FAMILY, CULTURE AND PSYCHOBIOLOGY

Edited by

Eliot Sorel, M.D.

1990

New York Ottawa Toronto

GENETIC, CULTURAL AND FAMILY FACTORS IN ALCOHOL USE IN ASIANS

Joe Yamamoto, M.D.

Introduction

It has been well known since the original studies of Wolff (1972, 1973), that Asians flush and that Caucasians do not. There has also been a belief among many physicians that Asians tend to abuse alcohol less often than Caucasians or Blacks. The presence of the flushing response in Asians has been given as an explanation for the lower prevalence of alcohol abuse among Asians.

In this chapter we will review some of the scientific aspects of the flushing response, including recent findings in the area of the metabolism of alcohol in Asians; the prevalence of the aldehyde dehydrogenase isoenzyme 1 deficit in Asians, as studied by biochemical analyses of hair roots; and the developing knowledge of genetic differences which result in the flushing response and ALDH I negativity. Along with these intriguing biological findings, we will be describing large scale epidemiological studies in Taiwan and in Korea which illustrate the importance of cultural issues in the prevalence of alcohol abuse. Cultural factors influence the different prevalence of alcohol abuse among Chinese and Koreans, and influence the rate among females.

Genetics and Physiology

The Flushing Response

That Asians flush and Caucasians and Blacks do not, is an intriguing difference which has been further described since the initial papers of Wolff (1972, 1973), and has been studied with reference to ethnic differences and fast flushing, notably in Hawaii by Johnson and his colleagues (1984). The group at the University of Hawaii developed a new definition of flushing which differentiated "fast flushing" as flushing immediately after having one

drink or less (one ounce of liquor, one 6 ounce glass of wine, or one bottle of beer), as compared to slow flushing, which occurs in most people if they have enough to drink.

Parallel to this important definition of fast flushing, there have been studies by H. W. Goedde and colleagues (1979) of the occurrence of flushing only in those who have the ALDH enzyme deficit (Tables 1, 2, 3). Goedde's group published (1983, 1984, 1985) descriptions of the prevalence of the aldehyde dehydrogenase isoenzyme deficit in various ethnic populations. To put it succinctly, Caucasians and Blacks do not have this deficit. The people of Asia, as well as the native peoples of North and South America, have a differential prevalence of this enzyme deficit. The Chinese tend to have the highest prevalence, with 50% among the Han Chinese (Goedde, *et al.*, 1984), and lesser prevalence among different minorities in China such as the Zhuang, 45.3%; the Mongolians, 29.7%; and the Koreans, 24.8% (Table 4). All of this suggests a genetic similarity in that all have a prevalence of the ALDH isoenzyme deficit, albeit of varying proportions.

One of Johnson's colleagues, Park, together with Huang and others, studied the Koreans in Korea and Chinese in Taiwan (Park, *et al.*, 1984). Table 5 shows that there are significant differences in the favored drinks of the Koreans compared to the Chinese. More Koreans, who were nonflushers or slow flushers, drank more, compared to the Chinese. Even among the fast flushers, 5.9% of the Koreans, as compared to only 1.5% of the Chinese, drank heavily. This suggests that cultural factors very much influence heavy drinking, for the Chinese are like the "Jews of the Orient" and the Koreans like the "Irishmen of the Orient." In Chinese culture, heavy drinking is discouraged by drinking customs which are highly ritualized. In contrast, among the Koreans, men are encouraged to drink very heavily, as a part of the camaraderie that occurs when men go out to dine and to drink in bars.

In addition to the differences in the prevalence of heavy drinking comparing the Koreans in Korea and the Chinese in Taiwan, there were also differences in the subjective symptoms of the Koreans compared to the Chinese (Table 6). The Koreans much more often complained of the body turning pink or red, limbs turning pink, and other somatic symptoms. Many more of the

Koreans avoided drinking because of the flushing, or quit drinking after flushing. In contrast, the fast flushers among the Chinese in Taiwan more often complained of their face turning pink or red and also said that they avoided drinking because of flushing. These differences were significant at the less than .05 level.

Physiology of the Flushing Response

Mizoi *et al.* (1979) showed a relationship between the level of blood acetaldehyde and facial flushing after the ingestion of a small amount of alcohol. Mizoi and his colleagues studied 68 healthy Japanese males from 20-32 years of age. Of these, 39 said that they flushed and 29 said that they did not. Each subject drank 0.4 grams of alcohol per kilogram of body weight. The blood alcohol levels and blood acetaldehyde levels were both studied. It was found that blood alcohol levels were comparable in both those with normal and deficient ALDH.

On the other hand, blood acetaldehyde levels were markedly different (Table 7). The highest level of acetaldehyde among those with normal ALDH was less than 5MM. When studied 30-60 minutes after drinking a test dose of alcohol, those subjects with deficient ALDH had much higher acetaldehyde levels, on the average, 30MM. Of those with deficient ALDH, the range of increase in the acetaldehyde level varied from 10 to 124 MM, a very significant difference in the range of increase in the acetaldehyde level. This is certainly a notable observation for among those who had the fast flushing, there was a tremendous variation in the build-up of blood acetaldehyde.

We would thus hypothesize that those who are able to drink heavily, despite being fast flushers, may be among those with lesser levels of build-up of blood acetaldehyde, with test doses of alcohol (Table 8). This is a hypothesis that should be tested in future studies of the relevance of the ALDH 1 deficit. The build-up of blood acetaldehyde may differentially predict those who drink despite the fast flushing and the build-up of acetaldehyde. That is to say, those with lesser build-up would be more likely to abuse alcohol than those with tremendous build-up in blood acetaldehyde (Table 9). This hypothesis is partially substantiated by the observations of Mizoi *et al.* (1983), that those with build-up of blood acetaldehyde

above 50 M had conspicuous facial flushing and severe subjective discomfort. In contrast, about 25% showed only a slight increase in blood acetaldehyde level up to 25 MM, and they had only the facial flushing without other dysphoric symptoms. Thus the key might be, not the facial flushing, but the subjective discomfort after the test dose of alcohol.

In the 1983 study, Mizoi and colleagues found that all subjects who were ALDH 1 negative showed facial flushing from approximately 15 minutes to 1-3 hours after drinking (Mizoi *et al.*, 1983). None of the others with normal ALDH showed facial flushing. The subjects with normal ALDH sobered up more quickly than those who were deficient. Thus, the normal control group were comfortable 40-60 minutes after the test dose of alcohol. In contrast, many of those who were deficient ALDH 1 complained of palpitation, dizziness, sleepiness, slight headache, and so forth, whereas few of those with normal ALDH 1 complained of any symptoms. Six of the 39 subjects with the ALDH 1 deficiency continued to show very high blood acetaldehyde levels, 30-60 minutes after alcohol intake, and even suffered from nausea and vomiting after 2-4 hours. They then fell asleep. Certainly, if one studies subjects who are ALDH negative with test doses of alcohol, the experimenters must be prepared to take care of the subjects for several hours subsequently, and to assure that they are fully awake and can be safely taken home without discomfort.

Cultural, Familial and Epidemiological Factors

Epidemiological Findings in Korea and Taiwan

Large scale epidemiological studies have been done in Taiwan with 11,000 subjects interviewed, and in Korea with 5,100 subjects interviewed, using the same National Institute of Mental Health Diagnostic Interview Schedule (Table 10). This standardized epidemiological methodology permits a cross-cultural comparison of the prevalence of alcohol abuse among the Koreans in Korea (Table 11) and the Chinese in Taiwan (Table 12). The DIS generates the DSM III diagnoses of alcohol abuse and dependence. In Korea, it was found that the prevalence of alcohol abuse and dependence was very high with a combined prevalence of 21.7% in Seoul and 22.4% in rural Korea (Table 11).

Table 13 shows that the drinking in Korea is mostly by the males, with relatively few females either having the diagnosis of alcohol abuse or alcohol dependency.

Table 12 shows that the prevalence of alcohol abuse varies tremendously, with a low for males of 6.4% in Taipei followed by 11.3% among the males in the rural areas and 14.7% among the males in Su-Lin and Tsau-Tung, the townships of 100,000 population, respectively (Table 14). The prevalence of alcohol abuse does not vary as dramatically among the females with the lowest prevalence being 0.2% among rural females, followed by 0.4% among females in Taipei, and the highest level, 0.6% among females in the two townships. These differences comparing males and females is significant at the .001 level. Comparing the female/male ratio, it can be seen that the ratio for alcohol abuse is 16 men for every one woman in Taipei City, 24.5 males for every woman in the townships, and 56.5 males per one woman in the six rural villages. This suggests an acculturation gradient with women becoming more acculturated in the largest metropolis of Taipei, lesser acculturated in the two townships, and least acculturated in the rural villages, where there are 56.5 male drinkers for every one female drinker.

The Chinese in Taiwan are traditional, but changing with rapid industrial development. The data comparing males and females illustrate the very important cultural issue that in the rural countryside, where the females tend to be more traditional, the ratio of alcohol abuse prevalence compared to males is minuscule; increases in the two townships of 100,000 population, respectively; and is the greatest in the capital city of Taipei.

The teachings of Confucius have influenced the behavior and values of the Chinese for over 2,000 years (Wilson (Ed), 1982). Among his teachings were the following five sayings, which are well remembered by educated Chinese:

1. Loyalty between the lord and subject;
2. Propriety between husband and wife;
3. Order between senior and junior;
4. Intimacy between father and son; and
5. Trust between friends.

Confucius had a very structured, hierarchical and harmonious view of human relationships.

> *"If there be righteousness in the heart, there will be beauty in the character.*
> *If there be beauty in the character, there will be harmony in the home.*
> *If there be harmony in the home, there will be order in the Nation.*
> *If there be order in the Nation, there will be peace in the world."*

I would like to highlight Confucius' emphasis on "harmony in the home," for it is this traditional teaching that has continued to influence the behavior of the Chinese (as well as Koreans, Japanese, and other Asians), in interpersonal relationships over the past twenty centuries and more. The value of harmony in the home aspired toward a family which lived, worked, and engaged in productive activities together.

These old and traditional values have continued to influence the drinking behavior of the males and females of Chinese ethnicity. The females drink very seldom, and even with acculturation, as is the case in Taiwan, the prevalence is still very small. Of course, it has been shown that as the Chinese emigrate to the United States and are influenced by American values, the drinking behavior changes, but they continue to drink less than other Asians and Caucasian Americans (Kitano and Chi, 1985). In addition, the females tend to drink less, although there is not as strikingly minuscule prevalence as among the Chinese females in Taiwan. This again highlights the importance of the traditional teachings of Confucius; the emphasis on harmony in the family, propriety between husband and wife, and the sharp and clear delineation of sex roles.

These cultural values were also inculcated in Korea, and can be seen manifest in the strikingly low prevalence of alcohol abuse among females compared to males in Korea, despite the fact that the males there tend to drink much more heavily than the Chinese males in Taiwan. In Korea, the ratio of alcohol abuse among females versus males is 16.12 in Seoul and 22.82 in rural areas (Table 11). In comparing the prevalence of alcohol abuse among Chinese females in Taiwan and Korean females in Korea, the following can be said: Despite the fact that we have no evidence

that the Chinese are more traditional, or Confucian, than the Koreans (indeed, some may say that the Koreans are the most Confucian people of the Orient), nonetheless, the prevalence of alcohol abuse among females in Taiwan is lower than among the females in Korea. Perhaps this illustrates the cultural influence in a culture where males are encouraged to drink, as among the Koreans in Korea. There may be a side effect in that the females may also drink a little more. The prevalence of alcohol abuse among the Chinese in Taiwan are between 0.2% among rural females, to 0.4% among females in Taipei, and 0.6% among females in the two townships of 100,000 population. In contrast, in Korea, drinking among females in the capital city of Seoul is 1.59%, and among females in the rural areas, .90%; distinctly higher compared to Chinese females.

Biological Factors

Biological Factors In Alcohol Abuse Among Asian-Americans

The biochemical issues that have been so thoroughly researched by H. Werner Goedde of West Germany, have been mentioned previously (Goedde, *et al.*, 1979, 1983, 1984, 1985). It is now assumed that the biochemical differences, namely the aldehyde dehydrogenase isoenzyme 1 deficit in some Asians, may result in a lesser prevalence of alcohol abuse among this cohort because of the flushing and other unpleasant side effects.

However, as suggested in the studies by Mizoi and colleagues in Japan, even this deficit may be relative, so that some may not have the same aversive response, but only the flushing without the other symptoms of palpitation, dizziness, sleepiness, headache, and so forth (1983). The determination of the presence or absence of the enzyme aldehyde dehydrogenase isoenzyme 1 is through examination of 20 to 30 hair roots. This biochemical procedure is a sensitive and difficult one.

In recent years, the new technology in biochemical genetics have resulted in improved methods to study the biochemical bases of enzymatic differences. As Watson and his colleagues (1983) have so clearly described, the cutting edge of research has now

focused upon human genetic studies, thanks to the addition of methods which include the use of restriction enzymes and the generation of restriction length polymorphism linking data (Tables 15 and 16). It has been shown that, thanks to these new and improved techniques, it will be possible to evaluate and establish the genotype.

There have been new developments in biochemical genetics so that it is now possible to establish the genetic background of individuals, including whether they have the hereditary genotype which results in the phenotype of flushing and the adverse symptoms of aldehyde buildup within the body. We hope that sophisticated biochemical genetic studies, correlated with biochemical studies of the buildup of acetaldehyde, will enable us to determine those individuals who are most at risk for alcohol abuse among those who are ALDH 1 negative and those who are essentially protected because of greater acetaldehyde buildup and aversive symptoms.

Conclusion

The study of alcohol abuse in Asians illustrates the importance of the biopsychosociocultural model of human behavior. There are biological issues related to the genetic differences in the prevalence of aldehyde dehydrogenase isoenzyme 1 deficit in Asians, with a difference in prevalence among Asians from 25 to 50 percent in Koreans and Han Chinese, respectively. This enzyme deficit is found only in those of Asian ancestry. In addition, there are important psychological, social and cultural issues in studying the family use of alcohol and gender issues in the development of patterns of alcohol abuse and dependency as defined by the DSM III.

It has been believed that Asians tend to abuse alcohol less than Americans. This has to be qualified now with the statement that many male Koreans and male Japanese drink as much, if not more, than Americans. The female Koreans drink much less than American females do, illustrating the cultural influence. On the other hand, the use of alcohol by female Japanese has risen over the past decade. With increasing urbanization, industrialization, and economic achievement, the pattern of abuse of alcohol has become much more like that found in Americans, although not yet quite as prevalent among the Japanese females.

Even the biological factors which may tend to discourage the use of alcohol among those who are ALDH negative, has been shown to be somewhat variable. That is to say, those who have the enzyme deficit, usually tend not to abuse alcohol, but some of the ALDH negative Asians do abuse alcohol and become alcohol dependent. Studies are very much needed along the lines of evaluating the physiology of the buildup of acetaldehyde in those who are ALDH negative to understand the ways in which they have overcome the flushing response and learned to abuse alcohol.

REFERENCES

Burnam, Audrey M. "Prevalence of alcohol abuse and dependence among Mexican Americans and Non-Hispanic Whites in the community." Presented at the NIAAA "Epidemiology of Alcohol Use and Abuse Among U.S. Ethnic Minorities" Conference, September 11-14, 1985.

Goedde, H.W., Agarwal, D.P., Harada. S. "Population genetic and family studies on aldehyde dehydrogenase deficiency and alcohol sensitivity." *Alcohol*, 2 (1985): 383-390.

Goedde, H.W., Agarwal. D.P., Harada. S. "The role of alcohol dehydrogenase and aldehyde dehydrogenase isozymes in alcohol metabolism, alcohol sensitivity, and alcoholism. Isozymes." *Current Topics in Biological and Medical Research.* New York: Liss, 8 (1983): 175-193.

Goedde, H.W., Agarwal, D.P., Harada, S., *et al.* "Incidence aldehyde dehydrogenase deficits in four ethnic populations in China." *Human Heredity*, 34 (1984): 18.

Goedde, H.W., Harada, S., Agarwal, D.P. "Racial differences in alcohol sensitivity: a new hypothesis." *Hum Genet.*, 51 (1979): 331-334.

Johnson, R.C., Nagoshi, C.T., Schmitters, S.Y., *et al.* "Further investigation of racial/ethnic differences and of familial resemblances in flushing in response to alcohol." *Behav Genet.*, 14 (1984): 171-178.

Kitano, H.L., Chi, I. "Asian Americans and alcohol: The Chinese, Japanese, Koreans and Pilipinos in Los Angeles." Presented at the Epidemiology of Alcohol Among U.S. Minorities Conference, National Institute of Alcohol Abuse and Alcoholism, Bethesda, MD., Sept. 11-14, 1985.

Lee, C.K., *et al. DIS lifetime prevalence in Korea: A nationwide epidemiologic study of mental disorders in Korea*, 1986.

Mizoi, Y., Ijiri, I., Tatsuno, Y., *et al.* "Relationship between facial flushing and blood acetaldehyde levels after alcohol intake." *Pharmacology Biochemistry & Behavior*, 10 (1979): 303-311.

Mizoi, Y., Tatsuno, Y., Adachi, J., *et al.* "Alcohol sensitivity related to polymorphism of alcohol-metabolizing enzymes in Japanese." *Pharmacology Biochemistry & Behavior*, Vol. 18. Suppl 1 (1983): 127-133.

Park, J.Y., Huang, Y.H., Nagoshi, C.T., *et al.* "The flushing response to alcohol use among Koreans and Taiwanese." *J of Stud on Alcohol*, 45(1984):481-485, .

Watson, J.D., Tooze, J., Kurtz, D.T. *Recombinant DNA: A Short Course*. New York:W.H. Freeman and Co., 1983.

Wilson, E. (Ed.) *The Wisdom of Confucius*. New York: Avenl Books, 1982.

Wolff, P. "Ethnic differences in alcohol sensitivity." *Science*, 175 (1972): 449-450.

Wolff, P. "Vasomotor sensitivity to alcohol in diverse Mongoloid populations." *Am J of Human Genetics*, 25 (1973):193-199.

Yeh, E.K., Hwu, H.G., Chang, L.Y., Yeh, Y.L. "Anxiety, alcoholism and depression in Taiwan Chinese Community." Presented, American Psychiatric Association meeting, May, 1986.

TABLE- 1

FREQUENCY OF ALDH ISOZYME I-DEFICIENCY IN DIFFERENT POPULATIONS

Population	ALDH I-Deficiency No. in	% of population sample
Europeans	224	0
Egyptians, Sudanese	160	0
Liberians	169	0
Chinese	196	35
Japanese	79	48
Indonesians, Koreans	35	40
Vietnamese	82	57
Thais (Northern Thailand)	110	8
Highland Indians (Equador)	33	39

B. Werner Goedde, *et al.*, "The role of alcohol dehydrogenase and aldehyde dehydrogenase isozymes in alcohol metabolism, alcohol sensitivity, and alcoholism. Isozymes." *Current Topics in Bilogical and Medical Research.* New York: Liss, 8 (1983): 175-193.

TABLE 2

DISTRIBUTION OF ALDH 1 ISOZYME DEFICIENCY IN VARIOUS RACIAL AND ETHNIC GROUPS

	Sample Size deficiency Detected	% Deficient
Asians orientals		
Japanese	184	44
Ainu	80	20
Chinese (natives)		
Han	120	50
Zhuang	106	45
Mongolians	198	30
Koreans	209	25
Chinese (living abroad)	196	35
South Koreans	75	27
Vietnamese	82	57
Thais (Northern Thailand)	110	8
Indonesians	30	39.

H. W. Goedde, *et al.* w Population genetic and family studies on aldehyde dehydrogenase deficiency and alcohol sensitivity; *Alcohol*, Vol 2. pp. 383-390, 1985.

TABLE 3

DISTRIBUTION OF ALDH 1 ISOZYME DEFICIENCY IN VARIOUS RACIAL AND ETHNIC GROUPS

	Sample Size Deficiency Detected	% Deficient
American Indians		
Shuara (Ecuador)	99	42
Atacamenos (Chile)	133	43
Mapuche (Chile)	64	41
Sioux (North America)	97	5
Mestizos (Mexico)	46	4

E.W. Goedde, *et al.*, Population genetic and family studies on aldehyde dehydrogenase deficiency and alcohol sensitivity. *Alcohol*, Vol 2, pp: 383-390, 1985.

TABLE 4
INCIDENCE OF ALDH ISOZYME DEFICIENCY IN 4 CHINESE POPULATIONS

Population	N	Deficient Type		Normal Type	
		N	%	N	%
Mongolian	198	59	29.7	139	70.3
Korean	209	52	24.8	157	75.2
Zhuang	106	48	45.3	58	54.7
Han	120	60	50.0	60	50.0

Goedde, *et al.*, *Human Heredity*, Vol 34: 184, 1984.

TABLE 5
NUMBER OF DIFFERENT TYPES OF FLUSHERS, BY FAVORITE ALCOHOLIC BEVERAGE AND AMOUNT OF THIS BEVERAGE USUALLY CONSUMED

	Koreans						Taiwanese					
	NF		SF	FF			NF		SF	FF		
Favorite Drink*												
1	35	36.8%	22%	39	76.5%		92	82.0%	32	74.4%	129	94.2
2	15	15.8%	16%	9	17.6%		8	7.1%	5	11.6%	3	2.2
3	4	4.2%	13%	0			5	4.5%	4	9.3%	3	2.2
4	41	43.2%	49%	3	5.9%		7	6.3%	2	4.7%	2	1.05
	x^2= 53.62, 6 df, p <.0001						x^2 = 16.08, df, p< .02					

*1 = 1-2 bottles of beer, 1 glass of wine or 1 drink of distilled spirits
2 = 3-4 bottles of beer, 2 glasses of wine or 2 drinks of distilled spirits
3 = 5-6 bottles of beer, 3 glasses of wine or 3 drinks of distilled spirits
4 = 7+bottles of beer, 4+ glasses of wine or 4+ drinks of distilled spirits

Park JY, Huang YH, Nagoshi CT, et al: The flushing response to alcohol use among Koreans and *J Stud Alcohol* 1984: 45:481-485.

TABLE 6
PERCENTAGE OF SUBJECTS REPORTING VARIOUS ALCOHOL-RELATED SYMPTOMS AND FLUSHING RESPONSES

	Koreans			Taiwanese		
	SF	FF	F	SF	FF	F
Face turns pink or red	98	100	1.04	82	92	4.58*
Body turns pink or red	31	57	9.48**	25	37	2.69
Limbs turn pink	22	50	12.34***	18	24	0.89
Heart beats faster	58	75	4.52*	70	71	0.14
Break out in hives	03	10	3.02	07	11	0.81
Breath faster	32	55	7.62**	53	51	0.04
Get dizzy	37	59	6.72*	56	53	0.19
Get headache	36	61	8.47**	33	39	0.31
Get nauseous	29	39	1.63	11	20	2.75
Feel warm	75	74	0.02	84	77	1.75
Feel lightheaded	43	52	1.11	34	36	0.02
Feel sleepy	58	35	7.01**	69	73	0.31
Avoid drinking because of flushing	15	57	35.13***	23	37	3.90*
Quit drinking after flushing	31	89	65.15***	55	63	1.17
Time before color disappears (min)	74	57	4.16*	61	65	0.15

*p < .05. ** p.<.01. *** p < .001.

Park JY, Hung YH, Nagoshi CT, et al: The flushing response to alcohol use among Koreans and Taiwanese. *J Stud Alcohol* 1984; 45:481-485.

TABLE 7

BLOOD ALCOHOL AND ACETALDEHYDE LEVELS IN USUAL AND UNUSUAL ALDH GROUPS AFTER IN-TAKE OF 0.4 QRTS ALCOHOL (MEAN = SD)

Before	30 min	I HR	2 HR	3 HR	4 HR
		Blood Alcohol (mM)			
		USUAL ALDH			
0	10.17	9.88	6.37	2.92	0.57
	= 2.27 =	1.43	=1.41	=1.46	=0.66
		Unusual ALDH			
0	10.99	9.37	6.30	3.33	1.06
	=1.95	=1.09	=1.22	=1.34	= 1.02
		Blood Acetaldehyde (mM)			
		Usual ALDH			
0.25	1.98	1.56	1.39	0.81	0.52
=20.22	=1.38	=0.96	=0.97	=0.62	=0.48
		Unusual ALDH			
0.23	32.12	33.27	18.84	14.84	6.26
=0.29	=26.80	=26.50	=17.80	=13.59	=8.33

Usual ALDH group N=29: unusual ALDH group N=39.

Mizoi, Y., Tatsuno, Y., Adachi, J., *et al.*: Alcohol sensitivity related to polymorphism of alcohol-metabolized enzymes in Japanese. *Pharmacology Biochemistry & Behavior*, 1983; Vol 18, Suppl 1:127-133.

TABLE 8

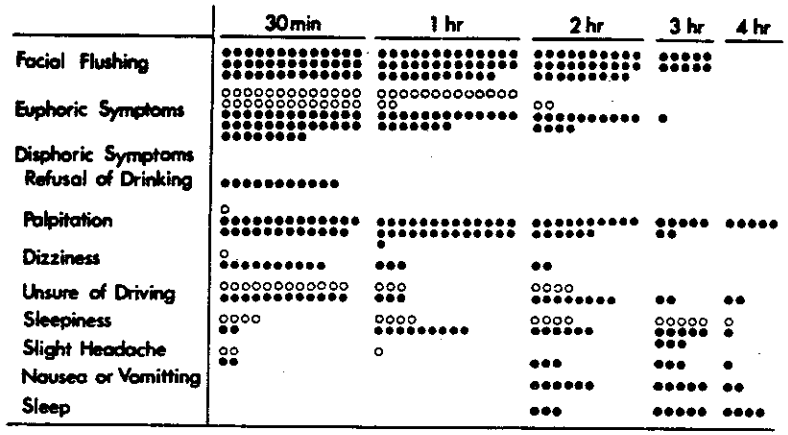

FIG : Symptoms and signs in the subjects of alcohol experiment. Usual ALDH group (o) N=29. Unusual ALDH group (*)N=39

Mizoi Y, Tatsuno Y, Adachi J, et al: Alcohol sensitivity related to polymorphism of alcohol-metabolizing enzymes in Japanese. Pharmacology Biochemistry & Behavior 1983; Vol. 18, Suppl 1:127-133.

TABLE 9
ALCOHOL SENSITIVITY IN JAPANESE

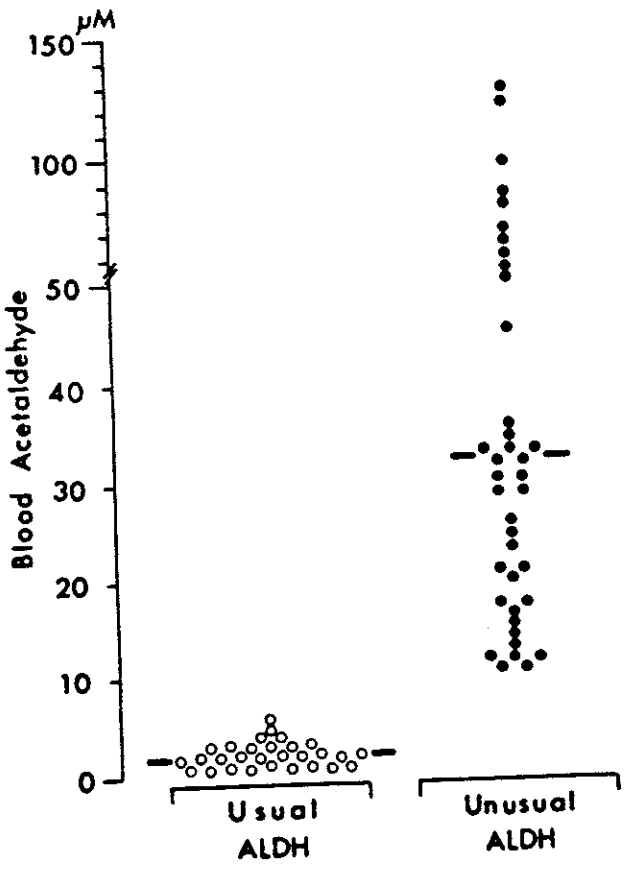

FIG. 1. Highest level; of blood acetaldehide in each subject of the alcohol experiment.

Mizoi Y, Tatsuno Y, Adachi, J: Alcohol Sensitivity related to polymorphism of alcohol-metabolizing enzymes in Japanese. Pharmacology Biochemistry Behavior 1983; Vol 18, Suppl 1:127-133.

TABLE 10
FIGURE 1. DIS/DSM III ALCOHOL DISORDER MEASURE SUMMARY
ALCOHOL ABUSE - BOTH CRITERIA BELOW REQUIRED

Criterion A (Pathological Use)
One of the following is present:
1. Wanted to stop drinking but couldn't
2. Tried to control drinking
3. Drank as much as a fifth of liquor in one day (or equivalent in wine or beer)
4. Had blackouts while drinking
5. Continued to drink when a serious illness might be made worse
6. Period when could not do ordinary daily work well unless had something to drink
7. Two or more benders that each lasted at least a couple of days

Criterion B (Impairment in social or occupational functioning).
One of the following is present:
1. Family objected because drinking too much
2. Friends; doctors clergy or other professional said drinking too much for own good
3. Had job or school troubles because of drinking
4. Lost job or kicked out of school on account of drinking
5. Got into trouble driving because of drinking
6. Was arrested or held at police station because of drinking or disturbing the peace while drinking
7. Got into physical fights while drinking

ALCOHOL DEPENDENCE

Both criteria below required:
Criterion A (Either pathological use or impairment in social and occupational functioning as assessed for alcohol abuse above)

Criterion B (Tolerance or withdrawal)
One of the following is present:
1. Period of 2 weeks when every day drank seven or more drinks
2. Needed a drink just after getting up
3. Had "the shakes" after stopping or cutting down on drinking

Burnam, Audrey M.: Prevalence of Alcohol Abuse and Dependence Among Mexican Americans and Non-Hispanic Whites in the Community, presented at the NIAAA "Epidemiology of Alcohol Use and Abuse Among U.S. Ethnic Minorities" Conference, September 11-14, 1985.

TABLE 11
LIFETIME PREVALENCE RATE OF DIS/DSM-III ALCOHOL ABUSE/DEPENDENCE IN KOREA

	Seoul % N=3, 134	Rural % N=l, 966
Alcohol Abuse	12.95	10.65
Alcohol Dependence	8.76	11.74
Alcohol Abuse and Dependence	7.87	10.76
Alcohol Dependence Only	0.89	0.98
Alcohol Abuse/Dependence (Sum)	21.71	22.39

Lee, Chung Kyoon, *et al.*: *DIS Lifetime Prevalence in Korea: A Nationwide Epidemiologic Study of Mental Disorders in Korea*, 1986.

TABLE 12
LIFETIME PREVALENCE OF ALCOHOL ABUSE/DEPENDENCE IN TAIWAN

	Taipei City N=5005			Sun-Lin & Tsau-Tung N=3004			Six Villages N=2995		
	Male no %	Female no %	Total no %	Male no %	Female no %	Total no %	Male no %	Female no %	Total no %
Alcohol Abuse	158 6.4	11 0.4	169 3.4	232 14.7	8 0.6	240 8.0	185 11.3	3 0.2	188 6.3
Alcohol Abuse	70 2.8	3 0.1	73 1.5	50 3.2	4 0.3	54 1.8	35 2.1	0 0.0	35 1.20

Source: Yeh EK, *et al.*, 1986.

TABLE 13
LIFETIME PREVALENCE OF DSM III

	SEOUL % MALE	FEMALE	KOREAN RURAL % MALE	FEMALE
Alcohol/Abuse	25.63	1.59	20.54	.90
Alcohol/Dependency	17.23	1.04	.22.39	.67

Lee, Chung Kyoon, et.al.: DIS Lifetime Prevalence in Korea A Nationwide Epidemiologic Study of Mental Disorders in Korea, 1986.

TABLE 14
LIFETIME PREVALENCE OF SPECIFIC MENTAL DISORDERS IN 2 TOWNSHIPS

	Su-Lin N-1505 N	%	Tsau -Tung N-1499 N	%	t	p
Psychotic disorders						
Schizophrenia	5	0.3	2	0.1	1.23	n.s.
Manic episode	1	0.1	1	0.1	0	n.s.
Bipolar disorder	3	0.2	2	0.1	0.71	n.s.
Paranoid disorder	16	1.1	4	0.3	2.63	P<.05
Depressions						
Major depressive episode	23	1.5	27	1.8	0.65	n.s.
Dysthymic disorder	26	1.7	19	1.3	0.90	n.s-
Anxiety/somatoform disorder						
G. A. D.	169	11.2	146	9.7	1.34	n.s.
Phobic disorder	110	7.3	59	3.9	4.09	P<.05
O. C. D.	11	0.7	5	0.3	1.56	n-s.
Panic disorder	5	0.3	5	0.3	0	n.s.
Somatization disorder	2	0.1	2	0.1	0	n.s
Substance use disorders						
Alcohol abuse	137	9.1	103	6.9	2.22	P<.05
Alcohol dependence	35	2.3	19	1.3	2.06	P<.05
Tobacco dependence	186	12.4	181	12.1	0.25	n.s.
Drug dependence	1	0.1	5	0.3	1.22	n.s.
Personality disorder						
Antisocial personality	1	0.1	1	0.1	0	n.s.
Pathological gambling	12	0.8	6	0.4	1.42	n.s.
Psychosexual disorders						
Transsexualism	3	0.2	3	0.2	0	n.s.
Psychosexual dysfunction	39	2.6	14	0.9	3.56	P<.05
Cognitive impairment	22	1.5	30	2.0	1.04	n.s.

E.K. Yeh, at.al. 1986

TABLE 15
RESTRICTION ENZYMES MAKES SEQUENCE-SPECIFIC CUTS IN DNA

Since then, restriction enzymes that cut specific sequences have been Isolated from some 230 bacterial strains, and over 91 different specific cleavage sites have been found.

Watson JD, Tooze J, Kurtz DT: *Recombinant DNA: A Short Course.New York: Scientific American Books, 1983, pp. 58-59.*

TABLE 16
SOME RESTRICTION ENZYMES AND THEIR CLEAVAGE SEQUENCES

Microorganism	Abbreviation	Sequence 5'—3' 3'—5'
Bacillus amyloliquefaciens	bam HI	G GATCC CCTAG G
Brevibacterium albidum	BalI	TGG CCA ACC GGT
Escherichia coli	Eco RI	G AATTC CTTAA G
Haemophilus aegyptius	HaeII	Pu G C G C Py Py C G C G Pu
Hoemopbilus aegyptius	HEIII	G G C C CC GG
Hoemopbilus haemolyticus	Hbal	GCG C CTGCG
Hoemophilus influenzae Rd	HindII	G T Py Pu A C C A Pu Py T G
Hoemophilus influenzae Rd	HindIII	A AGCTT TTCGA A
Haemophilus para influenzae	Hpal	GTT AAC CAA TTG
Haemophilus parainfluenzae	HpaII	C CGG G G C C
Providentia stuartii	PstI	CTGCA G G ACGTC
Streptomyces albs G	SalI	G TCGAC CAGCT G
Xanthomonas eryzae	xerII	CGATC G G CTAGC

Watson JD, Tooze J, Kurtz Dr: *Recombinant DNA: A Short Course.* New York: Scientific American Books; 1983, pp. 59.

*ETHNICITY AND PSYCHOPHARMACOLOGY: RECENT FINDINGS AND FUTURE RESEARCH DIRECTIONS**

Keh-Ming Lin, M.D.,M.P.H.
Russell E. Poland, Ph.D.
Ching-Piao Chien, M.D.

Introduction

The last decade has witnessed noteworthy progress in the field of cross-ethnic psychopharmacology. Capitalizing on recent advances in cross-cultural research methodology as well as bioassay methods, a number of studies have attempted to quantitatively examine the issues of ethnic differences in psychotropic responses. Utilizing research strategies such as chart reviews, single-dose pharmacokinetic studies with volunteer subjects, and longitudinal assessment of drug responses with serial determinations of serum drug concentrations, some of these studies have reported ethnic differences in therapeutic dose ranges, side effect profiles, pharmacokinetic parameters, as well as neuroendocrine responses to psychotropics.

Despite the progress, however, many issues remain unresolved. Factors contributing to the controversies include: (1) small sample size; (2) variation in the pharmacological and pharmacokinetic properties of psychotropics; (3) subcultural differences within each broadly-defined ethnicity category; (4) lack of coordination among researchers from divergent settings utilizing divergent research methodologies; (5) the neglect of "non-pharmacological" factors.

In order to ensure further progress in the field, interdisciplinary collaboration is necessary, and systematic efforts should be made

* Supported in part by State of California Contract #85-76263 (Drs. Lin and Poland), National Institute of Mental Health, National Research Center on Asian-American Mental Health, MH44331-01 (Dr. Lin), and National Institute of Mental Health Research Scientist Development Award MHOO534 (Dr. Poland).