

Endothelial PPAR γ Is Crucial for Averting Age-Related Vascular Dysfunction by Stalling Oxidative Stress and ROCK

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Aging plays a significant role in the progression of vascular diseases and vascular dysfunction. Activation of the ADP-ribosylation factor 6 and small GTPases by inflammatory signals may cause vascular permeability and endothelial leakage. Pro-inflammatory molecules have a significant effect on smooth muscle cells (SMC). The migration and proliferation of SMC can be promoted by tumor necrosis factor alpha (TNF- α). TNF- α can also increase oxidative stress in SMCs, which has been identified to persuade DNA damage resulting in apoptosis and cellular senescence. Peroxisome proliferator-activated receptor (PPAR) acts as a ligand-dependent transcription factor and a member of the nuclear receptor superfamily. They play key roles in a wide range of biological processes, including cell differentiation and proliferation, bone formation, cell metabolism, tissue remodeling, insulin sensitivity, and eicosanoid signaling. The PPAR γ activation regulates inflammatory responses, which can exert protective effects in the vasculature. In addition, loss of function of PPAR γ enhances cardiovascular events and atherosclerosis in the vascular endothelium. This appraisal, therefore, discusses the critical linkage of PPAR γ in the inflammatory process and highlights a crucial defensive role for endothelial PPAR γ in vascular dysfunction and disease, as well as therapy for vascular aging. © 2019, Springer Science+Business Media, LLC, part of Springer Nature.

Aging

Inflammation

Oxidative stress

PPAR?

ROCK

Vascular dysfunction

epidermal growth factor

hydroxymethylglutaryl coenzyme A reductase kinase

icosanoid

immunoglobulin enhancer binding protein

inducible nitric oxide synthase

interleukin 10

interleukin 12

interleukin 1beta

interleukin 2

interleukin 6

interleukin 7

interleukin 8

liver X receptor alpha

mitogen activated protein kinase 1

mitogen activated protein kinase 3

mitogen activated protein kinase p38

peroxisome proliferator activated receptor delta

peroxisome proliferator activated receptor gamma

peroxisome proliferator activated receptor gamma 1

peroxisome proliferator activated receptor gamma 2

phosphatidylinositol 3 kinase

platelet derived growth factor

protein kinase B

retinoid X receptor

Rho kinase

toll like receptor 4

transcription factor AP 1

transforming growth factor beta1

tumor necrosis factor

unclassified drug

unindexed drug

peroxisome proliferator activated receptor gamma

Rho kinase

aging

apoptosis

cell differentiation

cell metabolism

cell migration

cell proliferation

Crohn disease

cytokine production

cytokine release

disease duration

disease severity

DNA damage

endothelial dysfunction

enzyme activation

enzyme inhibition

enzyme mechanism

gene repression

human

insulin sensitivity

multiple sclerosis

nonhuman

oxidative stress

priority journal

protein expression

protein function

protein phosphorylation

Review

signal transduction

single nucleotide polymorphism

smooth muscle cell

sumoylation

Th17 cell

ulcerative colitis

animal

metabolism

pathophysiology

physiology

vascular endothelium

Aging

Animals

Endothelium, Vascular

Humans

Oxidative Stress

PPAR gamma

rho-Associated Kinases