

THE DISTRIBUTION OF THE RH(D) BLOOD TYPES IN JAPAN¹

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Summary Data on the Rh(D) types of 2,745,618 individuals were collected from prefectural health departments, health centers, and Red Cross blood centers in 35 of 47 prefectures in the whole country. Phenotypic and gene frequencies for each subpopulations were calculated and tabulated.

The frequency of Rh(D) negatives in the whole sample is 0.5428% and the frequency of the Rh(D) negative gene is estimated to be $7.37 \pm 0.03\%$. An insignificant cline of the frequencies is suggested, *i.e.* the Rh(D) negative gene is increased from the northeast to the southwest of Japan.

INTRODUCTION

Frequencies of Rh blood types in different localities in Japan were summarized by Akaishi and Kudo (1975) who compiled available data on 10 prefectures from literature and through their own surveys. A majority of the studied prefectures cluster in the northmost part of the country and, therefore, distribution of the Rh system in the whole of Japan was still uncertain.

Recently, examination of the Rh(D) type is extensively carrying out at health centers and blood centers in the whole country. The present authors collected such data and report here the results of the analyses.

MATERIALS AND METHODS

The data on the numbers of Rh(D) positives and negatives were obtained from health centers, prefectural health departments and Red Cross blood centers by mail. Most data from Kagoshima Prefecture became available through Prof. Tetuo Zyo, Kagoshima University. Thus, data on the distribution of Rh(D) negatives were available from 35 of 47 prefectures for 2,745,618 individuals, in total.

The blood-typing was carried out during the period from 1964 to 1975, mostly from 1970 to 1973.

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Frequency of the Rh(D) negative allele was calculated simply by $d = \sqrt{n_d/N}$, where n_d denotes the number of Rh(D) negative individuals and N the size of the sample.

RESULTS

The phenotypic frequency of Rh(D) negative individuals in the entire sample was 0.5428% and frequency of the Rh(D) negative allele was estimated to be $7.37 \pm$

Table 1. Distribution of Rh(D) negatives in Japan for prefectures.

Prefecture	Number examined N	Rh(D) negative		Gene frequency (%)	
		n_d	%	d	\pm Standard error
2. Aomori	31,203	91	0.2916	5.40	0.28
4. Miyagi	87,080	215	0.2469	4.97	0.17
6. Yamagata	41,516	226	0.5444	7.38	0.24
8. Ibaraki	45,916	385	0.8385	9.16	0.23
9. Tochigi	91	0			
10. Gunma	112	3			
11. Saitama	448	3			
12. Chiba	6,820	30	0.4399	6.63	0.60
13. Tokyo	293,688	1,491	0.5077	7.13	0.09
14. Kanagawa	7,832	45	0.5746	7.58	0.56
15. Niigata	39,155	210	0.5363	7.32	0.25
16. Toyama	10	0			
18. Fukui	187,714	1,006	0.5359	7.32	0.11
19. Yamanashi	11,025	76	0.6893	8.30	0.47
20. Nagano	348,946	1,952	0.5594	7.48	0.08
21. Gifu	4,578	25	0.5461	7.39	0.74
22. Shizuoka	1,501	12	0.7995	8.94	1.29
23. Aichi	90,582	405	0.4471	6.69	0.17
24. Mie	119,461	736	0.6161	7.85	0.14
26. Kyoto	11,610	52	0.4479	6.69	0.46
27. Osaka	604,866	3,385	0.5596	7.48	0.06
28. Hyogo	43,632	234	0.5363	7.32	0.24
30. Wakayama	6,492	57	0.8780	9.37	0.62
31. Tottori	99,371	474	0.4770	6.91	0.16
32. Shimane	106	0			
34. Hiroshima	3,669	42	1.1447	10.70	0.82
35. Yamaguchi	828	11			
37. Kagawa	23,611	100	0.4235	6.51	0.32
38. Ehime	8,094	44	0.5436	7.37	0.55
39. Kochi	69,559	487	0.7001	8.37	0.19
40. Fukuoka	25,788	68	0.2637	5.14	0.31
41. Saga	50,244	258	0.5135	7.17	0.22
42. Nagasaki	46,732	239	0.5114	7.15	0.23
44. Oita	44,533	293	0.6579	8.11	0.24
46. Kagoshima	388,805	2,249	0.5784	7.61	0.08
Total	2,745,618	14,904	0.5428	7.37	0.03

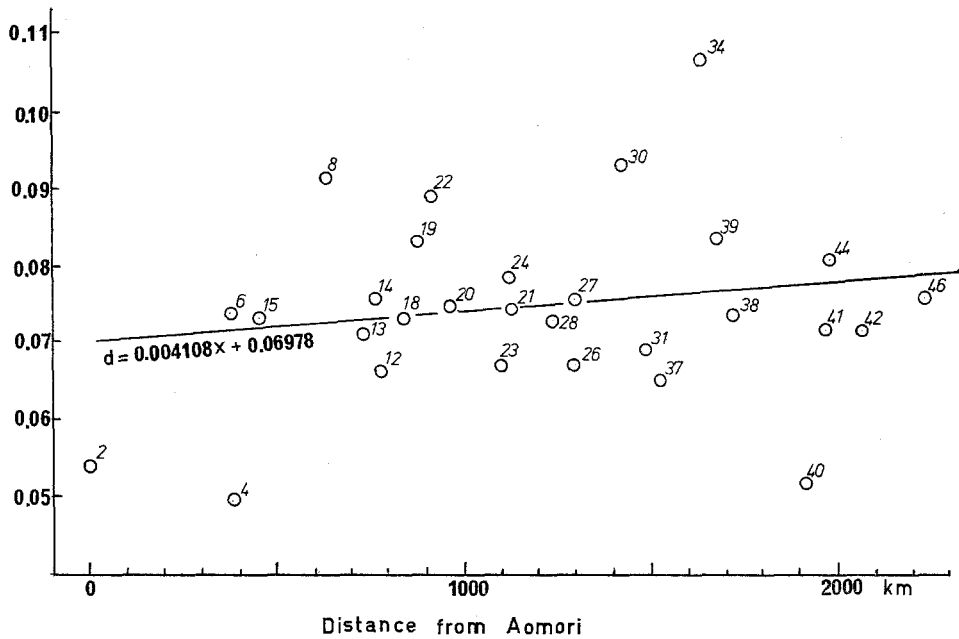


Fig. 1. Gradient of the frequency of the Rh(D) negative allele, d.

0.03%. The frequencies for prefectures are shown in Table 1 and those for health centers and districts in each prefecture are listed in the appendix. Each number of prefecture in italic and health center or district in roman corresponds to that shown in maps (Figs. 1 and 6–14) in a previous paper on the distribution of the ABO system (Fujita *et al.*, 1978).

The frequency of the Rh(D) negative gene for each prefecture and the distance measured from Aomori, the northernmost of the Honshu Island, to each prefecture capital along the National Railroad were plotted in Fig. 1, which suggests a slight increase of the gene frequency with the increasing distance. An analysis of the data on 29 prefectures, excluding 6 prefectures with sample sizes smaller than 1,000, revealed that the correlation coefficient between the distance from Aomori and the frequency of Rh(D) negative gene is 0.193, which deviates from zero insignificantly ($t=1.022$ with 27 degrees of freedom, $0.3 < P < 0.4$). The regression equation of the gene frequency on the distance in 1,000 kilometers, x , is $d=0.004108x+0.06978$.

DISCUSSION

The frequency of the Rh(D) negatives in the whole sample is not greatly different from those reported by previous authors in various populations in Japan, excluding the Rhukyuan and the Ainu (see Akaishi and Kudo, 1975). As shown in Table 1, the frequency of Rh(D) negative gene for prefecture ranges from zero to 10% or higher.

Such a wide variation is mostly attributable to the smallness of the sample sizes. The range in 6 prefectures with samples larger than 100,000 is as narrow as 7.13–7.85%.

On the other hand, it was suggested that the frequency of the Rh(D) negative gene was increased from the northeast to the southwest, though insignificantly. Such a cline may not be unexpected, since the frequencies of the Rh(D) types in the neighboring races are different from those in the Japanese and there are known significant clines of the frequencies of some polymorphic genes, including ABO blood group genes in Japan (Kobayashi, 1940; Tanaka, 1959; Nei and Imaizumi, 1966; Fujita *et al.*, 1978). Frequency of the Rh(D) negative gene in Okinawa is apparently higher than that in other districts of Japan (Nakajima *et al.*, 1967b; Waki, 1972). This may accord with the cline of the gene frequency which increases from the northeast to the southwest.

However, the Rh(D) negative gene is much more frequent in the Ainu (Kobayashi, 1953, 1956; Ishibashi, 1971; Misawa and Hayashida, 1972; Misawa *et al.*, 1975), the original inhabitants in the northmost districts of Japan, and much rarer in Korean (Sarkisian, 1956; Won, 1960; Won *et al.*, 1960; Mourant *et al.*, 1976) and Taiwanese (Nakajima *et al.*, 1967a, 1971) who have had close contacts particularly with the southwest districts of Japan. Thus, it may be premature to deduce a decisive explanation of the relationship between the distributions of Rh(D) negative gene in the Japanese and surrounding races.

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APPENDIX. DISTRIBUTION OF RH(D) NEGATIVES AND RH(D) NEGATIVE
 GENE IN JAPAN FOR HEALTH CENTERS OR DISTRICTS

Health center or district	Number examined N	Rh(D) negative		Gene frequency (%)	
		na	%	d	± S.E.
2. Aomori					
Total	31,203	91	0.2916	5.40	0.28
4. Miyagi					
5. Sendai-Higashi (仙台東)	1,703	3	0.1762	4.20	1.21
6. Sendai-Minami (仙台南)	1,309	3	0.2292	4.79	1.38
7. Sendai-Kita (仙台北)	1,262	0	0.0	0.0	1.41
Prefect. Health Dept.	82,806	209	0.2524	5.02	0.17
Total	87,080	215	0.2469	4.97	0.17
6. Yamagata					
1. Yamagata (山形)	8,029	49	0.6103	7.81	0.56
2. Sagae (寒河江)	5,919	25	0.4224	6.50	0.65
3. Yonezawa (米沢)	6,181	36	0.5824	7.63	0.63
Prefect. Health Dept.	21,387	116	0.5424	7.36	0.34
Total	41,516	226	0.5444	7.38	0.24
8. Ibaraki					
6. Omiya (大宮)	448	4	0.8929	9.45	2.35
Prefect. Health Dept.	45,468	381	0.8380	9.15	0.23
Total	45,916	385	0.8385	9.16	0.23
9. Tochigi					
5. Ashikaga (足利)	91	0			
10. Gunma					
1. Tatebayashi (館林)	112	3	2.6786	16.37	4.66
11. Saitama					
9. Tokorozawa (所沢)	448	3	0.6696	8.18	2.35
12. Chiba					
1. Mobarra (茂原)	630	4	0.6349	7.97	1.99
2. Sakura (佐倉)	334	6	1.7964	13.40	2.71
3. Chuo (中央)	241	0	0.0	0.0	3.22
4. Kamogawa (鴨川)	1,155	4	0.3463	5.88	1.47
5. Kashiwa (柏)	1,706	5	0.2931	5.41	1.21
7. Tateyama (館山)	1,185	7	0.5907	7.69	1.45
8. Noda (野田)	1,569	4	0.2549	5.05	1.26
Total	6,820	30	0.4399	6.63	0.60
13. Tokyo					
1. Katsushika (葛飾)	933	4	0.4287	6.55	1.63
2. Edogawa (江戸川)	996	4	0.4016	6.34	1.58
3. Adachi (足立)	2,546	4	0.1571	3.96	0.99
4. Sumida (墨田)	1,404	8	0.5698	7.55	1.33

Health center or district	Number examined N	Rh(D) negative		Gene frequency (%)	
		nd	%	d	± S.E.
5. Koto (江東)	1,525	5	0.3279	5.73	1.28
6. Arakawa (荒川)	3,954	5	0.1265	3.56	0.79
7. Taito (台東)	2,162	8	0.3700	6.08	1.07
8. Chuo (中央)	4,207	7	0.1664	4.08	0.77
9. Kita (北)	1,730	12	0.6936	8.33	1.20
10. Bunkyo (文京)	2,161	7	0.3239	5.69	1.07
11. Chiyoda (千代田)	3,354	18	0.5367	7.33	0.86
12. Minato (港)	4,068	11	0.2704	5.20	0.78
13. Itabashi (板橋)	2,903	21	0.7234	8.51	0.92
14. Toshima (豊島)	1,394	7	0.5022	7.09	1.34
15. Shinjuku (新宿)	1,738	13	0.7480	8.65	1.19
16. Shibuya (渋谷)	1,319	4	0.3033	5.51	1.37
17. Meguro (目黒)	935	4	0.4278	6.54	1.63
18. Shinagawa (品川)	1,990	9	0.4523	6.73	1.12
19. Ota (大田)	5,554	22	0.3961	6.29	0.67
20. Nerima (練馬)	1,382	3	0.2171	4.66	1.34
21. Nakano (中野)	1,543	8	0.5185	7.20	1.27
22. Suginami (杉並)	3,351	13	0.3879	6.23	0.86
23. Setagaya (世田谷)	4,595	20	0.4353	6.60	0.74
24. Musashino (武蔵野)	910	0	0.0	0.0	1.66
25. Mitaka (三鷹)	1,010	3	0.2970	5.45	1.57
26. Musashi-Chofu (武蔵調布)	430	1	0.2326	4.82	2.41
27. Tanashi (田無)	422	0	0.0	0.0	2.43
28. Koganei (小金井)	1,266	3	0.2370	4.87	1.40
29. Kodaira (小平)	1,475	20	1.3559	11.64	1.29
30. Fuchu (府中)	388	4	1.0309	10.15	2.53
31. Machida (町田)	1,314	6	0.4566	6.76	1.38
32. Tachikawa (立川)	416	4	0.9615	9.81	2.44
33. Hino (日野)	396	2	0.5051	7.11	2.51
34. Hachioji (八王子)	1,084	8	0.7380	8.59	1.51
35. Ome (青梅)	6,287	21	0.3340	5.78	0.63
36. Itsukaichi (五日市)	1,045	3	0.2871	5.36	1.54
Subtotal	72,187	292	0.4045	6.36	0.19
Prefect. Health Dept.	101,436	539	0.5314	7.29	0.16
Others	120,065	660	0.5497	7.41	0.14
Grandtotal	293,688	1,491	0.5077	7.13	0.09
14. Kanagawa					
1. Daishi (川崎大師)	1,046	5	0.4780	6.91	1.54
2. Saiwai (川崎幸)	2,125	9	0.4235	6.51	1.08
3. Nakahara (川崎中原)	451	3	0.6652	8.16	2.35
4. Takatsu (川崎高津)	1,941	2	0.1030	3.21	1.13
6. Midori (横浜緑)	1,430	19	1.3287	11.53	1.31
9. Kanazawa (横浜金沢)	414	4	0.9662	9.83	2.45
10. Yokosuka-Kita (横浜賀北)	425	3	0.7059	8.40	2.42
Total	7,832	45	0.5746	7.58	0.56

Health center or district	Number examined N	Rh(D) negative		Gene frequency (%)	
		na	%	d	± S.E.
<i>15. Niigata</i>					
2. Niigata-Higashi (新潟東)	15,990	65	0.4065	6.38	0.39
3. Niigata-Nishi (新潟西)	7,440	51	0.6855	8.28	0.58
4. Maki (巻)	804	0	0.0	0.0	1.76
9. Tokamachi (十日町)	14,921	94	0.6300	7.94	0.41
Total	39,155	210	0.5363	7.32	0.25
<i>16. Toyama</i>					
2. Himi (氷見)	10	0			
<i>18. Fukui</i>					
Red Cross Blood Center	187,714	1,006	0.5359	7.32	0.11
<i>19. Yamanashi</i>					
Red Cross Blood Center	675	0	0.0	0.0	1.92
Blood Center	10,350	76	0.7343	8.57	0.49
Total	11,025	76	0.6893	8.30	0.47
<i>20. Nagano</i>					
1. Iiyama (飯山)	8,968	42	0.4683	6.84	0.53
2. Nakano (中野)	14,218	84	0.5908	7.69	0.42
3. Susaka (須坂)	12,032	63	0.5236	7.24	0.45
4. Komoro (小諸)	13,577	94	0.6923	8.32	0.43
5. Saku (佐久)	17,231	102	0.5920	7.69	0.38
6. Nagano (長野)	42,204	224	0.5308	7.29	0.24
7. Shinonoi (篠ノ井)	16,266	98	0.6025	7.76	0.39
8. Matsushiro (松代)	12,888	104	0.8070	8.98	0.44
9. Ueda (上田)	16,777	89	0.5305	7.28	0.38
10. Omachi (大町)	15,580	123	0.7895	8.89	0.40
11. Toyoshina (豊科)	21,179	110	0.5194	7.21	0.34
12. Matsumoto (松本)	56,261	388	0.6896	8.30	0.21
13. Okaya (岡谷)	18,459	76	0.4117	6.42	0.28
14. Suwa (諏訪)	20,816	81	0.3891	6.24	0.35
15. Ina (伊那)	23,215	96	0.4135	6.43	0.33
16. Iida (飯田)	22,376	89	0.3977	6.31	0.33
17. Kiso (木曾)	16,899	89	0.5267	7.26	0.38
Total	348,946	1,952	0.5594	7.48	0.08
<i>21. Gifu</i>					
1. Inaba (伊奈波)	1,139	8	0.7024	8.38	1.48
2. Ena (恵那)	1,709	7	0.4096	6.40	1.21
3. Gujo (郡上)	391	4	1.0230	10.11	2.52
4. Hajima (羽島)	1,339	6	0.4481	6.69	1.36
Total	4,578	25	0.5461	7.39	0.74

Health center of district	Number examined N	Rh(D) negative		Gene frequency (%)	
		n _d	%	d	± S.E.
22. Shizuoka					
2. Shimoda (下田)	679	2	0.2946	5.43	1.92
5. Tenryu (天竜)	69	0			
6. Hamamatsu (浜松)	753	10	1.3280	11.52	1.81
Total	1,501	12	0.7995	8.94	1.29
23. Aichi					
1. Shitara (設楽)	2,835	16	0.5644	7.51	0.94
2. Shinshiro (新城)	3,960	23	0.5808	7.62	0.79
3. Ichinomiya (一宮)	4,694	21	0.4474	6.69	0.73
4. Toyokawa (豊川)	7,011	30	0.4279	6.54	0.60
5. Toyohashi (豊橋)	3,214	18	0.5600	7.48	0.88
6. Tahara (田原)	2,967	11	0.3707	6.09	0.92
7. Asuke (足助)	1,852	6	0.3240	5.69	1.16
8. Gamagori (蒲郡)	2,086	15	0.7191	8.48	1.09
9. Okazaki (岡崎)	5,608	32	0.5706	7.55	0.67
10. Toyota (豊田)	3,105	14	0.4509	6.71	0.90
11. Anjo (安城)	2,572	14	0.5443	7.38	0.98
12. Nishio (西尾)	1,294	1	0.0773	2.78	1.39
13. Kariya (刈谷)	11,783	35	0.2970	5.45	0.46
14. Handa (半田)	6,613	29	0.4385	6.62	0.61
15. Mihama (美浜)	277	0	0.0	0.0	3.00
16. Seto (瀬戸)	4,689	23	0.4905	7.00	0.73
17. Kasugai (春日井)	4,484	17	0.3791	6.16	0.75
18. Nagoya (名古屋)	697	3	0.4304	6.56	1.89
19. Chita (知多)	3,964	17	0.4289	6.55	0.79
20. Konan (江南)	3,173	15	0.4727	6.88	0.89
21. Nishibiwajima (西枇杷島)	5,194	38	0.7316	8.55	0.69
22. Inazawa (稲沢)	2,045	2	0.0978	3.13	1.11
23. Bisai (尾西)	2,107	18	0.8543	9.24	1.08
24. Tsushima (津島)	4,358	7	0.1606	4.01	0.76
Total	90,582	405	0.4471	6.69	0.17
24. Mie					
Preventive Med. Center	119,461	736	0.6161	7.85	0.14
26. Kyoto					
1. Maizuru (舞鶴)	5,036	35	0.6947	8.33	0.70
2. Amino (網野)	35	0			
3. Yamashina (山科)	1,671	5	0.2992	5.47	1.22
4. Higashiyama (東山)	2,012	6	0.2982	5.46	1.11
5. Fushimi (伏見)	410	2	0.4878	6.98	2.46
6. Nakakyo (中京)	1,410	2	0.1418	3.77	1.33
7. Shimokyo (下京)	1,036	2	0.1931	4.39	1.55
Total	11,610	52	0.4479	6.69	0.46

Health center or district	Number examined N	Rh(D) negative		Gene frequency (%)	
		n _d	%	d	± S.E.
27. Osaka					
1. Hirakata (枚方)	29,951	191	0.6377	7.99	0.29
2. Takatsuki (高槻)	30,896	183	0.5923	7.70	0.28
3. Ibaragi (茨木)	29,715	146	0.4913	7.01	0.29
4. Neyagawa (寝屋川)	17,940	98	0.5463	7.39	0.37
5. Shijonawate (四条畷)	35,918	218	0.6069	7.79	0.26
6. Moriguchi (守口)	37,771	247	0.6539	8.09	0.26
7. Kadoma (門真)	1,977	7	0.3541	5.95	1.12
8. Hiraoka (枚岡)	33,936	178	0.5245	7.24	0.27
9. Fuse (布施)	35,841	207	0.5776	7.60	0.26
10. Yao (八尾)	36,283	197	0.5430	7.37	0.26
11. Fujiidera (藤井寺)	42,699	222	0.5199	7.21	0.24
12. Tondabayashi (富田林)	23,563	138	0.5857	7.65	0.32
13. Sayama (狭山)	8,749	44	0.5029	7.09	0.53
14. Suita (吹田)	27,867	142	0.5096	7.14	0.30
15. Ikeda (池田)	25,348	135	0.5326	7.30	0.31
16. Toyonaka (豊中)	41,380	243	0.5872	7.66	0.24
17. Asahi-ku (大阪市旭区)	6,340	37	0.5836	7.64	0.63
18. Joto-ku (城東区)	2,771	8	0.2887	5.37	0.95
19. Higashinari-ku (東成区)	7,121	42	0.5898	7.68	0.59
20. Ikuno-ku (生野区)	1,576	2	0.1269	3.56	1.26
21. Higashi-ku (東区)	563	10	1.7762	13.33	2.09
22. Minami-ku (南区)	1,166	0	0.0	0.0	1.46
23. Bandai (万代診療所)	15,656	74	0.4727	6.88	0.40
24. Kita-ku (北区)	1,605	4	0.2492	4.99	1.25
25. Nishi-ku (西区)	3,926	24	0.6113	7.82	0.80
26. Nishinari-ku (西成区)	6,364	38	0.5971	7.73	0.62
27. Suminoc (住之江)	774	2	0.2584	5.08	1.79
28. Nishiyodogawa-ku (西淀川区)	5,813	14	0.2408	4.91	0.65
29. Izumiotsu (泉大津)	21,325	144	0.6753	8.22	0.34
30. Izumi (和泉)	13,469	98	0.7276	8.53	0.43
31. Kishiwada (岸和田)	20,588	118	0.5731	7.57	0.35
32. Kaizuka (貝塚)	12,509	68	0.5436	7.37	0.45
33. Izumisano (泉佐野)	10,696	51	0.4768	6.91	0.48
34. Ozaki (尾崎)	12,770	55	0.4307	6.56	0.44
Total	604,866	3,385	0.5596	7.48	0.06
28. Hyogo					
1. Itami (伊丹)	3,419	21	0.6142	7.84	0.85
2. Amagasaki-Kita (尼ヶ崎北)	399	5	1.2531	11.19	2.49
3. Ibid	344	2	0.5814	7.62	2.69
4. Amagasaki-Higashi (尼ヶ崎東)	679	2	0.2946	5.43	1.92
5. Takarazuka (宝塚)	746	6	0.8043	8.97	1.82
6. Nishinomiya (西宮)	4,178	21	0.5026	7.09	0.77
7. Ashiya (芦屋)	440	6	1.3636	11.68	2.37
8. Santa (三田)	732	2	0.2732	5.23	1.85
9. Nada (灘)	94	0			

Health center or district	Number examined N	Rh(D) negative		Gene frequency (%)	
		na	%	d	+ S.E.
10. Ikuta (生田)	162	1	0.6173	7.86	3.92
11. Kobe-Kita (神戸北)	63	0			
12. Hyogo (兵庫)	78	0			
13. Nagata (長田)	18	0			
15. Yashiro (社)	4,192	20	0.4771	6.91	0.77
16. Akashi (明石)	1,249	13	1.0408	10.20	1.41
17. Kakogawa (加古川)	2,835	23	0.8113	9.01	0.94
19. Himeji-Nishi (姫路西)	213	3	1.4085	11.87	3.40
20. Yamazaki (山崎)	835	2	0.2395	4.89	1.73
21. Tatsuno (竜野)	11,483	54	0.4703	6.86	0.47
22. Aioi (相生)	720	6	0.8333	9.13	1.86
23. Sayo (佐用)	1,822	6	0.3293	5.74	1.17
24. Ako (赤穂)	3,679	18	0.4893	6.99	0.82
26. Kasumi (香住)	949	11	1.1591	10.77	1.61
27. Hamasaka (浜坂)	2,291	5	0.2182	4.67	1.04
28. Tsuna (津名)	1,104	4	0.3623	6.02	1.50
30. Mihara (三原)	908	3	0.3304	5.75	1.66
Total	43,632	234	0.5363	7.32	0.24
30. Wakayama					
1. Chuo (中央)	6,492	57	0.8780	9.37	0.62
31. Tottori					
Total	99,371	474	0.4770	6.91	0.16
32. Shimane					
1. Kawamoto (川本)	106	0	0.0	0.0	4.86
34. Hiroshima					
4. Shobara (庄原)	1,217	16	1.3147	11.47	1.42
5. Chiyoda (千代田)	1,833	16	0.8729	9.34	1.16
6. Kaita (海田)	6	1			
9. Hiroshima Health Lab. (広島衛生試験所)	613	9	1.4682	12.12	2.00
Total	3,669	42	1.1447	10.70	0.82
35. Yamaguchi					
1. Iwakuni (岩国)	79	4			
4. Toyota (豊田)	749	7	0.9346	9.67	1.82
Total	828	11	1.3285	11.53	1.73
37. Kagawa					
3. Marugame (丸亀)	992	2	0.2016	4.49	1.59
Red Cross Blood Center	22,619	98	0.4333	6.58	0.33
Total	23,611	100	0.4235	6.51	0.32
38. Ehime					
1. Mishima (三島)	708	1	0.1412	3.76	1.88

Health center or district	Number examined N	Rh(D) negative		Gene frequency (%)	
		nd	%	d	± S.E.
2. Niihama (新居浜)	478	3	0.6276	7.92	2.28
3. Saijo (西条)	102	2	1.9608	14.00	4.90
4. Nyugawa (壬生川)	111	1	0.9009	9.49	4.72
5. Imabari (今治)	675	5	0.7407	8.61	1.92
6. Kuma (久万)	1,146	10	0.8726	9.34	1.47
7. Matsuyama (松山)	750	2	0.2667	5.16	1.82
9. Nomura (野村)	304	0	0.0	0.0	2.87
10. Osu (大洲)	18	0			
11. Yawatahama (八幡浜)	18	0			
12. Uwa (宇和)	208	3	1.4423	12.01	3.44
13. Uwajima (宇和島)	715	6	0.8392	9.16	1.86
14. Misho (御荘)	2,861	11	0.3845	6.20	0.93
Total	8,094	44	0.5436	7.37	0.55
39. Kochi					
Red Cross Blood Center	69,559	487	0.7001	8.37	0.19
40. Fukuoka					
1. Tobata (戸畑)	2,160	4	0.1852	4.30	1.07
2. Wakamatsu (若松)	1,797	9	0.5008	7.08	1.18
3. Tagawa (田川)	1,675	16	0.9552	9.77	1.22
4. Soeda (添田)	557	2	0.3591	5.99	2.11
5. Ukiha (浮羽)	1,559	9	0.5773	7.60	1.26
6. Onga (遠賀)	8,696	11	0.1265	3.56	0.54
7. Munakata (宗像)	7,329	13	0.1774	4.21	0.58
8. Kasuya (粕屋)	521	4	0.7678	8.76	2.18
10. Yame (八女)	1,494	0	0.0	0.0	1.29
Total	25,788	68	0.2637	5.14	0.31
41. Saga					
1. Tosu (鳥栖)	3,734	21	0.5624	7.50	0.82
2. Kanzaki (神崎)	3,469	12	0.3459	5.88	0.85
3. Saga (佐賀)	14,225	75	0.5272	7.26	0.42
4. Ogi (小城)	4,688	32	0.6826	8.26	0.73
5. Kashima (鹿島)	4,357	15	0.3443	5.87	0.76
6. Takeo (武雄)	7,822	36	0.4602	6.78	0.56
7. Karatsu (唐津)	6,834	32	0.4682	6.84	0.60
8. Imari (伊万里)	5,115	35	0.6843	8.27	0.70
Total	50,244	258	0.5135	7.17	0.22
42. Nagasaki					
1. Obama (小浜)	8,000	14	0.1750	4.18	0.56
2. Omura (大村)	6,567	26	0.3959	6.29	0.62
3. Kita (北)	25,071	161	0.6422	8.01	0.31
4. Yoshii (吉井)	5,790	31	0.5354	7.32	0.66
5. Arikawa (有川)	1,304	7	0.5368	7.33	1.38
Total	46,732	239	0.5114	7.15	0.23

Health center or district	Number examined N	Rh(D) negative		Gene frequency (%)	
		n _d	%	d	± S.E.
44. Oita					
Prefect. Health Dept.	44,533	293	0.6579	8.11	0.24
46. Kagoshima					
1. Okuchi-city (大口市)	9,211	31	0.3366	5.80	0.52
2. Kokubu-city (国分市)	8,533	48	0.5625	7.50	0.54
3. Tarumi-city (垂水市)	4,566	24	0.5256	7.25	0.74
4. Kanoya-city (鹿屋市)	15,804	96	0.6074	7.79	0.40
5. Kagoshima-city (鹿児島市)	141,933	828	0.5834	7.64	0.13
6. Ibusuki-city (指宿市)	8,338	67	0.8036	8.96	0.55
7. Izumi-city (出水市)	4,380	19	0.4338	6.59	0.75
8. Akune-city (阿久根市)	9,766	41	0.4198	6.48	0.50
9. Sendai-city (川内市)	19,276	109	0.5655	7.52	0.36
10. Kushikino-city (串木野市)	11,031	75	0.6799	8.25	0.47
11. Kaseda-city (加世田市)	4,305	27	0.6272	7.92	0.76
12. Makurazaki-city (枕崎市)	14,275	74	0.5184	7.20	0.42
13. Soo-gun (曾於郡)	19,200	122	0.6354	7.97	0.36
14. Kimotsuki-gun (肝付郡)	20,986	128	0.6100	7.81	0.34
15. Isa-gun (伊佐郡)	2,572	10	0.3888	6.24	0.98
16. Aira-gun (姶良郡)	27,433	158	0.5760	7.59	0.30
17. Izumi-gun (出水郡)	7,382	23	0.3116	5.58	0.58
18. Satsuma-gun (薩摩郡)	11,169	58	0.5192	7.21	0.47
19. Hioki-gun (日置郡)	21,537	135	0.6269	7.92	0.34
20. Kawanabe-gun (川辺郡)	4,750	31	0.6526	8.08	0.72
21. Ibusuki-gun (揖宿郡)	10,068	72	0.7151	8.46	0.50
22. Nishinoomote (西之表)	6,370	39	0.6122	7.82	0.62
23. Yakushima (屋久島)	3,919	23	0.5868	7.66	0.80
25. Tokunoshima (徳之島)	2,001	11	0.5497	7.41	1.11
Total	388,805	2,249	0.5784	7.61	0.08