

# Carotid Interventions

Evidenced-based Guidance  
For  
Clinical Therapy

# Conflict Of Interest

- Past-President ISES & Chair, Caress Steering Committee
- Vascular surgeon with primary academic and practice activity in endovascular techniques
- Consultant (advisor) to industry, academic and private hospitals and health care organizations, societies, and federal agencies
- Research support and paid consultant for Medtronic and Boston Scientific who funded the Phase 1 CARESS study

# Appropriate Science to Determine Role of Carotid Interventions

- Randomized Trials do not reflect real world experience with devices in many instances
  - different from drug trials where randomization models have had more utility
  - cardiovascular device approvals are different ie., valves, aortic endografts, etc
  - for surgical and interventional procedures randomized patient entry is not always practical and in some cases unethical

# Appropriate Science to Determine Role of Carotid Interventions

- Points of Agreement
  - role of carotid intervention is to prevent stroke (30-40% of strokes are caused by ICA lesions)
  - In US, 70% of CEAs performed for asymptomatic ICA, agreed that intervention event rates need to be less than 3% for patients to derive long-term benefit

# Appropriate Science to Determine Role of Carotid Interventions

- Risk stratification (high-risk vs low-risk) is an important clinical parameter that has not been clearly defined by 50 years of carotid intervention & thousands of studies and reports in the literature.
- No established methods identify low-risk patients who have stroke during intervention

# Appropriate Science to Determine Role of Carotid Interventions

- RTC's (level 1 evidence) requires elimination of most patients eligible for treatment in order to satisfy entry criterion
  - ? Correlation to clinical practice where most patients needing intervention are eliminated by the entry criterion of the trial

Carotid Revascularization using  
Endarterectomy or Stenting  
Systems (CaRESS) Phase 1  
Clinical Trial: 2-year outcome  
results

# OBJECTIVE

To assess the equivalence of CSS to CEA in treating both high-risk (symptomatic  $\geq 50\%$  stenosis) and low risk (asymptomatic  $\geq 75\%$  stenosis) populations consistent with current clinical practice for the broadest possible indication in labeling any future device approval.

# RESULTS - Demographics

	Treatment Arm			
	CEA (254)		CSS (143)	
Age	71.4 ± 8.8		71.2 ± 9.6	
Male	161 (63.4%)		86 (60.1%)	
Caucasian	236 (92.9%)		133 (93.0%)	
Symptomatic	83 (32.7%)		44 (30.8%)	
<sup>c</sup>	Asympt	Sympt	Asympt	Sympt
50-75%	6 (2.4%)	26	1	8 (5.6%)
>75%	164	(10%)	(0.7%)	37
	(65%)	(22%)	(69%)	(26%)

Overall 68% asymptomatic (67% CEA and 69% CSS)

# 30-Day Results

## Primary/Secondary Endpoints

	Combined Death/Stroke		Combined Death/Stroke/AMI	
	CEA	CAS	CEA	CAS
At Risk	254	143	254	143
Events	9	3	11	3
Censored	21	5	21	5
KM est.	0.9641	0.9786	0.9562	0.9786
Std. Error	0.0118	0.0122	0.0129	0.0122
Event Rate	3.5%	2.1%	4.3%	2.1%
<b>p-value</b>	0.4105		0.2428	

No statistically significant differences between groups

# 1-Year Results

## Primary/Secondary Endpoints

	Combined Death/Stroke		Combined Death/Stroke/AMI	
	CEA	CAS	CEA	CAS
At Risk	254	143	254	143
Events	29	12	31	13
Censored	34	13	34	13
KM est.	0.8752	0.9116	0.8674	0.9040
Std. Error	0.0217	0.0244	0.0223	0.0253
Event Rate	11.4%	8.4%	12.2%	9.1%
<b>p-value</b>	0.2699		0.2606	

No statistically significant differences between groups

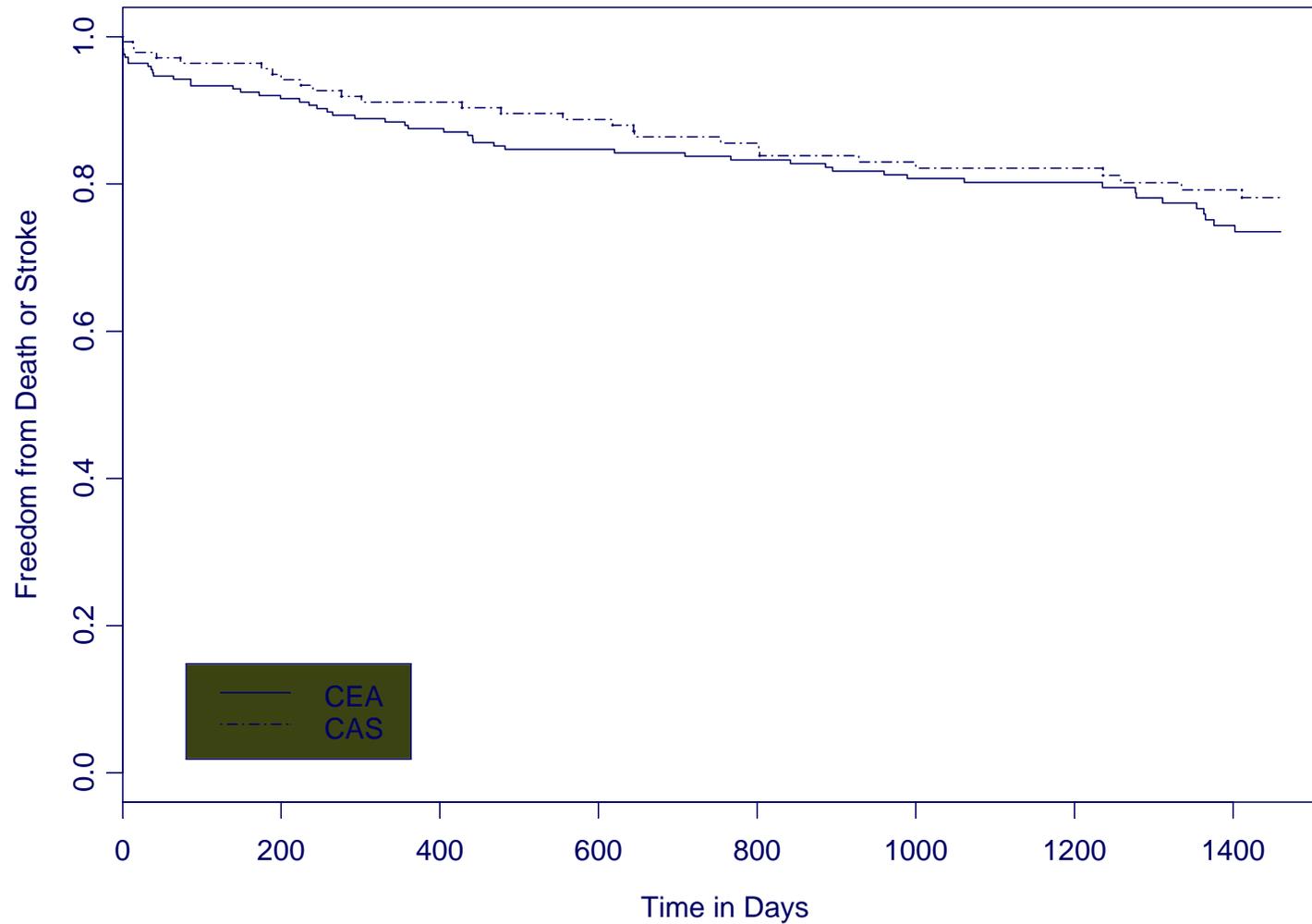
# 4-Year Results

## Primary/Secondary Endpoints

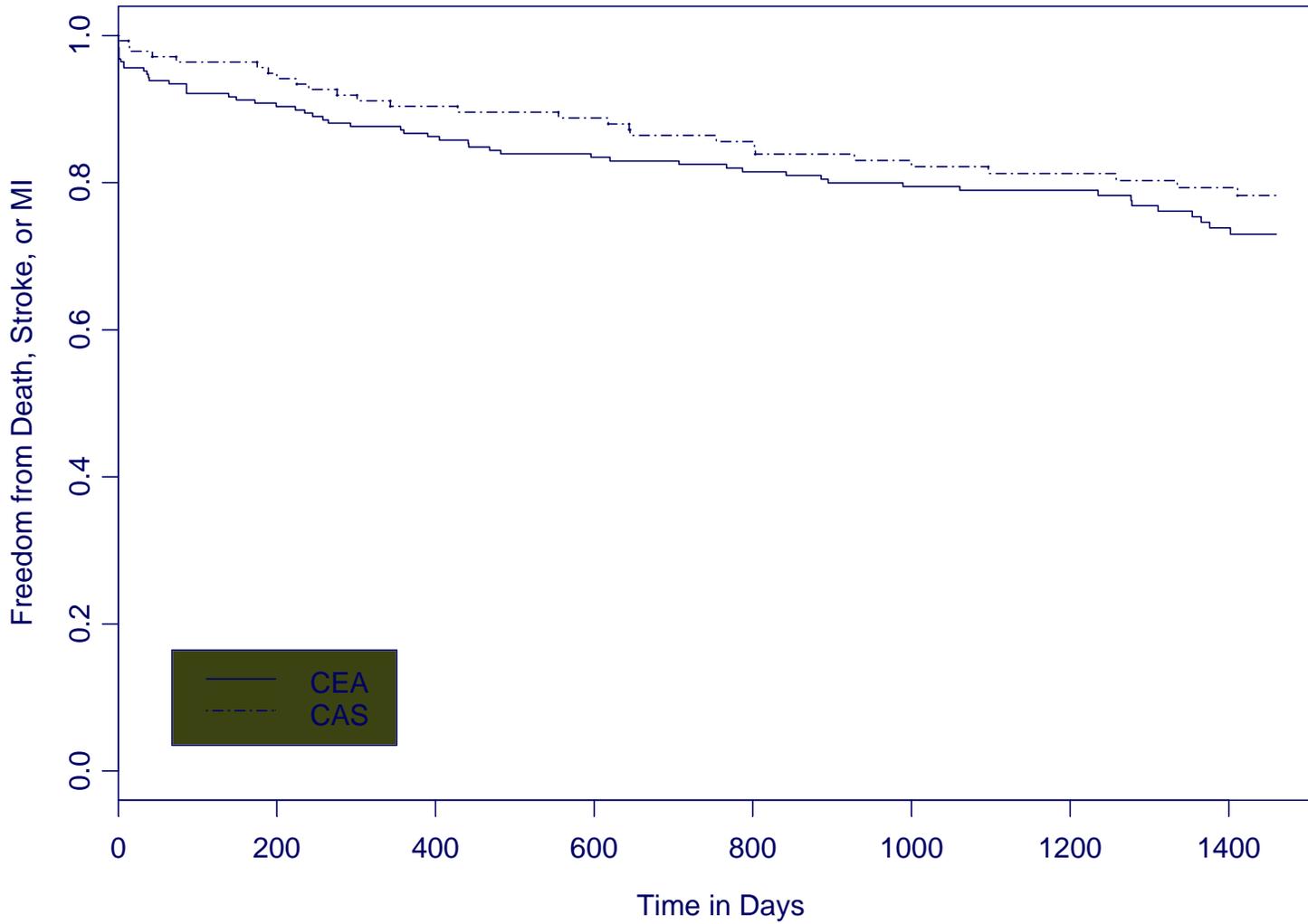
	Combined Death/Stroke		Combined Death/Stroke/AMI	
	CEA	CAS	CEA	CAS
At Risk	254	143	254	143
Events	53	27	55	27
Censored	144	68	143	68
KM est.	0.7352	0.7816	0.7301	0.7827
Std. Error	0.0327	0.0377	0.0325	0.0375
Event Rate	20.9%	18.9%	21.7%	18.9%
<b>p-value</b>	0.3611		0.2734	

No statistically significant differences between groups

## CARESS - Phase I - Freedom from Death or Stroke



## CARESS - Phase I - Freedom from Death, Stroke, or MI



# 30-Day Efficacy Results

<b>30-day</b>	<b>CEA</b>	<b>CAS</b>	<b>P-value</b>
Re-Stenosis	1/225 (0.4%)	1/134 (0.8%)	1.0000
Residual Stenosis	0/225 (0.0%)	2/134 (1.5%)	0.1387
Carotid Revascularization	0/225 (0.0%)	0/134 (0.0%)	-
Repeat Angiography	2/225 (0.9%)	0/134 (0.0%)	0.5308

# 4-Year Efficacy Results

<i>4-year</i>	<b>CEA</b>	<b>CAS</b>	<b>P-value</b>
Re-Stenosis	1/110 (0.9%)	6/83 (7.2%)	<b>0.0437</b>
Residual Stenosis	0/110 (0.0%)	0/83 (0.0%)	-
Carotid Revascularization	1/110 (0.9%)	3/83 (3.6%)	0.3162
Repeat Angiography	1/110 (0.9%)	1/83 (1.2%)	1.0000

# Appropriate Science to Determine Risk of Carotid Interventions

- Proposed Study Option
  - RTC's (CREST, ACT 1, etc) for level 1 evidence
  - Prospective, Consecutive, Concurrent (PCC) Studies comparing CSS, CEA & medical therapy (SVS, ACC Registries)

# Appropriate Science to Determine Risk of Carotid *Intervnetions*

- Registry entry of all patients having CEA & CSS procedures in a prospective, concurrent model
  - Audited data with IRB approval providing option for FDA approval of patient subsets & observation of patient outcomes representative of clinical practice environment