

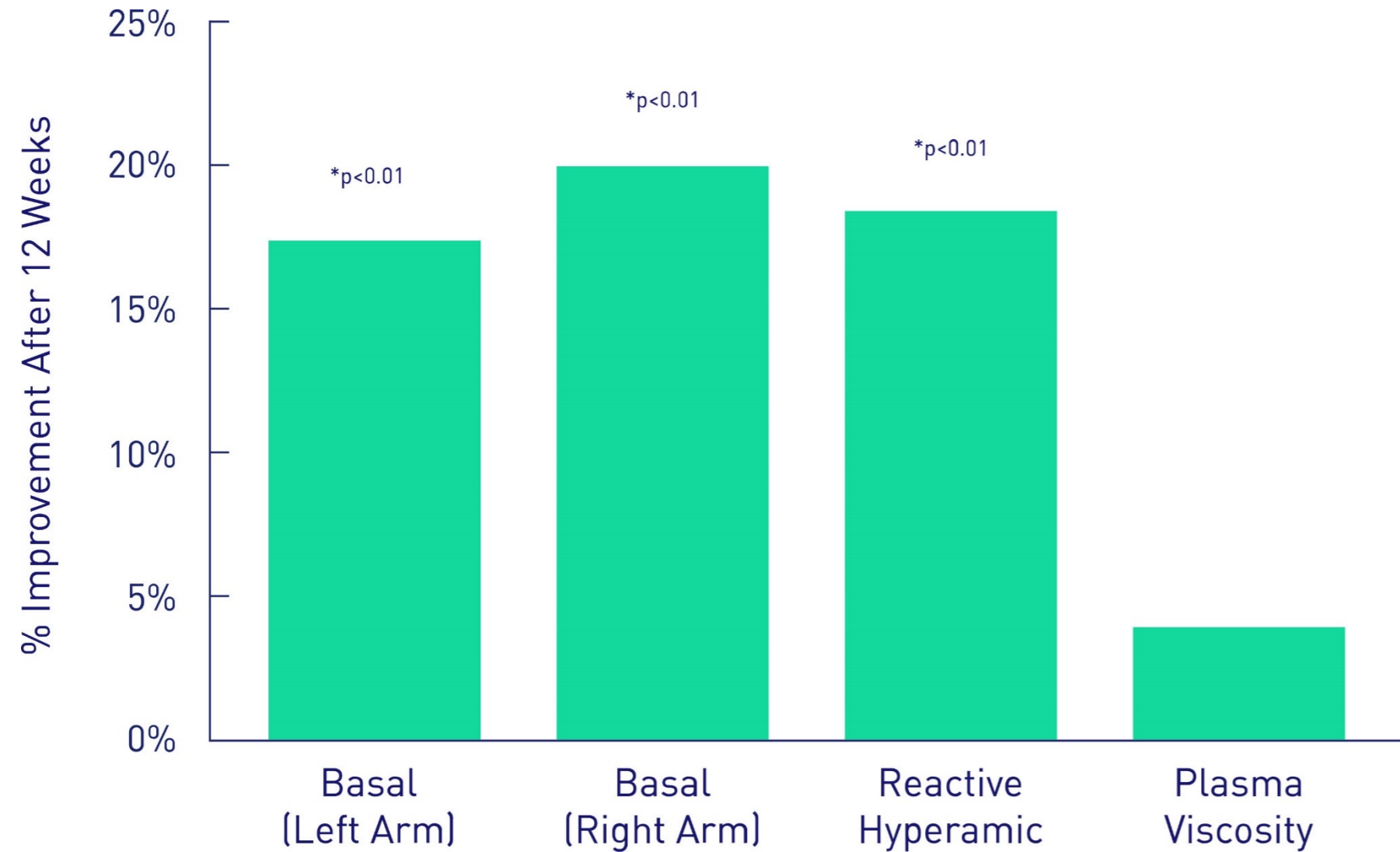
Cardiovascular Benefits – 1

blood vessel health

Improving Endothelial Function and Plasma Viscosity

Pilot clinical study shows that Enzogenol improves blood flow.

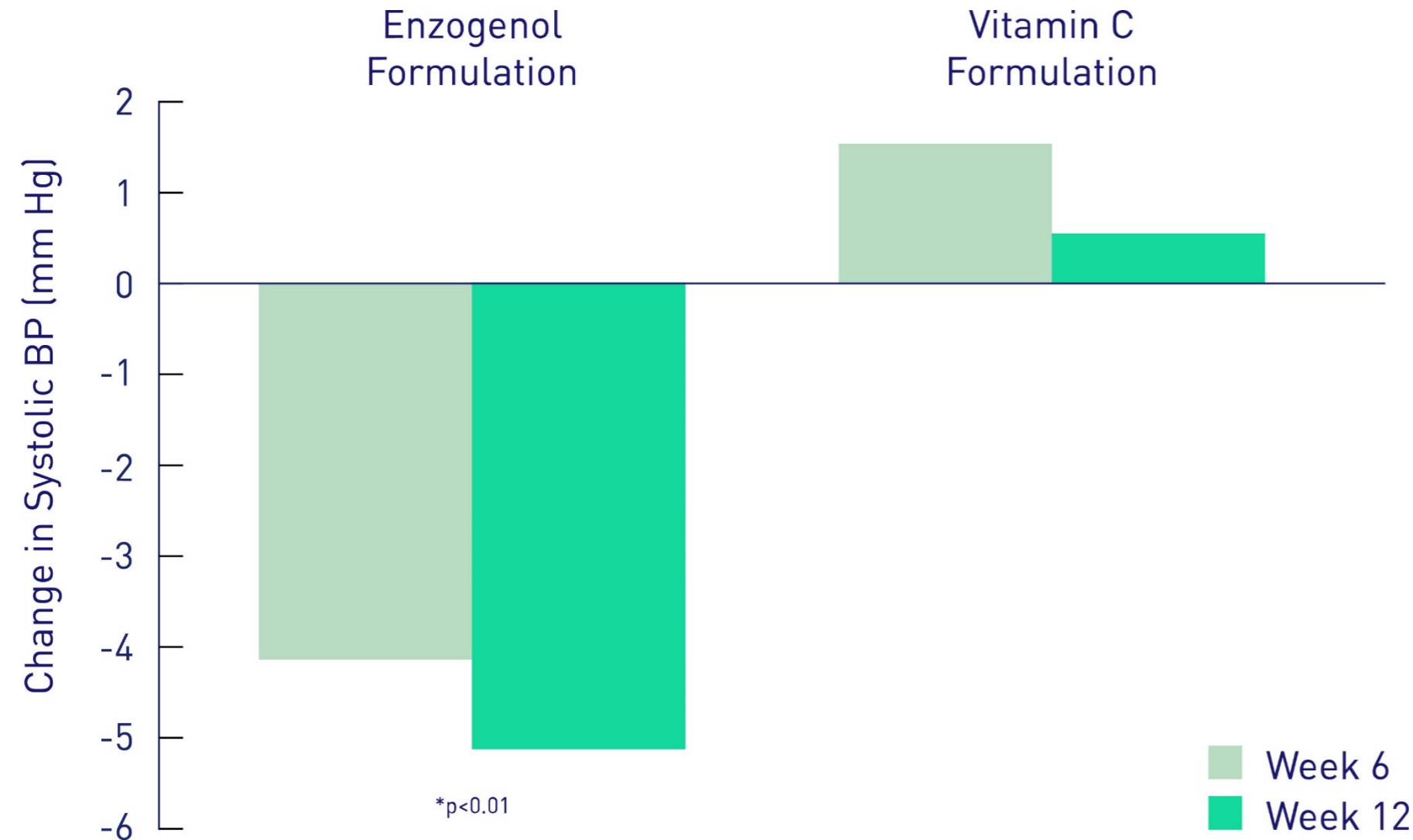
12 weeks of 480mg Enzogenol + 240mg Vit C led to better endothelial response and reduced plasma viscosity.



Shand, et al., 2003. Pilot study on the clinical effects of dietary supplementation with Enzogenol, a flavonoid extract of pine bark and vitamin C. [Phytotherapy Research 17, 490-494.](#)

Cardiovascular Benefits – 2

blood vessel health

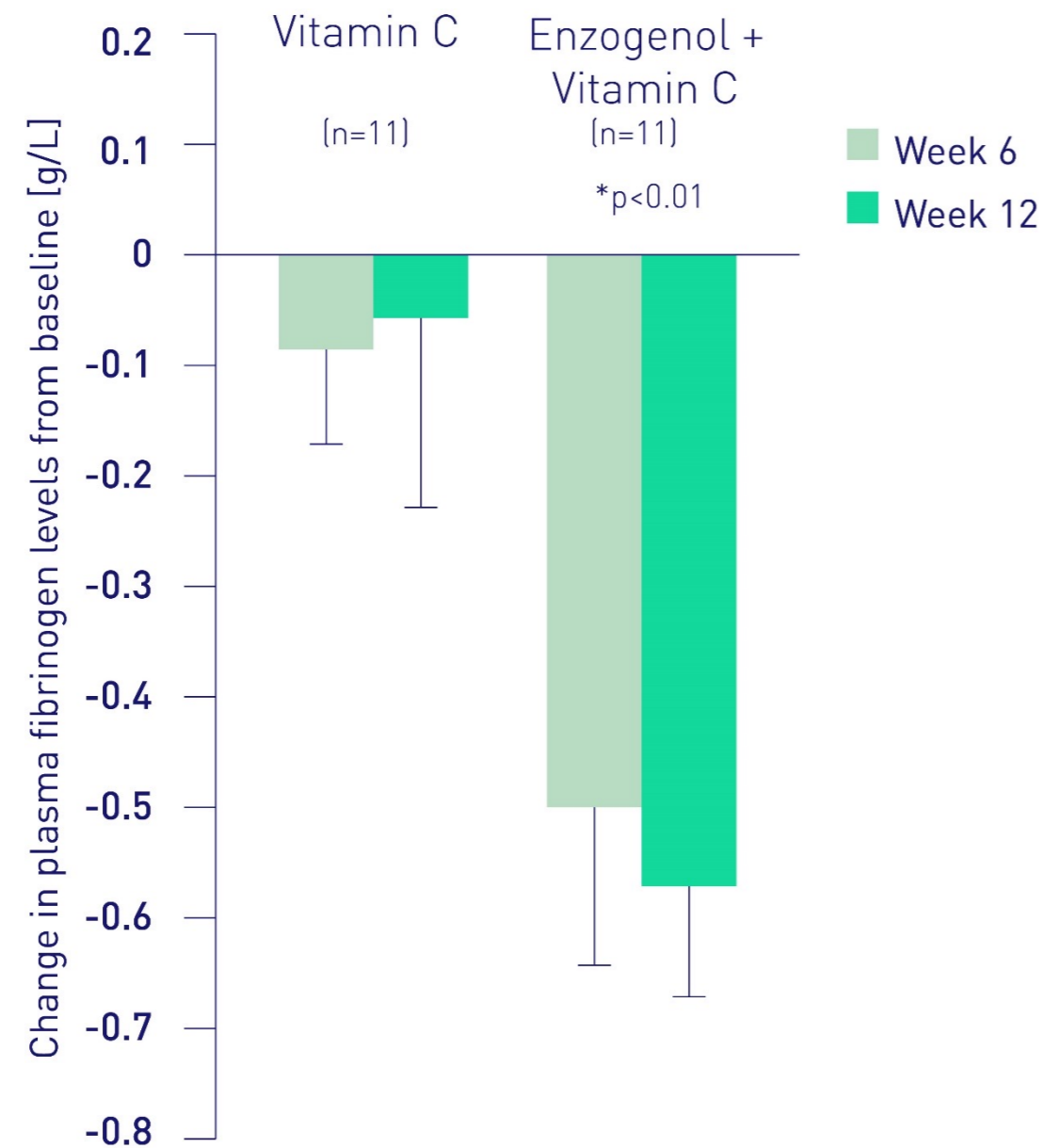


Improving Systolic Blood Pressure

Meta-analysis over two studies shows significant reduction in systolic blood pressure for normotensive people (130 down to 123mmHg).

Young, et al., 2006. [Free Radical Research 40\(1\), 85-94.](#) & Pipingas, A., et al., 2008. [Phytotherapy Research 22, 1168-1174.](#)

Cardiovascular Benefits – 3



Young, et al., 2006. [Free Radical Research 40\(1\), 85-94.](#)

blood vessel health

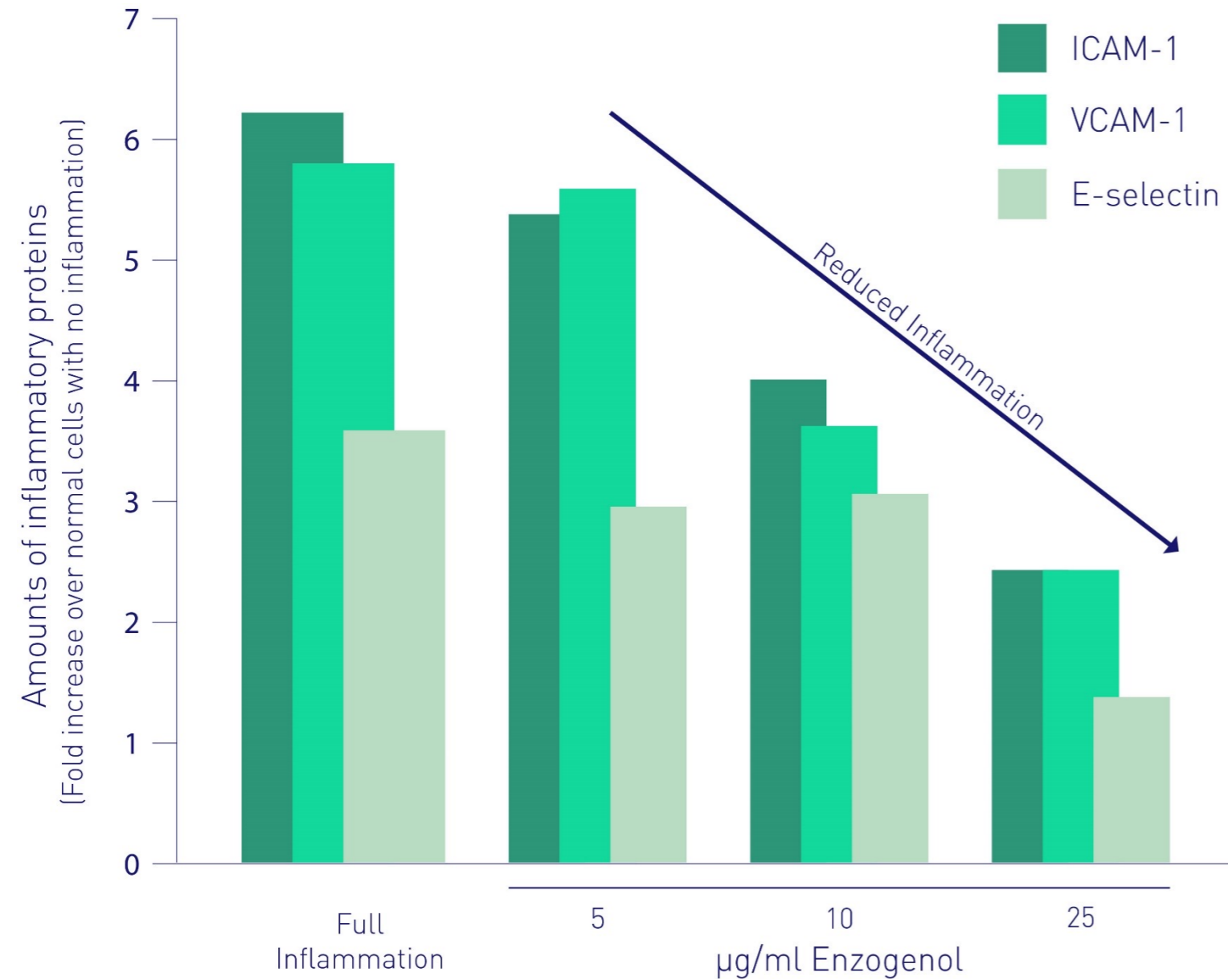
Reduced Fibrinogen Levels in Heavy Smokers

Clinical study shows that Enzogenol improves inflammatory marker in smokers.

6 and 12 weeks of 480mg Enzogenol + 60mg Vit C led to lower plasma fibrinogen levels in heavy smokers.

Cardiovascular Benefits – 4

in-vitro research



Reduced endothelial cell adhesion after inflammatory stimulus

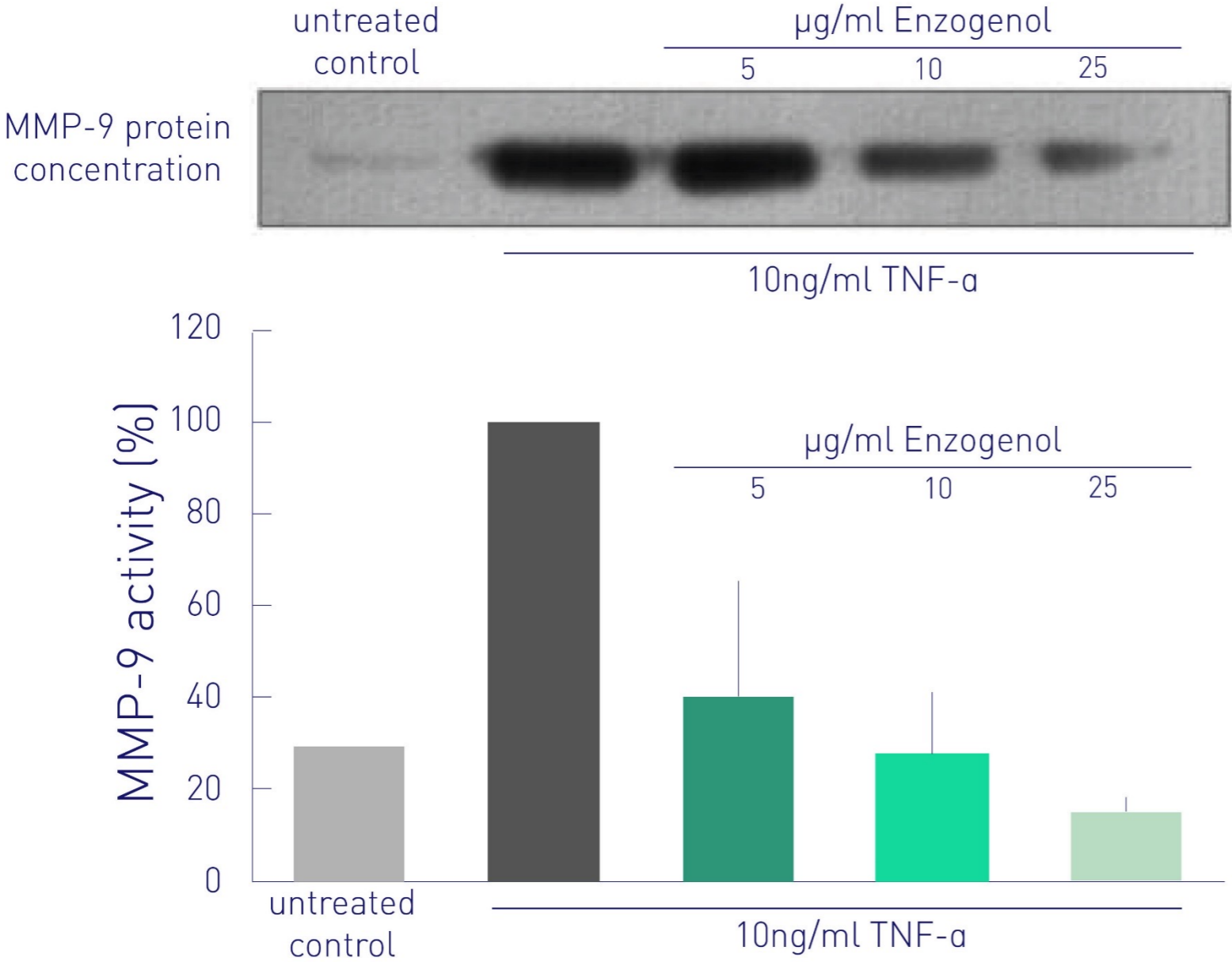
In a cell culture model of atherosclerosis Enzogenol reduces the expression of cell adhesion molecules:

- **ICAM-1**
- **VCAM-1**
- **E-selectin**

Kim, et al., 2010. Pine bark extract enzogenol attenuated tumor necrosis factor-alpha-induced endothelial cell adhesion and monocyte transmigration. [Journal of Agricultural Food Chemistry 58: 7088-7095](#)

Cardiovascular Benefits – 5

in-vitro research



Reduced monocyte migration across the endothelial cell barrier

Enzogenol inhibits transendothelial migration of THP-1 cells by decreasing MMP-9 secretion and activity.

Kim, et al., 2010. Pine bark extract enzogenol attenuated tumor necrosis factor-alpha-induced endothelial cell adhesion and monocyte transmigration. [Journal of Agricultural Food Chemistry 58: 7088-7095](#)

Cardiovascular Benefits – 6

Leukocyte-Endothelium Interaction in Atherosclerosis

Pro-inflammatory Signal



Activation of the vascular endothelium,
Adherence of leukocytes,
Migration of leukocytes across the blood vessel wall

in-vitro research

Dampening down the inflammatory response involved in early atherosclerosis

Kim, et al., 2010. Pine bark extract enzogenol attenuated tumor necrosis factor-alpha-induced endothelial cell adhesion and monocyte transmigration. [Journal of Agricultural Food Chemistry 58: 7088-7095](#)

Cardiovascular Benefits – 7

Conclusions

Clinical trials and in-vitro research show how Enzogenol

- Helps to support healthy blood vessel function through improving the endothelial response
- Helps to support healthy systolic blood pressure
- Helps to support healthy fibrinogen levels, a marker of vascular inflammation
- May help to counter development of atherosclerosis