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ABO/Rh Blood Groups and the Temperament (Mizaj) Based on Traditional Persian Medicine Perspective: A Cross-sectional Study

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Abstract

Background: Mizaj is a fundamental concept in traditional Persian medicine (TPM) that explains the physiological and psychological traits of human beings. This study aimed to investigate the association between the ABO/Rh blood groups and the Mizaj. **Materials and Methods:** This cross-sectional study was conducted on 18-60 years old individuals who visited the Iranian Blood Transfusion Organization, Shiraz Branch. We used Mojahedi's Mizaj questionnaire to determine the Mizaj of the participants. The participants' blood group and Rh were determined based on the antibodies against types A, B, and Rh antigens of their blood. **Results:** We assessed 308 individuals consisting of 174 (56.49%) male and 134 (43.51%) female. The results of our study showed a significant relationship between the AB blood group and the cold Mizaj in both simple and compound Mizaj categories (P=0.012, P=0.014, respectively). Logistic regression analysis revealed that people with the AB blood group were 2.88 times more likely to have cold Mizaj than people with the O blood group (OR=2.88, 95% CI: 1.16 to 7.15). In addition, those with the A blood group were found to be 54% less likely to have a dry Mizaj than those with the O blood group (OR=0.46, 95% CI: 0.23 to 0.92). There was no significant association between the participants' Mizaj and their Rh blood group (P>0.05). **Conclusion:** It seems that there was a significant relation between the AB blood group and cold Mizaj, as well as the A blood group and dry Mizaj. However, further studies are recommended with controlling the probable confounding factors.
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Keywords: ABO Blood-Group System; Persian Medicine; Temperament; Traditional Medicine

Introduction

Traditional Persian medicine (TPM) is one of the most ancient forms of traditional holistic medicine that is based on humoral medical theories [1-3]. Mizaj (temperament) is a fundamental TPM concept [4-8]. It is a phenotype-based categorization describing all physiological and psychological aspects of human beings and can also explain the rea-

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son for the difference in the diseases's presentation and the response to treatment in each person [6]. Moreover, Mizaj derives from the interaction of contrary qualities of hotness, coldness, dryness, and wetness in elements [6, 9]. Abnormal Mizaj or sue-Mizaj referred to the condition of imbalance between the Mizaj qualities and is classified into 9 general categories: hot, cold, dry, wet, cold-wet, hot-wet, hot-dry, cold-dry, and medium type [6, 9, 10]. All humans have sanguineous (Dam), phlegmatic (Balgham), bilious (Safra, yellow bile), and melancholic (Savda) humor depending on the dominant humor in the body [11, 6].

The dominant humor determined which diseases the person is susceptible to, and which treatments are more effective. In other words, according to the concepts of TPM, Mizaj could be defined as the presence of the humor(s) quality accumulated in the body, according to the level of hotness and dryness. When there is an imbalance in the amount of humor in the body, people develop sue-Mizaj (dystemperament) [11, 10, 12]. Previous studies analyzed the association between the Mizaj and many physical and mental characteristics. For example, a recent study demonstrated a correlation between hot temperament and neuroticism [13].

It has also been shown that there is a significant correlation between hot and dry Mizaj and type 1 diabetes mellitus [14]. In addition, another study showed that non-melanoma skin cancer (NMSC) was associated with dry Mizaj [15]. Analysis of the association between body mass index and Mizaj showed that there is a significant relationship between the fat mass and cold-dry and hot-wet Mizaj [16]. Moreover, the results of a study showed a significant relationship between low body mass index (BMI<18) in teenage girls and dry Mizaj [17]. Determination of ABO antigen in humans blood is one of the most important, available, unchangeable, and valuable factors for determining the fundamental difference among humans genotypes which was discovered by Karl Landsteiner, a Viennese pathologist, in 1900 [18]. It was divided into four blood groups consisting of A, B, AB, and O according to the surface antigens of red blood cells [18, 19]. Several studies revealed the association between the ABO blood group and some medical conditions including cancer [20, 21] gastric ulcer[22], some infectious diseases including Plamodium falciparum malaria [23], helicobacter pylori gastritis [24], COVID-19 [25, 26], as well as some psychological conditions including anxiety and stress [27, 28]. There is also some significant evidence that adherence to diets specific to one's blood type can reduce the risk of cardiovascular disease and improve overall health. The 'Blood-Type' diet advises individuals to eat according to their ABO blood type to improve their health and reduce the risk of chronic diseases [29]. Since the publication of the book "Eat Right for Your Type" by D'Adamo, there have been many controversial discussions about the relationship between ABO blood types, dietary habits, and human health [30].

However, there are few studies on the association between physical characteristics, blood type, and Mizaj [31, 32]. The result of a study on 640 participants in 1930 showed a significant association between the blood group and Mizaj [31]. Another study in this regard investigated the association between 12 blood markers and Mizaj [32].

In contrast to previous studies, results showed no relation between the ABO and Rh alleles and the Mizaj [32]. There was only a significant association between the Lewis alleles and Mizaj [32].

To the best of our knowledge, there was little evidence of a correlation between the Mizaj and blood groups in humans. Therefore, this study aimed to analyze the prevalence of Mizajs among the Iranian population by considering the individual's ABO/Rh blood groups and evaluating the relationship between blood group and Mizaj among the study participants.

Materials and Methods

Study Design, Sample Size, and Participants

This cross-sectional study was conducted from the 1st of August to the 10th of October, 2020 at the Iranian Blood Transfusion Organization, Shiraz Branch (one of the main branches in Iran), Fars Province, Iran. The study population consisted of all voluntary blood donors, aged 18-60 years, who were referred to this organization. The convenience sampling

method was used to enroll the participants in our study. Participants with contraindications of blood donation including taking anti-coagulants, having high-risk sexual behaviors or multiple sex partners, active seizure disease, significant pulmonary or cardiac diseases, hepatitis, syphilis, and addiction to intravenous drugs were excluded. Additionally, patients with kidney, hepatic, and thyroid disorders were excluded due to the possible effects of these diseases on the Mizaj. Before the enrollment, the study procedure was explained to all participants, and written informed consent was obtained from them.

According to the prevalence of dry Mizaj (25%) among Rh-positive participants in our initial pilot sampling, using the following formula, the sample size was estimated to be at least 288 with overall power of 95% at a significant level of 0.05.

$$n = \frac{z_{1-\alpha/2}p(1-p)}{d^2} = 288$$

$$d = 0.2 \times p$$

$$p = 0.25, \alpha = .05, z_{0.975} = 1.96$$

Ethics Statements

The study protocol was approved by the Ethics Committee of Shiraz University of Medical Sciences (Ethics Code: IR.SUMS.MED.REC.1399.308). In addition, written informed consent was obtained from all participants before the enrollment. Moreover, participants were assured that their data would remain confidential to the researchers.

Data Collection

The Mojahedi's Mizaj Questionnaire was utilized to determine the Mizaj of participants [33]. This questionnaire contains ten questions (scored from 1 to 3, based on a three-point Likert scale). Eight of these questions are related to the hot/cold quality and two others are related to the wet/dry quality. Therefore, each participant had two scores, one for the hot/cold quality (ranges from 8 to 24) and the other for the wet/dry quality (ranges from 2 to 6). Participants with ≥19 scores in the hot/cold subscale were located in the category of hot Mizaj and those with ≤14 scores were categorized as cold Mizaj. In the dry/wet subscale, participants with a≥5 score had dry Mizaj and with ≤3 the score had wet Mizaj. The psychometric properties of this questionnaire were approved in the Iranian population. The reliability of this questionnaire was approved by Cronbach's α coefficient of 0.71 in the Iranian population. Moreover, the sensitivity and specificity of this questionnaire for detecting the individual's Mizaj were acceptable.

Also, the blood group information of the participants was determined from their blood samples by surveying the antibodies against type A and B, as well as Rh in the participants' blood.

Statistical Data Analysis

Data analysis was performed using SPSS (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.) and Stata software version 14.2 (StataCorp LLC, 4905 Lakeway Drive, College Station TX77845, USA). Qualitative and quantitative data were represented as frequency (percentage) and mean ± standard deviation, respectively. Kolmogorov-Smirnov test was used to determine the normality distribution of data. In addition, Chi-square and independent t-test were used to analyze the relationship between the variables. Furthermore, multiple logistic regression was performed to estimate the effect sizes with controlling the effect of participants' gender on the results of the study. $P<0.05$ was considered statistically significant.

Results

A total of 308 subjects were enrolled in this study. of these, 174 (56.49%) were male and 134 (43.51%) were female. The mean and standard deviation age of these patients was 37.90±10.06 (CI 95%: 36.76 to 39.03). Among the participants, 122 (39.61%) were blood group O. The prevalence of A, B, and AB blood groups was 27.27%, 22.40%, and 10.71%, respectively. Moreover, 226 (73.38%) participants had positive and 82 (26.62%) of them had negative Rh group. Table-1 shows the demographic information of the participants in the study.

Table-2 shows the participants' Mizaj con-

Table 1. Demographic Characteristics of the Participants Enrolled Into the Study

Variables	ABO blood groups					P -value	Rh blood groups		P -value
	Total	A (N=84)	B (N=69)	AB (N=33)	O (N=122)		Rh positive (N=226)	Rh negative (N=82)	
Age, mean±SD [a]	37.90± 10.06	38.42± 9.90	37.82± 9.64	37.25± 9.09	37.75± 10.73	0.944	38.17± 10.00	37.13± 10.25	0.427
Gender, N (%)									
Male	174 (56.49)	47 (55.95)	36 (52.17)	19 (57.58)	72 (59.02)	0.834	131 (57.95)	43 (52.44)	0.387
Female	134 (43.51)	37 (44.05)	33 (47.83)	14 (42.42)	50 (40.98)		95 (42.04)	39 (47.56)	
Marital status, N (%) [b]									
Single	98 (32.24)	20 (24.10)	28 (41.18)	9 (27.17)	41 (34.17)	0.134	67 (30.18)	31 (37.80)	0.207
Married	206 (67.76)	63 (75.90)	40 (58.82)	24 (72.73)	79 (65.83)		155 (69.82)	51 (62.20)	
Educational level, N (%) [c]									
Under diploma	22 (7.28)	4 (4.88)	2 (2.94)	3(9.68)	13 (10.74)	0.452	15 (6.76)	7 (8.75)	0.503
Diploma	96 (31.79)	31 (37.80)	21 (30.88)	11 (35.48)	33 (27.27)		72 (32.43)	24 (30.00)	
Bachelor degree	145 (48.01)	35 (42.68)	38 (55.88)	14 (45.16)	58 (47.93)		103 (46.40)	42 (52.50)	
Master's degree and higher	39 (12.91)	12 (14.63)	7 (10.29)	3 (9.68)	17 (14.05)		32 (14.41)	7 (8.75)	

a. Missing data for 3 cases; **b.** Missing data for 4 cases; **c.** Missing data for 6 cases

sidering their ABO/Rh blood group, as well as the association between each simple and compound Mizaj type with ABO/ Rh blood groups. According to this Table, the percentage of cold Mizaj, in both simple and compound Mizaj types, was significantly more prevalent in participants with the AB blood group compared to other blood groups (P=0.012 and P=0.014, respectively). In more detail, our results indicated that the incidence of cold Mizaj was significantly lower in the participants with the B blood group compared to other blood groups (P=0.012).

We also analyzed the association between gender and cold/hot qualities. The association between these two variables was significant (P=0.029). In this regard, the frequency of hot Mizaj was higher in men compared to women. While there was no significant association between wet/dry qualities and the participants' gender (P=0.167). In addition, the moderate Mizaj (in hotness and wetness qualities) were the most common Mizaj types in both male and female participants in this study.

According to logistic regression analysis, individuals with the AB blood group were 2.88 times more likely to have cold Mizaj (OR=2.88, 95% CI: 1.16 to 7.15) than those

Table 2. Study Participants' Mizaj with Considering Their ABO/Rh Blood Group and the Association between Each Simple and Compound Mizaj Types with ABO/ Rh Blood Groups

		ABO blood group					Rh blood group		
Mizaj	**N (%)**	**A**	**B**	**AB**	**O**	**P value***	**Rh positive**	**Rh negative**	**P value***
Simple Mizaj types									
Hotness quality									
Hot	91 (29.55)	20 (23.81%)	22 (31.88%)	5 (15.15%)	44 (36.07%)	0.063	66 (29.2%)	25 (30.49%)	0.888
Moderate	166 (53.90)	45 (53.57%)	41 (59.42%)	18 (54.55%)	62 (50.82%)	0.728	125 (55.31%)	41 (50.00%)	0.439
Cold	51 (16.56)	19 (22.62%)	6 (8.70%)	10 (30.30%)	16 (13.11%)	0.012	35 (15.49%)	16 (19.51%)	0.488
Total	308	84 (100%)	69 (100%)	33 (100%)	122 (100)		226 (100%)	82 (100%)	
Wetness quality									
Wet	107 (34.74)	27 (32.14%)	30 (43.48%)	10 (30.30%)	40 (32.79%)	0.387	73 (32.30%)	34 (41.46%)	0.139
Moderate	122 (39.61)	43 (51.19%)	22 (31.88%)	12 (36.36%)	45 (36.89%)	0.073	89 (39.38%)	33 (40.24%)	0.896
Dry	79 (25.65)	14 (16.67%)	17 (24.64%)	11 (33.33%)	37 (30.33%)	0.112	64 (28.32%)	15 (18.29%)	0.079
Total	308	84 (100%)	69 (100%)	33 (100%)	122 (100)		226 (100%)	82 (100%)	
Compound Mizaj types									
Cold and wet	13 (4.22)	5 (5.95%)	3 (4.35%)	1 (3.03%)	4 (3.28%)	0.799	9 (3.98%)	4 (4.88%)	0.730
Hot and wet	31 (10.06)	7 (8.33%)	11 (15.94%)	1 (3.03%)	12 (9.84%)	0.193	22 (9.73%)	9 (10.98%)	0.743
Hot and dry	23 (7.47)	2 (2.38%)	6 (8.70%)	1 (3.03%)	14 (11.48%)	0.070	17 (7.52%)	6 (7.32%)	0.952
Cold and dry	11 (3.57)	3 (3.57%)	2 (2.90%)	3 (9.09%)	3 (2.46%)	0.328	9 (3.98%)	2 (2.44%)	0.519
Hot	37 (12.01)	11 (13.10%)	5 (7.25%)	3 (9.09%)	18 (14.75%)	0.439	27 (11.95%)	10 (12.20%)	0.953
Cold	27 (8.77)	11 (13.10%)	1 (1.45%)	6 (18.18%)	9 (7.38%)	0.014	17 (7.52%)	10 (12.20%)	0.200
Wet	63 (20..45)	15 (17.86%)	16 (23.19%)	8 (24.24%)	24 (19.67%)	0.801	42 (18.58%)	21 (25.61%)	0.177
Dry	45 (14.61)	9 (10.71%)	9 (13.04%)	7 (21.21%)	20 (16.39%)	0.454	38 (16.81%)	7 (8.54%)	0.069
Moderate	58 (18.83)	21 (25.00%)	16 (23.19%)	3 (9.09%)	18 (14.75%)	0.097	45(19.91%)	13 (15.85%)	0.421
Total	308	84 (100%)	69 (100%)	33 (100%)	122 (100%)		226 (100%)	82 (100%)	

*The P-values were calculated using chi-square test by comparing each of temperament with other temperaments. P-value≤ 0.05 was considered significant.

Table 3. Association between Mizaj And ABO and RH Blood Groups Subtypes Using Multiple Logistic Regression Adjusting by the Participants' Gender

Hotness quality												
Mizaj		**Hot Mizaj**				**Moderate Mizaj**				**Cold Mizaj**		
	Blood group	**Odds ratio (95% CI[b])**	**P-value**	**Odds ratio[a] (95% CI)**	**P-value**	**Odds ratio (95% CI)**	**p-value**	**Odds ratio (95% CI)**	**P-value**	**Odds ratio (95% CI)**	**P-value**	**Odds ratio (95% CI)**	**P-value**
ABO Blood Group	**O**	1		1		1		1		1		1	
	A	0.55 (0.30 to 1.03)	0.063	0.56 (0.30 to 1.05)	0.070	1.12 (0.64 to 1.94)	0.698	1.11 (0.63 to 1.93)	0.725	1.94 (0.93 to 4.03)	0.077	1.92 (0.92 to 4.01)	0.082
	B	0.83 (0.44 to 1.55)	0.560	0.87 (0.46 to 1.66)	0.659	1.42 (0.78 to 2.58)	0.253	1.39 (0.76 to 2.53)	0.285	0.63 (0.23 to 1.70)	0.361	0.61 (0.23 to 1.65)	0.334
	AB	0.32 (0.11 to 0.88)	0.027*	0.31 (0.12 to 0.87)	0.027*	1.16 (0.54 to 2.51)	0.704	1.16 (0.53 to 2.51)	0.713	2.88 (1.16 to 7.15)	0.023*	2.88 (1.16 to 7.18)	0.023*
RH	**RH positive**	0.94 (0.54 to1.63)	0.827	0.90 (0.52 to 1.58)	0.722	1.24 (0.75 to 2.05)	0.409	1.26 (0.76 to 2.10)	0.364	0.76 (0.39 to 1.45)	0.402	0.77 (0.40 to 1.48)	0.435
Wetness quality													
Mizaj		**Wet Mizaj**				**Moderate Mizaj**				**Dry Mizaj**			
	Blood group	**Odds ratio (95% CI)**	**P-value**	**Odds ratio (95% CI)**	**P-value**	**Odds ratio (95% CI)**	**P-value**	**Odds ratio (95% CI)**	**P-value**	**Odds ratio (95% CI)**	**P-value**	**Odds ratio (95% CI)**	**P-value**
ABO Blood Group	**O**	1		1		1		1		1		1	
	A	0.97 (0.54 to 1.76)	0.923	0.96 (0.53 to 1.75)	0.903	1.79 (1.02 to 3.15)	0.042*	1.79 (1.02 to 3.14)	0.044*	0.46 (0.23 to 0.92)	0.028*	0.46 (0.23 to 0.93)	0.030*
	B	1.58 (0.86 to 2.90)	0.142	1.55 (0.84 to 2.85)	0.157	0.80 (0.43 to 1.50)	0.487	0.79 (0.42 to 1.48)	0.465	0.75 (0.38 to 1.47)	0.402	0.78 (0.39 to 1.52)	0.459
	AB	0.89 (0.39 to 2.05)	0.787	0.89 (0.39 to 2.05)	0.780	0.98 (0.44 to 2.17)	0.956	0.98 (0.44 to 2.17)	0.951	1.15 (0.51 to 2.61)	0.741	1.16 (0.51 to 2.65)	0.726
RH	**RH positive**	0.67 (0.40 to 1.13)	0.137	0.68 (0.40 to 1.15)	0.150	0.96 (0.58 to 1.62)	0.891	0.97 (0.58 to 1.63)	0.918	1.77 (0.94 to 3.31)	0.077	1.73 (0.92 to 3.25)	0.091

a. Odds ratio adjusted by gender of the participants; **b.** CI: confidence interval; *P-value≤0.05 was considered significant

with the O blood group. Furthermore, people with the A blood group were 54 percent less likely to have a dry Mizaj (OR=0.46, 95% CI: 0.23 to 0.92) than those with the O blood group. Otherwise, the logistic regression analysis showed that there was not any significant association between the individuals' Rh blood group and the participants' Mizaj (P>0.05). These associations did not change after controlling the individuals' gender as a probable confounding factor using multiple logistic regression analysis, as shown in Table-3.

Discussion

The results of our study showed that there is a significant association between the AB blood group and the cold Mizaj. In addition, findings revealed that the most common Mizaj types in all ABO blood groups were moderate in both hotness and wetness qualities. This finding was in line with the study of Parvizi *et al*. which demonstrated that the prevalence of moderate Mizaj was higher than its other types in a normal population including university staff [13]. On the other hand, there was no significant association between the Rh blood group and the participants' Mizaj.

It seems that the current study was the first study that analyzed the association between the Mizaj types and the blood groups in Iran. While, there were a few studies analyzing the association of the Mizaj types with the physical and mental characteristics of the individuals, as well as the association of ABO blood groups with the psychological characteristics of individuals. However, there were few studies assessing the relationship between the ABO/Rh blood groups and the Mizaj. A study conducted by Furukawa T. *et al*. in 1930 showed that there was a significant correlation between the ABO blood groups and the Mizaj [31]. The results of our study also showed a relation between the cold Mizaj and the ABO blood group [31].

According to the Seyed Mahtab Ali *et al*.'s study, conducted in Aligarh in New Delhi, the bilious Mizaj was the most common one among participants with B positive blood group [34]. Another study by Harburg *et al*. showed a significant association between the Lewis blood marker and the Mizaj. However, the association between the ABO/ Rh blood group and the different types of Mizaj was not significant. Furthermore, according to the results of this study, Males' Anger and Impulsivity were strongly connected with the Lewis red blood cell phenotypes, while Females' Sensation-seeking (a subscale of impulsivity) was significantly associated with the Lewis red blood cell morphologies [32]. Although the evidence showed that there was a significant relationship between Mizaj and personality type [13], analyzing this association was not considered in this study. It is necessary to consider that the various results among the Mizaj- related studies could be based on several factors including the ethnicity of the participants, the tools for determination of the Mizaj, and the different age ranges of the participants.

In addition, one of the important factors in the determination of Mizaj from the TPM viewpoint is psychological and mental conditions [9, 6]. A study by Yogeeshwaran *et al*. showed that there was no relationship between ABO blood groups and the level of stress among students [35]. While according to the study of Pisk *et al*. psychiatric disorders were more common in people with AB blood group compared to other blood groups [36]. Moreover, Kakathkar *et al*. found that children with AB blood group had a significantly higher level of dental anxiety compared to the children with other blood groups [27]. However, according to the TPM, Mizaj is an inherent feature in people, it should be considered that several factors including gender, age, place of residence, job and occupation, lifestyle, and food habits affect the Mizaj quality [37-39]. Therefore, it is probable that the individual's Mizaj has been changed during their lifetime [9, 10]. But, the blood group is one of the non-changeable characteristics of each person, so it seems that this could be considered as an initial factor with the potential capacity to affect the individual's Mizaj.

Multiple logistic regression demonstrated a relationship between people's Mizaj and their ABO blood group. In this regard, it seems that having both A and B antigens together in the blood makes that person up to 2.88 times more susceptible to cold Mizaj. On the other hand, it seems that having only the A antigen

in the blood may be a protective factor against dry Mizaj. These results could be considered as a base for further studies to clarify more physiological aspects of this phenomenon.

The distribution of the ABO (without considering RH) blood group in the Iranian population has been reported as % 38 for the O blood group, 33% for the A, % 22 for the B, and 7% for the AB in a previous study [40], which were similar to our study. Therefore, it seems that the participants of this study could be considered representative of the normal population of Iran. However, there were some limitations in our study.

First, our study was a single-center study. So multi-center studies are recommended in this regard. Second, the ethnicity of the participants was not considered in this study. Ethnicity could probably be a confounding factor in our study. Therefore, considering the participants' ethnicity is recommended for further studies. Next, the temperament of the individuals may be affected by several factors, especially nutrition, food habits, occupation, smoking, and psychological conditions which were not controlled in this study. Considering the probable effects of these lifestyle and environmental factors, it is recommended to repeat this study using related tools, questionnaires, and developed analytical models. Next, this study was conducted on healthy participants who were referred to the Iranian Blood Transfusion Organization, Shiraz Branch, so it could be possible that the results of this study may not apply to unhealthy individuals and patients with Sue-Mizaj. Finally, in this study, we only analyzed the relationship between the RBO blood groups and the Rh antigen. Future studies are proposed to consider other surface antigens of RBCs.

Conclusion

This study showed that the cold Mizaj was significantly more common in participants with the AB blood group and it was less in participants with the B blood group compared to other blood groups. In contrast, there was no association between temperament and the presence of Rh antigen on the surface of red blood cells. Overall, this was a basic research to analyze the relationship between two individual phenotypes, one from modern medicine (ABO/Rh blood groups) and the other from the TPM concept (Mizaj). The practical key point of this study could be emerging a theory that manages the nutrition and food, occupation, the place for residency, or other factors. Depending on an individual's blood type, Mizaj may help people improve their health, quality of life, and professional performance. More studies are recommended on this issue with controlling some probable confounding factors.

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Conflict of Interest

None.

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