Safety of Thrombolysis in Stroke Mimics
Results From a Multicenter Cohort Study

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Background and Purpose—intravenous thrombolysis for acute ischemic stroke is beneficial within 4.5 hours of symptom onset, but the effect rapidly decreases over time, necessitating quick diagnostic in-hospital work-up. Initial time strain occasionally results in treatment of patients with an alternate diagnosis (stroke mimics). We investigated whether intravenous thrombolysis is safe in these patients.

Methods—in this multicenter observational cohort study containing 5581 consecutive patients treated with intravenous thrombolysis, we determined the frequency and the clinical characteristics of stroke mimics. For safety, we compared the symptomatic intracranial hemorrhage (European Cooperative Acute Stroke Study II [ECASS-II] definition) rate of stroke mimics with ischemic strokes.

Results—one hundred stroke mimics were identified, resulting in a frequency of 1.8% (95% confidence interval, 1.5–2.2). Patients with a stroke mimic were younger, more often female, and had fewer risk factors except smoking and previous stroke or transient ischemic attack. The symptomatic intracranial hemorrhage rate in stroke mimics was 1.0% (95% confidence interval, 0.0–5.0) compared with 7.9% (95% confidence interval, 7.2–8.7) in ischemic strokes.

Conclusions—in experienced stroke centers, among patients treated with intravenous thrombolysis, only a few had a final diagnosis other than stroke. The complication rate in these stroke mimics was low. (Stroke. 2013;44:1080-1084.)

Key Words: safety ■ stroke ■ stroke mimics ■ thrombolysis

Intravenous thrombolysis (IVT) is the only approved therapy in patients with acute ischemic stroke presenting within 4.5 hours after symptom onset. Unfortunately, the benefit of IVT rapidly declines over time from symptom onset. Aiming at a prompt start of IVT after hospital arrival, time for initial diagnostic work-up is limited. Occasionally, results in treatment of patients who finally turn out to have an alternate diagnosis, so-called stroke mimics. IVT, however, is not without risks because symptomatic intracranial hemorrhage (SICH) is reported in 2% to 9% after IVT in stroke patients, depending on the definition used.

The proportion of stroke mimics varies between 1% and 16% in hospital-based IVT registers. Knowledge of safety of IVT in stroke mimics is important because treatment in these patients can only be accepted as long as the complication rate is very low. Serious complications of IVT in stroke mimics have not been reported so far, but most studies were from single centers and were based on a relatively small number of
The aim of the current study is to investigate the frequency and clinical characteristics of stroke mimics from a large cohort of patients treated with IVT and to assess the safety of IVT treatment in stroke mimics.

**Methods**

**Study Population**

In a collaboration of 12 European stroke centers, we designed a large cohort of IVT-treated ischemic stroke patients to study outcomes of IVT, reflecting daily clinical practice. Each center reported on the period for which they had prospectively collected data on consecutive patients treated with IVT up to December 31, 2011. Treatment with IVT is performed similarly in all centers by administering 0.9 mg/kg alteplase (maximum 90 mg) within 4.5 hours after symptom onset, according to current guidelines. Imaging protocols per center are summarized in Table I in the online-only Data Supplement.

**Data Collection**

Complete individual patient data were collected with a standardized form with predefined variables as it was used in previous studies. Local investigators filled in the forms systematically using prospective-ascertained in-hospital thrombolysis and stroke registers. Completed forms from all centers were compiled in the coordinating Academic Medical Center, where the analyses of the pooled data were performed.

The following prospectively collected baseline variables were used: age, sex, hypertension, diabetes mellitus, atrial fibrillation, hypercholesterolemia, coronary artery disease, previous ischemic stroke or transient ischemic attack, smoking, use of prestroke medication, initial stroke severity as assessed by the National Institutes of Health Stroke Scale, blood pressure before IVT, serum glucose at admission (mmol/L), and time from symptom onset to IVT. Global aphasia with minimal or no paresis was recorded because it was considered to occur more often in stroke mimics. Presence of global aphasia with minimal or no paresis was determined by the National Institutes of Health Stroke Scale, indicating global aphasia with ≤1 for the tested motor items.

Guiding criteria to distinguish stroke mimics from strokes were derived from Hand et al., resembling a previous study on this topic. Stroke mimics were defined as patients in whom clinical details did not suggest a vascular etiology but who had an alternate final diagnosis convincingly explaining their symptoms. In case additional diagnostic tests failed to establish an alternate diagnosis but the physician was convinced that, on clinical grounds, the symptoms were not caused by cerebral ischemia, a stroke mimic was diagnosed as well. On the contrary, stroke was assumed in all patients with history, examination, and disease course typical for involvement of an intracerebral vascular territory with supportive or noncontradictory brain imaging. Patients nonspecific clinical features, but no definite convincing of a stroke mimic, were also regarded as stroke. In each center, stroke mimics were retrospectively re-evaluated in detail for complications of IVT and final diagnosis. Patients were diagnosed with migraine when fulfilling International Headache Society criteria for migraine with aura before or during the follow-up. Diagnosis of a seizure was made on (retrospective) information from a witness suggesting (focal) seizure with a postictal deficit. In case of uncertainty, interictal epileptogenic activity on electroencephalography was necessary. Encephalitis was defined as cerebrospinal fluid pleocytosis, with encephalitis convincingly explaining the symptoms. If clinical signs were suggestive for stroke or transient ischemic attack, ischemic lesions had to be absent on MRI with diffusion-weighted images. Four centers participating in this study have published series on this topic previously. Patients reported in these series are included in this study.

**End Points**

The primary end point was the occurrence of SICH according to the criteria of the European Cooperative Acute Stroke Study II (SICHES-II: any hemorrhage with neurological deterioration, as indicated by a National Institutes of Health Stroke Scale score ≥4 than the value at baseline or the lowest value within 7 days, or any hemorrhage leading to death), because this definition had the largest contribution to worst outcomes in a recent cohort study. We further distinguished SICH according to the criteria of the National Institute of Neurological Disorders and Stroke trial (SICHINES: any hemorrhage plus any neurological deterioration). Fatal ICH was defined as death attributed to ICH, according to the NINDS-criteria as well. Other secondary end points were mortality, orolingual edema, and functional outcome at 3 months. Functional outcome was assessed by outpatient visits or telephone calls at 3 months using the modified Rankin Scale. Favorable outcome was defined as a modified Rankin Scale score of 0 to 2, and excellent outcome as modified Rankin Scale score of 0 to 1. All end points were prospectively collected.

**Standard Protocol Approvals, Registrations, and Patients Consents**

This study was conducted according to European and national legislations, and the medical ethics committee of the Academic Medical Center permitted analysis of the anonymous patient data.

**Statistical Analyses**

Baseline characteristics and outcome variables were summarized using descriptive statistics. For categorical variables, we calculated percentage proportions by dividing the number of events by the total number of patients, excluding missing or unknown cases. Statistics comparing these variables between stroke mimics and strokes included unpaired t, χ², Fisher exact, and Mann–Whitney U tests, where appropriate. P values <0.05 were considered statistically significant. Analyses were done with SPSS version 16.0 (SPSS Inc. Chicago, IL).

**Literature Search**

We systematically searched the PUBMED database from January 1, 1950, to June 8, 2012, for publications on thrombolysis in stroke mimics, using the following variables (mimic OR misdiagnosis) AND (stroke) AND (thrombolysis OR recombinant tissue plasminogen activator OR tissue plasminogen activator OR rtPA OR tPA OR alteplase). In addition, we searched for relevant studies in the Cochrane Library and Cochrane Central Register of Controlled Trials database from January 1, 1993, to June 8, 2012, and handsearched citations from the retrieved studies. Finally, experts in the field were consulted.

**Results**

**Study Population and Baseline Characteristics**

In this cohort, 5518 consecutive patients treated with IVT were included. In total, 18.3% (1010 patients) were >80 years of age, and 9.8% of the patients was treated outside the approved time window (408 patients after 180 minutes before October 2008, 86 patients after 270 minutes from October 2008). In 100 patients (1.8%; 95% confidence interval, 1.5–2.2), final diagnosis was other than stroke. Demographic and baseline characteristics of the stroke mimics are presented in Table 1. Patients with a stroke mimic were younger, more often female, and had fewer risk factors except smoking and previous stroke or transient ischemic attack. Presentation with global aphasia with minimal or no paresis occurred more often in stroke mimics. Stroke mimics were treated at later time points compared with true ischemic strokes. There was a trend toward a higher proportion of stroke mimics that were treated before the end of the time window (ie, between 165 and 180 minutes before October 2008 and between 255 and 270 minutes from October 2008) than at earlier time points (2.3 vs 1.4%; P=0.09).
Stroke April 2013

Eighty-one percent of stroke mimics (81 patients) were diagnosed with an epileptic seizure (41%), a psychogenic disorder (28%), or migraine (12%). Other diagnoses were demyelination (5%), encephalitis (3%), brain tumor (2%), peripheral vestibulopathy (1%), posterior reversible constrictive syndrome (1%), brachial plexopathy (1%), hypoglycemia (1%), sinusitis (1%), intoxication (1%), and cervical spine hematoma (1%). In 2 patients (2%), the final diagnosis remained unclear despite extensive work-up, but was definitely nonischemic. The period in which centers reported data, the rate of stroke mimics, and imaging protocols per center are presented in Table I in the online-only Data Supplement.

Safety and Outcome of Stroke Mimics
One patient (1%; 95% confidence interval, 0.0–5.0) had an SICH: this was a 76-year-old man, finally diagnosed with an epileptic seizure, who had an SICH causing hemianopia with a favorable functional recovery at 3 months. Another 73-year-old man who presented with an epileptic seizure resulting from an old postoperative defect experienced SICHNINDS with an excellent recovery. Compared with strokes, the rate of SICH according to any of the definitions was lower in stroke mimics, whereas only fatal ICH did not reach statistical significance because no fatal ICH occurred in stroke mimics. Orolingual edema did not occur in stroke mimics (Table 2).

Three-month follow-up data were complete in 98.3% of the patients (96 stroke mimics, 5473 strokes). Mortality in stroke mimics was lower compared with strokes: 2.0% versus 14.4% (P<0.0001; Table 2). Among the 2 stroke mimics who died, one was an 86-year-old man with an epileptic seizure who died 2 weeks before the 3-month visit. The other stroke mimic died because of a brain tumor at the age of 75. Stroke mimics had more often favorable outcome (87.5% vs 55.5%) and excellent outcome at 3 months (75.0% vs 39.5%; both P<0.0001).

Discussion
This multicenter consecutive cohort study shows that the proportion of patients with a stroke mimic treated with IVT is small. Our study suggests that IVT in stroke mimics is safe because the rate of SICH was low and incidental death was not attributed to IVT.

| Table 1. Clinical Characteristics of Patients With Ischemic Strokes and Stroke Mimics Treated With Intravenous Thrombolysis |
|---------------------------------|---------------------------------|-----------------|
| Age, y, median ± IQR            | Stroke Mimics (n=100)            | Strokes (n=5418) |
| Women, n (%)                    | 56 (42–76)                      | 70 (60–78)      |
| Hypertension, n/N (%)           | 35/97 (36.1)                    | 3593/5398 (66.4) |
| Diabetes mellitus, n/N (%)      | 16/97 (16.5)                    | 1008/5391 (18.7) |
| Atrial fibrillation, n/N (%)    | 5/97 (5.2)                      | 1490/5364 (27.8) |
| Hypercholesterolemia, n/N (%)   | 26/96 (27.1)                    | 1904/5030 (37.9) |
| Coronary artery disease, n/N (%)| 9/97 (9.3)                      | 873/5005 (17.4) |
| Previous ischemic stroke or TIA, n/N (%) | 20/97 (20.6) | 650/5001 (13.0) |
| Current smoking, n/N (%)        | 27/76 (28.9)                    | 1128/5178 (21.8) |
| Prior antihypertensives use, n/N (%) | 17/69 (24.6) | 1951/3531 (55.3) |
| Prior use of statin use, n/N (%) | 14/75 (18.7) | 1257/5077 (24.8) |
| Systolic blood pressure, mmHg±SD | 147.3±24.1                     | 155.6±25.4      |
| Diastolic blood pressure, mmHg±SD | 83.0±15.0                     | 84.5±16.2       |
| Median NIHSS (IQR)              | 6 (5–9)                         | 11 (7–17)       |
| GAWH, n/N (%)                   | 17/83 (20.5)                    | 80/3006 (2.7)   |
| Serum glucose on admission, mmol/L±SD | 6.4±2.8                       | 7.2±2.5         |
| Onset to IVT time, min, median (IQR) | 168 (125–197)                  | 145 (105–180)   |

GAWH indicates global aphasia with minimal paresis; IQR, interquartile range; IVT, intravenous thrombolysis; NIHSS, National Institutes of Health Stroke Scale; and TIA, transient ischemic attack.

*Mann–Whitney U test.
†χ² test.
‡Unpaired t test.
1.4% to 15.5% reported in previous studies.6–15 This low rate can be explained by the definition of stroke mimics used since this study. The aim of our study was to report on IVT treatment in patients retrospectively diagnosed as stroke mimics under real-life conditions from a large and heterogeneous population treated with IVT. This pragmatic definition and the retrospective design is a limitation of our study that might have introduced a potential bias of underreporting of stroke mimic. If we had applied a more strict and uniform definition, including an MRI with diffusion-weighted images in each patient before or directly after IVT, likely more patients would be diagnosed as stroke mimic, because negative MRI would raise the suspicion of a stroke mimic. However, stroke remains a clinical diagnosis, and MRI is still not performed as standard care in acute stroke care because of limited availability and several contraindications. In this study, only 2 of 12 centers routinely performed MRI before IVT and another 5 multimodal computed tomography (CT) imaging. Although superior to nonenhanced CT for the diagnosis of acute ischemic stroke, MRI still has a false-negative rate of 17% (27% in patients presenting within 3 hours after symptom onset),29 which might falsely increase the proportion of patients with a stroke mimic. This percentage, however, decreases when localizing clinical information is provided.

Another explanation of our low proportion could be that our study was performed in experienced stroke centers where patients were evaluated by (stroke) neurologists. This is in contrast to some community hospitals where emergency physicians start IVT after telephone consultation with a (stroke) neurologist. Indeed, IVT stroke mimics identified by negative MRI were more likely to be treated with IVT in a community hospital compared with a stroke center.13 On average, 3 of the centers using nonenhanced CT in the acute phase, our mimics rate of 1.8% is right between the 3% target, which is proposed for centers using nonenhanced CT alone, and 1%, which is recommended for centers using multimodal imaging.30

In an ideal situation, stroke mimics would not be treated with IVT. However, in centers where only nonenhanced CT is routinely performed before the administration of IVT, additional multimodal imaging are often at the expance of early treatment onset and thereby beneficial outcome in patients with acute ischemic stroke. Results from the recent International Stroke Trial 3 confirmed once more that stroke patients benefit most from early start of IVT.4 Our largest data set of stroke mimics treated with IVT adds to the current knowledge on thrombolysis in stroke mimics that previous assumptions hold, and our study provides no evidence to change current practice. Putting our findings in this context, it seems reasonable to start IVT and continue with more sophisticated diagnostics test during treatment in uncertain cases. However, time delays in imaging of the vessel status and brain perfusion is getting shorter with modern multimodal imaging techniques, and are therefore increasingly incorporated into routine imaging protocols before IVT.

In conclusion, among patients treated with IVT in experienced stroke centers, only a few had a final diagnosis other than stroke, and the complication rate in these stroke mimics was low. In our opinion, although efforts should be made to avoid IVT in such patients, rapid treatment is likely more beneficial than adding extensive exams to rule out mimics in daily clinical practice.

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Disclosures

Dr Engelter has received funding for travel or speaker honoraria from Bayer, Boehringer Ingelheim, Pfizer Inc, Sanofi-Aventis, and
Shire plc, and has served on scientific advisory boards for Bayer and Boehringer Ingelheim and on the editorial board of *Stroke*. Dr Lyer has served on scientific advisory boards for Boehringer Ingelheim and received funding for travel from Boehringer Ingelheim. Dr Ringleb has received travel expenses and speaker honoraria from Boehringer Ingelheim and Bristol-Myers Squibb. Dr Putaala has received modest honoraria from Boehringer Ingelheim, Orion Pharma, and Genzyme. Dr Tatarskum has served on scientific advisory boards for Boehringer Ingelheim, serves/has served as a consultant to Boehringer Ingelheim, PhotoThera, Brain's Gate, H. Lundbeck A/S, and Orion Pharma (all modest), and has/had research contracts with PhotoThera, Brain's Gate, and H. Lundbeck A/S (all significant). He has filed patents regarding new therapeutic uses (method to prevent brain edema and reperfusion injury) and thrombolytic compositions (method to prevent post-thrombolytic hemorrhage formation). He has received honoraria from Boehringer Ingelheim and ProFessio Finland. Dr Leys has been an investigator of 2 institutional trials (Cyclostroke and Ophelie) and the DIAS 3 trial sponsored by Lundbeck. Dr Michel has received funding for travel or speaker honoraria from Bayer, Sanofi-Aventis, and Boehringer Ingelheim, consulting fees from Lundbeck and Pierre-Fabre, and honoraria from scientific advisory boards for Bayer and Boehringer Ingelheim. He serves on the editorial board of the *International Journal of Stroke*. He uses all funding and honoraria for research and education. Dr Arnold received honoraria for advisory boards from Boehringer Ingelheim, Bayer Schering, Dr Arnold received speaker’s honoraria from CoviQien, Boehringer Ingelheim, Bayer Schering, and Bristol-Myers Squibb. Dr Beslac-Bumbasirevic has received funding for travel or speaker honoraria from Actavis, Bayer, Boehringer Ingelheim, Pfizer Inc, and Sanofi-Aventis, and has served on scientific advisory boards for Boehringer Ingelheim. Dr Nederkoorn served on the scientific advisory board for Boehringer Ingelheim. The other authors have no conflicts to report.

References
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# Tables: 2
## Supplemental Table 1. Proportion of stroke mimics and imaging protocol per center

<table>
<thead>
<tr>
<th>Center (city, country)</th>
<th>Period (years)</th>
<th>IVT, n</th>
<th>Stroke mimics, n (%)</th>
<th>Treating physician</th>
<th>Routine imaging before IVT</th>
<th>Routine imaging after IVT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal Hospital Altenburg, Germany</td>
<td>2004–2008</td>
<td>326</td>
<td>1 (0.3)</td>
<td>S</td>
<td>NCT</td>
<td>MRI or NCT</td>
</tr>
<tr>
<td>Academic Medical Center, Amsterdam, the Netherlands</td>
<td>2000–2011</td>
<td>447</td>
<td>12 (2.7)</td>
<td>R</td>
<td>NCT</td>
<td>None&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>University Hospital Basel, Switzerland</td>
<td>1998–2011</td>
<td>586</td>
<td>16 (2.7)</td>
<td>S</td>
<td>Until 2009 NCT, CTA</td>
<td>NCT or MRI</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>From 2009 NCT, CTA, CTP</td>
<td>NCT or MRI</td>
</tr>
<tr>
<td>Clinical Center, School of Medicine, University of Belgrade, Serbia</td>
<td>2006–2011</td>
<td>203</td>
<td>5 (2.5)</td>
<td>S</td>
<td>NCT</td>
<td>NCT</td>
</tr>
<tr>
<td>University Hospital Bern, Switzerland</td>
<td>2000–2011</td>
<td>269</td>
<td>0 (0.0)</td>
<td>S</td>
<td>Multimodal MRI (DWI, MRA)</td>
<td>NCT or CTA</td>
</tr>
<tr>
<td>Brescia University Hospital, Italy</td>
<td>2005–2009</td>
<td>61</td>
<td>4 (6.6)</td>
<td>S or N</td>
<td>NCT</td>
<td>None&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>University Hospital of Heidelberg, Germany</td>
<td>1998–2011</td>
<td>1151</td>
<td>8 (0.7)</td>
<td>S</td>
<td>NCT</td>
<td>NCT</td>
</tr>
<tr>
<td>Helsinki University Central Hospital, Finland</td>
<td>1998–2009</td>
<td>1005</td>
<td>14 (1.4)</td>
<td>S</td>
<td>NCT</td>
<td>NCT</td>
</tr>
<tr>
<td>Centre Hospitalier Universitaire Vaudois, Lausanne, Switzerland</td>
<td>2003–2011</td>
<td>396</td>
<td>8 (2.0)</td>
<td>S</td>
<td>NCT, CTA, CTP</td>
<td>NCT, CTA&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
</tbody>
</table>
### Supplemental Table 1 (continued). Proportion of stroke mimics and imaging protocol per center

<table>
<thead>
<tr>
<th>Location</th>
<th>Year</th>
<th>Number</th>
<th>Stroke Mimics</th>
<th>Imaging Protocol</th>
<th>NCT Protocol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lille University Hospital, France</td>
<td>2003–2011</td>
<td>430</td>
<td>6 (1.4)</td>
<td>S or N</td>
<td>Until 2009 NCT From 2009 multimodal MRI (DWI, FLAIR, MRA) Until 2009 NCT From 2009 multimodal MRI (DWI, FLAIR, MRA)</td>
</tr>
<tr>
<td>Nuovo Ospedale Civile, AUSL Modena, Italy</td>
<td>2005-2011</td>
<td>235</td>
<td>4 (1.7)</td>
<td>S or N</td>
<td>NCT, CTA, CTP</td>
</tr>
<tr>
<td>Nuovo Ospedale Civile, AUSL Modena, Italy</td>
<td>2005-2011</td>
<td>235</td>
<td>4 (1.7)</td>
<td>S or N</td>
<td>NCT, CTA, CTP</td>
</tr>
<tr>
<td>University Hospital Zurich, Switzerland</td>
<td>2002-2008</td>
<td>409</td>
<td>21 (5.1)</td>
<td>S or N</td>
<td>Contrast enhanced CT</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>5518</td>
<td>100 (1.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: CTA = computed tomography angiography, CTP = computed tomography perfusion, DWI = diffusion weighted imaging, FLAIR = fluid attenuated inversion recovery, MRA = magnetic resonance angiography, MRI = magnetic resonance imaging, NCT = non-enhanced computer tomography, IVT = intravenous thrombolysis, N= general neurologist, R=resident under supervision of neurologist, S=stroke neurologist.

* In absence of complications.

* CTA in case of occlusion on initial CTA.

* NCT in case of contra-indications or rapid deterioration.
**Supplemental Table 2. Studies reporting on stroke mimics treated with IVT from the literature**

<table>
<thead>
<tr>
<th>Registry</th>
<th>No. of IVT</th>
<th>No. of stroke mimics (%)</th>
<th>Definition of stroke mimics</th>
<th>Median age (years)</th>
<th>% male</th>
<th>Median NIHSS</th>
<th>Follow-up duration</th>
<th>SICH (%)</th>
<th>Mortality (%)</th>
<th>mRS 0-1 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michigan</td>
<td>151</td>
<td>6 (4.0)</td>
<td>Alternate clinical discharge diagnosis</td>
<td>39</td>
<td>-</td>
<td>14</td>
<td>discharge</td>
<td>0.0</td>
<td>0.0</td>
<td>16.7</td>
</tr>
<tr>
<td>Basel</td>
<td>250</td>
<td>7 (2.8)</td>
<td>Absence of ischemic lesions on post-IVT imaging and alternate clinical diagnosis</td>
<td>68†</td>
<td>57</td>
<td>9</td>
<td>3 months</td>
<td>0.0</td>
<td>0.0</td>
<td>85.7</td>
</tr>
<tr>
<td>Pittsburgh</td>
<td>254</td>
<td>9 (3.5)</td>
<td>Persistent symptoms with absent ischemic lesions on post-IVT MR-DWI or cerebral ischemia considered unlikely in transient symptoms</td>
<td>49</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Houston</td>
<td>512</td>
<td>69 (14.0)</td>
<td>Absence of ischemic lesions on post-IVT MR-DWI and alternate clinical diagnosis</td>
<td>55†</td>
<td>40</td>
<td>7</td>
<td>discharge</td>
<td>0.0</td>
<td>0.0</td>
<td>87.0</td>
</tr>
<tr>
<td>Memphis</td>
<td>89</td>
<td>9 (10.1)</td>
<td>Clinical presentation, hospital course and absence of ischemic lesions on post-IVT MR-DWI</td>
<td>52†‡</td>
<td>45</td>
<td>6‡</td>
<td>-</td>
<td>0.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lille + Belgrade</td>
<td>488</td>
<td>7 (1.4)</td>
<td>Absence of ischemic lesions on post-IVT imaging and alternate clinical diagnosis</td>
<td>46</td>
<td>57</td>
<td>7</td>
<td>3 months</td>
<td>0.0</td>
<td>14.0</td>
<td>71.4</td>
</tr>
<tr>
<td>Phoenix §</td>
<td>539</td>
<td>58 (10.4)</td>
<td>Absence of ischemic lesions on post-IVT MR-DWI and alternate clinical discharge diagnosis</td>
<td>56†</td>
<td>45</td>
<td>6</td>
<td>discharge</td>
<td>0.0</td>
<td>-</td>
<td>96.0</td>
</tr>
<tr>
<td>Phoenix §</td>
<td>193</td>
<td>30 (15.5)</td>
<td>Absence of ischemic lesions on post-IVT MR-DWI and alternate clinical diagnosis</td>
<td>56†</td>
<td>-</td>
<td>6</td>
<td>discharge</td>
<td>0.0</td>
<td>0.0</td>
<td>87.9</td>
</tr>
<tr>
<td>Helsinki</td>
<td>985</td>
<td>14 (1.4)</td>
<td>Absence of ischemic lesions on post-IVT imaging and alternate clinical diagnosis</td>
<td>56</td>
<td>21</td>
<td>8</td>
<td>3 months</td>
<td>0.0</td>
<td>0.0</td>
<td>69.2</td>
</tr>
<tr>
<td>Mannheim</td>
<td>648</td>
<td>42 (6.5)</td>
<td>Absence of ischemic lesions on post-IVT MR-DWI and alternate clinical diagnosis</td>
<td>61†</td>
<td>21</td>
<td>6.5</td>
<td>discharge</td>
<td>0.0</td>
<td>0.0</td>
<td>-</td>
</tr>
</tbody>
</table>
* Patients were included in this study as well.

† Mean age.

‡ Data including patients with TIA (n=14).

§ Overlap op patients between studies.

|| Proportion of patients with mRS scores of 0–2 instead of 0–1.

IVT indicates intravenous thrombolysis; MR-DWI, magnetic resonance diffusion-weighted imaging; NIHSS, National Institutes of Health Stroke Scale; SICH, symptomatic intracranial hemorrhage; mRS, modified Rankin Scale.

References


