



GENETIC VARIANTS of the FTO gene (Fat mass and obesity-associated)

ORDERING INFORMATION

REF: GEN-060-25
Tests: 25 Reactions: 31 x 2
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 medical devices **REAL-TIME QUALITATIVE PCR-GENETIC VARIANTS-RESEARCH USE ONLY**. Detection of the genetic variants rs1421085 (T>C) and rs9939609 (T>A) of the FTO gene by Real-Time PCR technique. Kit optimized for Real-time PCR instrumentation Biorad CFX96 Dx, Biorad Opus Dx, Agilent AriaDx, Thermofisher QuantStudio™ 5 Real-Time PCR System.

SCIENTIFIC BACKGROUND

In recent years, the incidence of obesity and cancer has increased. As this poses a serious threat to human health, the relationship between the two diseases has attracted much attention. A recent study examined whether genes associated with fat mass and obesity (FTO) are linked, taking into account a genome-wide association study (GWAS) that revealed multiple single nucleotide polymorphism (SNP) sites of the FTO gene, and consequently indicating an association between obesity and cancer in different populations. The FTO gene has 9 exons, covers 400 kb on chromosome 16q12.2, and is highly expressed in various tissues, including the brain and hypothalamus. Recent studies have demonstrated a relationship between FTO and obesity-related indices in early adolescence. SNP polymorphisms of the FTO gene play an essential role in the regulation of fat mass and adipogenesis. These obesity-associated SNPs can increase body weight by also altering the expression of other genes.

CLINICAL SIGNIFICANCE

Several studies have examined the effect of the rs9939609 (T>A) polymorphism of the FTO gene on satiety and eating habits in adults, showing that adults with the risk allele (A) had lower levels of satiety and control over their eating. The rs9939609 polymorphism can, in fact, alter the reactivity of the central nervous system to brain levels of ghrelin (the hunger hormone that influences appetite) through mRNA expression and methylation. This process is a potential mediating pathway between the risk alleles of the FTO gene and obesity. Another variant of particular interest is rs1421085 (T>C), as it is significantly associated with obesity, increased body fat percentage, increased BMI, and type 2 diabetes. The rs1421085 variant has been shown to play a key role in the regulation of adipocyte thermogenesis through interaction with other genes (ARID5B, IRX3, and IRX5), suggesting that manipulation of this pathway may modulate obesity levels.

§Genetic Variants in the Fat Mass and Obesity-Associated Gene and Risk of Obesity/Overweight in Children and Adolescents: A Systematic Review and Meta-Analysis. Endocrinology, Diabetes & Metabolism, 2024; 7: e00510
<https://doi.org/10.1002/edm2.510>

§Role of rs9939506 polymorphism of FTO gene in resistance to eating in male adolescents. Shaker et al. BMC Pediatrics (2023) 23:486 <https://doi.org/10.1186/s12887-023-04310-9>

§The role of FTO variant rs1421085 in the relationship with obesity: a systematic review and meta-analysis. Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity (2022) 27:3053–3062 <https://doi.org/10.1007/s40519-022-01509-0>

§FTO – A Common Genetic Basis for Obesity and Cancer. Front. Genet., 16 November 2020 | Sec. Cancer Genetics Volume 11 - 2020 | <https://doi.org/10.3389/fgene.2020.559138>

§ Association of type 2 diabetes susceptible genes GCKR, SLC30A8, and FTO polymorphisms with gestational diabetes mellitus risk: a meta-analysis. Endocrine (2018) 62:34–45 <https://doi.org/10.1007/s12020-018-1651-z>

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DESCRIPTION	LABEL	VOLUME	STORAGE
		GEN-060-25	
Mix oligonucleotides and probes FTO rs1421085 T>C	MIX 1 FTO 10X	1 x 62 µl	-20°C
Mix oligonucleotides and probes FTO rs9939609 T>A	MIX 2 FTO 10X	1 x 62 µl	-20°C
Mix buffer and Taq polymerase enzyme	Mix Real-Time PCR 5X	1 x 248 µl	-20°C
Deionized H ₂ O	Deionized H ₂ O	1 x 1 ml	-20°C
Genomic DNA or recombinant DNA Control FTO (rs1421085)	Control 1 MIX 1	1 x 22 µl	-20°C
	Control 2 MIX 1	1 x 22 µl	-20°C
	Control 3 MIX 1	1 x 22 µl	-20°C
Genomic DNA or recombinant DNA Control FTO (rs9939609)	Control 1 MIX 2	1 x 22 µl	-20°C
	Control 2 MIX 2	1 x 22 µl	-20°C
	Control 3 MIX 2	1 x 22 µl	-20°C

TECHNICAL CHARACTERISTICS

COD. GEN-060-25

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) + 64°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%