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Links between food and vascular disease[1,2]

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The article by Toborek et al (1) in this issue of the Journal is this group's next logical step in a theme targeting the actions of ingested lipids on the vascular system (2, 3). Over the past decade, these investigators have contributed a substantial body of literature investigating the dietary links to vascular physiology and pathophysiology. The current article reports that specific unsaturated dietary fatty acids, particularly linoleic acid, can stimulate a proinflammatory environment within the vascular endothelium. For many years this concept has remained elusive in the context of how a diet-vascular interaction could occur in this complex system. The authors have pursued this concept in a systematic and logically progressive fashion. Their work and this article specifically show that specific lipids can, without any modification, perturb vascular endothelial cells and promote a proinflammatory environment (4, 5). This finding separates this study from much previous work indicating that lipids must be modified to stimulate and activate endothelial cells.

These studies provide part of the foundation for future studies of diet-vascular interactions in more complex organ systems and whole organisms, including humans. These future studies are essential for determining the pathophysiologic relevance of the present experiments performed in cell culture. Additionally, basic mechanistic studies are needed to determine the exact sequence in which certain ingested lipids activate endothelial cells (6) and the modalities and therapies by which the process of endothelial cell activation can be prevented or attenuated (7). Additional interesting experiments may determine the mechanisms by which endothelial cell activation is amplified by specific lipids, such as linoleic acid.

It is clear that multiple mechanisms exist by which the vascular endothelium can be activated and the vascular wall injured. The studies by Hennig et al (2) show that specific lipids, ie, fatty acids, can injure vascular endothelium without modification. Thus, it is clear that our reliance on measuring classic blood lipid indexes, such as total cholesterol, triacylglycerol, HDL cholesterol, and LDL cholesterol, remains rudimentary. Future analysis may include more comprehensive dietary phenotyping and plasma lipid composition, including specific phospholipids and fatty acids. Although the authors have identified a specific culprit in the activation of the vascular endothelium, many more of these "bad actors" may exist in the diet. In the coming years, our major challenge will be to identify additional pathogenic lipids and other blood components that activate endothelial cells, investigate their mechanisms, and develop treatment regimens to prevent the development of vascular disease, the most costly disease in our country in terms of both lives lost and health care dollars.

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