Mechanical Thrombectomy for Acute Ischemic Stroke
Final Results of the Multi MERCI Trial

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Background and Purpose—Endovascular mechanical thrombectomy may be used during acute ischemic stroke due to large vessel intracranial occlusion. First-generation MERCI devices achieved recanalization rates of 48% and, when coupled with intraarterial thrombolytic drugs, recanalization rates of 60% have been reported. Enhancements in embolectomy device design may improve recanalization rates.

Methods—Multi MERCI was an international, multicenter, prospective, single-arm trial of thrombectomy in patients with large vessel stroke treated within 8 hours of symptom onset. Patients with persistent large vessel occlusion after IV tissue plasminogen activator treatment were included. Once the newer generation (L5 Retriever) device became available, investigators were instructed to use the L5 Retriever to open vessels and could subsequently use older generation devices and/or intraarterial tissue plasminogen activator. Primary outcome was recanalization of the target vessel.

Results—One hundred sixty-four patients received thrombectomy and 131 were initially treated with the L5 Retriever. Mean age ± SD was 68 ± 16 years, and baseline median (interquartile range) National Institutes of Health Stroke Scale score was 19 (15 to 23). Treatment with the L5 Retriever resulted in successful recanalization in 75 of 131 (57.3%) treatable vessels and in 91 of 131 (69.5%) after adjunctive therapy (intraarterial tissue plasminogen activator, mechanical). Overall, favorable clinical outcomes (modified Rankin Scale 0 to 2) occurred in 36% and mortality was 34%; both outcomes were significantly related to vascular recanalization. Symptomatic intracerebral hemorrhage occurred in 16 patients (9.8%); 4 (2.4%) of these were parenchymal hematoma type II. Clinically significant procedural complications occurred in 9 (5.5%) patients.

Conclusions—Higher rates of recanalization were associated with a newer generation thrombectomy device compared with first-generation devices, but these differences did not achieve statistical significance. Mortality trended lower and the proportion of good clinical outcomes trended higher, consistent with better recanalization. (Stroke. 2008;39:1205-1212.)

Key Words: acute stroke ■ fibrinolytic ■ thrombectomy

Ischemic stroke caused by large vessel occlusions (middle cerebral, basilar artery, and carotid terminus) is particularly morbid1 and neurological outcome is dependent on timely recanalization. Thrombus within vessels of this size is relatively resistant to dissolution from plasminogen activators delivered intravenously2–4 providing a reason to pursue direct endovascular techniques to open vessels. Intraarterial (IA) plasminogen activator (tPA) with mechanical thrombectomy. Interim data regarding the safety of combining IV tPA with thrombectomy can restore vascular patency of these vessels between 41% and 54% of the time,7–9 providing an alternative or synergistic method to restore blood flow. Because clinical outcome is improved with better recanalization rates,8–11 further improvements in recanalization rates are desirable.

The Multi MERCI trial was designed in part to test the performance of a newer generation thrombectomy device designed to attain better grasp of the thrombus compared with first-generation devices and in part to further evaluate the safety and efficacy of combining IV tPA with mechanical thrombectomy. Interim data regarding the safety of combining IV tPA with thrombectomy
was reported previously and the final results are reported here.

Materials and Methods
Multi MERCI was an international, multicenter, single-arm trial using a family of thrombectomy devices (Merci Retriever X5, X6 and L5 Retriever) to restore cerebral perfusion (Figure 1). Treatment was initiated within 8 hours of stroke symptom onset. The trial had 3 broad aims: (1) to gain greater experience with the Merci Retriever and L5 Retriever to restore cerebral perfusion (Figure 1). Treatment using a family of thrombectomy devices (Merci Retriever X5, X6 and L5 Retriever) once these became available for trial investigation. The X5 and X6 models were cleared for commercial use in August 2004, and the L5 Retriever was used under an US Food and Drug Administration-approved Investigational Device Exemption as part of this trial. The trial enrolled patients at 15 sites, including 2 Canadian sites, shown in the Appendix, and the trial protocol was approved by each local Institutional Review Board. The study was supervised by an independent data safety monitoring board (DSMB).

Patient eligibility in the IV tPA ineligible arm of Multi MERCI was the same as the MERCI trial. Eligibility in the IV tPA-treated arm was the same as in the IV tPA-ineligible arm except that patients who had received tPA within 3 hours of onset under US Food and Drug Administration-labeled indications could be enrolled if tPA failed to open the intracranial large vessel as proved by conventional angiography. Specifically, patients were eligible who met all of the following criteria: age ≥18 years, signs and symptoms of acute stroke, National Institutes of Health Stroke Scale (NIHSS) score ≥8, and stroke symptom duration under 8 hours. After cerebral angiography, eligible patients had to have occlusion of a treatable vessel. Treatable vessels were defined as the intracranial vertebral artery, basilar artery, intracranial carotid artery, internal carotid artery terminus, or the MCA first division (M1) or second division (M2). The patient was defined as enrolled once the balloon guide catheter was placed in the vasculature.

Patients were ineligible for the study if any of the following were true: informed consent was not obtained (and approval for waiver of explicit consent for emergency circumstances had not been obtained at the study site), current pregnancy, serum glucose <50 mg/dL, excessive tortuosity of cervical vessels precluding device delivery/deployment, known hemorrhagic diathesis, known coagulation factor deficiency, oral anticoagulation treatment with international normalized ratio >3.0, use of heparin within 48 hours and a prothrombin time >2 times normal, platelet count <30,000/µL, history of severe allergy to contrast media, sustained systolic blood pressure >185 mm Hg or diastolic blood pressure >110 mm Hg despite treatment, CT scan revealing significant mass effect with midline shift, greater than 50% stenosis of the artery proximal to the target vessel, or life expectancy under 3 months.

All patients underwent conventional cerebral angiography. The embolectomy procedure has been described previously. Successful recanalization was defined as achieving Thrombolysis In Myocardial Infarction (TIMI) II or III flow in all treatable vessels. Successful recanalization for the MCA required all M1 and M2 segments to be at least TIMI II; for internal carotid artery terminus lesions, the internal carotid artery, M1, and both M2 branches needed to be at least TIMI II; and for the posterior circulation, both the vertebral and basilar arteries needed to be at least TIMI II to be considered recanalized. TIMI scoring of angiography was scored by the local investigator who was not blinded to clinical outcome. If the treatable vessel was not opened to at least TIMI II flow with a maximum of 6 passes with the device, it was considered a treatment failure for the device. Intrarheal fibrinolysis (up to 24 mg tPA) was allowed in cases of treatment failure with the device or to treat distal embolus not accessible to the device after successful proximal embolectomy. Use of glycoprotein (GP IIb/IIIa) antagonists and alternate mechanical thrombectomy procedures were prohibited. Aspirin but not IV heparin was allowed in the first 24 hours after the procedure among patients who had not received fibrinolytics.

Patient demographics, medical history, vital signs, and routine laboratory values were documented on standardized clinical report forms. The NIHSS and modified Rankin scores (mRS) were obtained at baseline and at 30 and 90 days. CT or MRI brain imaging was performed at baseline, 24 hours, and at any time there was a decline in patient neurological status.

The prespecified primary efficacy end point was L5 Retriever device recanalization rate ≥44%, which represents 1 SD below the mean of MERCI postdevice recanalization rate (48.2%±4.2%) as a test of noninferiority to the X5/X6 device. Postdevice recanalization was defined as TIMI grades II and III flow assessed immediately posttreatment with the device. Final recanalization was assessed following any and all procedures, including administration of IA plasminogen activators.

The major secondary end point was safety defined as the major device-related serious adverse event rate ≤10%, which represents a 5% increase of this rate beyond the 5% reported rate in MERCI. Procedure-related adverse events were defined as vascular perforation, intramural arterial dissection, or embolization of a previously
uninvolved territory, symptomatic hemorrhage adjudicated as procedure-related, and access site complications requiring surgery or transfusion. Clinically significant procedural complications were defined as a procedure complication with decline in NIHSS of ≥4 or death or groin complication requiring surgery or blood transfusion. Symptomatic intracranial hemorrhage was defined as a 4 or more point decline in the NIHSS score within 24 hours with any blood products identified on 24-hour head CT/MRI scan (petechial bleeding, hematoma, or subarachnoid hemorrhage) or any intracranial hemorrhage in which no further NIHSS scores were available beyond baseline and the patient died. All 24-hour CT/MRI scans were reviewed at a central core laboratory and adjudicated as subarachnoid hemorrhage or as ECASS hemorrhagic infarction type I or II or ECASS parenchymal hematoma types I and II.13 All symptomatic intracerebral hemorrhages were reviewed by the DSMB and adjudicated as to whether they were related to the procedure; in cases in which IV or IA plasminogen activator was given, the DSMB classified any hemorrhage as procedure-related. Asymptomatic hemorrhage was defined as evidence of any blood on the 24-hour CT or MRI scan with no more than a 3-point decline in the NIHSS score within the text where relevant. All analyses were performed by a biostatistician using SAS for Windows, version 8.2 (SAS Institute, Cary, NC).

**Statistical Analysis**

Primary outcomes are reported based on patients who had the Retriever deployed. Statistical tests used to determine the significance of differences in variables are listed in the data tables and within the text where relevant. All analyses were performed by a biostatistician using SAS for Windows, version 8.2 (SAS Institute, Inc, Cary, NC).

**Results**

Overall, 1088 patients were screened, 177 patients were enrolled, and the device was deployed in 164 patients. Patient demographics and baseline characteristics are shown in Table 1. Patient enrollment began January 20, 2004. The trial was placed on hold May 2, 2005, by the DSMB because of a question of safety regarding intracranial hemorrhages and protocol violations. After review, the DSMB allowed the trial to continue with stricter control on protocol violations.9 Final enrollment occurred in July 2006. Thirteen patients did not have the device deployed for the following reasons: vessel tortuosity (n=4), clot not penetrable with the microcatheter (n=1), spontaneous recanalization (n=2), distal clot migration to the M3 segment (n=1), and presence of significant carotid stenosis (n=5). All results are analyzed for the 164 patient cohort in whom the device was deployed.

All patients underwent conventional angiography and were enrolled in the trial based on complete occlusion of the intracranial vessels shown in Table 1. Overall recanalization after device treatment alone and device followed by adjuvant IA therapy is shown in Table 2. Postdevice recanalization was 55%, which exceeded 44%, thus meeting the prespecified primary end point of the study (see “Methods”). The device-related serious adverse events rate was 2.4%, which is below the prespecified adverse event rate of 10%, thus meeting the secondary prespecified end point. Clinically significant procedure complications occurred in 9 (5.5%) patients and did not occur more often with any particular device. There was one L5 device fracture on withdrawal of the device into the balloon guide catheter and the fractured end was retrieved with a snare; the patient had successful recanalization with no adverse outcome and had a mRS score of 0 at 90 days. There were 19 off-protocol mechanical interventions to address clot, including 10 patients treated with snares or other foreign body retrievers and 9 with balloons at the thrombus site; 11 patients received GP IIB/IIIa antagonists; 14 received IA thrombolitics before or between passes and 10 had a proximal stenosis treated with a stent before embolectomy. These protocol violations typically occurred as multiples within individual patients; see the discussion in part I of this trial.

At 90 days, 36% of patients had a favorable neurological outcome (mRS 0 to 2) and 34% had died. Prestroke mRS were 0 in 86% of patients, but 23 patients had mRS greater than 0 on entry (9 had mRS=1, one had mRS=2, 8 had mRS=3, and 5 had mRS=4). In patients with a baseline mRS of 0, favorable neurological outcome (mRS 0 to 2) was seen in 39.4% and 32% died. Favorable outcome was often apparent at 24 hours; for patients who had an NIHSS determined at 24 hours (146 cases), 32% (46 of 146) had an 8 or more point decrease in NIHSS or achieved a 0 score,

### Table 1. Patient Demographics, Baseline Stroke Score, and Site of Vascular Occlusion

<table>
<thead>
<tr>
<th>No. of patients</th>
<th>164</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean±SD, years</td>
<td>68.1±16.0</td>
</tr>
<tr>
<td>Female, %</td>
<td>57%</td>
</tr>
<tr>
<td>Baseline NIHSS, median (interquartile range)</td>
<td>19 (15–23)</td>
</tr>
<tr>
<td>Baseline mRS=0</td>
<td>86%</td>
</tr>
<tr>
<td>Baseline mRS, mean±SD</td>
<td>0.34±0.95</td>
</tr>
<tr>
<td>Site of vascular occlusion, % (n)</td>
<td>1. Internal carotid artery</td>
</tr>
<tr>
<td>ICA/ICA terminal bifurcation</td>
<td>32% (52)</td>
</tr>
<tr>
<td>Middle cerebral artery</td>
<td>60% (98)</td>
</tr>
<tr>
<td>Vertebral/basilar/P1</td>
<td>8% (14)</td>
</tr>
</tbody>
</table>

ICA indicates internal carotid artery.

### Table 2. Major Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Post Retriever recanalization, % (95% CI)</th>
<th>Final recanalization, % (95% CI)</th>
<th>Symptom onset to groin puncture, median hours (IQR)</th>
<th>Procedure duration, median hours (IQR)</th>
<th>Attempts to remove clot, mean±SD</th>
<th>IV tPA pretreatment, %</th>
<th>Procedural complications, % (95% CI)</th>
<th>Clinically significant procedure complication, % (95% CI)</th>
<th>Device-related serious adverse event rate, % (95% CI)</th>
<th>Good outcome (mRS ≤2) at 90 days, % (95% CI)</th>
<th>NIHSS improvement of ≥10 points or 0 score at 24 hours, % (95% CI)</th>
<th>Mortality at 90 days, % (95% CI)</th>
<th>Symptomatic intracranial hemorrhage, % (95% CI)</th>
<th>Symptomatic PH-2 hemorrhage, % (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>55 (47–63)</td>
<td>68 (61–75)</td>
<td>4.3 (3.2–5.3)</td>
<td>1.6 (1.2–2.3)</td>
<td>2.9±1.6</td>
<td>29</td>
<td>9.8 (5.2–14.3)</td>
<td>5.5 (2.0–9.0)</td>
<td>2.4 (0.1–4.8)</td>
<td>36 (29–44)</td>
<td>26 (19–33)</td>
<td>34 (26–41)</td>
<td>9.8 (5.2–14.3)</td>
<td>2.4 (0.1–4.8)</td>
</tr>
</tbody>
</table>

IQR indicates interquartile range.
whereas 26% (38 of 146) exhibited a 10 or more point decrease or achieved a 0 score.

Among cases in which the L5 Retriever was deployed, primary recanalization was achieved in 75 of 131 cases (57.3%) as compared with recanalization in 15 of 33 (45.5%) of cases in which older generation X5/X6 devices were the first device deployed ($P = 0.25$). In patients receiving postadjunctive IA therapies, recanalization was achieved in 91 of 131 patients (69.5%) in whom the L5 Retriever was used as compared with 21 of 33 (63.6%) patients treated with the X5 or X6 only ($P = 0.54$).

Recanalization by target vessel is shown in Table 3. There were significant differences in recanalization by vessel both for L5 postdevice recanalization and for final recanalization for both L5 and all patients. Mortality and proportion of good neurological outcomes were not significantly different across vessel categories. However, a significant difference in mortality and proportion of patients with good neurological outcome was observed based on vessel recanalization (Table 4). Furthermore, there were more patients with mRS 0, 1, and 2 scores and less with mRS 3, 4 and 5 scores in those who recanalized ($P = 0.001$). Nearly half of recanalized patients had a good neurological outcome and there were fewer disabled survivors among those with recanalization; therefore, patients did not appear to be saved only to live disabled.

Forty-eight patients (29.3%) received IV tPA before angiography; as reported previously, no differences in the rates of intracranial hemorrhage or clinically significant procedure complications were seen between those patient treated with IV tPA and those who were not (Table 5) suggesting that pretreatment with IV tPA does not raise a concern of safety. The significant difference in time of onset between those receiving IV tPA and those who did not reflects the underlying eligibility for using IV tPA within 3 hours of symptom onset. The significant difference in rates of IA thrombolytic use between those patients who had successful vascular recanalization with the device and those who did not reflects...
differential investigator use of adjuvant thrombolytic for cases that failed to recanalize with the device.

Symptomatic hemorrhages were observed in 16 (9.8%) patients and representative images of each patient are shown in Figure 3. Each hemorrhage was classified as to hemorrhage type and adjudicated by a core laboratory neuroradiologist; disagreement between the site reading and this core laboratory interpretation was adjudicated by a second neuroradiologist. Only 4 of the hemorrhages (2.4%) were classified as PH-2, suggesting that 12 of the 16 patients may have declined not from the intracranial blood, but from cytotoxic edema generated from the initial infarction. Three of the 4 PH-2 patients had hemorrhages adjudicated as procedure complications: one received IA tPA (Figure 3K), one was due to guidewire perforation of the MCA vessel during IA tPA infusion (Figure 3L), and one received IV tPA (Figure 3M). Another patient (Figure 3N) had a symptomatic PH-2 hemorrhage that was not considered procedure-related because no thrombolytics were administered and no apparent problem during the procedure was reported by the investigator. The rate of symptomatic hemorrhage in patients treated without any tPA was 7.9% (6 of 76), whereas the rate of symptomatic hemorrhages in patients given any tPA was 11% (10 of 88; \( P=0.60 \)). The rate of symptomatic PH-2 hemorrhages in patients receiving no tPA was 1.3% (one of 76). Asymptomatic hemorrhages were observed in 30.5% of all patients.

**Discussion**

The final results of the Multi MERCI trial reveal that the study’s prespecified primary end point of recanalization was achieved. The study found an increased rate of recanalization of intracranial vessels using a newer generation thrombectomy device with a higher rate (although not statistically significant) of device-only recanalization among L5 Retriever-treated patients in Multi MERCI than among X5/ X6-treated patients in MERCI. In addition, these results support the preliminary conclusions of Multi MERCI, part I that pretreatment with IV tPA followed by mechanical thrombectomy has an acceptable safety profile. Among patients who experienced recanalization, there was a 2-fold survival advantage and a significantly higher proportion of patients lived without significant disability.

Given the large separation between outcomes in recanalized and nonrecanalized patients, the stringent definition of recanalization used in the Multi MERCI trial appears to be a clinically meaningful one. Because there were no contempo-

### Table 5. Use of IV or IA Thromblytics

<table>
<thead>
<tr>
<th>Result</th>
<th>IV tPA (N=48)</th>
<th>No IV tPA (N=116)</th>
<th>( P ) Value*</th>
<th>IA Lytic (N=57)</th>
<th>No IA Lytic (N=107)</th>
<th>( P ) Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recanalization post Retriever, %</td>
<td>58</td>
<td>53</td>
<td>0.61</td>
<td>33</td>
<td>66</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Recanalization post Adjuvant, %</td>
<td>73</td>
<td>66</td>
<td>0.46</td>
<td>68</td>
<td>68</td>
<td>0.99</td>
</tr>
<tr>
<td>Symptom onset to arterial puncture, hours</td>
<td>3.9</td>
<td>4.6</td>
<td>0.031</td>
<td>3.7</td>
<td>4.8</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>IA lytic use, %</td>
<td>35</td>
<td>34</td>
<td>0.99</td>
<td>100</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>mRS ≥2 at 90 days, %</td>
<td>38</td>
<td>35</td>
<td>0.72</td>
<td>32</td>
<td>39</td>
<td>0.49</td>
</tr>
<tr>
<td>Mortality at 90 days, %</td>
<td>28</td>
<td>36</td>
<td>0.36</td>
<td>43</td>
<td>29</td>
<td>0.08</td>
</tr>
<tr>
<td>Intracranial hemorrhage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Symptomatic ICH, %</td>
<td>10</td>
<td>9.5</td>
<td>0.99</td>
<td>14</td>
<td>7.5</td>
<td>0.27</td>
</tr>
<tr>
<td>Symptomatic PH-2, %</td>
<td>2.1</td>
<td>2.6</td>
<td>0.99</td>
<td>3.5</td>
<td>1.9</td>
<td>0.61</td>
</tr>
<tr>
<td>Clinically significant procedure complications, %</td>
<td>4.2</td>
<td>6.0</td>
<td>0.99</td>
<td>12</td>
<td>1.9</td>
<td>0.009</td>
</tr>
</tbody>
</table>

*Difference between IV and no IV tPA groups.
†Difference between IA and no IA groups. Fisher exact test for all tests of significance, except “symptom onset to arterial puncture” in which analysis of variance was used.
ICH indicates intracerebral hemorrhage.
raneous controls, the trial is unable to conclusively show that thrombectomy actually improves stroke outcomes; a randomized trial would help answer that question. However, trial results do strongly suggest that a treatment effect exists despite the lack of contemporaneous controls. First, the remarkable 27% absolute difference in mortality between recanalizers and nonrecanalizers is consistent with the known pathophysiology of stroke whereby timely recanalization of ischemic brain mitigates tissue death and leads to better survival and better outcomes of patients because less brain is injured. The only other comparable effect of any stroke therapy on mortality is hemicraniectomy for cytotoxic cerebral edema after ischemic stroke in which a 49% difference in mortality was reported. It is unlikely that the mortality rate of nonrecanalizers could have been inflated by iatrogenic complications administered to patients whose vessels failed to open with the procedure because the 27% difference in mortality between groups is far higher than our blinded adjudication of clinically significant procedural complications (5.5%). Second, the 68% final recanalization rate found here is likely superior to that achieved with supportive medical therapy. Based on the PROACT-II placebo arm that showed a spontaneous recanalization rate of the MCA stem or M2 branches of 18% at 2 hours after initial angiography, and cerebral angiography-based studies of vascular patency of 25% to 30% within 6 hours of presumed large vessel stroke onset, 20% is a reasonable estimate for the spontaneous recanalization rate of vessels of the size treated in the MERCI trials. The reported recanalization rate of 68% in Multi MERCI for all cerebral vessels, not just MCA vessels, is similar to that reported in PROACT-II for MCA or M2 branches only (66%). Given that clot burdens in the internal carotid artery terminus and basilar artery can be substantially higher, and therefore less likely to be recanalized with thrombolytics, our data suggest that the device provides an advantage over IA thrombolytic therapy alone for all large vessel occlusions. Third, timely recanalization of cerebral vessels is a highly significant predictor of good clinical outcome as has been reported in several series and in a recent meta-analysis of earlier published series. Finally, 26% of patients treated in Multi MERCI had dramatic clinical improvement within 24 hours. For patients treated with IV tPA within 3 hours, the rate of dramatic improvement within 24 hours is 22% to 32%. Because the patients in Multi MERCI were treated up to 8 hours after stroke, and the baseline stroke severity is markedly higher, the 26% rate seen in Multi MERCI suggests a treatment benefit.

Multi MERCI also met its secondary prespecified safety end point: device-related serious adverse events rate of 2.4%. Clinically significant procedural complications were fewer in this trial compared with the MERCI trial (5.5% versus 7.1%, P not significant), although the absence of groin complications alone in Multi MERCI accounted for this numeric difference. Only one device fracture occurred with the L5 device and this resulted in no clinical consequence. One strength of both studies is that these estimates of procedural risk are based on all treated patients within the trial; no patient was excluded as a run-in patient, which is typical of other human device trials. Investigators were trained with phantoms before device use but were not required to have treated patients outside of the trial first before being able to enroll. Therefore, the results reported here are likely representative of how the device performs outside of investigational use.

Symptomatic intracranial hemorrhages were observed in 9.8% of cases as adjudicated by a radiology core laboratory and reviewed by the independent DSMB. However, inspection of Figure 3 shows that only 4 of the 16 hemorrhages were classified as PH-2, representing hematoma with significant hemorrhage classification. (E and L) were also classified as having subarachnoid blood. The hemorrhage in image (P) occurred outside of the area of ischemia and therefore is not classified by the ECASS method.
mass effect on neighboring brain. Most of the hemorrhages are hemorrhagic transformation of ischemic infarcts, which is seen more often after vascular recanalization and has been associated with more favorable neurological outcomes or no clinical adverse effect. The DSMB classified a patient as having a symptomatic hemorrhage if the patient declined by 4 or more NIHSS points and had any blood products on the 24-hour CT scan. This conservatisms was proscribed to err on the side of safety to ensure that no potential symptomatic hemorrhages would be missed. If one considers, however, only the symptomatic hemorrhages that were sizable enough to cause mass effect, only 4 hemorrhages (2.4%) met these criteria. This definition of symptomatic intracranial hemorrhage was used in a European registry of IV tPA-treated patients because it was felt to be more representative of the true clinically meaningful intracranial hemorrhage rate.

This trial has several limitations. Because the trial included adults with no upper age limit, nor an upper limit to NIHSS, and 14% of treated patient had prestroke mRS scores exceeding 0, the overall mortality results are difficult to compare with other published stroke trials that exclude elderly patients and those with high stroke severity and typically enroll only patients with no prestroke disability. As previously reported, the outcomes for patients in MERCI who were PROACT-II eligible was comparable to the PROACT-II outcomes; therefore, although the mortality rates are relatively high in both trials, this likely represents the overall stroke severity of the patients enrolled. Finally, although all CT scans were reviewed by a blinded central reviewer, the conventional angiograms were interpreted by the site investigator.

Mechanical embolectomy is undergoing further analysis in the MR RESCUE and IMS-III trials. Both trials are randomized and each will provide important efficacy data with true clinically meaningful intracranial hemorrhage rate.

### Appendix

#### Investigators

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### References


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for the Multi MERCI Investigators

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The article, “Mechanical Thrombectomy for Acute Ischemic Stroke Final Results of the Multi MERCI Trial” by Smith et al (2008;39:1205–1212) included an error in the Appendix. Dr Fawaz Al-hussain’s name and affiliation were incorrect. The correct information appears below as well as in the current online version.

The investigator’s name should appear as Fawaz Al-hussain, MD, King Saud University.