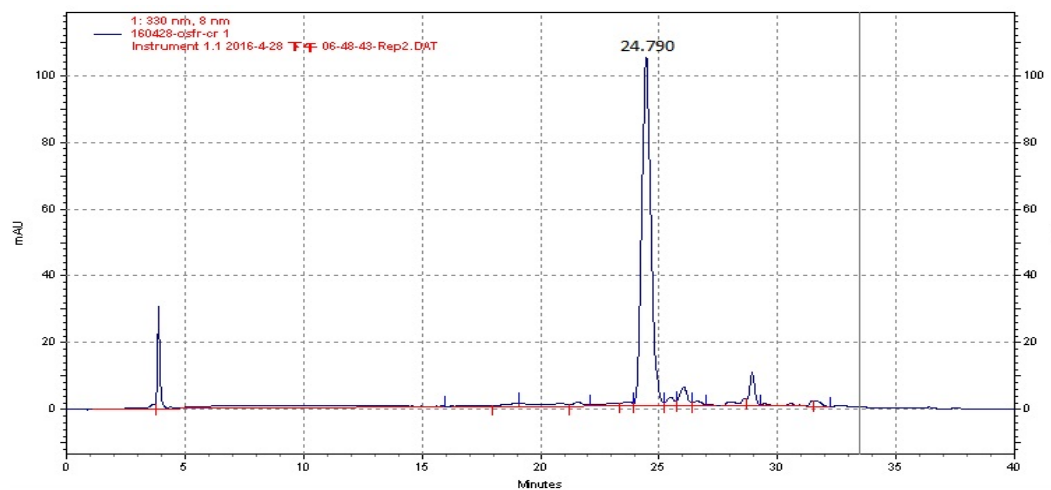




acteolin[™]

*A NuLiv Science Proprietary
Acteoside for Cognitive, Lung
and Eye Health*

DISCOVER ACTEOLIN™



Acteolin™ is NuLiv Science's proprietary acteoside (a **caffeoyl phenylethanoid glycoside (C₂₉H₃₆O₁₅)**) extracted from *Osmanthus fragrans* by a proprietary water extraction process. Acteolin™ has been validated as a genuine acteoside by HPLC chromatography.

Pharmacological, *in-vitro*, animal and human clinical studies have demonstrated that acetoside:

- supports cognitive and memory functions by reducing β -amyloid peptide (A β) accumulation and abnormal tau protein phosphorylation and by protecting central cholinergic system in the brain
- supports lung functions by reducing nuclear factor kappa β (NF- κ β) induced inflammation, collagen accumulation and histamine release in lung tissue
- protects retinal functions by promoting hepatocyte growth factor (HGF) that may be involved in organ regeneration, would healing and embryogenesis and retinal pigment epithelium (RPE) that is essential for normal visual functions

For more details, please view the scientific papers

HOW ACTEOSIDE WORKS



Numerous research articles have shown acteoside reduces β -amyloid peptide ($A\beta$) and tau protein phosphorylation buildup in the human brain that are implicated in impaired cognitive and memory functions. Acteoside has also shown to increase acetylcholine, the primary neurotransmitter in the human nervous system, by decreasing the breakdown and increasing the synthesis of acetylcholine in the human brain.



Acteoside has shown to reduce a master inflammatory cytokine Nuclear factor kappa β ($NF-\kappa\beta$) that is implicated in inflammatory lung functions. Collagen buildup is associated with fibrotic lung disorders. Acteoside may reduce collagen buildup in the lungs by reducing Transforming growth factor-beta 1 ($TGF-\beta 1$) production. Acteoside has shown to reduce histamine release and Tumor necrosis factor alpha ($TNF\alpha$) and Interleukin 4 ($IL-4$) production in cells that are implicated in breathing obstruction.

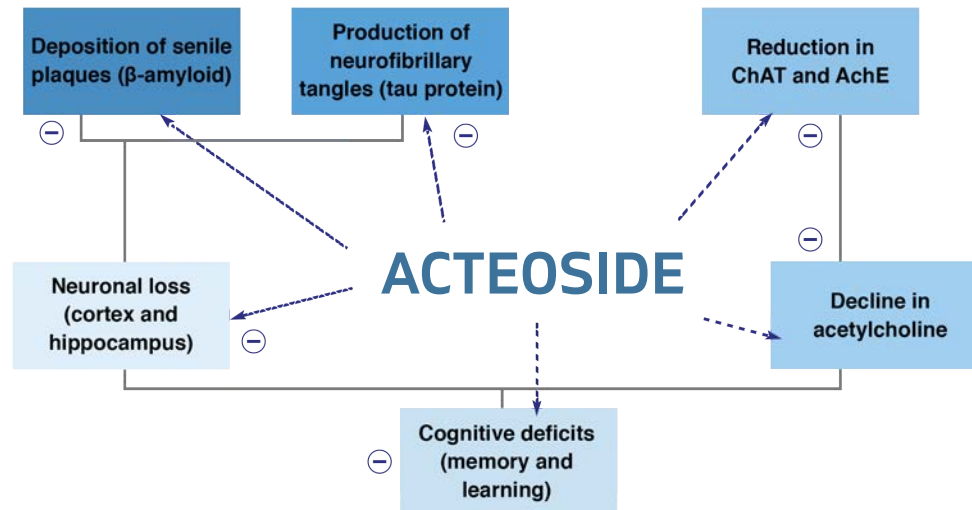


Acteoside induces Hepatocyte growth factor (HGF) in epithelial cells and may be involved in organ regeneration, wound healing and embryogenesis. Acteoside may also increase retinal pigment epithelium (RPE) that is essential for normal visual functions. RPE cells decrease with aging.

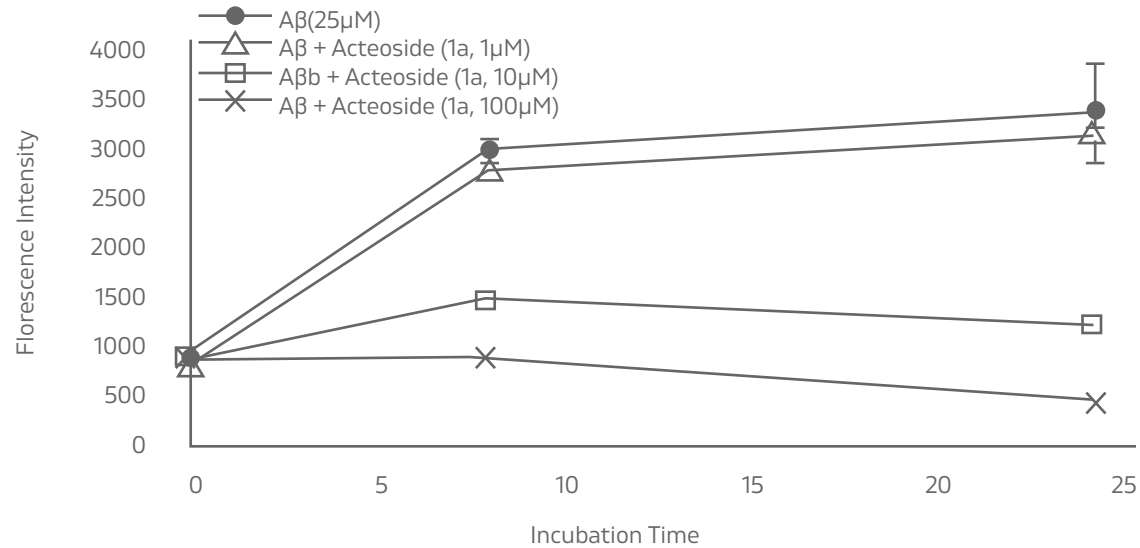


ACTEOSIDE SUPPORTS COGNITIVE AND MEMORY FUNCTIONS

- Reduces β -amyloid peptide ($A\beta$) accumulation in the brain
- Inhibits abnormal tau protein phosphorylation to reduce neurofibrillary tangles in the brain that causes neuronal cell death
- Protects central cholinergic system

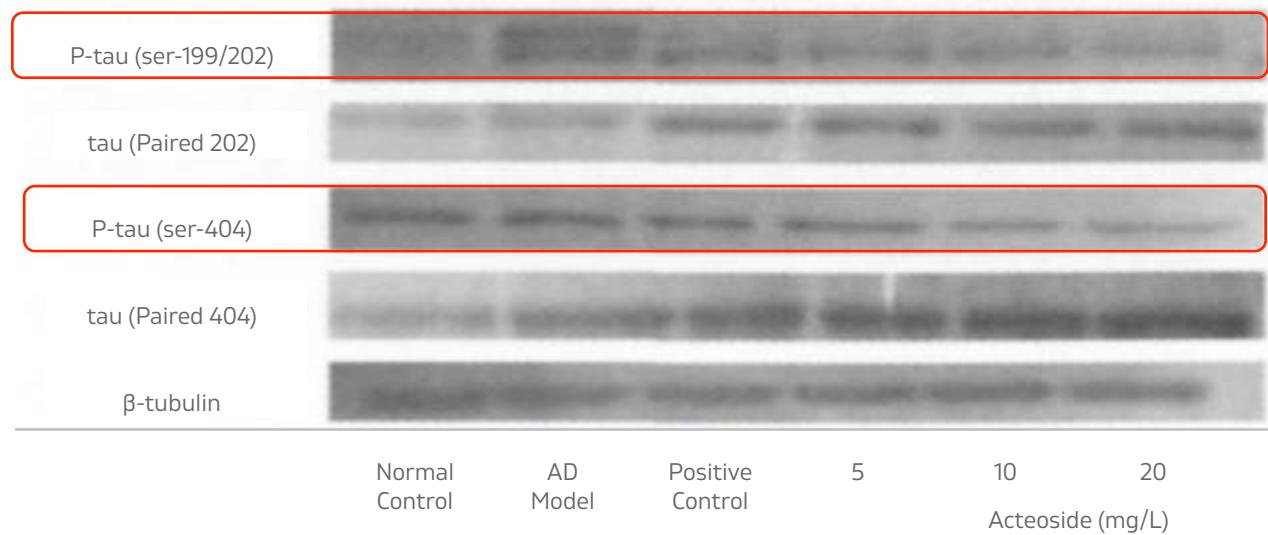


ACTEOSIDE REDUCES β -AMYLOID PEPTIDE ($A\beta$) ACCUMULATION



Kurusu M. et al. 2013. *Biotechnol. Biochem.*

ACTEOSIDE INHIBITS ABNORMAL TAU PROTEIN PHOSPHORYLATION



Bai P. et al. 2013. *China Journal of Chinese Materia Medica*

ACTEOSIDE PROTECTS THE CENTRAL CHOLINERGIC SYSTEM

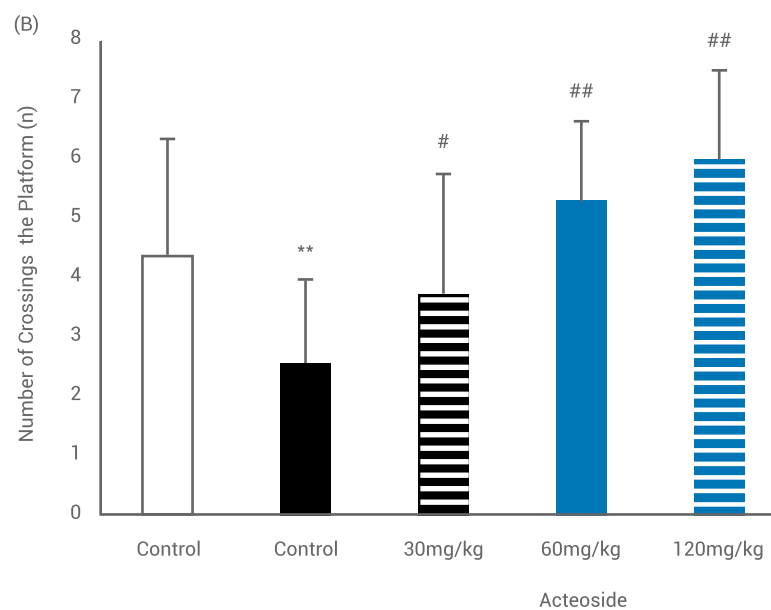
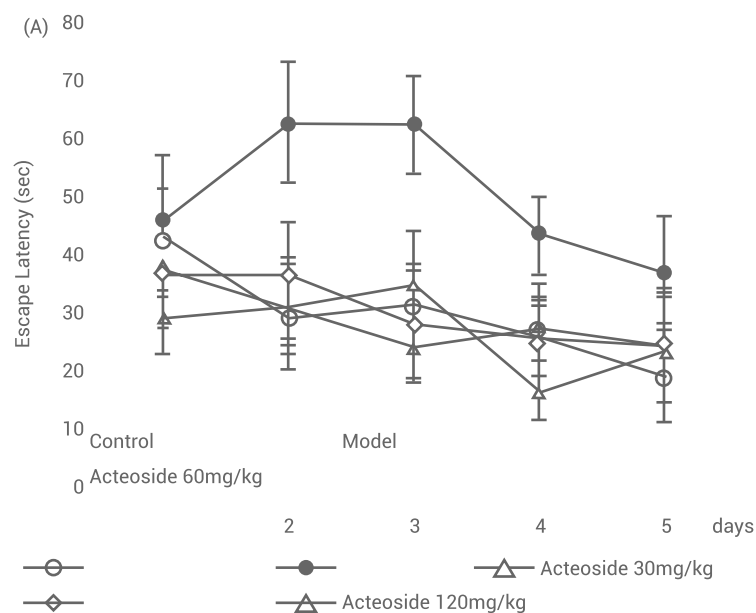
Effects of acteoside on activities of ChAT and AchE in brain tissue of mice ($\bar{x}\pm s$, n=10)

Group	Dose (mg·kg ⁻¹)	AchE / (mmol·mg ⁻¹)	ChAT (U·g ⁻¹)
Normal Control	-	3.79±0.58	272.32±47.05
AD Model	-	5.62±0.90 ^{**}	102.14±30.73 [†]
Acteoside	30	3.80±0.70 ^{##}	244.06±55.36
	60	3.97±0.61 ^{##}	231.84±44.74 [#]
	120	4.35±0.54 [#]	201.06±73.34 [#]

Gao Li. et al. 2014. *Chinese Traditional and Herbal Drugs*.

ACTEOSIDE PROTECTS THE CENTRAL CHOLINERGIC SYSTEM

Effects of acteoside on the behavior of D-gal and AlCl₃ treated mice in the Morris water maze test (n=12) in 90 seconds



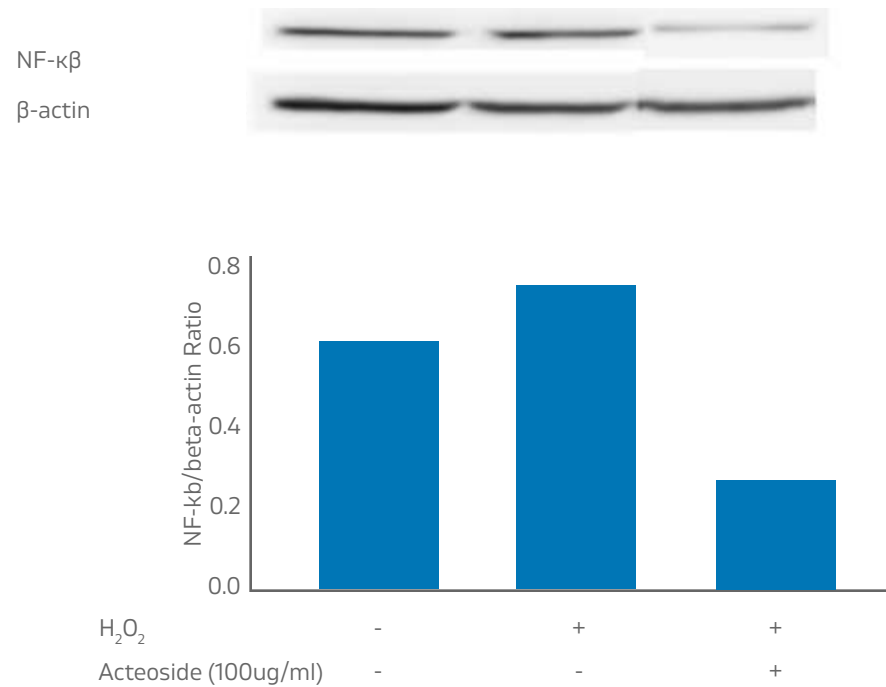
Gao Li. et al. 2015. *Phytother. Res.*

ACTEOSIDE SUPPORTS LUNG FUNCTIONS



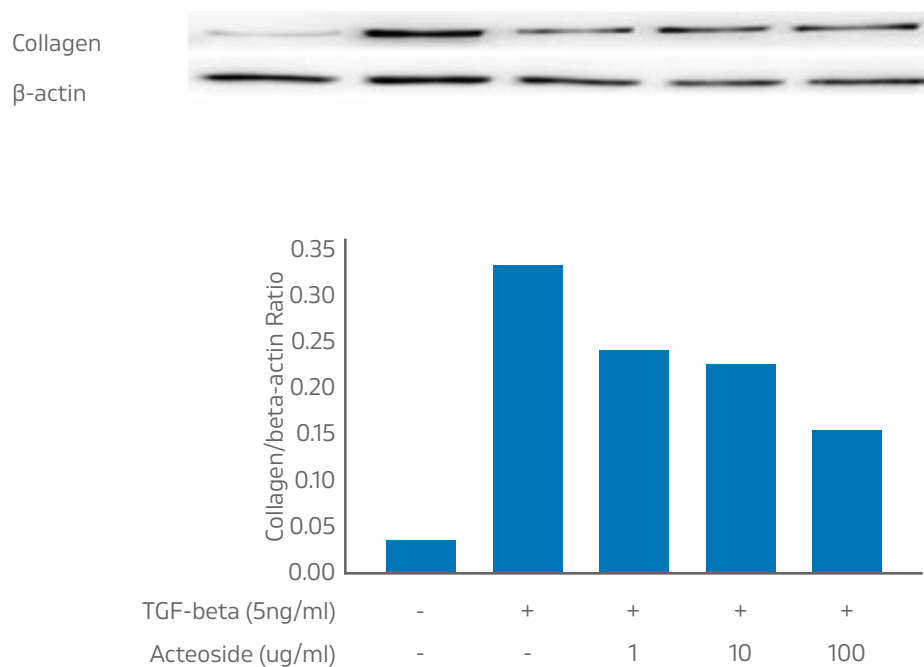
- Reduces nuclear factor kappa β (NF- κ B) induced inflammation
- Decreases collagen accumulation in lung tissues by inhibiting transforming growth factor-beta 1 (TGF- β 1)
- Inhibits histamine release and tumor necrosis factor alpha (TNF- α) and interleukin 4 (IL-4) production

ACTEOSIDE REDUCES NUCLEAR FACTOR KAPPA B (NF-KB) INDUCED INFLAMMATION



Inhibitory activity of acteoside on H₂O₂-induced NF-κβ expression in WiDr cells

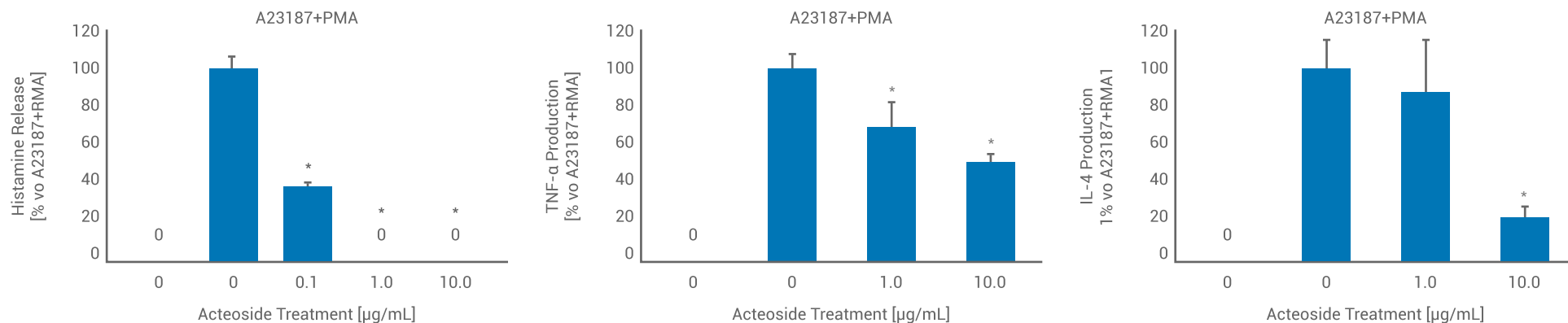
ACTEOSIDE DECREASES COLLAGEN ACCUMULATION IN LUNG TISSUES BY INHIBITING TRANSFORMING GROWTH FACTOR-BETA 1 (TGF- β 1)



Inhibitory activity of acteoside on TGF- β 1 induced fibrosis in MLg cells

ACTEOSIDE INHIBITS HISTAMINE RELEASE, TUMOR NECROSIS FACTOR ALPHA (TNF- α) AND INTERLEUKIN 4 (IL-4 PRODUCTION)

Inhibitory effect of acteoside release from KU812 cells after stimulation with calcium ionophore A23187 (1 μ M) plus phorbol 12-myristate 13-acetate (PMA) (20nM)



Yamada P. et al. 2010. *Planta Med.*

ACTEOSIDE PROTECTS RETINAL FUNCTIONS

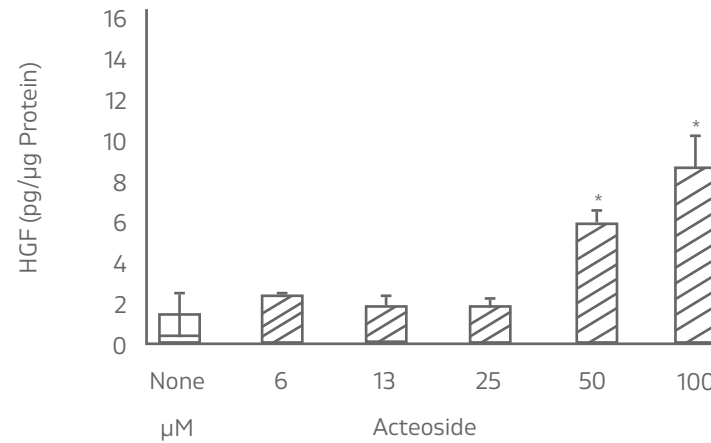
-
- Hepatocyte growth factor (HGF) has mitogenic, motogenic, and morphogenic activities in epithelial cells. Induction of HGF production may be involved in organ regeneration, wound healing and embryogenesis
 - Retinal pigment epithelium (RPE) is essential for normal visual functions, including nutrient and ion transport, melanin synthesis, retinol metabolism, photoreceptor outer segment disc phagocytosis and digestion. RPE cells decreased with aging.



ACTEOSIDE PROTECTS RETINAL FUNCTIONS



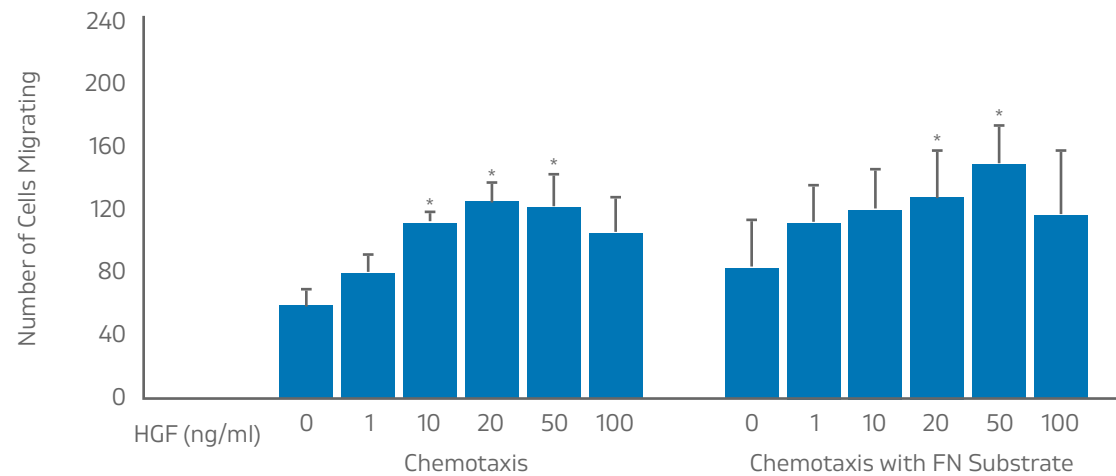
Promotes the production of hepatocyte growth factor (HGF) to protect the retinal pigment epithelium (RPE) function



Manami K. et al. 2013. *Pharm. Bull.*

ACTEOSIDE PROTECTS RETINAL FUNCTIONS

HGF stimulates a concentration-dependent chemotaxis of RPE cells in the Boyden chamber assay both in the presence and absence of fibronectin (FN) substrate

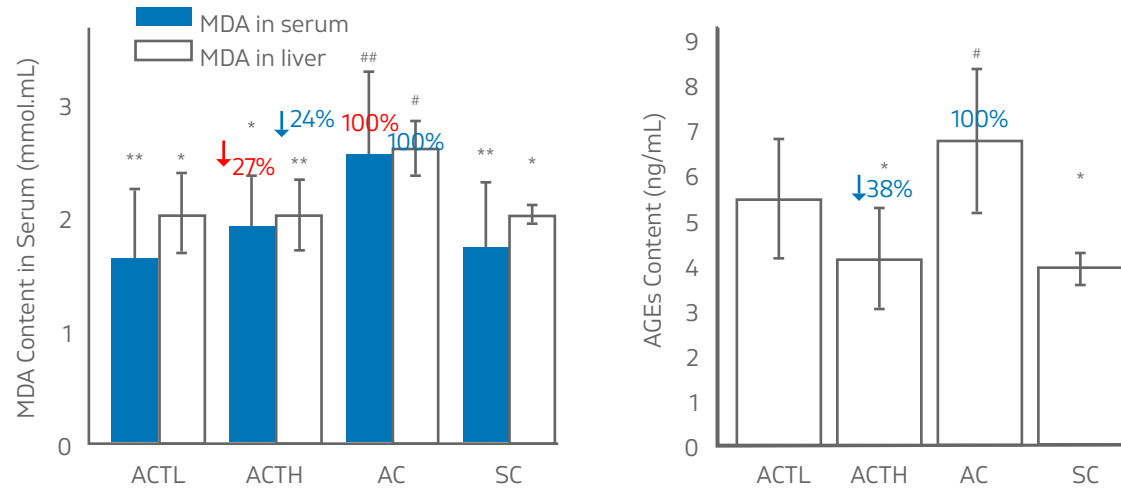


He P.M. et al. 1998. *Biochem Biophys Res Commun.*

ACTEOSIDE EXTENDS LIFE SPAN



Reduces free radical injury to cells



ACTH: High-dose Acteoside
ACTL: Low-dose Acteoside
AC: Aging Control
SC: Sham Control

Xiong L. et al. 2016. *J Med Food*.

For questions and additional information please contact



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