

# Gene Section

## Short Communication

# MOAP1 (Modulator Of Apoptosis 1)

Gamze Ayaz, Mesut Muyan

Department of Biological Sciences, Middle East Technical University, Ankara, Turkey (GA, MM)

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## Abstract

Short communication on MOAP1, with data on DNA/RNA, on the protein encoded and where the gene is implicated.

## Identity

**Other names:** MAP-1, PNMA4

**HGNC (Hugo):** MOAP1

**Location:** 14q32.12

## DNA/RNA

### Description

Human MOAP1 gene contains three exons and the encoding sequence of 1056 bases is in the exon 3.

### Transcription

MOAP1 is a 351 amino-acid long protein.

### Pseudogene

No reported pseudogenes.

## Protein

### Note

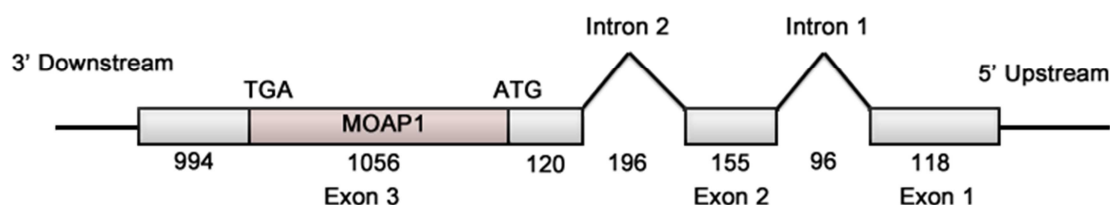
MOAP1 is a short-lived protein with a half-life of 25 minutes.

It is degraded by the ubiquitin-proteasome system (Fu et al., 2007).

### Description

MOAP-1 is a 351 amino-acid long protein with a molecular mass of 39.5 kDa.

Isoelectric point (pI) of MOAP-1 is 4.939 at pH 7.0. MOAP-1 contains a BH3 (Bcl-2 homology 3) like domain required for homodimerization and interaction with Bcl-2 associated X (Bax) protein. Under normal condition, MOAP1 is held as an inactive conformation through intramolecular interactions. Interaction between RASSF1A (ras-association domain family 1, isoform A) and MOAP1 reduces the inhibitory intramolecular interaction of MOAP1 and allows MOAP1 through the BH3 like domain to bind Bax (Baksh et al., 2005).



The MOAP1 gene is located in the reverse strand. Exons are shown as boxes and introns as lines. The filled box in the exon 3 is the coding sequence of MOAP1. Numbers below represent the size of exon or intron in base pair.

## Expression

MOAP1 is expressed in the adipose, adrenal, blood, brain, breast, colon and heart. MOAP1 is expressed in higher level in the heart and brain.

## Localisation

MOAP-1 protein localizes in the cytoplasm (Law, 2012) and also seen in the mitochondria (Tan et al., 2005).

## Function

MOAP1 is a BH3-like protein that acts as a proapoptotic molecule (Tan et al., 2001). When overexpressed, MOAP1 induces caspase-dependent apoptosis in mammalian cells (Tan et al., 2005). Studies showed that TNF $\alpha$  stimulation recruits RASSF1A and MOAP1 to death receptors complexes. This recruitment leads to the association of RASSF1A with MOAP1 and to the induction of a conformational change in MOAP1. This results in the opening of the BH3 domain to allow MOAP1 to interact with Bax. Bax is subsequently inserted into the mitochondrial membrane leading to apoptosis (Baksh et al., 2005; Foley et al., 2008).

## Homology

Also highly conserved in rat (*Rattus norvegicus*) and mouse (*Mus musculus*), human MOAP1 protein shares 99% amino acids identity with that of chimpanzee (*Pan troglodytes*) (Law et al., 2012).

## Mutations

### Note

Gene mutations have not been described yet.

## Implicated in

### Breast cancer

#### Disease

Microarray analysis of 176 primary, treatment-naive breast cancer and of 10 normal breast tissue samples suggests that the MOAP1 gene expression is significantly down-regulated in breast cancer. It appears that there is a positive correlation between

the downregulation of MOAP1 expression and the aggressiveness of breast cancer (Law, 2012).

## To be noted

### Note

miRNA: It is reported that miR-1228 prevents cellular apoptosis by binding to the 3'UTR of MOAP1 mRNA, thereby decreasing MOAP-1 protein levels (Yan and Zhao, 2012).

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