Response by Hwang et al to Letter Regarding Article, “Impact of Target Arterial Residual Stenosis on Outcome After Endovascular Revascularization”

In Response:
We appreciate Cao et al’s for their interest and constructive comments to our recent article. Cao et al suggested that a more intensive antiplatelet strategy during and after endovascular therapy (EVT) may be helpful in patients with excellent pretreatment collaterals and in situ thrombo-occlusion (IST) as a target arterial pathogenic mechanism. The reasons why more intensified antiplatelet therapy can be used in patients with excellent collaterals were as follows: (1) the presence of excellent pretreatment collaterals might be a marker for severe chronic atherosclerotic disease in situations when the angiographic information before acute IST is unavailable; and (2) the chance of procedure-related endothelial damage might be higher in patients with severe stenosis than those with only mild to moderate stenosis before acute IST.1

We strongly agree with the comments by Cao et al that the ideal management strategies including more intensified antiplatelet therapy should be tested when performing EVT in patients with acute intracranial occlusion because of IST pathogenesis. However, there are some barriers in defining acute IST without the knowledge of angiographic information before the occurrence of index stroke. To overcome these barriers, we operationally defined IST based on interval angiographic changes, and the prevalence of IST pathogenesis was ≈25% based on this definition.2 The drawback of our definition is that the etiologic classification can only be confirmed 5 to 7 days after the index stroke, which might hinder specific treatment strategies based on the pathogenic mechanism of target arterial lesion before or during the EVT.

To make timely decisions for treatment strategies based on target arterial lesion pathogenesis, information regarding candidate markers for IST pathogenesis are necessary before the performance of EVT. Cao et al speculated that well-developed collaterals are a plausible marker for severe chronic intracranial atherosclerotic disease. It seems reasonable, and post hoc analysis using the WASID data set (Warfarin-Aspirin Symptomatic Intracranial Disease) showed that more extensive collaterals were associated with more severe stenoses in patients with symptomatic intracranial atherosclerotic disease.3 However, the limited inclusion of patients showing excellent pretreatment collaterals poses some issues: (1) the well-developed collaterals can be observed in patients without IST pathogenesis; (2) the well-developed collaterals during EVT are recognized as independent predictors for better reperfusion and more favorable outcome; and (3) acute IST can occur in patients with mild to moderate stenosis before index stroke.

In the EVT era, acute intracranial occlusion because of IST pathogenesis has engendered scant attention. Our article highlighted that the actual prevalence of acute IST might be high in patients who were candidates for EVT. The angiographic and clinical course and outcomes during or after EVT were not always benign. Furthermore, instant or delayed reocclusion can be a barrier in patients with IST pathogenesis. Because obtaining the angiographic information before the occurrence of index stroke might be impossible in most cases, markers for predicting IST pathogenesis should be sought in future research, and treatment strategies including more intensified antiplatelet therapy focused on IST pathogenesis may be tested in future trials.

Sources of Funding
This work has been funded by National Institutes of Health/National Institute of Neurological Disorders and Stroke award (NIH/NINDS) K24NS072272.

Disclosures
Dr Liebeskind is a consultant to Stryker (significant) and Medtronic (significant) and is employed by the University of California (UC), which holds a patent on retriever devices for stroke. The other authors report no conflicts.

Yang-Ha Hwang, MD, PhD
Yong-Won Kim, MD
Department of Neurology
Cerebrovascular Center
Kyungpook National University School of Medicine and Hospital
Dongdeok-ro, Jung-gu, Daegu, South Korea

David S. Liebeskind, MD
Department of Neurology
Neurovascular Imaging Research Core
UCLA Stroke Center

Response by Hwang et al to Letter Regarding Article, "Impact of Target Arterial Residual Stenosis on Outcome After Endovascular Revascularization"

Yang-Ha Hwang, Yong-Won Kim and David S. Liebeskind

Stroke. 2016;47:e241; originally published online August 30, 2016; doi: 10.1161/STROKEAHA.116.014694

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://stroke.ahajournals.org/content/47/10/e241