

CYP1A2 GENETIC VARIANT (CAFFEINE METABOLISM)

ORDERING INFORMATION

REF: GEN-043-25
Tests: 25 Reactions: 31
Manufacturer: BioMol Laboratories s.r.l.

CONTENTS OF THE KIT

The kit consists of reagents for Real-Time PCR amplification
*Reagents for the extraction of genomic DNA are not supplied in the kit



PRODUCT CHARACTERISTICS

Device belonging to the family of in vitro devices **REAL-TIME QUALITATIVE PCR-GENETIC VARIANTS- RESEARCH USE ONLY**. Detection of the C>A polymorphism of the CYP1A2 (rs762551) gene by Real-Time PCR technique. Kit optimized for Real-time PCR instruments Biorad CFX96 Dx, Biorad Opus Dx, Agilent AriaDx, Thermofisher QuantStudio™ 5 Real-Time PCR System.

SCIENTIFIC BACKGROUND

Cytochromes P450 (CYPs) are heme-containing oxidoreductase enzymes with mono-oxygenase activity. Human CYPs catalyze the oxidation of a great variety of chemicals, including xenobiotics, steroid hormones, vitamins, bile acids, procarcinogens, and drugs. A substantial interindividual variability exists in response to caffeine ingestion. On the basis of sequence homology, the human CYP superfamily has been divided into 18 families, including 44 subfamilies and 57 isoforms, each of which is encoded by an individual gene. Several hundreds of variant alleles have been identified for genes encoding detoxifying and drug-metabolizing CYPs in humans.

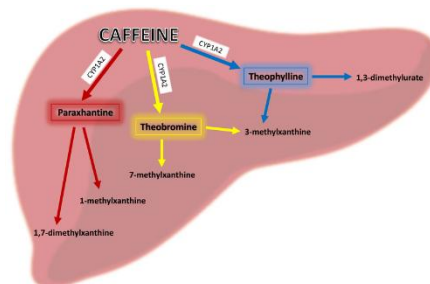
The human cytochrome P450 1A (CYP1A) subfamily genes, CYP1A1 and CYP1A2, encoding monooxygenases are critically involved in biotransformation of key endogenous substrates (estradiol, arachidonic acid, cholesterol) and exogenous compounds (smoke constituents, carcinogens, caffeine, therapeutic drugs). This suggests their significant involvement in multiple biological pathways with a primary role of maintaining endogenous homeostasis and xenobiotic detoxification.

CLINICAL SIGNIFICANCE

Since caffeine metabolism is mainly determined by the cytochrome enzyme P-450 1A2, genetic variations in this enzyme represent a major endogenous determinant of enzyme activity.

In particular, genetic variation rs762551 has a substantial impact on both caffeine intake and caffeine metabolism. A single nucleotide C→A polymorphism at position 734 within intron 1 is correlated with high inducibility of the P-450 1A2 enzyme in Caucasian subjects. Based on rate of CYP1A2 enzyme expression, individuals who possess AC or CC genotype are categorized as "slow metabolizers". Individuals who possess AA genotype may have increased metabolism of caffeine as compared to patients with the CC genotype and are categorized as "fast metabolizers".

Patients with the AA genotype may be more likely to experience insomnia as a result of consuming caffeine as compared to patients with the AC or CC genotypes.



5 Cells 2024 Nov 26;13(23):1958. Human Cytochrome P450 Cancer-Related Metabolic Activities and Gene Polymorphisms: A Review

5 J Sport Health Sci. 2024 Jul;13(4):499-508. Does ergogenic effect of caffeine supplementation depend on CYP1A2 genotypes? A systematic review with meta-analysis

5 Ther Drug Monit. 2024 May 1;46(6):797-803. CYP1A2 Polymorphism and Drug Co-administration Affect the Blood Levels and Adverse Effects of Pirfenidone

5 Nutr Res. 2022 Sep 10;57:77-81. Functional single-nucleotide polymorphism (rs762551) in CYP1A2 gene affects white coffee intake in healthy 20- to 40-year-old adults

5 Review J Nutrigenet Nutrigenomics. 2016;9(2-4):106-115. Moving towards Specific Nutrigenetic Recommendation Algorithms: Caffeine, Genetic Variation and Cardiovascular Risk

5 Pharmacogenet Genomics. 2012 Jan;22(1):73-7. PharmGKB summary: very important pharmacogene information for CYP1A2



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DESCRIPTION	LABEL	VOLUME	STORAGE
		GEN-043-25	
Mix oligonucleotides and probes	Mix CYP1A2 10X	1 x 62 µl	-20°C
Mix buffer and Taq polymerase enzyme	Mix Real-Time PCR 2X	1 x 310 µl	-20°C
Deionized H ₂ O	Deionized H ₂ O	1 x 1 ml	-20°C
Genomic DNA or recombinant DNA	Control 1	1 x 22 µl	-20°C
Genomic DNA or recombinant DNA	Control 2	1 x 22 µl	-20°C
Genomic DNA or recombinant DNA	Control 3	1 x 22 µl	-20°C

TECHNICAL CHARACTERISTICS

COD. GEN-043-25

STABILITY	18 months
REAGENTS STATUS	Ready to use
BIOLOGICAL MATRIX	Genomic DNA extracted from whole blood, tissues, cells
CONTROLS	Recombinant DNA for at least 3 analytical sessions
VALIDATED INSTRUMENTS	Biorad CFX96 Dx, Biorad Opus Dx and Agilent AriaDx, Thermofisher QuantStudio™ 5 Real-Time PCR System.
TECHNOLOGY	Real-time PCR; oligonucleotides and specific probes; 2 FAM/HEX fluorescence channels
RUNNING TIME	85 min
THERMAL CYCLING PROFILE	1 cycle at 95 °C (10 min); 45 cycles at 95 °C (15 sec) + 68 °C (60 sec)
ANALYTICAL SPECIFICITY	Absence of non-specific pairings oligonucleotides and probes; absence of cross-reactivity
LIMIT OF DETECTION (LOD)	≥ 5 ng of genomic DNA
LIMIT OF BLANK (LOB)	>40 Cq
REPRODUCIBILITY	99,9%
SPECIFICITY / SENSITIVITY	99,9%/98%