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Suppression of Leukocyte Adhesion Molecules Through Inhibition of IκB Kinase by Tea Polyphenols in Human Vascular Endothelial Cells

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ABSTRACT

Background. Expressions of vascular cell adhesion molecule-1 (VCAM-1) and intercellular adhesion molecule-1 (ICAM-1) are elevated at sites of inflammation. Our previous studies demonstrated that tea polyphenols potently inhibit inflammation.

Aims. To examine the effects of both black tea and green tea polyphenols on the expression of adhesion molecules induced by interleukin-1β (IL-1β) in cultured human umbilical vein endothelial cells (HUVECs).

Methods. *In vitro* cultured HUVECs were treated with IL-1β and various polyphenols, and analyzed by Western blotting, Northern blotting, leukocyte adhesion assay, NFκB reporter plasmid assay, and IκB kinase activity assay.

Results. Of the tea polyphenols tested, epicatechin-3-gallate (ECG), epigallocatechin-3-gallate (EGCG), and theaflavin-3,3'-digallate (TF-3) significantly inhibited IL-1β-induced the protein expression of VCAM-1 and ICAM-1 in dose-dependent manners, and which was associated with reduced adhesion of leukocytes to HUVECs. The mRNA level of VCAM-1 was also inhibited by these 3 polyphenols. Transition transfection experiments showed that these 3 polyphenols inhibited NFκB-dependent transcriptional activity induced by IL-1β. Finally, we found that the inhibition of NFκB activation was mediated by the inhibition of IKK activity by these 3 polyphenols.

Conclusions. Taken together, these results demonstrate that ECG, EGCG, and TF-3 can inhibit IL-1β-induced IKK activity, and thus the nuclear translocation of NFκB, thereby suppressing expression of VCAM-1 and ICAM-1. This study suggests that tea polyphenols exhibit anti-inflammatory properties by blocking IKK activity, and may be important in the prevention of inflammation.
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INTRODUCTION

Adhesion of monocytes to vascular endothelium and their subsequent recruitment into the artery wall are key features in the pathogenesis of atherosclerosis and inflammation.[1,2] Monocyte recruitment is mediated, in part, by vascular cell adhesion molecule-1 (VCAM-1), a cell surface protein expressed

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