Hydroxytyrosol supplementation modulates the expression of miRNAs in rodents and in humans

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Dietary microRNAs (miRNAs) modulation could be important for health and wellbeing. Part of the healthful activities of polyphenols might be due to a modulation of miRNAs' expression. Among the most biologically active polyphenols, hydroxytyrosol (HT) has never been studied for its actions on miRNAs. We investigated whether HT could modulate the expression of miRNAs in vivo. We performed an unbiased intestinal miRNA screening in mice supplemented (for 8 weeks) with nutritionally relevant amounts of HT. HT modulated the expression of several miRNAs. Analysis of other tissues revealed consistent HT-induced modulation of only few miRNAs. Also, HT administration increased triglycerides levels. Acute treatment with HT and in vitro experiments provided mechanistic insights. The HT-induced expression of one miRNA was confirmed in healthy volunteers supplemented with HT in a randomized, double-blind and placebo-controlled trial. HT consumption affects specific miRNAs' expression in rodents and humans. Our findings suggest that

the modulation of miRNAs' action through HT consumption might partially explain its healthful activities and might be pharmanutritionally exploited in current therapies targeting endogenous miRNAs. However, the effects of HT on triglycerides warrant further investigations.

Dietary Supplementation

Hydroxytyrosol

Intestine

Lipids

MiRNAs

CD36 antigen

cholesterol

CXCL13 chemokine

dual specificity phosphatase 6

glutathione transferase A3

hydroxytyrosol

interleukin 33

messenger RNA

microRNA

microRNA 1247 5p

microRNA 135a 1 3p

microRNA 1898

microRNA 193a 5p

microRNA 196b 3p

microRNA 1982 5p

microRNA 346 5p

microRNA 483 3p

microRNA 491 3p

phospholipid

placebo

pyruvate dehydrogenase kinase 4

triacylglycerol

unclassified drug

3,4-dihydroxyphenylethanol

microRNA

phenethyl alcohol

acute drug administration

animal cell

animal experiment

animal tissue

Article

cholesterol blood level

controlled study

crossover procedure

diet supplementation

double blind procedure

down regulation

gene expression

gene interaction

human

human cell

human experiment

in vitro study

in vivo study

lipid metabolism

male

nonhuman

normal human

oxidative stress

phospholipid blood level

randomized controlled trial

rat

treatment duration

triacylglycerol blood level

upregulation

analogs and derivatives

animal

antibody specificity

C57BL mouse

cell culture

cell line

clinical trial

comparative study

cytology

dietary supplement

intestine mucosa

metabolism

mononuclear cell

organoid

small intestine

tissue culture technique

Animals

Cell Line

Cells, Cultured

Cross-Over Studies

Dietary Supplements

Double-Blind Method

Humans

Intestinal Mucosa

Intestine, Small

Leukocytes, Mononuclear

Male

Mice, Inbred C57BL

MicroRNAs

Organ Specificity

Organoids

Phenylethyl Alcohol

Tissue Culture Techniques