The OXPHOS supercomplex assembly factor HIG2A responds to changes in energetic metabolism and cell cycle

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HIG2A promotes cell survival under hypoxia and mediates the assembly of complex III and complex IV into respiratory chain supercomplexes. In the present study, we show that human HIGD2A and mouse Higd2a gene expressions are regulated by hypoxia, glucose, and the cell cycle-related transcription factor E2F1. The latter was found to bind the promoter region of HIGD2A. Differential expression of the HIGD2A gene was found in C57BL/6 mice in relation to tissue and age. Besides, the silencing of HIGD2A evidenced the modulation of mitochondrial dynamics proteins namely, OPA1 as a fusion protein increases, while FIS1, a fission protein, decreases. Besides, the mitochondrial membrane potential (??m) increased. The protein HIG2A is localized in the mitochondria and nucleus. Moreover, we observed that the HIG2A protein interacts with OPA1. Changes in oxygen concentration, glucose availability, and cell cycle regulate HIGD2A expression. Alterations in HIGD2A expression are associated with changes in mitochondrial physiology. © 2019 Wiley Periodicals, Inc.

cell cycle

E2F1

HIG2A

hypoxia

mitochondrial dynamics

OPA1

OXPHOS supercomplexes

cytochrome c oxidase

glucose

RNA directed DNA polymerase

transcription factor E2F1

ubiquinol cytochrome c reductase

HIG2 protein, mouse

HILPDA protein, human

mitochondrial protein

reduced nicotinamide adenine dinucleotide dehydrogenase (ubiquinone)

tumor protein

animal experiment

animal model

animal tissue

Article

cell cycle

cell hypoxia

cell survival

controlled study

energy metabolism

gene

gene expression

HEK293 cell line

higd2a gene

immunofluorescence

immunoprecipitation

male

mitochondrial dynamics

mitochondrial membrane potential

mitochondrion

mouse

neuroblastoma cell

nonhuman

oxidative phosphorylation

oxidative phosphorylation system

oxygen concentration

priority journal

promoter region

real time polymerase chain reaction

respiratory chain

Western blotting

animal

C57BL mouse

cell cycle

genetics

human

metabolism

mitochondrial membrane

physiology

Animals

Cell Cycle

Electron Transport Complex I

Humans

Membrane Potential, Mitochondrial

Mice, Inbred C57BL

Mitochondrial Dynamics

Mitochondrial Membranes

Mitochondrial Proteins

Neoplasm Proteins