

Inhibition of Endothelial Adhesion Molecule Expression by *Monascus* Metabolites

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Background: Inflammation is an independent risk factor of cardiovascular diseases and associated with endothelial dysfunction. *Monascus purpureus*-fermented rice, containing naturally-occurring statins and various pigments, has lipid-modulating, anti-inflammatory, and antioxidative effects.

Methods and Results: The effects of monacolin K, ankaflavin, and monascin, as the metabolites from *Monascus*-fermented rice on the expression of cell adhesion molecules (intercellular adhesion molecule-1/ICAM-1, vascular cell adhesion molecular-1/VCAM-1, and E-selectin) by tumor necrosis factor (TNF)- α -treated human aortic endothelial cells (HAECs) were investigated. Supplement of HAECs with these *Monascus*-fermented rice metabolites significantly suppressed cellular binding between the human monocytic cells U937 and TNF- α -stimulated HAECs. Immunoblot analysis showed that *Monascus*-fermented rice metabolites significantly attenuated TNF- α -induced of VCAM-1 and E-selectin but not ICAM-1 protein expression. Gel shift assays showed that *Monascus*-fermented rice metabolites treatment reduced TNF- α -activated transcription factor nuclear factor (NF)- κ B. Furthermore, *Monascus*-fermented rice metabolites also attenuated reactive oxygen species (ROS) generation *in vitro* and in TNF- α -treated HAECs. Supplement with an ROS scavenger *N*-acetyl-cysteine gave similar results as compared with *Monascus*-fermented rice metabolites.

Conclusion: *Monascus*-fermented rice metabolites reduced TNF- α -stimulated endothelial adhesiveness as well as down-regulating intracellular ROS formation, NF- κ B activation, and VCAM-1/E-selectin expression in HAECs, supporting the notion that the various metabolites from *Monascus*-fermented rice might have potential implications in clinical atherosclerosis disease. [*J Sci Food Agric.* 2011 Aug 15;91(10):1751-8.]