ROADSTER 2 Trial Results: TCAR is Ready for Prime Time

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Disclosure

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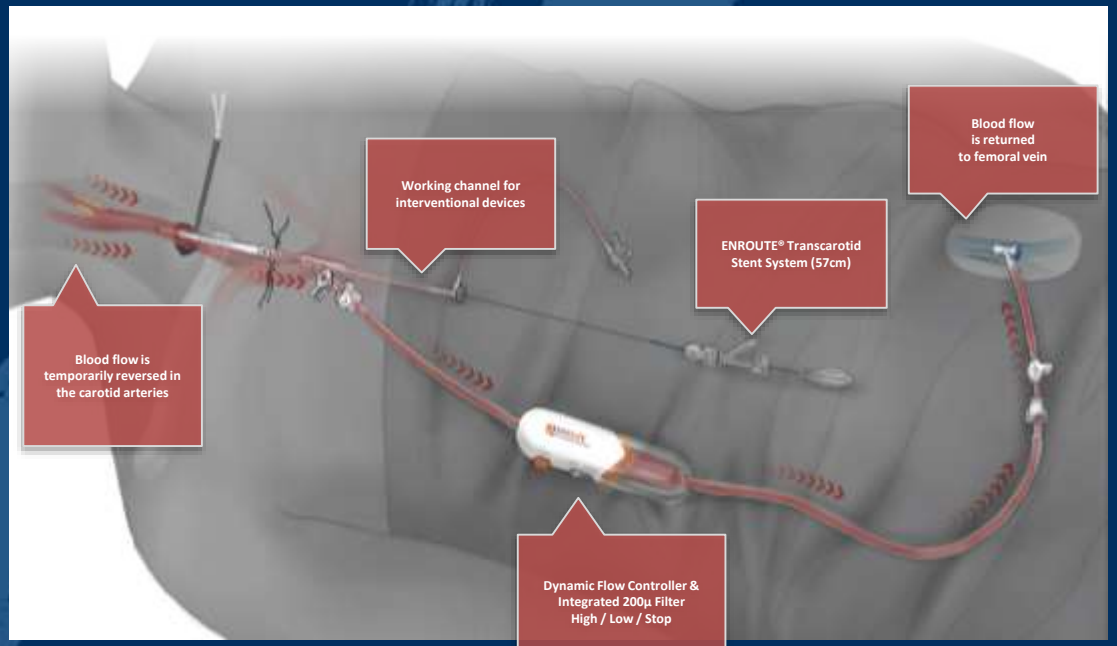
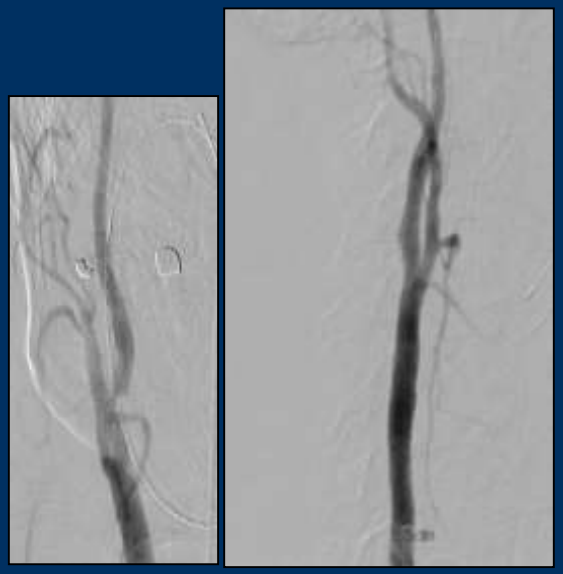
I have the following potential conflicts of interest to report:

- ☐ Consulting: Philips, Medtronic, Boston Scientific, Intact, PQ Bypass, Cagent, Silk Road Medical, Surmodics, Profusa, CSI

Proximal Protection with Reversed Flow





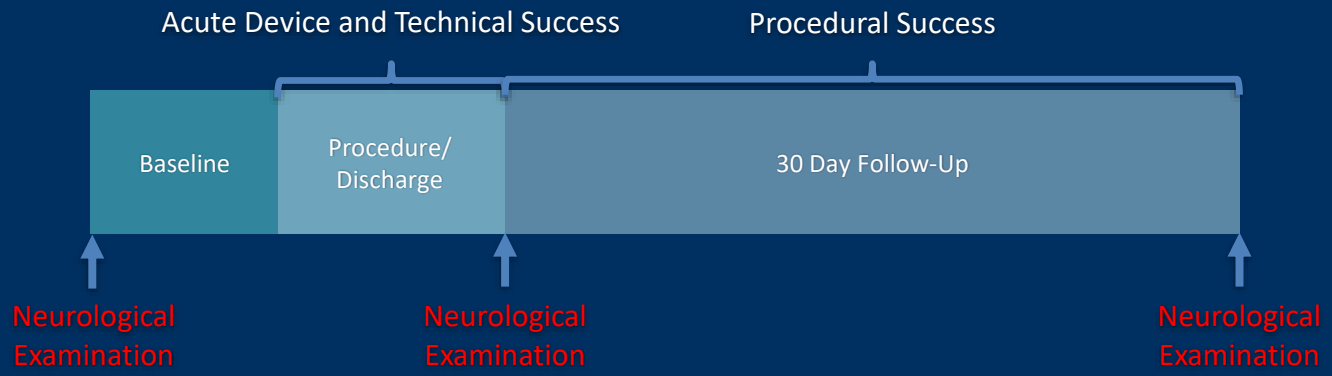
First commercial case in US-2015
Honolulu, HI

Avoid the arch
Proximal protection
Protect brain before crossing
Improved particle capture

Less invasive than CEA
Avoid cranial nerve injury
Low risk of intolerance
Acceptable learning curve

ROADSTER 2: Study Design

- **FDA-Mandated Post Approval Study** (condition of FDA approval for the ENROUTE Transcarotid Stent System)
- **Minimum of 600 patients treated Per-Protocol** (all subjects enrolled without a major protocol deviation)
- **70% new sites**, no more than 30% ROADSTER 1 sites
- **Independent adjudication** of major adverse events
- **Dedicated TCAR System** = ENROUTE NPS + ENROUTE Stent
- **Objective:** The ROADSTER 2 Study is intended to evaluate **real world usage** of TCAR.



ROADSTER 2: Study Design

PRIMARY ENDPOINT:

Procedural Success at 30 Days Post TCAR

Acute Device Success:
Insert the device, establish flow reversal, and remove the device.

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Technical Success:
Acute Device Success plus ability to deliver interventional tools.

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Procedural Success:
Technical Success without occurrence of stroke, death or myocardial infarction.

SECONDARY ENDPOINTS:

- Cranial nerve injury
- Cardiac death
- Neurological death
- Hierarchical ipsilateral stroke, death and MI
- Hierarchical ipsilateral stroke, death and MI by symptom status
- Acute device, technical and procedural success by physician experience/training and by enrollment quartile

Results from the analysis of the primary endpoint based on a 2-sided binomial test, compared to an *a priori* threshold of 85.0%.

ROADSTER 2: Inclusion/Exclusion Criteria

Inclusion

- High Physiologic or Anatomic Risk (CMS criteria)
  - ≥75 years of age
  - ≥2 vessel CAD
  - CHF (NYHA III or IV)
  - LVEF <30%
  - COPD
  - Contralateral occlusion
  - Prior CEA
  - Hostile necks (prior irradiation, radical dissection or cervical spine immobility)
- Symptomatic stenosis ≥50%
- Asymptomatic stenosis ≥80%
- Life expectancy ≥3 years

Exclusion

- Atrial fibrillation
- Intracranial hemorrhage within 12 mos
- Prior major stroke with NIHSS ≥ 5 OR mRS ≥ 3
- Intracranial tumor
- Evolving stroke
- TIA within 48 hrs of procedure
- Isolated hemisphere
- MI within 72 hrs of procedure
- Open neck stoma
- Ostial CCA lesion requiring revascularization

42 Participating Sites
80% physicians new TCAR operators
632 Patients in the FDA Analysis Population

ROADSTER 2:Baseline Characteristics

Parameter	n=632
Age ≥80	21.2%
Female	32.3%
Symptomatic	26.1%
Diabetes	55.0%
Insulin dependent	10.3%
Hypertension	90.3%
Smoking History	77.8%
Hyperlipidemia	85.6%
Prior CEA	19.3%
Contralateral Carotid Artery Occlusion	10.1%
High Risk Factors	
Physiologic Risk Factors Only	31.9%
Anatomic Risk Factors Only	43.5%
Both Physiologic and Anatomic Risk Factors	24.7%

ROADSTER 2: Procedure Details

Parameter	ROADSTER 1 n=219	ROADSTER 2 n=632
ROADSTER 1 Operators	100%	20.0%
Enrollment by New Operators	65.3%	70.0%
Skin-to-Skin Time (median)	70 mins	75 mins
Reverse Flow/Clamp Time (median)	9 mins	11 mins
Fluoro Time (median)	N/R	5.0 mins
Contrast Usage (median)	62 cc	36 cc

ROADSTER 2: Procedure Details

Parameter	ROADSTER 1 n=219	ROADSTER 2 n=632	*p*-value
General Anesthesia	59.6%	71.7%	P<0.001
Local Anesthesia	47.0%	24.7%	P<0.001
Regional Block	0.0%	3.6%	0.042
Tolerance to High Flow	98.6%	98.0%	1.00
Tolerance to Low Flow	100%	100%	1.00
Local Complications			
Bleeding at Arteriotomy	0.0%	0.0%	1.00
Hematoma (requiring intervention)	2.3%	0.0%	0.0013
CCA Dissection (req. repair)	1.8%	0.8%	0.14
Cranial Nerve Injury	0.5%	1.3%	0.30
Permanent	0.0%	0.5%	1.00

ROADSTER 2: Primary Endpoint

FDA Analysis Population

Parameter	n=632		95% CI
Acute Device Success	630	99.7%	98.9%, 100%
Technical Success	630	99.7%	98.9%, 100%
Procedural Success	619	97.9%	96.5%, 98.2%

Primary Endpoint
2-sided binomial test, compared to an *a priori* threshold of 85.0%
***p*<0.0001**

Procedural success is defined as technical success in the absence of hierarchical stroke, death or myocardial infarction at 30 days.

ROADSTER 2: Clinical Outcomes

FDA Analysis Population

	ROADSTER 2 n=632	
Stroke/Death/MI	11	1.7%
Stroke	4	0.6%
Death	1*	0.2%
MI	6	0.9%
Stroke/Death	5	0.8%
Neurological Death	0	0.0%
Cardiac Death	0	0.0%

*One patient expired ~2 weeks post-procedure due to ruptured AAA.

ROADSTER Trials:
Comparative Clinical Outcomes

FDA Analysis Population

	ROADSTER 1 n=203		ROADSTER 2 n=632		*p*-value
Stroke/Death/MI	6	3.0%	11	1.7%	0.40
Stroke	1	0.5%	4	0.6%	1.00
Death	2	1.0%	1	0.2%	0.15
MI	3	1.5%	6	0.9%	0.46
Stroke/Death	3	1.5%	5	0.8%	0.46
Neurological Death	0	0.0%	0	0.0%	1.00
Cardiac Death	1	0.5%	0	0.0%	0.24

ROADSTER Trials: Comparative Outcomes by Symptom Status

Asymptomatic Patients – FDA Analysis Population

	ROADSTER 1 n=157		ROADSTER 2 n=467	
Stroke/Death/MI	4	2.5%	9	1.9%
Stroke	1	0.6%	3	0.9%
Death	1	0.6%	1	0.2%
MI	2	1.3%	5	1.1%
Stroke/Death	2	1.3%	4	0.9%

Symptomatic Patients – FDA Analysis Population

	ROADSTER 1 n=46		ROADSTER 2 n=165	
Stroke/Death/MI	1	2.2%	2	1.2%
Stroke	0	0.0%	1	0.6%
Death	1	2.2%	0	0.0%
MI	0	0.0%	1	0.6%
Stroke/Death	1	2.2%	1	0.6%

ROADSTER 2: High Stroke Risk Cohorts

FDA Analysis Population

	Females n=202		Age ≥ 80 n=134	
Stroke/Death/MI	**3**	**1.5%**	**4**	**3.0%**
Stroke	**1**	**0.5%**	**2**	**1.5%**
Death	**0**	**0.0%**	**0**	**0.0%**
MI	**2**	**1.0%**	**2**	**1.5%**
Stroke/Death	**1**	**0.5%**	**2**	**1.5%**

Conclusions

- TCAR is a safe and effective treatment for patients with extracranial carotid stenosis.
- The outcomes in ROADSTER 2 are excellent even in patients deemed at high risk for stroke including symptomatic patients and octagenarians.
- Outcomes with TCAR are consistent across physicians with varying levels of experience.

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