	4	14	2	2	1	0	65.8	6.0
25-29	21	1	0	0	1	6	8	5	0	0	115.4	6.9
30-34	14	2	0	0	0	5	4	1	2	0	128.0	7.0
35-39	8	1	0	1	0	2	1	2	0	1	128.0	7.0
40-	52	6	0	5	14	7	6	12	2	0	76.7	6.3
不明 UNKNOWN	0											
埼玉 11-SAITAMA												
合計 TOTAL	101	3	13	25	33	16	10	1	0	0	29.4	4.9
0	0											
1-4	0											
5-9	0											
10-14	0											
15-19	0											
20-24	5	0	0	2	2	1	0	0	0	0	27.9	4.8
25-29	17	1	1	5	5	3	2	0	0	0	32.0	5.0
30-34	28	0	2	9	12	3	2	0	0	0	27.6	4.8
35-39	11	0	1	3	1	3	2	1	0	0	43.9	5.5
40-	40	2	9	6	13	6	4	0	0	0	26.7	4.7
不明 UNKNOWN	0											
新潟 15-NIIGATA												
合計 TOTAL	287	0	11	15	50	68	56	54	22	11	94.6	6.6
0	1	0	0	0	0	0	0	1	0	0	256.0	8.0
1-4	24	0	0	0	2	5	2	9	6	0	181.0	7.5
5-9	32	0	1	2	7	11	4	6	0	1	72.9	6.2
10-14	39	0	2	2	8	9	6	10	2	0	82.1	6.4
15-19	39	0	0	1	4	9	13	9	1	2	121.4	6.9
20-24	0											
25-29	1	0	0	0	1	0	0	0	0	0	32.0	5.0
30-34	30	0	0	3	4	7	7	7	1	1	99.3	6.6
35-39	23	0	0	1	2	4	10	4	0	2	124.2	7.0
40-	98	0	8	6	22	23	14	8	12	5	78.0	6.3
不明 UNKNOWN	0											
長野 20-NAGANO												
合計 TOTAL	373	49	29	97	126	63	9	0	0	0	27.3	4.8
0	0											
1-4	36	8	0	8	14	6	0	0	0	0	30.5	4.9
5-9	37	4	7	8	15	3	0	0	0	0	21.5	4.4
10-14	51	4	12	19	14	2	0	0	0	0	17.5	4.1
15-19	48	4	2	16	15	10	1	0	0	0	28.2	4.8
20-24	45	4	2	10	17	10	2	0	0	0	32.0	5.0
25-29	40	5	2	7	17	8	1	0	0	0	31.4	5.0
30-34	39	8	1	11	13	5	1	0	0	0	28.0	4.8
35-39	38	5	2	8	12	9	2	0	0	0	32.7	5.0
40-	39	7	1	10	9	10	2	0	0	0	33.4	5.1
不明 UNKNOWN	0											
三重 24-MIE												
合計 TOTAL	279	51	7	7	15	40	39	39	42	39	191.2	7.6
0	4	3	0	0	1	0	0	0	0	0	32.0	5.0
1-4	32	8	1	0	0	1	5	5	5	7	332.0	8.4
5-9	44	4	1	2	5	12	9	4	3	4	109.5	6.8
10-14	25	1	0	0	4	6	5	4	3	2	135.6	7.1
15-19	7	0	0	1	0	2	0	1	1	2	210.0	7.7
20-24	30	10	0	0	1	2	2	1	3	11	494.6	9.0
25-29	47	9	0	2	2	2	7	6	16	3	246.8	7.9
30-34	40	8	2	0	0	6	5	9	6	4	197.4	7.6
35-39	17	5	1	1	1	3	2	1	1	2	107.6	6.7
40-	33	3	2	1	1	6	4	8	4	4	165.0	7.4
不明 UNKNOWN	0											

鳥取 31-TOTTORI												
合計 TOTAL	105	22	4	13	19	22	19	6	0	0	51.5	5.7
0	4	4	0	0	0	0	0	0	0	0		
1-4	20	9	0	3	2	2	4	0	0	0	49.7	5.6
5-9	13	3	1	1	3	1	4	0	0	0	48.5	5.6
10-14	10	0	2	3	1	2	2	0	0	0	29.9	4.9
15-19	2	0	0	1	0	1	0	0	0	0	32.0	5.0
20-24	4	0	0	0	2	0	2	0	0	0	64.0	6.0
25-29	13	0	1	1	4	4	2	1	0	0	49.0	5.6
30-34	6	1	0	2	2	0	1	0	0	0	32.0	5.0
35-39	0											
40-	31	4	0	1	5	12	4	5	0	0	76.6	6.3
不明 UNKNOWN	2	1	0	1	0	0	0	0	0	0	16.0	4.0
山口 35-YAMAGUCHI												
合計 TOTAL	440	8	44	21	80	127	107	46	6	1	60.7	5.9
0	0											
1-4	33	0	0	1	4	12	11	5	0	0	87.7	6.5
5-9	36	0	5	0	8	16	6	0	1	0	48.9	5.6
10-14	73	3	8	7	21	19	13	2	0	0	42.2	5.4
15-19	42	2	6	2	9	9	7	6	1	0	54.8	5.8
20-24	43	0	6	1	6	10	15	4	0	1	65.0	6.0
25-29	46	0	4	2	7	15	11	6	1	0	67.0	6.1
30-34	41	1	2	1	9	13	12	2	1	0	66.3	6.1
35-39	42	1	4	1	5	10	8	12	1	0	83.9	6.4
40-	84	1	9	6	11	23	24	9	1	0	61.4	5.9
不明 UNKNOWN	0											
徳島 36-TOKUSHIMA												
合計 TOTAL	332	75	7	16	52	74	65	35	6	2	74.4	6.2
0	3	2	0	0	1	0	0	0	0	0	32.0	5.0
1-4	52	21	0	1	5	4	17	4	0	0	95.7	6.6
5-9	41	6	2	5	10	9	7	2	0	0	47.6	5.6
10-14	26	8	1	2	5	7	2	1	0	0	47.0	5.6
15-19	1	0	0	0	0	1	0	0	0	0	64.0	6.0
20-24	38	5	0	3	6	10	9	5	0	0	74.1	6.2
25-29	48	9	2	1	6	16	4	8	1	1	80.6	6.3
30-34	42	9	0	2	9	11	8	3	0	0	65.4	6.0
35-39	30	7	0	0	4	6	7	6	0	0	100.6	6.7
40-	51	8	2	2	6	10	11	6	5	1	97.3	6.6
不明 UNKNOWN	0											
福岡 40-FUKUOKA												
合計 TOTAL	394	69	7	18	45	78	88	59	16	14	100.6	6.7
0	3	1	0	1	0	0	1	0	0	0	45.3	5.5
1-4	30	11	0	0	0	0	4	8	7	0	285.6	8.2
5-9	55	12	2	4	5	11	8	10	0	3	89.8	6.5
10-14	38	7	2	3	7	8	6	2	3	0	64.0	6.0
15-19	47	6	0	1	4	11	10	10	2	3	130.2	7.0
20-24	43	8	0	2	0	10	15	4	2	2	123.0	6.9
25-29	42	8	0	3	6	14	5	4	1	1	75.3	6.2
30-34	42	6	0	1	9	6	13	6	0	1	90.5	6.5
35-39	40	4	1	0	6	5	12	9	1	2	120.8	6.9
40-	54	6	2	3	8	13	14	6	0	2	81.8	6.4
不明 UNKNOWN	0											
沖縄 47-OKINAWA												
合計 TOTAL	364	84	18	46	68	80	49	17	2	0	47.0	5.6
0	10	7	2	0	1	0	0	0	0	0	12.7	3.7
1-4	29	20	0	1	1	5	2	0	0	0	59.3	5.9
5-9	49	13	3	12	7	8	5	1	0	0	33.9	5.1
10-14	28	10	2	2	7	3	3	1	0	0	40.3	5.3
15-19	54	7	0	8	13	15	7	3	1	0	52.8	5.7
20-24	40	3	1	2	7	14	10	3	0	0	66.4	6.1
25-29	41	7	1	3	7	12	8	2	1	0	62.7	6.0
30-34	39	5	0	6	12	7	7	2	0	0	49.1	5.6
35-39	36	10	4	4	4	9	4	1	0	0	39.6	5.3
40-	38	2	5	8	9	7	3	4	0	0	36.6	5.2
不明 UNKNOWN	0											

表8-1 予防接種歴別風疹HI抗体保有状況 [女性]

Table 8-1 DISTRIBUTION OF RUBELLA HEMAGGLUTINATION INHIBITION (HI) ANTIBODY ACQUISITION RATE BY VACCINATION HISTORY [FEMALE]

年齢 (歳) AGE (YEARS)	合計 TOTAL	HI抗体価 HI ANTIBODY TITER										
		<8	8 ／ 15	16 ／ 31	32 ／ 63	64 ／ 127	128 ／ 255	256 ／ 511	512 ／ 1023	1024 ／	G.M.	Log2 (G.M.)
無 [NON-VACCINEE]												
合計 TOTAL	189	51	14	14	31	22	27	23	5	2	63.0	6.0
0	11	7	2	0	1	0	0	1	0	0	26.9	4.7
1	10	9	0	1	0	0	0	0	0	0	16.0	4.0
2	10	10	0	0	0	0	0	0	0	0		
3	1	1	0	0	0	0	0	0	0	0		
4	3	2	0	0	1	0	0	0	0	0	32.0	5.0
5	2	2	0	0	0	0	0	0	0	0		
6	1	1	0	0	0	0	0	0	0	0		
7	2	1	0	1	0	0	0	0	0	0	16.0	4.0
8	2	1	1	0	0	0	0	0	0	0	8.0	3.0
9	4	3	1	0	0	0	0	0	0	0	8.0	3.0
10	2	2	0	0	0	0	0	0	0	0		
11	4	1	0	0	2	0	1	0	0	0	50.8	5.7
13	4	2	0	0	1	0	1	0	0	0	64.0	6.0
14	8	3	2	1	1	0	1	0	0	0	21.1	4.4
15	7	1	3	2	1	0	0	0	0	0	12.7	3.7
16	1	0	0	0	0	0	1	0	0	0	128.0	7.0
17	5	1	0	0	1	1	0	1	1	0	128.0	7.0
18	8	1	0	0	1	1	3	2	0	0	115.9	6.9
19	3	0	0	0	1	0	0	2	0	0	128.0	7.0
20	4	1	0	1	1	0	0	1	0	0	50.8	5.7
21	1	0	0	0	0	0	0	0	1	0	512.0	9.0
22	2	0	0	1	0	0	0	0	1	0	90.5	6.5
23	4	0	0	0	2	1	1	0	0	0	53.8	5.7
24	2	0	0	0	0	0	1	1	0	0	181.0	7.5
26	1	1	0	0	0	0	0	0	0	0		
27	1	0	0	0	0	1	0	0	0	0	64.0	6.0
28	5	0	1	0	2	2	0	0	0	0	32.0	5.0
29	1	0	0	0	1	0	0	0	0	0	32.0	5.0
30	4	0	0	0	1	1	2	0	0	0	76.1	6.2
32	2	0	0	0	0	1	1	0	0	0	90.5	6.5
33	1	0	0	0	0	0	0	1	0	0	256.0	8.0
34	2	0	0	0	1	0	0	1	0	0	90.5	6.5
35	3	0	0	0	1	1	0	1	0	0	80.6	6.3
36	2	0	0	0	0	0	1	1	0	0	181.0	7.5
37	2	0	0	0	1	0	0	0	1	0	128.0	7.0
38	3	0	0	0	0	1	1	1	0	0	128.0	7.0
39	6	0	0	0	0	1	2	3	0	0	161.3	7.3
40-49	23	0	2	3	3	4	5	4	0	2	81.4	6.3
50-	32	1	2	4	8	7	6	3	1	0	54.7	5.8

有 [VACCINEE]												
合計 TOTAL	597	19	27	61	107	158	113	80	18	14	70.0	6.1
1	13	1	0	1	2	2	0	2	2	3	203.2	7.7
2	19	1	1	0	2	4	5	4	2	0	109.7	6.8
3	28	1	0	1	2	7	7	6	3	1	131.3	7.0
4	27	1	0	1	5	8	4	5	2	1	100.7	6.7
5	29	1	2	1	5	6	6	7	0	1	84.0	6.4
6	19	0	0	2	4	7	3	3	0	0	66.4	6.1
7	18	1	1	2	1	5	4	2	1	1	85.1	6.4
8	27	0	2	5	4	8	5	2	0	1	53.5	5.7
9	32	2	3	4	8	7	5	3	0	0	46.3	5.5
10	13	1	0	0	3	7	1	1	0	0	64.0	6.0
11	6	0	1	1	1	0	1	2	0	0	57.0	5.8
12	15	0	2	2	2	3	3	2	1	0	58.4	5.9
13	26	0	1	7	6	6	3	2	1	0	45.3	5.5
14	36	0	3	5	11	8	5	2	1	1	48.9	5.6
15	25	1	1	6	6	5	4	2	0	0	44.0	5.5
16	32	0	2	2	3	9	6	7	2	1	92.5	6.5
17	21	0	0	2	1	3	7	7	1	0	119.8	6.9
18	12	0	0	0	3	2	4	3	0	0	95.9	6.6
19	13	1	0	1	2	5	3	1	0	0	67.8	6.1
20	19	0	0	1	1	11	2	3	0	1	88.9	6.5
21	6	0	0	0	2	2	1	0	0	1	90.5	6.5
22	3	0	0	0	1	0	1	1	0	0	101.6	6.7
23	10	1	0	2	1	2	3	1	0	0	64.0	6.0
24	6	0	0	1	1	0	3	1	0	0	80.6	6.3
25	6	1	0	1	1	3	0	0	0	0	42.2	5.4
26	8	0	1	0	3	2	0	1	1	0	58.7	5.9
27	6	1	0	1	1	1	1	0	1	0	73.5	6.2
28	9	0	0	0	2	4	3	0	0	0	69.1	6.1
29	13	0	1	0	4	3	4	1	0	0	60.7	5.9
30	16	1	0	4	2	6	2	1	0	0	48.5	5.6
31	8	0	0	3	2	0	3	0	0	0	41.5	5.4
32	4	0	0	0	1	2	1	0	0	0	64.0	6.0
33	5	1	0	0	1	2	1	0	0	0	64.0	6.0
34	6	0	0	0	1	3	0	2	0	0	90.5	6.5
35	7	0	0	0	1	3	1	1	0	1	115.9	6.9
36	7	0	3	0	1	1	2	0	0	0	29.0	4.9
37	8	0	0	0	3	1	3	1	0	0	76.1	6.2
38	5	0	0	2	0	1	1	0	0	1	73.5	6.2
39	9	0	1	1	3	1	2	1	0	0	47.0	5.6
40-49	18	2	1	2	3	6	2	2	0	0	53.8	5.7
50-	7	1	1	0	1	2	1	1	0	0	57.0	5.8

表8-2 予防接種歴別風疹HI抗体保有状況 [男性]

Table 8-2 DISTRIBUTION OF RUBELLA HEMAGGLUTINATION INHIBITION (HI) ANTIBODY ACQUISITION RATE BY VACCINATION HISTORY [MALE]

年齢 (歳) AGE (YEARS)	合計 TOTAL	HI抗体価 HI ANTIBODY TITER										
		<8	8 / 15	16 / 31	32 / 63	64 / 127	128 / 255	256 / 511	512 / 1023	1024 /	G.M.	Log2 (G.M.)
無 [NON-VACCINEE]												
合計 TOTAL	151	65	9	6	15	20	21	13	2	0	63.5	6.0
0	10	6	0	1	1	0	2	0	0	0	53.8	5.7
1	12	11	0	0	0	0	0	1	0	0	256.0	8.0
2	7	6	0	0	0	0	1	0	0	0	128.0	7.0
3	8	8	0	0	0	0	0	0	0	0		
4	7	6	0	1	0	0	0	0	0	0	16.0	4.0
5	7	6	0	0	0	1	0	0	0	0	64.0	6.0
6	2	1	0	0	1	0	0	0	0	0	32.0	5.0
7	3	2	1	0	0	0	0	0	0	0	8.0	3.0
8	4	4	0	0	0	0	0	0	0	0		
12	1	1	0	0	0	0	0	0	0	0		
13	1	1	0	0	0	0	0	0	0	0		
14	6	2	3	0	0	0	1	0	0	0	16.0	4.0
15	4	2	1	0	1	0	0	0	0	0	16.0	4.0
16	3	0	1	0	0	2	0	0	0	0	32.0	5.0
17	3	0	0	0	1	1	1	0	0	0	64.0	6.0
18	4	0	0	0	0	0	0	2	2	0	362.0	8.5
20	1	0	0	0	0	0	1	0	0	0	128.0	7.0
21	1	0	0	0	0	1	0	0	0	0	64.0	6.0
23	3	2	0	0	0	0	1	0	0	0	128.0	7.0
24	3	1	0	1	1	0	0	0	0	0	22.6	4.5
25	2	0	1	0	0	0	0	1	0	0	45.3	5.5
26	2	0	0	0	1	0	0	1	0	0	90.5	6.5
27	1	0	0	0	0	1	0	0	0	0	64.0	6.0
28	1	0	0	0	1	0	0	0	0	0	32.0	5.0
31	2	1	0	0	1	0	0	0	0	0	32.0	5.0
32	1	1	0	0	0	0	0	0	0	0		
34	1	0	0	0	0	0	1	0	0	0	128.0	7.0
35	2	1	0	0	1	0	0	0	0	0	32.0	5.0
36	4	1	0	0	0	1	1	1	0	0	128.0	7.0
37	1	0	0	0	0	1	0	0	0	0	64.0	6.0
38	2	1	0	0	0	0	0	1	0	0	256.0	8.0
39	1	0	0	0	0	0	0	1	0	0	256.0	8.0
40-49	10	0	0	0	2	3	3	2	0	0	90.5	6.5
50-	31	1	2	3	4	9	9	3	0	0	62.5	6.0

有 [VACCINEE]												
合計 TOTAL	447	12	23	39	105	103	78	59	17	11	68.1	6.1
1	15	0	0	0	2	1	5	5	2	0	154.0	7.3
2	25	0	0	1	2	2	10	6	2	2	155.4	7.3
3	35	0	0	3	6	7	6	9	4	0	102.9	6.7
4	32	0	0	4	7	6	9	5	1	0	74.5	6.2
5	29	0	0	1	8	8	4	5	1	2	91.6	6.5
6	25	0	1	1	6	6	4	4	2	1	86.8	6.4
7	19	1	1	2	4	6	3	1	0	1	59.3	5.9
8	32	1	1	4	8	11	4	2	1	0	53.5	5.7
9	28	0	5	1	9	5	3	4	0	1	48.7	5.6
10	15	0	0	2	4	4	2	2	0	1	70.2	6.1
11	12	1	2	3	3	1	1	1	0	0	30.0	4.9
12	10	0	2	2	2	2	2	0	0	0	32.0	5.0
13	24	0	2	3	8	6	3	2	0	0	44.0	5.5
14	40	2	3	4	12	13	4	0	2	0	45.3	5.5
15	24	2	2	4	5	5	4	1	0	1	48.2	5.6
16	11	0	0	0	1	3	3	4	0	0	120.2	6.9
17	13	0	0	1	0	7	2	2	0	1	98.0	6.6
18	8	0	0	0	2	2	3	1	0	0	83.0	6.4
19	3	0	0	1	0	1	1	0	0	0	50.8	5.7
20	2	0	0	0	1	1	0	0	0	0	45.3	5.5
22	1	0	0	0	0	0	1	0	0	0	128.0	7.0
23	2	0	0	0	0	1	1	0	0	0	90.5	6.5
24	1	0	0	0	1	0	0	0	0	0	32.0	5.0
25	2	0	0	0	1	0	0	1	0	0	90.5	6.5
27	1	0	0	0	1	0	0	0	0	0	32.0	5.0
28	2	1	0	0	1	0	0	0	0	0	32.0	5.0
29	2	0	0	0	1	1	0	0	0	0	45.3	5.5
30	2	1	1	0	0	0	0	0	0	0	8.0	3.0
31	3	0	0	0	1	0	0	1	1	0	161.3	7.3
32	3	2	0	0	0	1	0	0	0	0	64.0	6.0
33	1	0	0	0	1	0	0	0	0	0	32.0	5.0
34	2	0	0	0	0	0	1	1	0	0	181.0	7.5
36	5	0	0	1	1	0	1	2	0	0	84.4	6.4
39	1	0	1	0	0	0	0	0	0	0	8.0	3.0
40-49	10	1	0	1	4	2	0	0	1	1	69.1	6.1
50-	7	0	2	0	3	1	1	0	0	0	29.0	4.9

表8-3 予防接種歴別風疹HI抗体保有状況［女性＋男性］

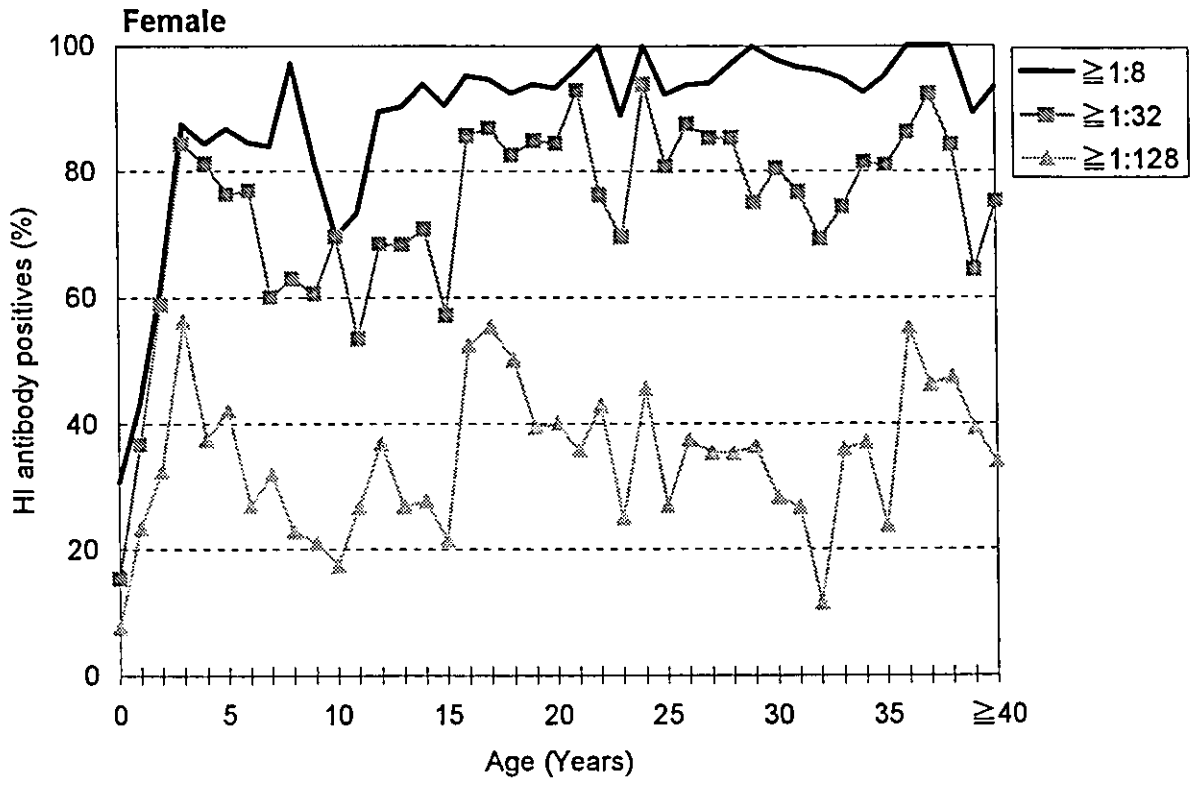
Table 8-3 DISTRIBUTION OF RUBELLA HEMAGGLUTINATION INHIBITION (HI) ANTIBODY ACQUISITION RATE BY VACCINATION HISTORY [FEMALE+MALE]

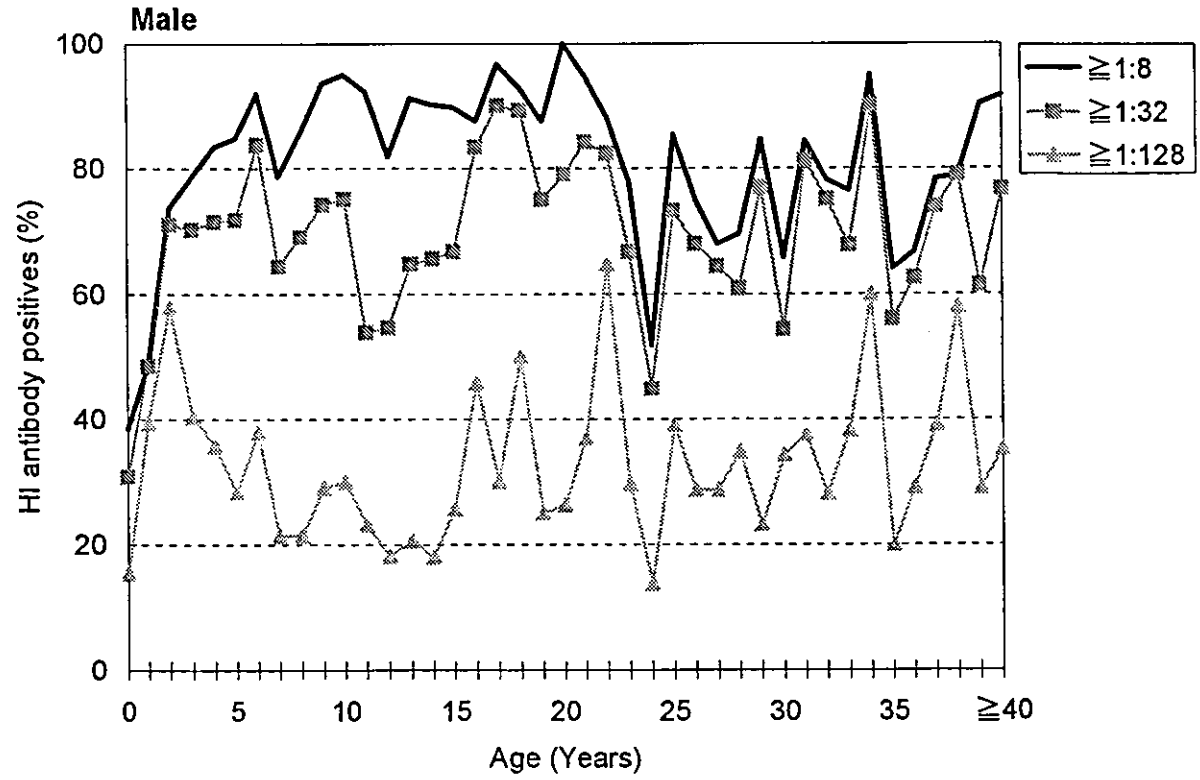
年齢（歳） AGE (YEARS)	合計 TOTAL	HI抗体価 HI ANTIBODY TITER										
		<8	8 ／ 15	16 ／ 31	32 ／ 63	64 ／ 127	128 ／ 255	256 ／ 511	512 ／ 1023	1024 ／	G.M.	Log2 (G.M.)
無 [NON-VACCINEE]												
合計 TOTAL	340	116	23	20	46	42	48	36	7	2	63.2	6.0
0	21	13	2	1	2	0	2	1	0	0	38.1	5.3
1	22	20	0	1	0	0	0	1	0	0	64.0	6.0
2	17	16	0	0	0	0	1	0	0	0	128.0	7.0
3	9	9	0	0	0	0	0	0	0	0		
4	10	8	0	1	1	0	0	0	0	0	22.6	4.5
5	9	8	0	0	0	1	0	0	0	0	64.0	6.0
6	3	2	0	0	1	0	0	0	0	0	32.0	5.0
7	5	3	1	1	0	0	0	0	0	0	11.3	3.5
8	6	5	1	0	0	0	0	0	0	0	8.0	3.0
9	4	3	1	0	0	0	0	0	0	0	8.0	3.0
10	2	2	0	0	0	0	0	0	0	0		
11	4	1	0	0	2	0	1	0	0	0	50.8	5.7
12	1	1	0	0	0	0	0	0	0	0		
13	5	3	0	0	1	0	1	0	0	0	64.0	6.0
14	14	5	5	1	1	0	2	0	0	0	18.7	4.2
15	11	3	4	2	2	0	0	0	0	0	13.5	3.8
16	4	0	1	0	0	2	1	0	0	0	45.3	5.5
17	8	1	0	0	2	2	1	1	1	0	95.1	6.6
18	12	1	0	0	1	1	3	4	2	0	175.4	7.5
19	3	0	0	0	1	0	0	2	0	0	128.0	7.0
20	5	1	0	1	1	0	1	1	0	0	64.0	6.0
21	2	0	0	0	0	1	0	0	1	0	181.0	7.5
22	2	0	0	1	0	0	0	0	1	0	90.5	6.5
23	7	2	0	0	2	1	2	0	0	0	64.0	6.0
24	5	1	0	1	1	0	1	1	0	0	64.0	6.0
25	2	0	1	0	0	0	0	1	0	0	45.3	5.5
26	3	1	0	0	1	0	0	1	0	0	90.5	6.5
27	2	0	0	0	0	2	0	0	0	0	64.0	6.0
28	6	0	1	0	3	2	0	0	0	0	32.0	5.0
29	1	0	0	0	1	0	0	0	0	0	32.0	5.0
30	4	0	0	0	1	1	2	0	0	0	76.1	6.2
31	2	1	0	0	1	0	0	0	0	0	32.0	5.0
32	3	1	0	0	0	1	1	0	0	0	90.5	6.5
33	1	0	0	0	0	0	0	1	0	0	256.0	8.0
34	3	0	0	0	1	0	1	1	0	0	101.6	6.7
35	5	1	0	0	2	1	0	1	0	0	64.0	6.0
36	6	1	0	0	0	1	2	2	0	0	147.0	7.2
37	3	0	0	0	1	1	0	0	1	0	101.6	6.7
38	5	1	0	0	0	1	1	2	0	0	152.2	7.2
39	7	0	0	0	0	1	2	4	0	0	172.3	7.4
40-49	33	0	2	3	5	7	8	6	0	2	84.1	6.4
50-	63	2	4	7	12	16	15	6	1	0	58.4	5.9

有 [VACCINEE]												
合計 TOTAL	1044	31	50	100	212	261	191	139	35	25	69.2	6.1
1	28	1	0	1	4	3	5	7	4	3	174.2	7.4
2	44	1	1	1	4	6	15	10	4	2	134.3	7.1
3	63	1	0	4	8	14	13	15	7	1	114.5	6.8
4	59	1	0	5	12	14	13	10	3	1	85.3	6.4
5	58	1	2	2	13	14	10	12	1	3	87.8	6.5
6	44	0	1	3	10	13	7	7	2	1	77.3	6.3
7	37	2	2	4	5	11	7	3	1	2	70.7	6.1
8	59	1	3	9	12	19	9	4	1	1	53.5	5.7
9	60	2	8	5	17	12	8	7	0	1	47.5	5.6
10	28	1	0	2	7	11	3	3	0	1	67.4	6.1
11	18	1	3	4	4	1	2	3	0	0	37.7	5.2
12	25	0	4	4	4	5	5	2	1	0	45.9	5.5
13	50	0	3	10	14	12	6	4	1	0	44.6	5.5
14	76	2	6	9	23	21	9	2	3	1	47.0	5.6
15	49	3	3	10	11	10	8	3	0	1	45.9	5.5
16	43	0	2	2	4	12	9	11	2	1	98.9	6.6
17	34	0	0	3	1	10	9	9	1	1	111.0	6.8
18	20	0	0	0	5	4	7	4	0	0	90.5	6.5
19	16	1	0	2	2	6	4	1	0	0	64.0	6.0
20	21	0	0	1	2	12	2	3	0	1	83.3	6.4
21	6	0	0	0	2	2	1	0	0	1	90.5	6.5
22	4	0	0	0	1	0	2	1	0	0	107.6	6.7
23	12	1	0	2	1	3	4	1	0	0	68.2	6.1
24	7	0	0	1	2	0	3	1	0	0	70.7	6.1
25	8	1	0	1	2	3	0	1	0	0	52.5	5.7
26	8	0	1	0	3	2	0	1	1	0	58.7	5.9
27	7	1	0	1	2	1	1	0	1	0	64.0	6.0
28	11	1	0	0	3	4	3	0	0	0	64.0	6.0
29	15	0	1	0	5	4	4	1	0	0	58.4	5.9
30	18	2	1	4	2	6	2	1	0	0	43.3	5.4
31	11	0	0	3	3	0	3	1	1	0	60.1	5.9
32	7	2	0	0	1	3	1	0	0	0	64.0	6.0
33	6	1	0	0	2	2	1	0	0	0	55.7	5.8
34	8	0	0	0	1	3	1	3	0	0	107.6	6.7
35	7	0	0	0	1	3	1	1	0	1	115.9	6.9
36	12	0	3	1	2	1	3	2	0	0	45.3	5.5
37	8	0	0	0	3	1	3	1	0	0	76.1	6.2
38	5	0	0	2	0	1	1	0	0	1	73.5	6.2
39	10	0	2	1	3	1	2	1	0	0	39.4	5.3
40-49	28	3	1	3	7	8	2	2	1	1	58.9	5.9
50-	14	1	3	0	4	3	2	1	0	0	39.6	5.3

図1. 年齢別風疹HI抗体保有状況, 2003年

Fig. 1 Age distribution of rubella HI antibody positives, 2003

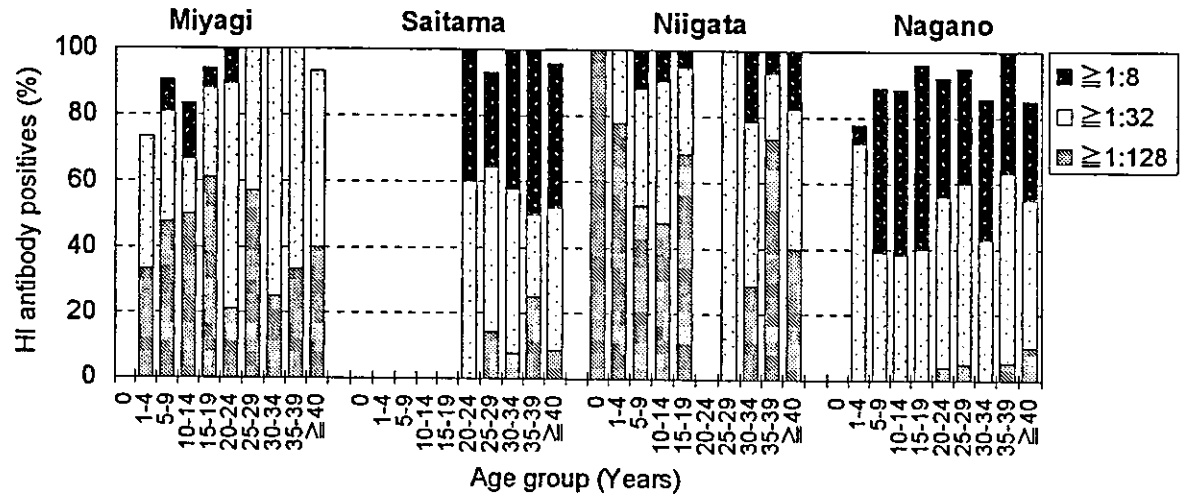


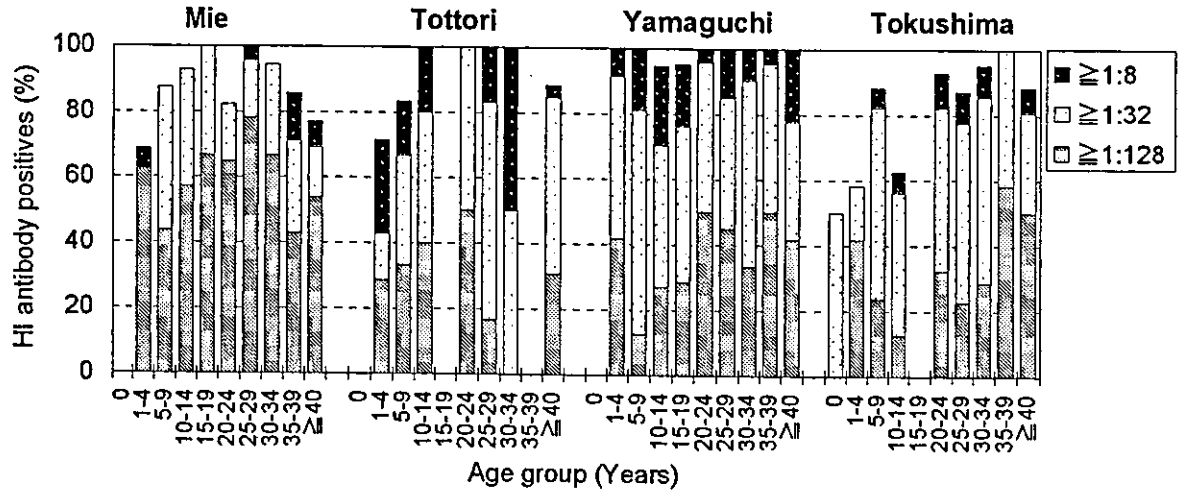


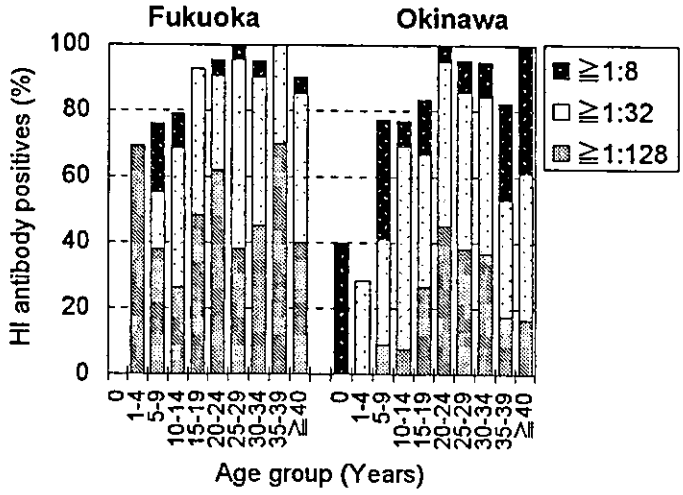
流行予測2003

図2-1. 県別風疹HI抗体保有状況（女性），2003年

Fig. 2-1 Age group distribution of rubella HI antibody positives in each prefecture (Female), 2003



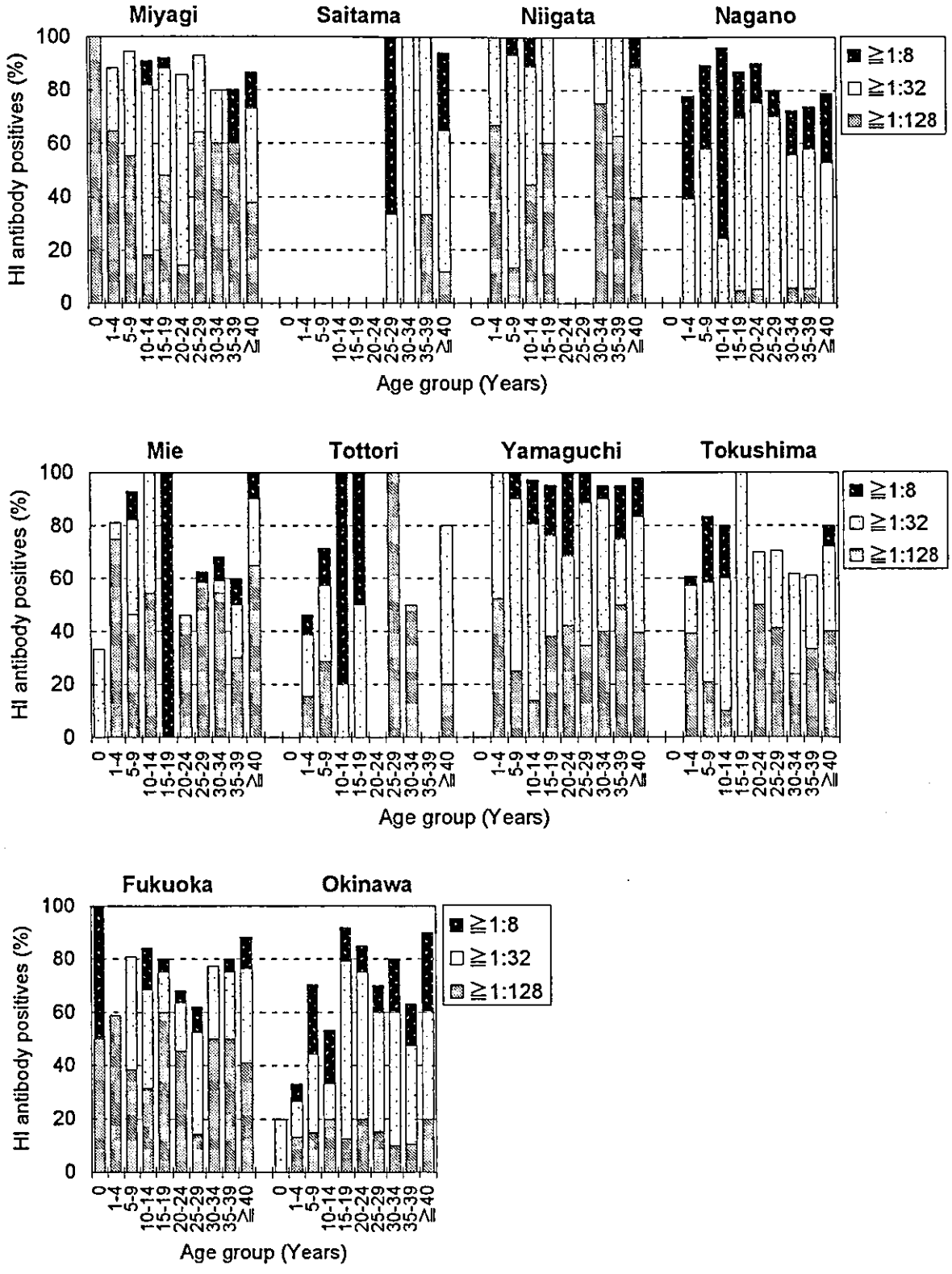




〈流行予測2003〉

図2-2. 県別風疹HI抗体保有状況（男性），2003年

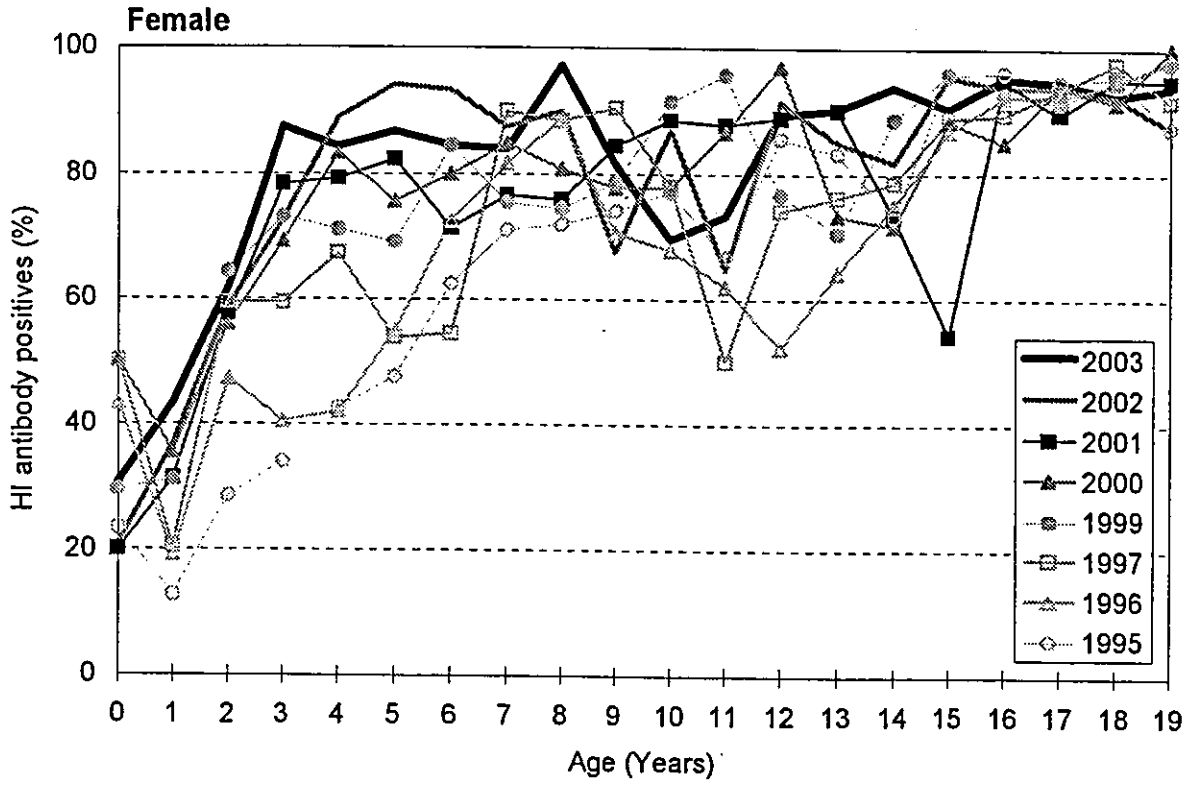
Fig. 2-2 Age group distribution of rubella HI antibody positives in each prefecture (Male), 2003

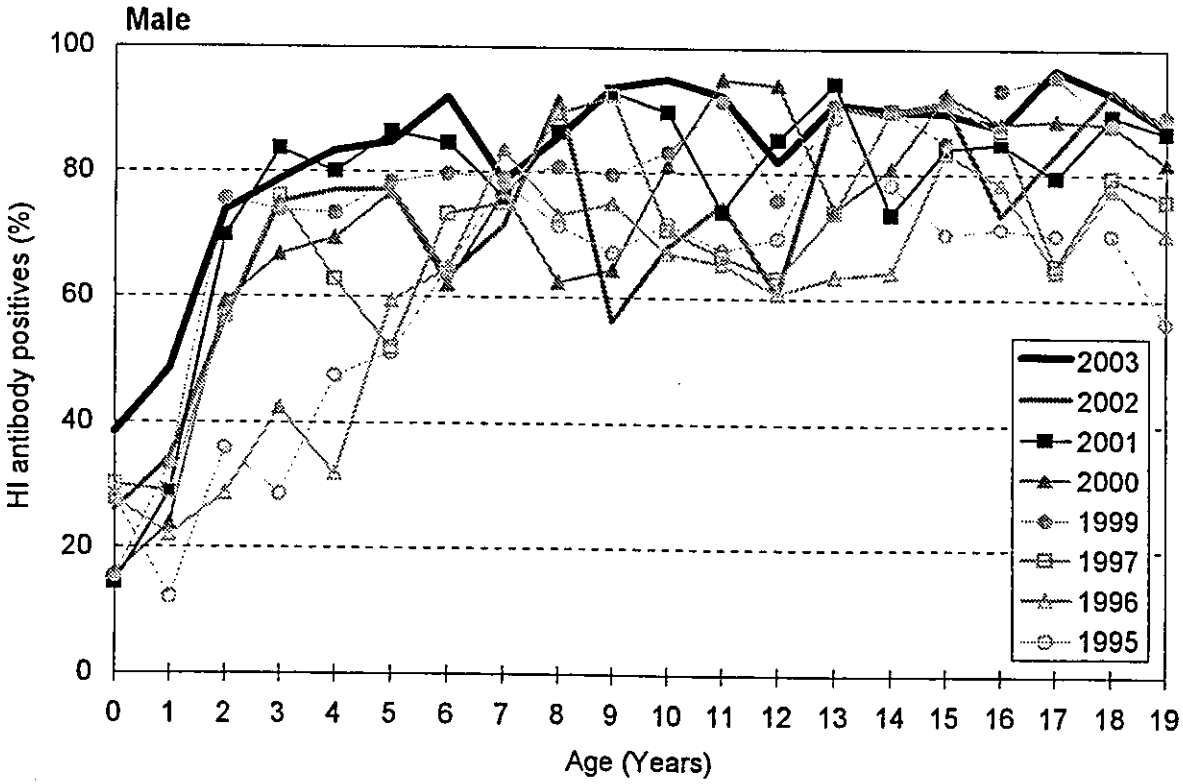


流行予測2003

図3. 風疹HI抗体保有状況（≧1:8）の年次別比較

Fig. 3 Change of age specific rubella HI antibody prevalence in different years (≧1:8)

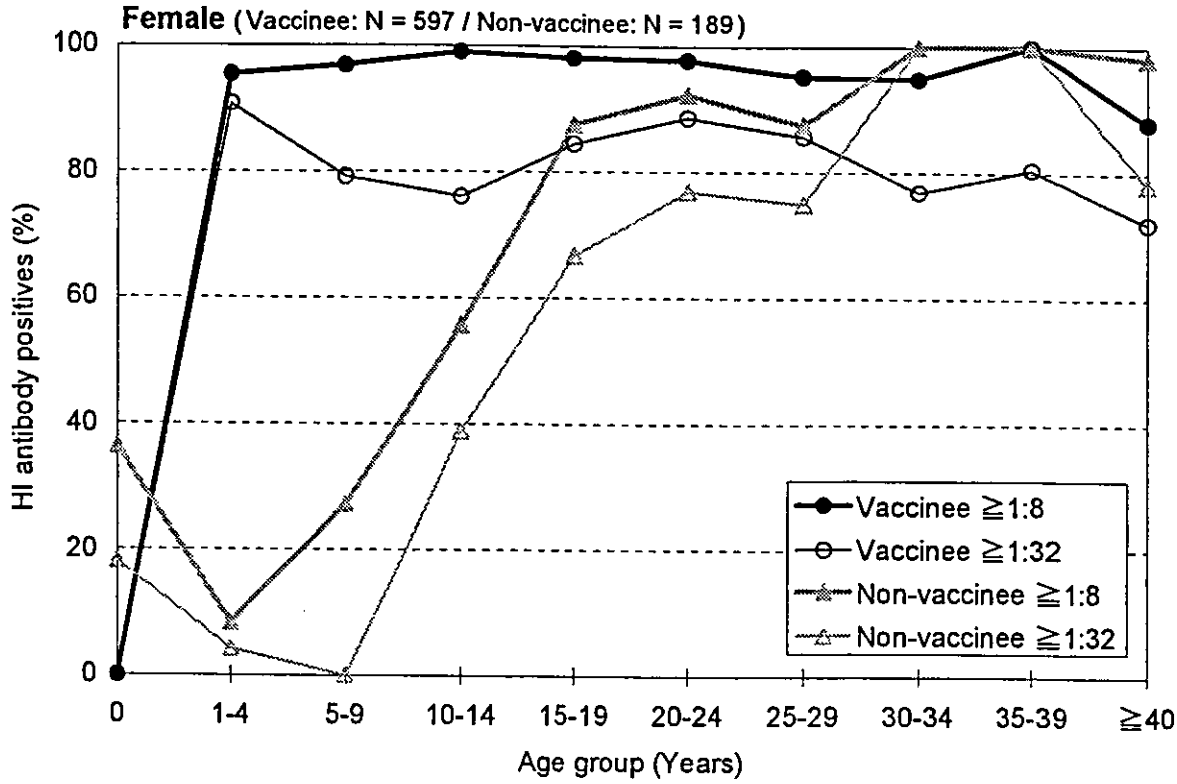


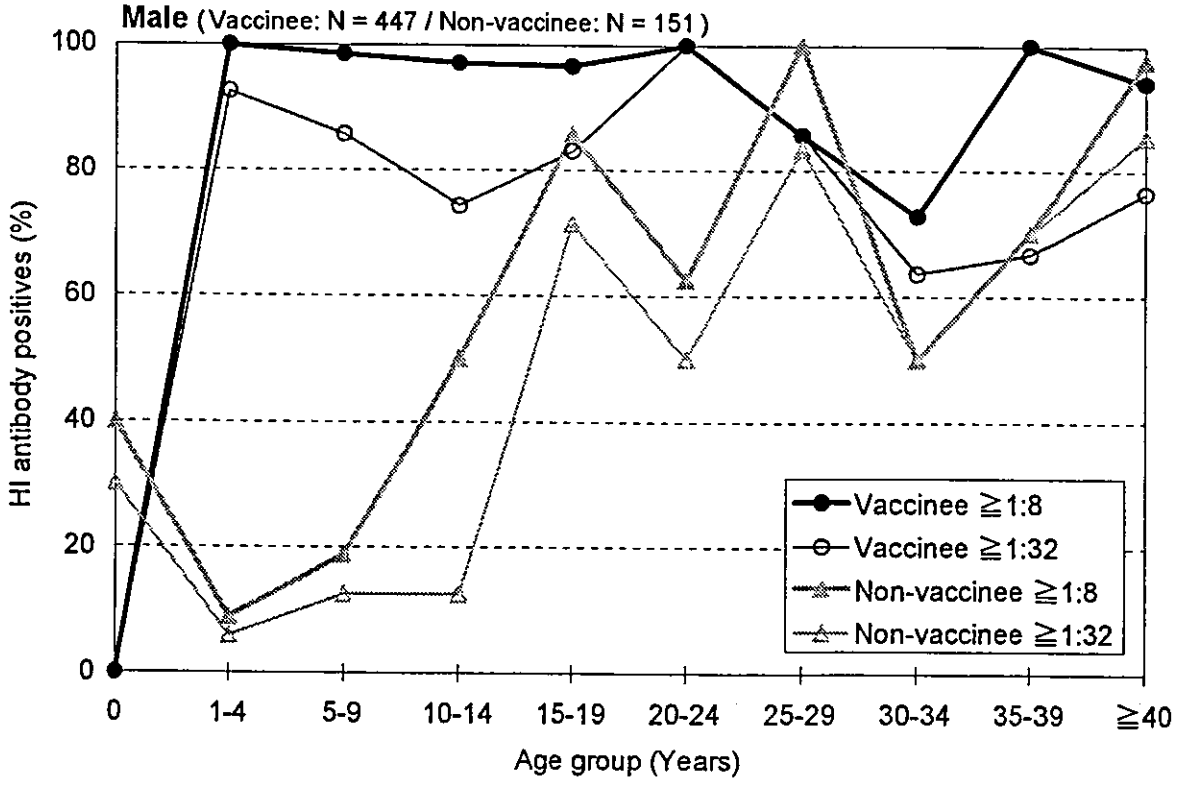


流行予測2003

図4. 予防接種歴別風疹HI抗体保有状況，2003年

Fig. 4 Age group distribution of rubella HI antibody positives by history of vaccination, 2003





流行予測2003

図5. 乳児月齢群別風疹HI抗体保有状況, 2003年

Fig. 5 Age group distribution of rubella HI antibody positives in infants, 2003

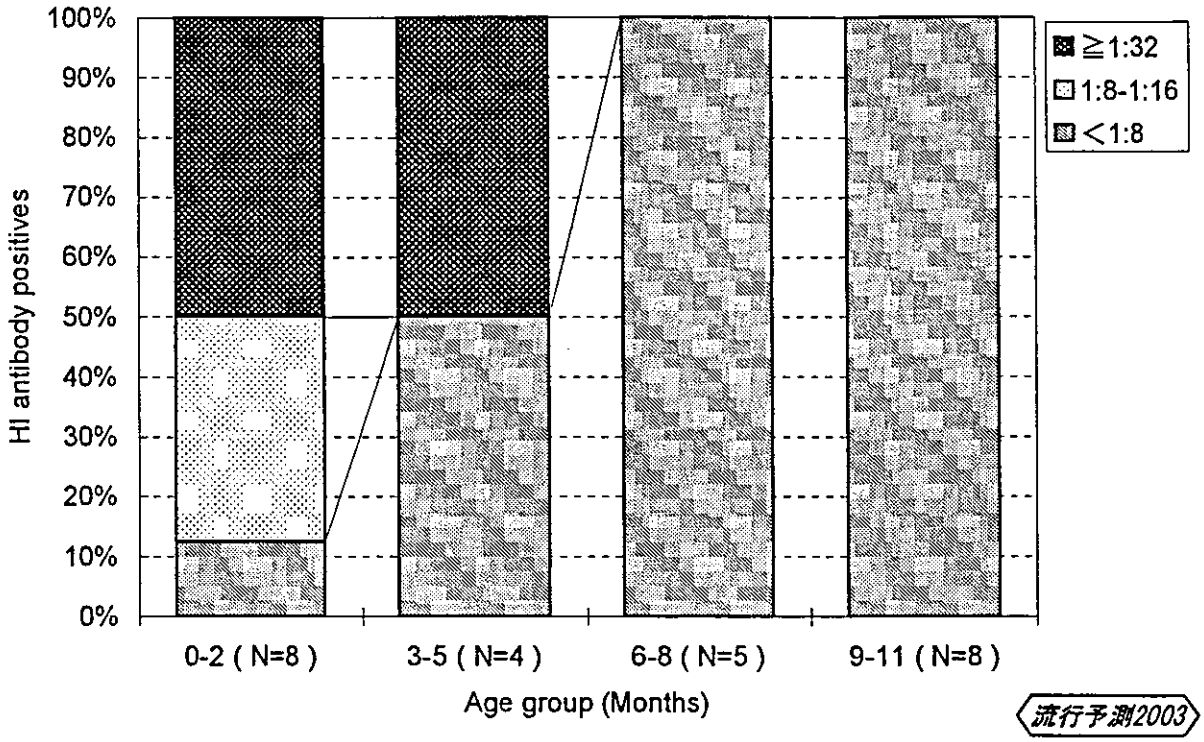
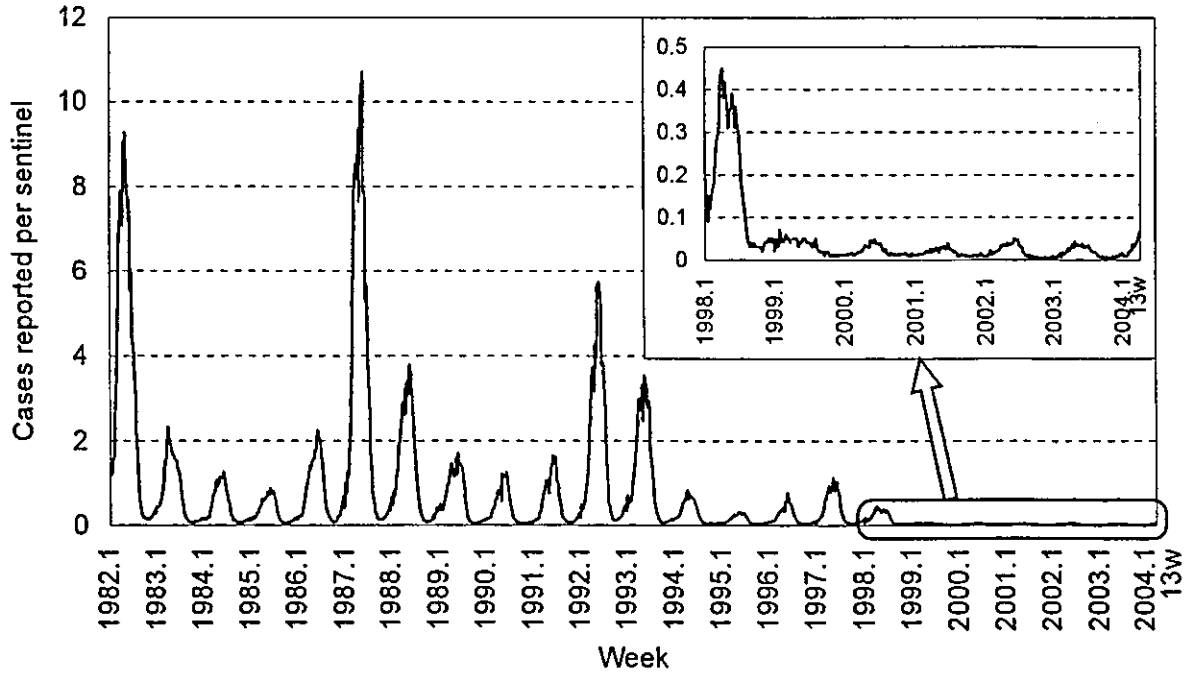


図6. 週別定点あたり風疹患者報告数 (1982年1週～2004年13週)

Fig. 6 Weekly rubella cases reported per sentinel (1982.1w～2004.13w)



[厚生労働省感染症発生動向調査事業より] 流行予測2003

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Hepatology Research 25 (2003) 371–376
Hepatology Research
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Serum lipid profile of patients with genotype 1b hepatitis C viral infection in Japan

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Received 6 June 2002; received in revised form 7 August 2002; accepted 24 October 2002

Abstract

Hepatitis C virus (HCV) infection is associated with the development of steatosis in the liver. Recently, infection with genotype 3a HCV has been reported to have a closer association with hepatic steatosis than that with genotype 1 or 2 HCV. Moreover, infection with genotype 3a HCV but not with genotype 1 has been shown to be associated with serum hypocholesterolemia or hypobetalipoproteinemia in European countries. We conducted a case control study to characterize the serum lipid profile in patients infected with genotype 1b HCV, which is the most prevalent HCV genotype in Japan. These patients had significantly lower serum cholesterol levels than those infected with HBV or genotype 2a HCV who had similar liver disease progression and body mass index. Further analysis of serum apolipoproteins revealed that not only apolipoprotein B but also apolipoprotein CII and apolipoprotein CIII levels were significantly reduced, while apolipoprotein AI, AII and E levels were similar in patients infected with genotype 1b HCV and those with HBV or genotype 2a HCV. These results indicate that, in Japan, infection with genotype 1b HCV is a cause of lipid metabolism disturbances, which may be associated with the pathogenesis of hepatitis C liver disease.

Keywords: Apolipoprotein; Hypocholesterolemia; Steatosis

1. Introduction

Infection with hepatitis C virus (HCV) is the cause of a sequence of liver diseases that finally leads to the development of hepatocellular carcinoma (HCC) worldwide [1,2]. Chronic hepatitis C, which precedes the development of HCC, is

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1386-6346/03/$ - see front matter
doi:10.1016/S1386-6346(02)00309-1

characterized by several histopathologic features: lymphocytic follicle formation, bile duct damage and steatosis (fatty change) [3–5]. In addition, an association between HCV infection and lipid metabolism has been extensively reported. For example, the low-density-lipoprotein (LDL) receptor [6,7] is suggested to be associated with HCV particles, and analysis using a cell culture system has revealed that the secretion of apolipoprotein AII from cells is modulated by the core protein of HCV [8,9]. In experimental animal models, the core protein or nonstructural protein(s) of HCV is steatogenic when expressed in the liver of mice [10,11]. Lipid analysis of fatty liver in mice transgenic for the HCV core gene revealed that the amount of carbon 18 mono-unsaturated fatty acids increased, being distinct from lipid accumulation in the fatty liver of simple obesity mice [12]. Importantly, those transgenic mouse strains develop HCC after the phase of hepatic steatosis [11,13]. Therefore, it is essential to elucidate the changes in lipid metabolism in patients with HCV infection.

Recently, several reports from European countries have pointed out that the degrees of hepatic steatosis are different among chronic hepatitis C patients depending on the genotype of the infecting virus: steatosis is more marked in patients with genotype 3a HCV infection, which is moderately prevalent in European countries such as France or Italy [14] than in those with genotype 1 or 2 infection [15–17]. In addition, hypocholesterolemia or hypobetalipoproteinemia was observed only in patients with genotype 3a HCV infection but not in those with genotype 1 HCV infection [17]. However, in Japan where the genotype 3 HCV infection is very rare, hepatic steatosis is also common in patients with chronic hepatitis of genotype 1b HCV infection, and the detection of the HCV core protein in liver tissue is an independent risk factor for steatosis in a specific liver tissue by multivariate analysis [18,19]. We, therefore, explored for dyslipidemia or alteration in lipid metabolism in patients with genotype 1b HCV infection in Japan by determining the levels of lipids and apolipoproteins in the serum.

2. Patients and methods

2.1. Patients

We studied 50 patients (male:female = 30:20) with histologically proven noncirrhotic chronic hepatitis C who were admitted to our hospitals from January 1999 to December 2000. Patients were selected according to the following criteria: (1) presence of HCV-RNA in serum; (2) absence of cirrhosis; (3) a body mass index (BMI) <25; (4) alcohol consumption <40 g/day; (5) absence of evident diabetes; and (6) not taking drugs influencing lipid metabolism (lipid-lowering agents, nonsteroidal anti-inflammatory drugs (NSAIDS)). Exclusion of cirrhotic patients was done by limiting the patients to only those who showed F1 or F2 [3,4] on liver biopsy that was performed within 1 year before serum lipid determination. Diagnosis of overt diabetes was done according to the guidelines of Japan Diabetes Society: at least two determinations of fasting blood glucose ≥ 126 mg/dl or casual blood glucose ≥ 200 mg/dl. Patients were regarded not to have overt diabetes if they did not meet this criterion and were not subject to insulin or oral hypoglycemic agents. The general characteristics of the 50 patients are shown in Table 1. All the patients were negative for the hepatitis B surface antigen (HBsAg) in serum. Informed consent was obtained from the patients, and human experimentation guidelines of the hospitals were followed in the conduct of this research.

As a control, 50 patients infected with hepatitis B virus (HBV) were selected according to the same criteria for selection of hepatitis C patients except for the criterion (1). Instead, the presence of HBsAg and absence of HCV-RNA in serum have been added as a criterion.

2.2. Viral serology

The levels of HBsAg, antibody to HBsAg (anti-HBs) and anti-HCV in the sera were determined using commercially available enzyme immunoassay kits (Dainabot, Tokyo, Japan) according to the manufacturer's instructions. HCV-RNA levels were determined using a commercially available

Table 1
Comparison of patients with chronic hepatitis C (C–CH) and chronic hepatitis B (B–CH)

	C–CH (N = 50)	B–CH (N = 50)	P
Age (years)	57.3±9.0	55.2±11.4	0.257
Sex	30:20	30:20	–
BMI (kg/m^2)	22.4±2.9	21.9±2.9	0.434
ALT (IU/l)	50.1±40.6	57.3±70.7	0.534
Albumin (g/dl)	4.21±0.21	4.16±0.20	0.282
Prothrombin time (%)	90.2±11.9	89.8±11.6	0.859
Total cholesterol (mg/dl)	167.4±37.7	195.6±38.3	<0.0005*
HDL-cholesterol (mg/dl)	55.2±16.7	59.7±17.6	0.277
Triglyceride (mg/dl)	122.8±63.6	129.8±67.5	0.637
Apolipoprotein AI (mg/dl)	134.5±20.1	140.2±29.5	0.263
Apolipoprotein AII (mg/dl)	28.8±5.9	28.5±6.4	0.787
Apolipoprotein B (mg/dl)	78.1±21.3	105.8±24.4	<0.0001*
Apolipoprotein CII (mg/dl)	2.15±1.35	3.98±1.87	<0.0001*
Apolipoprotein CIII (mg/dl)	6.74±2.17	8.87±2.60	<0.0001*
Apolipoprotein E (mg/dl)	4.17±1.08	4.31±0.95	0.618
Serum HCV-RNA (KIU/ml)	245±200		
HCV genotype 1b	40		
2a	10		

*Statistically significant.

kit (Amplicor HCV monitor v2.0, Roche Diagnostic Systems, Branchburg, NJ). The genotype of HCV was determined by RT-PCR with primers in the core region as described previously [20].

2.3. Laboratory investigations

Levels of total and HDL cholesterol, triglycerides and other biochemical parameters including apolipoproteins measured in the serum or plasma were using an auto-analyzer (Hitachi 7600 auto-analyzer, Tokyo, Japan). All assays were performed using fresh serum samples drawn from patients after at least 12 h fasting without taking alcohol overnight.

2.4. Statistical analysis

Results are expressed as means±S.E. The significance of the difference of means was determined using Student's t-test. Differences are considered significant when $P < 0.05$.

3. Results

Serum apolipoprotein levels and other parameters were determined; serum samples were drawn from patients infected with HCV and those with HBV (control) after at least 12 h of fasting. As shown in Table 1, there was no significant difference in age, sex ratio or BMI between the patients infected with HCV and those with HBV. Moreover, there was no difference in liver function between the two groups as assessed by alanine aminotransferase (ALT) or albumin level or prothrombin time level. Total cholesterol, and apolipoproteins B, CII and CIII levels were significantly lower in patients infected with HCV than those with HBV, while there was no significant difference in the levels of apolipoprotein AI, AII or E between these two groups (Table 1). Thus, there was dyslipidemia in patients with HCV infection, although there was no significant difference in the synthesis function of the liver between the two groups. There was no significant difference in serum lipid profile between the patients with histological degrees of F1 and F2, although the number of patients with F1 was small.

By analysis of the HCV genotype, 40 of the 50 chronic hepatitis C patients were found to have genotype 1b HCV, while the remaining ten patients had genotype 2a HCV. There were no patients with genotype 2b or other genotypes. These results are compatible with the prevalence of HCV genotypes in Japan as reported previously, where the prevalence of genotype 1b is about 70%, genotype 2a about 25% and genotype 2b about 5% [21,22]. There was no significant difference in age, sex ratio, BMI, serum albumin level, prothrombin time, platelet count or serum HCV-RNA level between the patients infected with genotype 1b HCV and those with genotype 2a HCV. Total cholesterol, and apolipoproteins B,

CII and CIII levels were significantly lower in patients infected with genotype 1b HCV than those with genotype 2a HCV, while there was no significant difference in the level of apolipoprotein AI, AII or E between the two groups (Table 2). There was no significant difference in the levels of apolipoproteins between the patients infected with genotype 2a HCV and those infected with HBV. There was no significant correlation between the levels of HCV-RNA and lipid profiles in patients with genotype 1b HCV infection. However, it might be possible that analysis of a larger number of patients leads to a significant correlation.

4. Discussion

Disturbance in lipid metabolism in HCV infection has been suggested by several lines of evidence: (1) steatosis in the liver of hepatitis C patients [3–5], (2) steatosis in the liver of transgenic mice harboring the HCV core gene or the entire HCV genome [10,11], (3) a possible role of LDL receptors in HCV entry into cells [6,7] and (4) association between the HCV core protein and apolipoprotein AII in an experimental system [8,9]. In addition, hypocholesterolemia has recently been documented in HCV infection and suggested as a possible basis for steatosis [17]. Interestingly, these reports from European countries stated that only HCV of genotype 3a is associated with hepatic steatosis or hypocholesterolemia, while HCV of genotype 1, 2 or 4 is scarcely associated with lipid metabolism disturbance, particularly with dyslipidemia [15–17]. However, the association of hepatic steatosis with HCV infection has also been documented in Japan, where about 70% of HCV infection was of genotype 1b [21,22]. In addition, HCV constructs used in the experimental steatosis mouse models are of genotype 1b from Japanese patients [10,11]. Therefore, it is of a great importance to assess whether chronic hepatitis C with genotype 1b HCV in Japan has an abnormality in lipid metabolism represented by dyslipidemia.

Our current results clearly indicate that patients with HCV infection in Japan have disturbances in lipid metabolism compared with those with HBV infection, and the disorder is attributed not to genotype 2a but to genotype 1b HCV infection, although the number of patients with genotype 2a HCV may be small. In our cohort, this is not due to other common causes of dyslipidemia, such as malignancy, poor liver function, intestinal malabsorption or inherited disorders of lipids. Indeed, cirrhotic patients were excluded, and patients with

Table 2
Comparison of patients with hepatitis C virus of genotype 1b and genotype 2a

	Genotype 1b ($N=40$)	Genotype 2a ($N=10$)	P
Age (years)	57.6±6.1	56.1±5.9	0.493
Sex	24:16	6:4	–
BMI (kg/m^2)	22.4±3.0	22.1±2.2	0.694
Albumin (g/dl)	4.23±0.21	4.12±0.21	0.142
Platelet count (× 10^4/μl)	17.6±5.0	16.8±3.1	0.658
PT (%)	90.0±12.4	93.6±8.5	0.386
Total cholesterol (mg/dl)	159.0±27.4	211.9±44.4	<0.0001*
HDL-cholesterol (mg/dl)	53.4±13.5	60.6±24.7	0.297
Triglyceride (mg/dl)	121.5±66.0	128.4±55.5	0.788
Apolipoprotein A I (mg/dl)	133.8±20.0	137.1±21.3	0.636
Apolipoprotein AII (mg/dl)	28.6±5.9	29.8±6.0	0.541
Apolipoprotein B (mg/dl)	76.3±15.7	89.7±26.8	0.039*
Apolipoprotein CII (mg/dl)	1.86±0.92	3.18±2.04	0.003*
Apolipoprotein CIII (mg/dl)	6.35±1.40	8.09±3.62	0.018*
Apolipoprotein E (mg/dl)	4.07±0.88	4.49±1.58	0.383
Serum HCV-RNA (KIU/ml)	247±199	234±218	0.868

*Statistically significant.

or without dyslipidemia were not significantly different in terms of prothrombin time or serum albumin level. It is not clear whether or not genotype 3a HCV is more closely associated with disturbances in lipid metabolism than genotype 1b in Japan, because there are very few, if any, patients with genotype 3a HCV infection in Japan [21,22].

It is of an interest that not only apolipoprotein B but also apolipoprotein CII and CIII levels were low in patients with genotype 1b HCV infection in Japan, whereas apolipoprotein AI, AII and E levels were similar to those in control groups. Because apolipoprotein CII and CIII are present in both high-density lipoprotein (HDL) and very-low density lipoprotein) (VLDL), and apolipoprotein B is present in VLDL and LDL, impairment of synthesis or secretion of VLDL in the liver may explain these observations. In a mouse model of hepatic steatosis that is transgenic for the HCV core gene, secretion of VLDL from the liver is disrupted chiefly due to the decrease in the level of the microsomal triglyceride transfer protein [23]. Moreover, it might be interesting to know that peroxisome proliferator-activated receptor-α (PPAR-α) activates the transcription of *apolipoprotein AI* and *AII* genes and suppresses the *apolipoprotein CII* and *CIII* genes in humans [24,25]. In fact, association of the HCV core protein with PPAR-α has been observed in an experimental system (Tanaka N, Moriya K, Kamijo Y, Kiyosawa K, Koike K, Aoyama T., unpublished data). Further studies are necessary to clarify the mechanism underlying lipid disturbance in HCV infection.

It is unclear at present why there is a difference in observations for genotype 1b HCV, which may induce lipid metabolism disturbances, between Japan and European countries. It may be noteworthy that determining the amino acid sequences of nonstructural region 5A of genotype 1b HCV genome is useful for the prediction of IFN responsiveness of patients in Japan but is not effective in studies from European countries [26,27]. Thus, there may be some differences in amino acid sequences, which are responsible for the development of distinct features of hepatitis C including hepatic steatosis, in the genotype 1b HCV clones between Japan and European countries. Further studies are required to elucidate the 'steatogenic' region in the HCV genome.

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