it is unclear at this point if the improved outcomes that were observed in GWTG-Stroke are owing to improved care, increased adherence to inpatient care process measures, or unmeasured confounders, such as more frequent use of emergency medical services, expanded public education, improvements in in-hospital response times, guideline adherence, and progressive prevention methods, concluded Dr. Schwamm. Further study is needed to establish the origin of these improvements in stroke outcome.

Table 1. Clinical Outcomes at Discharge.

In-Hospital Outcomes (Overall)	Percent
Discharge Destination	
Home	46.0
SNF	20.4
Rehab	21.3
Transfer	2.7
Left AMA	0.5
Hospice	3.6
Death (in-hospital)	
Yes	5.5
Ambulatory Status	
Able to ambulate	47.5
With Assistance	29.9
Unable to ambulate	19.5

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Common Carotid Artery Intima-Media Thickness and Stroke Incidence: Results from the MESA Study

Changes in common carotid artery intima-media thickness (IMT) are associated with stroke incidence in a multiethnic cohort, according to findings from the Multi-Ethnic Study of Atherosclerosis (MESA; NCT00005487) ancillary study for progression of IMT. Common carotid artery IMT is used as a predictive measure for cardiovascular events and stroke. However, studies that investigated the association between common carotid artery IMT and stroke have demonstrated mixed results [Lorenz et al. *Stroke* 2006; Hollander et al. *Stroke* 2002; O'Leary et al. *N Engl J Med* 1999; Chambless et al. *Am J Epidemiol* 2002]. Joseph F. Polak, MD, MPH, Tufts Medical Center, Boston, MA, presented findings from the MESA study.

The MESA study included 6814 individuals from 4 different ethnic groups (Caucasian-white, African-American, Chinese-American, and Hispanic-American) who were free of cardiovascular disease, without symptoms of atherosclerosis, and were capable of follow-up (median follow-up 3.0 years). The IMT progression substudy included 5640 participants. Ultrasonographies of the right common carotid artery were performed during two follow-up visits subsequent to the baseline visit. Ultrasonography studies included diameter curves, determined based on a 20-second-long series, and IMT measurements, determined from image selections at end-diastole.

The occurrence of stroke, defined as symptoms that lasted >24 hours or the detection of a clinically relevant lesion on brain imaging, was determined during the MESA follow-up visits or by phone interview, which was conducted every 9 to 12 months. Risk factors such as age, gender, systolic blood pressure, antihypertensive medications, cholesterol (high-density lipoprotein-HDL and low-density lipoprotein-LDL), diabetes, smoking, education, income, and ethnicity were also evaluated during this study, and Cox proportional hazards models were adjusted accordingly. Within this substudy, 39.5% of participants were Caucasian-white, 26.5% was African-American, 12.3% was Chinese-American, and 21.7% was Hispanic-American. The mean age was 64 years (range=46 to 88 years), and 52% was female.

This substudy revealed a mean rate of change in IMT of 0.015±0.05 mm, and 48 stroke events were observed. The rate of change in common carotid artery IMT was associated with stroke incidence in this multiethnic cohort (HR, 1.282; 1.014 to 1.620; p=0.0376). Age (p=0.0085), systolic blood pressure (p=0.0012), and HDL-cholesterol (p=0.0055) were associated with the highest risk after Cox proportional hazards models adjustment.

However, there was a stronger association prior to risk factor adjustments. The nonadjusted mean common carotid artery IMT was 0.71±0.19 mm for those with no stroke and 0.79±0.17 mm for stroke (p=0.0025), and the rate of change in common carotid artery IMT was 0.01±0.05 mm/year for those with no stroke and 0.04±0.07 mm/year for stroke (p=0.0506). The most significant risk factors that were associated with stroke, according to the nonadjusted data, were age (p=0.0007), systolic blood pressure (123.1±20.6 for no stroke and 138.8±22.7 for stroke; p<0.0001), treatment with hypertension medication (p=0.0020), and HDL-cholesterol (52.0±15.0 for no stroke and 46.5±11.2 for stroke; p=0.0028).

The results from the MESA study are promising with regard to the association between common carotid artery IMT and first-time stroke outcome. However, previous studies that investigated this association have yielded conflicting results. Therefore, additional studies are needed to support these findings.

Sonothrombolysis is Effective for Minimally Invasive Evacuation of Spontaneous ICH

Continuous ultrasound that is delivered by catheter directly into an intracerebral hemorrhage (ICH) and intraventricular hemorrhage (IVH) with tissue plasminogen activator (tPA) for 24 hours appears to be safe and effective for hemorrhage removal. David W. Newell, MD, Swedish Neuroscience Institute, Seattle, WA, presented findings from the Safety of Lysis with EKOS Ultrasound in the Treatment of Intracerebral and Intraventricular Hemorrhage (SLEUTH).

There are many catheter-based treatments for ICH, but clot resolution rates are greatly dependent on proper catheter placement [Morgan T et al. *Acta Neurochir Suppl* 2008]. Additionally, ultrasound may promote the effect of tPA and aid in the dissolution of clots. The purpose of the SLEUTH study was to evaluate the safety of adding catheter-delivered ultrasound to catheter-based lysis in ICH and IVH (Figures 1A and 1B). This study included 9 patients (mean age=63) who had spontaneous supratentorial ICH ≥25 cc (n=6) and/or IVH (n=3) that obstructed the third and/or fourth ventricles (no documented vascular lesion) with symptom onset <12 hours prior to diagnostic CT scan. Treatment occurred within 72 hours. One ICH patient was subsequently excluded from the study analysis due to catheter breakage that occurred during transport to CT. A neuronavigation system was used to locate the catheter and deliver the lytic, and continuous ultrasound was delivered via catheter for 24 hours. The endpoints were 30-day mortality, symptomatic bleeding rate, brain infection, and blood clot resolution. There was a stopping rule in place for increase in hemorrhage size.

One IVH patient died within 30 days of treatment. No other deaths, infections, or rebleeds were observed. There was a 59% ± 5 (SEM) reduction in mean percentage volume after 24 hours of treatment in the ICH group compared with pretreatment stability scans, as determined by CT. A 45.1% ± 13 (SEM) mean percentage volume reduction was observed in the IVH group compared with pretreatment stability scans. Patients who were treated with sonolysis + tPA had faster rates of lysis during the first 24 hours of treatment for IVH (p=0.046) and ICH (p=0.074) compared with similar treatment with tPA alone [Morgan T et al. *Acta Neurochir Suppl* 2008; courtesy of D. Hanley (unpublished data)].
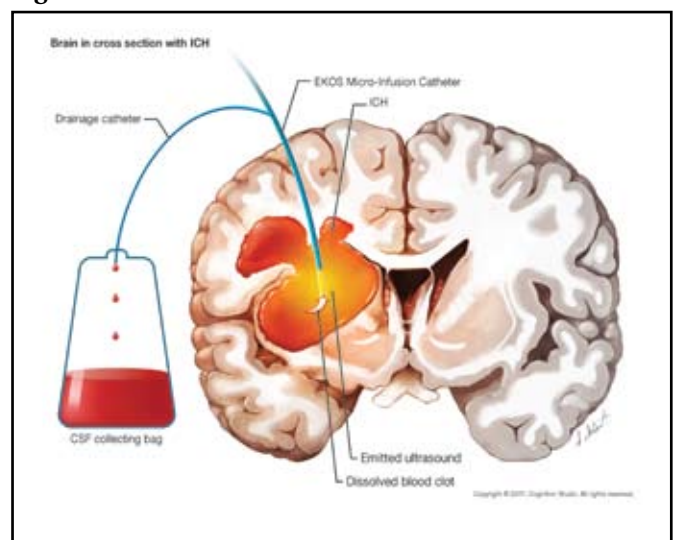
Dr. Newell concluded that adding catheter-delivered ultrasound to catheter-based lysis appears to be safe and effective for removal of intracerebral or intraventricular hemorrhage. The addition of sonolysis to tPA resulted in increased rates of lysis during the first 24 hours. These encouraging results justify additional clinical trials of catheter drainage of ICH and IVH that employs ultrasound.

Figure 1A. EKOS Micro-Infusion Catheter.
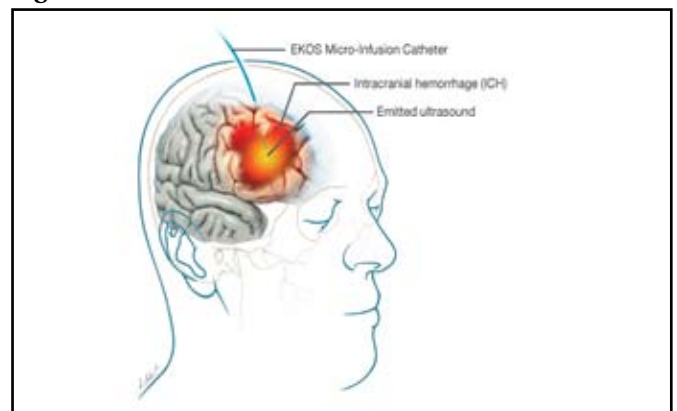
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Figure 1B. EKOS Micro-Infusion Catheter.

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