Do Genes Correlate with Intelligence ? A Case-Control Study in Greek Volunteers with Elevated IQ

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Introduction

According to a recent publication, the genetic basis of non environmentally influenced intelligence and decision making characteristics seem to have no statistically significant differences between genders [1]. Within a population, the majority seems to be genetically characterized by prudence and temperance of thought, with only a small proportion expected to express genetically spontaneous and adventurous reaction. Similarly, regarding intelligence, a population seem to be around average and a little above it. It is suggested that only a small number of the population, although assumed genetically "smartest", somehow seem to lack prudence as genetic characteristic, concluding that intelligence and decision-making may be less linked to each other than expected. The objective of this case-control study is to determine the rs324420, rs1800497, rs363050 and rs6265 gene effect on intelligence in 794 Greek volunteers and 82 Greek volunteers with elevated IQ, according to Mensa IQ test.

Materials and Methods

Human personality characteristics were correlated with specific genetic polymorphisms in a Greek population consisting of 82 volunteers of known IQ (MENSA IQ TEST) score and 794 controls. Initially, the frequency distribution of rs324420, rs180049, rs363050 and rs6265 polymorphisms, known to be involved in individual personality characteristics, were determined with real-time PCR. Demographic data of both groups were obtained, including gender and age. Gene frequencies and the minor allele frequency (MAF) were calculated. All volunteers were anonymized after signing an informed consent. Intelligence was assigned following a simple algorithm, where volunteers receive +1 or -1 for each allele, which theoretically is associated with an enhanced or relegated intelligence, respectively. The data were analyzed with Statistic Package For Social Science (SPSS) software Pearson Chi-Square, Likelihood Ratio and Odd ratios analysis.

Results

Table 1a. Intelligence combined scores of rs324420, rs1800497, rs363050 and rs6265, according to additive model.

Alleles	Grade	-4	-2	0	2	4	Total
Control	Population	49	406	1020	891	194	2560
	%	1.9	15.9	39.8	34.8	7.6	100.0
Case	Population	1	22	80	86	25	214
	%	0.5	10.3	37.4	40.2	11.7	100.0

Table 1b. Correlation of grading (<2 vs. 2-4) and volunteers - odds ratios, confidence intervals and statistical significance (CI, p-value) calculation (additive model).

Alleles	Grade <2	Grade 2-4	Odds ratio	95% CI	P Value
Case	103	111	1.465	1.1079 - 1.9372	0.0074
Control	1475	1085	-	-	-

Table 2. rs1800497 is statistical significantly associated with very high IQ results (>135).

rs1800497 Crosstabulation Count				
	C/T	C/C	T/T	Total
Normal/ High	236	607	18	861
Very High	6	37	0	43
Total	242	644	18	904

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.059	2	0.080
Likelihood Ratio	6.395	2	0.041
Linear-by-Linear Association	2.336	1	0.126

Conclusions

Preliminary data show that personality characteristics derived genetically by combined genotype determination of rs324420, rs1800497, rs363050 and rs6265 polymorphisms have a close relationship to data derived from established IQ tests. The rs1800497 polymorphism, which has to do with the learning ability, was statistically different between persons with very high IQ (>135) and the rest sample. High IQ score can be linked with the genetic background, as classified in this study. These findings may be useful in targeted and personalized therapies of relevant disorders.

[1] Marinos G. Naziris N. Limnaios SA. Drakoulis N. Genes and personality characteristics: Possible association of the genetic background with intelligence and decision making in 830 Caucasian Greek subjects. Meta Gene. 2014 Nov 16;2:844-53
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