HLA ANTIGENS IN THREE NORMAL SOUTHERN CHINESE DIALECT GROUPS — CANTONESE, HOKKIENS AND TEOCHEW

S. H. Chan
G. B. Wee
N. Srinivasan
D. Vengadasalam

Department of Microbiology
Faculty of Medicine
University of Singapore, Singapore.

S.H. Chan, M.B. (Monash), Ph.D. (Melbourne)
Senior Lecturer

G.B. Wee
Senior Technologist

WHO Immunology Research and Training Centre
Faculty of Medicine, University of Singapore
Singapore

N. Srinivasan
Technologist

Department of Obstetrics and Gynaecology
Alexandra Hospital, Singapore

D. Vengadasalam, M.B.B.S. (Madras),
M.R.C.O.G., A.M.
Consultant and Head

Address for Reprints:
Dr S.H. Chan
WHO Immunology Centre
Faculty of Medicine
University of Singapore
Singapore 3

SYNOPSIS

The HLA profiles of the Cantonese, Hokkien and Teochew dialect groups in the Chinese population were compared. The profiles of the three groups were remarkably similar. HLA-A2 and HLA-Bw46 were strongly and significantly associated in all three dialect groups. Other significantly associated antigen pairs were Aw19, B17 and A29, B7 in the Cantonese and Blank, B40 in the Teochews.

INTRODUCTION

The HLA complex exhibits an extreme degree of genetic polymorphism and antigen (phenotype) frequencies vary considerably among different ethnic populations (Bodmer and Bodmer, 1970). However little is known about differences in antigen frequencies among dialect groups within a normal population. Recently we have reported the HLA profiles of 238 normal Chinese subjects (Chan et al., 1979) which were made up of Cantonese, Hokkien and Teochew dialect groups. Reported here are the HLA profiles of the three dialect groups within the Chinese population.

MATERIALS AND METHODS

Subjects

The subjects studied were unrelated and had been reported previously as a group (Chan et al., 1979). They were typed from cord blood from consecutive normal Chinese babies delivered at Alexandra Hospital, Singapore, over a period of seven months. The dialect group of the subjects was based on the dialect group of the parents and there were 100 Cantonese, 43 Teochew (both originated from the Southern Province of Canton, China) and 95 Hokkien (from another Southern Province, Fukien).

HLA Typing

HLA typing was performed using the NIH Lymphocyte Microcytotoxicity Method (NIAID Manual of Tissue Typing Techniques, 1976-1977. DHEW Publication No. (NIH) 76-545) employing a total of 216 antisera (from NIH Serum Bank, our own laboratory and direct exchange from other laboratories)

in defining 26 locus A and B specificities. All specimens were typed within twelve hours of collection and there was no apparent difficulty in determining HLA antigens on lymphocytes from cord blood.

Statistical Analysis

The gene frequencies were calculated by the formula

$$P = 1 - \sqrt{1 - f}$$

where p denotes the gene frequency and f the frequency of the corresponding antigen. For the haplotype frequencies estimated from the phenotype data the equation of Ceppellini et al., (1967) was used

$$x_{ij} = p_i p_j + D_{ij}$$

where $p_i p_j$ is the product of the gene frequencies of the antigens forming the haplotype and D_{ij} the gametic association of these antigens. The D values were calculated from the 2×2 table for the phenotype association between i and j. If the + +, + −, − +, − − phenotypes are represented by a, b, c, d, respectively, the corresponding D is estimated by

$$D = \sqrt{\frac{d}{n}} - \sqrt{\frac{(b+d)\ (c+d)}{n^2}}$$

where n = a + b + c + d.

The probability that a given D value differs significantly from zero (no association between genes of the two series) was obtained from the 2×2 contingency comparisons. The chi square test with Yates' correction for continuity was used throughout this investigation.

RESULTS

Table 1 shows the HLA phenotype and gene frequencies of the 26 antigens typed for in the three dialect groups. In general there were no major differences in HLA antigen frequencies in the three dialect groups except in B13, B27 and Bw22 (Table 2). However these differences were of marginal significance and were no longer significant after corrected for the number of antigens typed for (p value × 26). The calculated remaining locus A and B blanks in all three dialect groups were low.

The significant locus A and B antigen associations in the three dialect groups are shown in Table 3. A2 and Bw46 were significantly associated in all three dialect groups. Other significant antigen combinations were Aw19 B17 and A29 B7 in the Cantonese, Blank B40 in the Teochews. Significant negative associations were observed with A2 B40 in the Teochews and with All B17 in the Hokkiens.

DISCUSSION

The present paper documents the HLA profiles of three normal Chinese dialect groups, the Cantonese, Hokkiens and Teochews, all orginating from the Southern provinces of China. The HLA antigen phenotype and gene frequencies of the three groups were remarkably similar probably reflecting the closeness of origin of the three dialect groups.

In the locus A and locus B antigen associations A2 and Bw46 were found to be strongly associated in all the three dialect groups. Aw19 B17 were also associated in all three dialect groups but in only Cantonese did the association reach significant levels. It is interesting to note that the two haplotypes A2 Bw46 and Aw19 B17 are strongly associated with the disease Nasopharyngeal Carcinoma in the Chinese (Chan and Simons, 1977; Simons et al., 1979) and A2 Bw46 also with Thyrotoxicosis (Chan et al., 1978). The haplotype A29 B7 was found only among the Cantonese. Payne et al., (1975) had reported on the HLA pattern among the Californian Cantonese and the HLA profile in that population was very similar to that of the Cantonese reported here.

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TABLE 1

HLA PHENOTYPE AND GENE FREQUENCIES IN CHINESE NORMAL DIALECT GROUPS

	CANTONESE n = 100		HOKKIEN n = 95		TEOCHEW n = 43		TOTAL n = 238	
	Ag. F.	G. F.	Ag. F.	G. F.	Ag. F.	G. F.	Ag. F.	G. F.
A1	0	0	0	0	0	0	0	0
A2	.57	.334	.48	.279	.53	.314	.529	.314
A3	.01	.005	0	0	0	0	.004	.002
A9	.28	.151	.27	.146	.26	.140	.273	.147
A10	.03	.015	.05	.025	.09	.046	.05	.026
A11	.57	.344	.64	.40	.60	.368	.605	.372
A28	.01	.005	0	0	0	0	.004	.002
A29	.03	.015	0	0	0	0	.013	.006
Aw19	.15	.078	.24	.128	.26	.140	.206	.109
BLANK		.043		.022		0		.022
		1.000		1.000		1.008		1.000
B5	.09	.046	.16	.083	.14	.073	.126	.065
B7	.04	.020	0	0	0	0	.017	.008
B8	0	0	.01	.005	0	0	.004	.002
B12	.05	.025	.03	.015	0	0	.034	.017
B13	.24	.128	.13	.067	.28	.151	.202	.107
B14	0	0	0	0	0	0	0	0
B15	.29	.157	.19	.10	.14	.073	.223	.118
B17	.11	.057	.17	.089	.16	.083	.143	.074
B18	.02	.01	0	0	.05	.025	.017	.008
B27	.03	.015	.13	.067	.05	.025	.071	.036
B37	0	0	0	0	.02	.01	.004	.002
B40	.38	.213	.48	.282	.33	.181	.412	.233
Bw16	.14	.073	.08	.041	.09	.046	.109	.056
Bw21	0	0	0	0	0	0	0	0
Bw22	.09	.046	.12	.062	.21	.111	.122	.063
Bw35	.08	.041	.02	.01	.02	.01	.046	.023
Bw46	.24	.128	.21	.111	.23	.123	.227	.121
BLANK		.041		.068		.089		.067
		1.000		1.000		1.000		1.000

Ag. F. — Antigen Frequency
G. F. — Gene Frequency

TABLE 2

SIGNIFICANT HLA ANTIGEN DIFFERENCES AMONG THE THREE NORMAL CHINESE DIALECT GROUPS

	CANTONESE vs HOKKIEN	HOKKIEN vs TEOCHEW	TEOCHEW vs CANTONESE
B13	—	$X^2 = 4.81$	—
B27	$X^2 = 5.07$	—	—
Bw22	—	—	$X^2 = 3.89$

TABLE 3
SIGNIFICANT HLA LOCUS A AND B ANTIGEN ASSOCIATIONS IN NORMAL CANTONESE, HOKKIEN AND TEOCHEW CHINESE POPULATION

			CANTONESE	HOKKIEN	TEOCHEW
A2	Bw46	HF	79.4	65.7	123.1
		D	.0366	.0347	.0845
		P	< .05	< .05	< .005
Aw19	B17	HF	29.1	25.4	43.5
		D	.0247	.014	.0319
		P	< .0001	NS	NS
A29	B7	HF	15.1	0	0
		D	.0148		
		P	< .0001		
BLANK	B40	HF	0	14.6	54
		D	– .0184	.0084	.054
		P	NS	NS	< .05
A2	B40	HF	58.7	69.1	0
		D	– .0124	– .0096	– .078
		P	NS	NS	< .05
A11	B17	HF	9.2	0	5.0
		D	– .0104	– .043	– .0255
		P	NS	< .05	NS

HP — Estimated Haplotype frequency $\times 10^3$
D — Delta value

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