

CONTROVERSES ET ACTUALITÉS EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES IN VASCULAR SURGERY

JANUARY 19-21 2017

MARRIOTT RIVE GAUCHE & CONFERENCE CENTER

PARIS, FRANCE



Quand et comment réopérer une lésion carotidienne?

Reintervention following CAS and CEA: when and how?

Prof. Carlo Setacci
Chief of Vascular Surgery
University of Siena – Italy



JANUARY 19-21 2017

MARIBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

Nothing to disclose



Restenosis

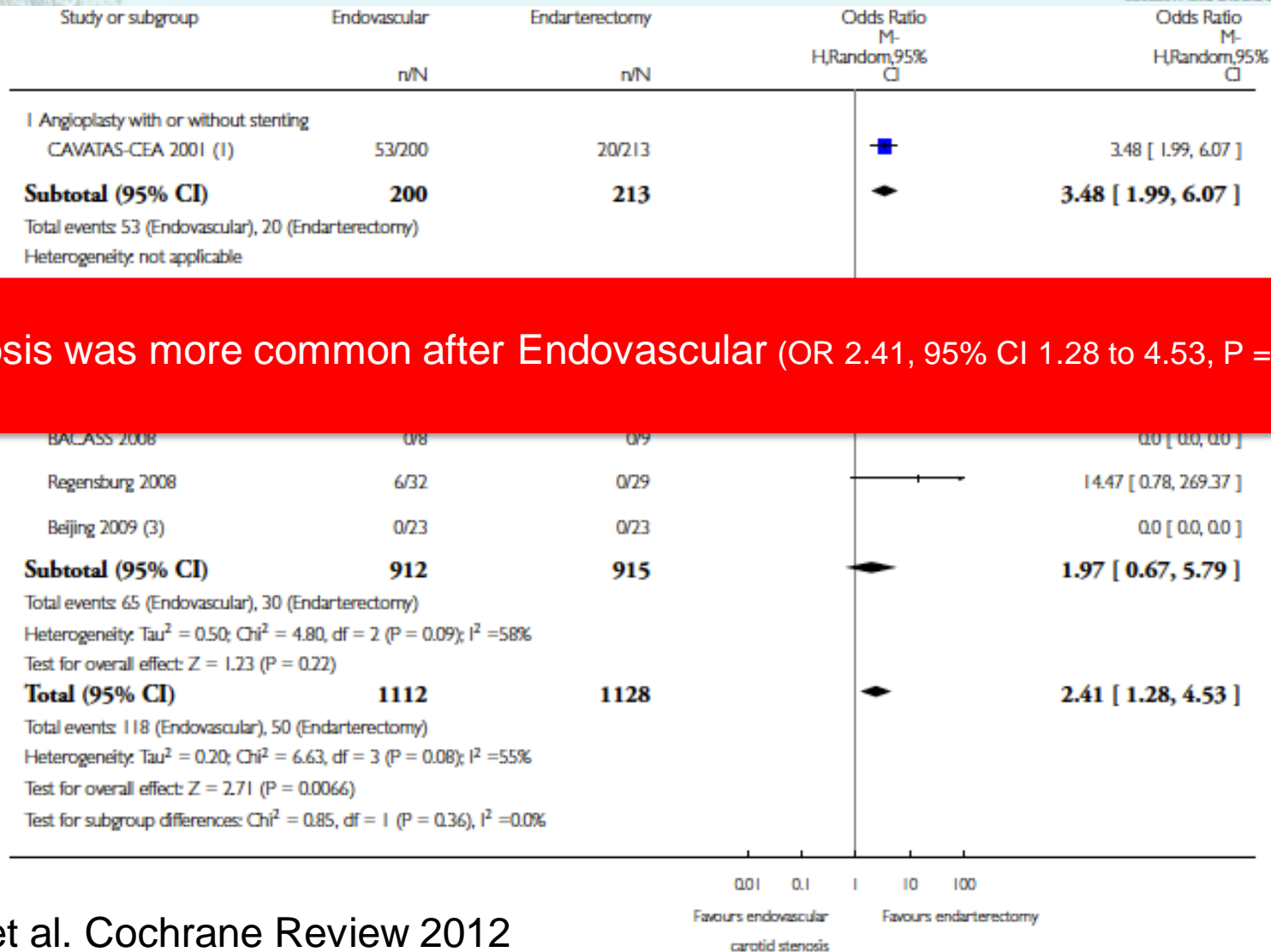
Reports describing long-term follow-up indicate that **restenosis** >50% occurs:

- in **6-37%** of patients after **CEA**

Fluri F et al, The probability of restenosis, contralateral disease progression, and late neurologic events following carotid endarterectomy: a long-term follow-up study.
Cerebrovasc Dis 2008;26:654-8.

Setacci et al Carotid restenosis after endarterectomy and stenting: a critical issue?
Ann Vasc Surg. 2013;27:888-93.

Restenosis after CAS & CEA



restenosis was more common after Endovascular (OR 2.41, 95% CI 1.28 to 4.53, P = 0.007)

Carotid restenosis after CAS & CEA

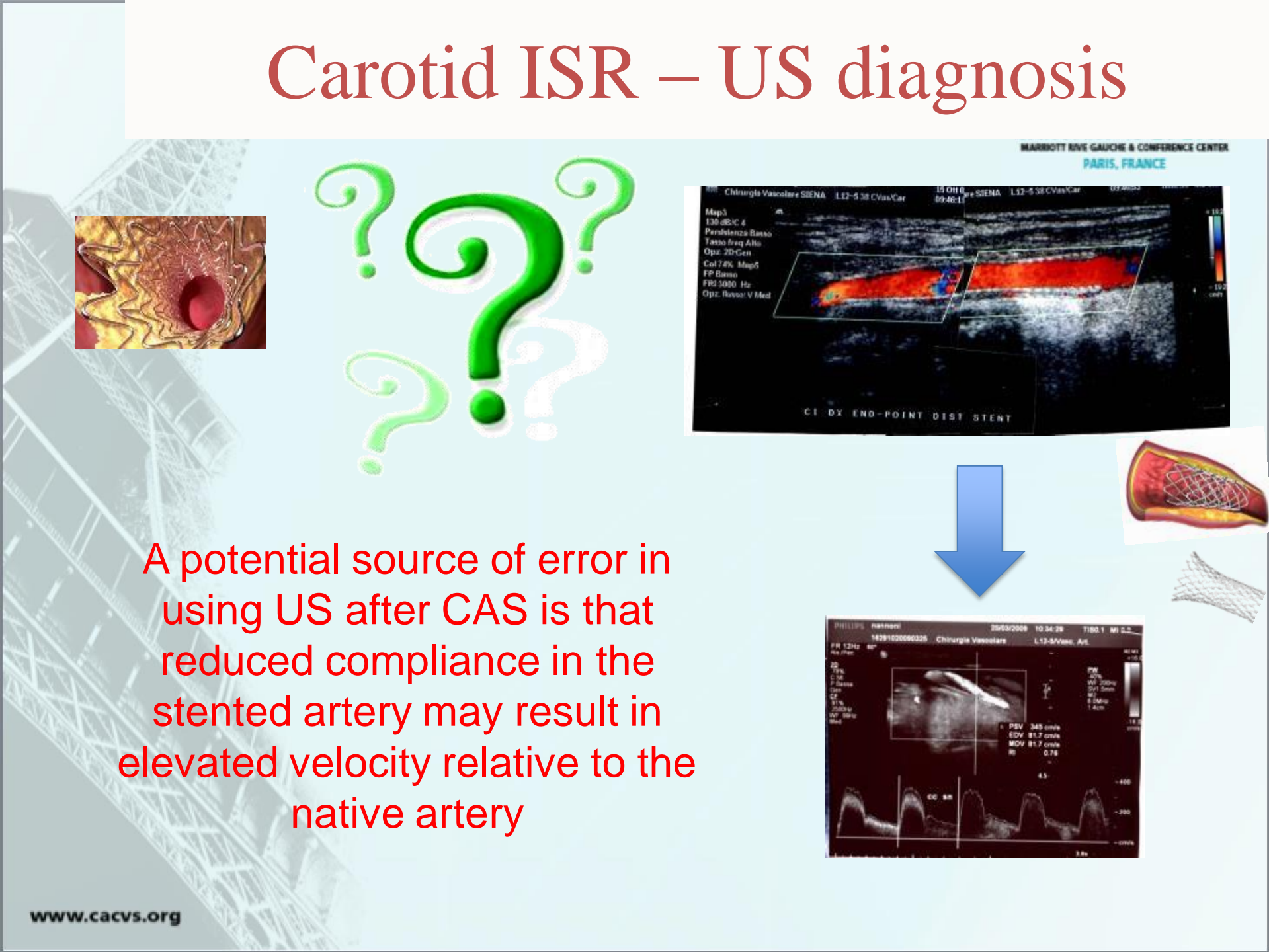
CONTROVERSES ET ACTUALITES EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES
IN VASCULAR SURGERY
JANUARY 19-21 2017
MARBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

How to deal with it:

- *Diagnosis*
- *Indication to treatment*
- *Treatment options*

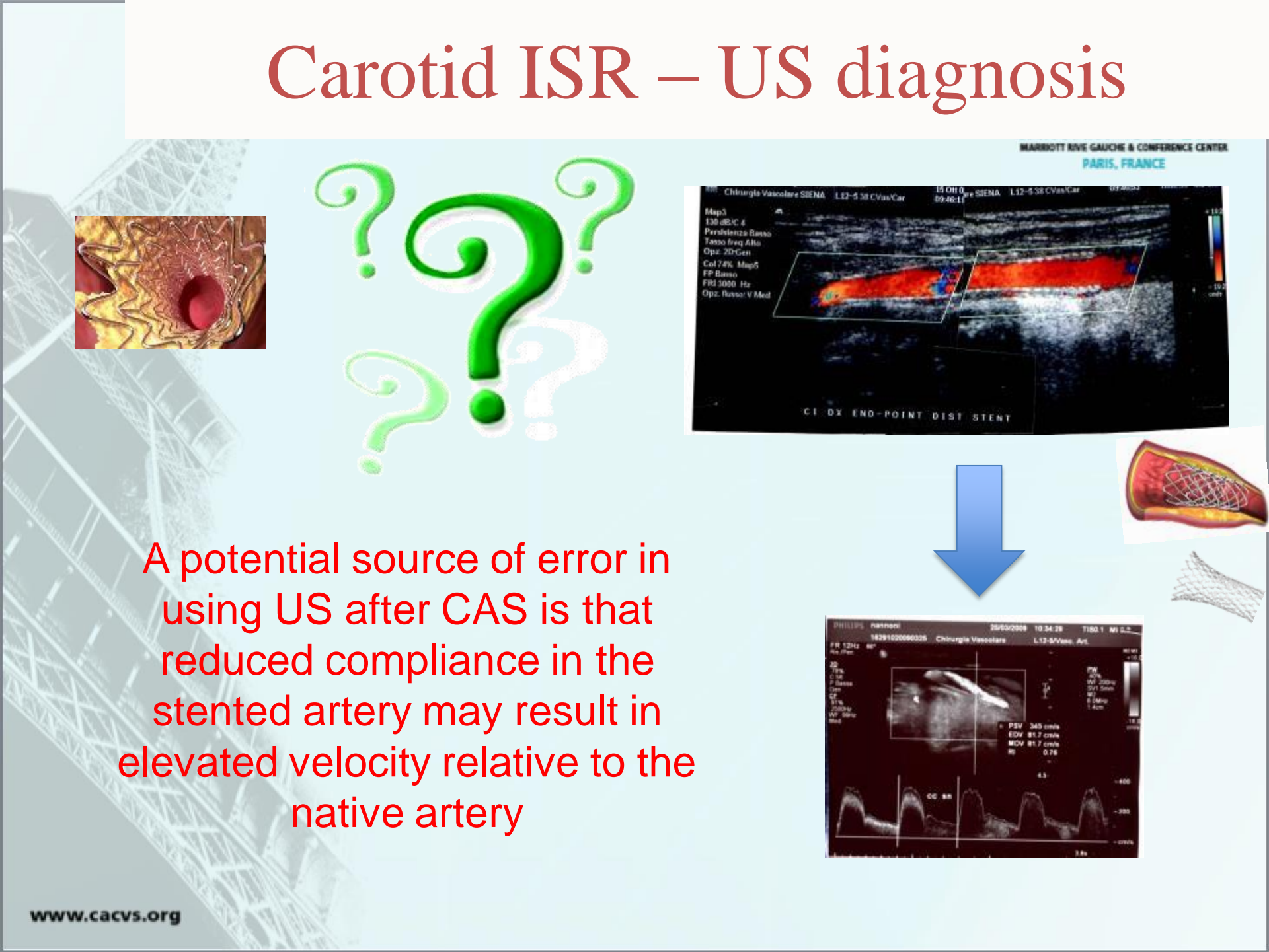
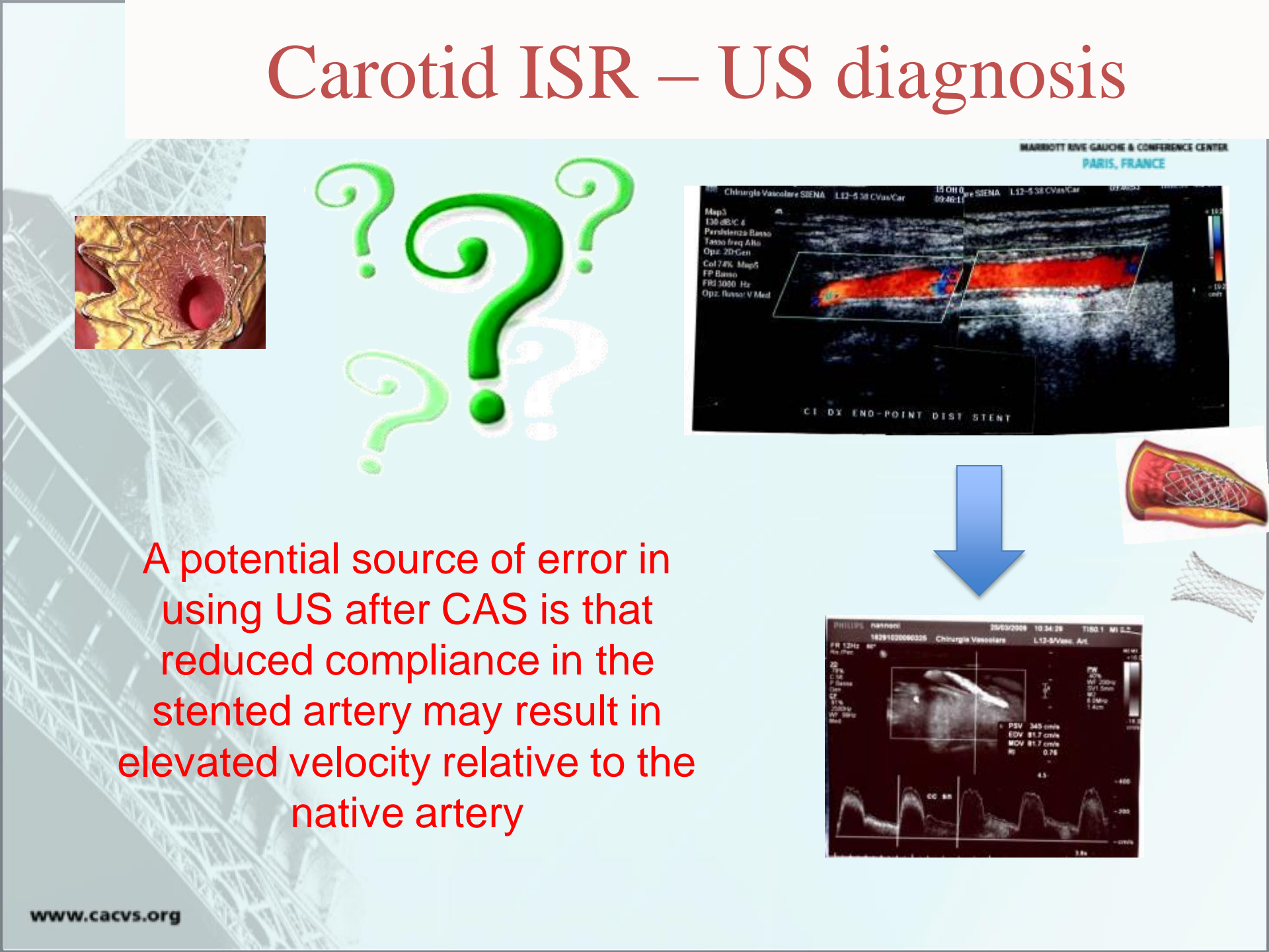
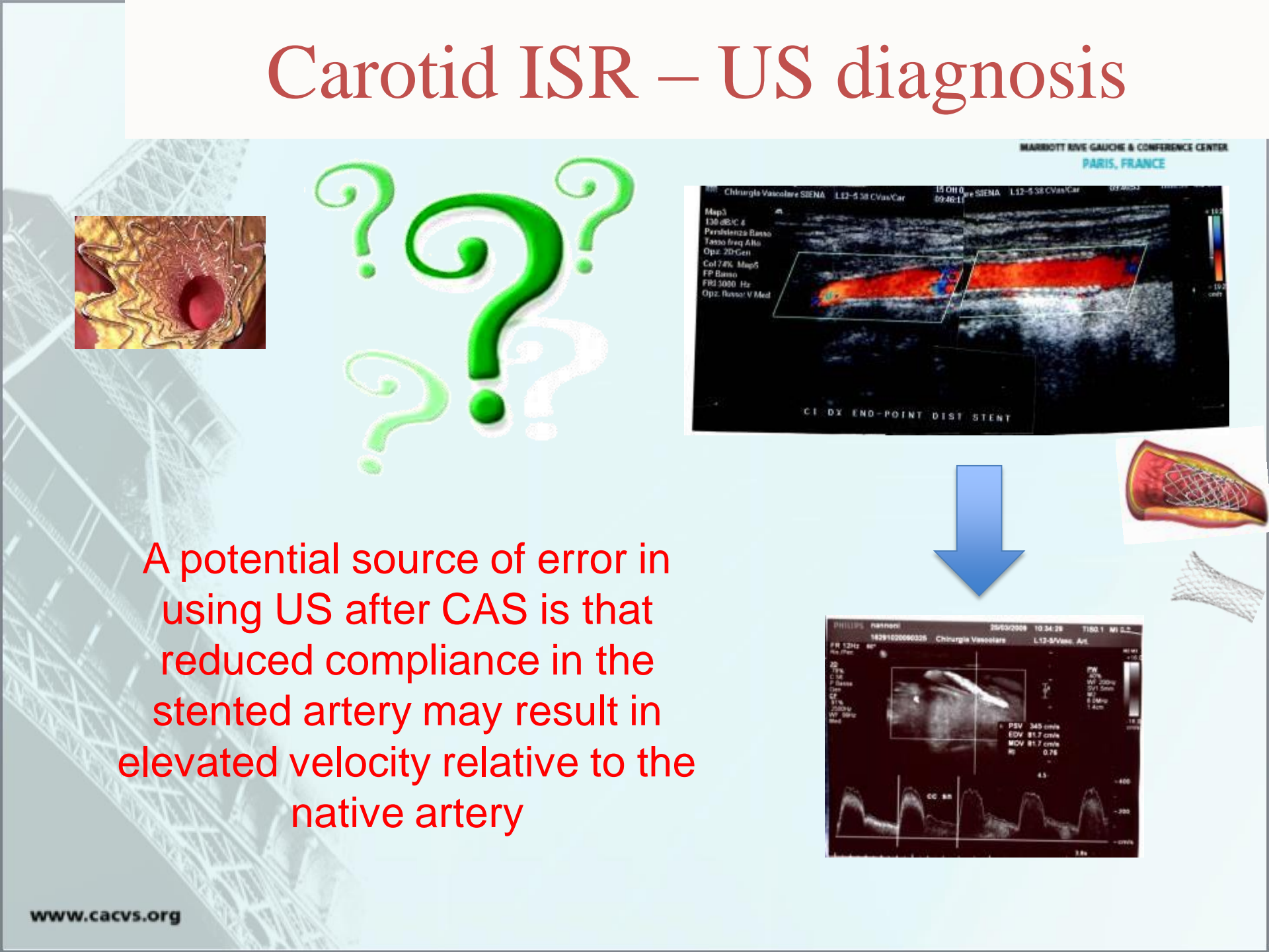
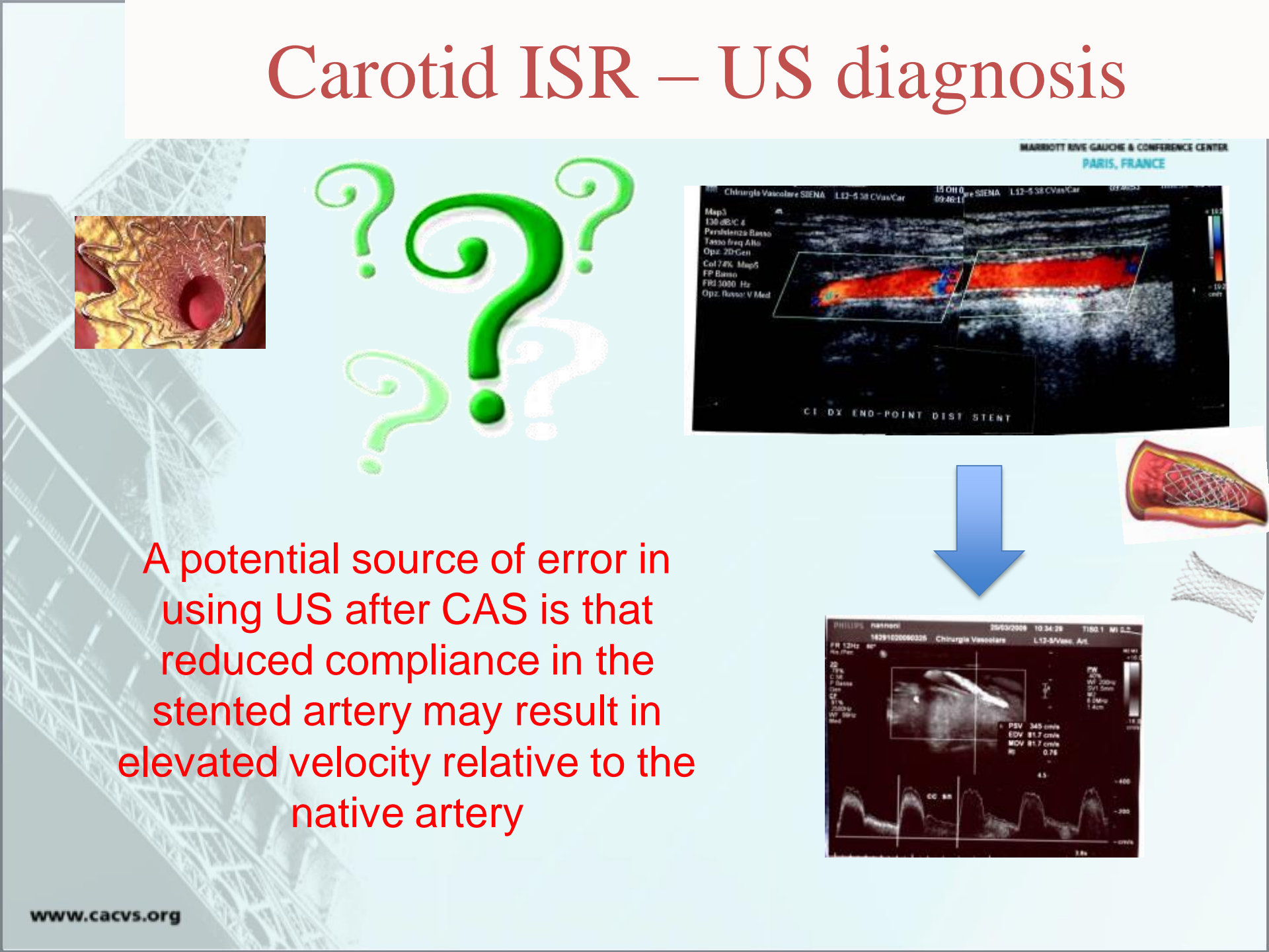


Carotid ISR – US diagnosis



A potential source of error in using US after CAS is that reduced compliance in the stented artery may result in elevated velocity relative to the native artery

www.cacvs.org



Carotid ISR – US diagnosis

A potential source of error in using US after CAS is that reduced compliance in the stented artery may result in elevated velocity relative to the native artery

MARBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

Chirurgia Vascolare SIENA L12-S 58 CVasCar IS ON 0 09:46:11

Map5
130 dB/C 4
Persistenza Basso
Tasso freq Alio
Opz. 2D-Geri
Col 7.4% Map5
FP Basso
FR 1000 Hz
Opz. Fluss: V Med

CI DX END-POINT DIST STENT

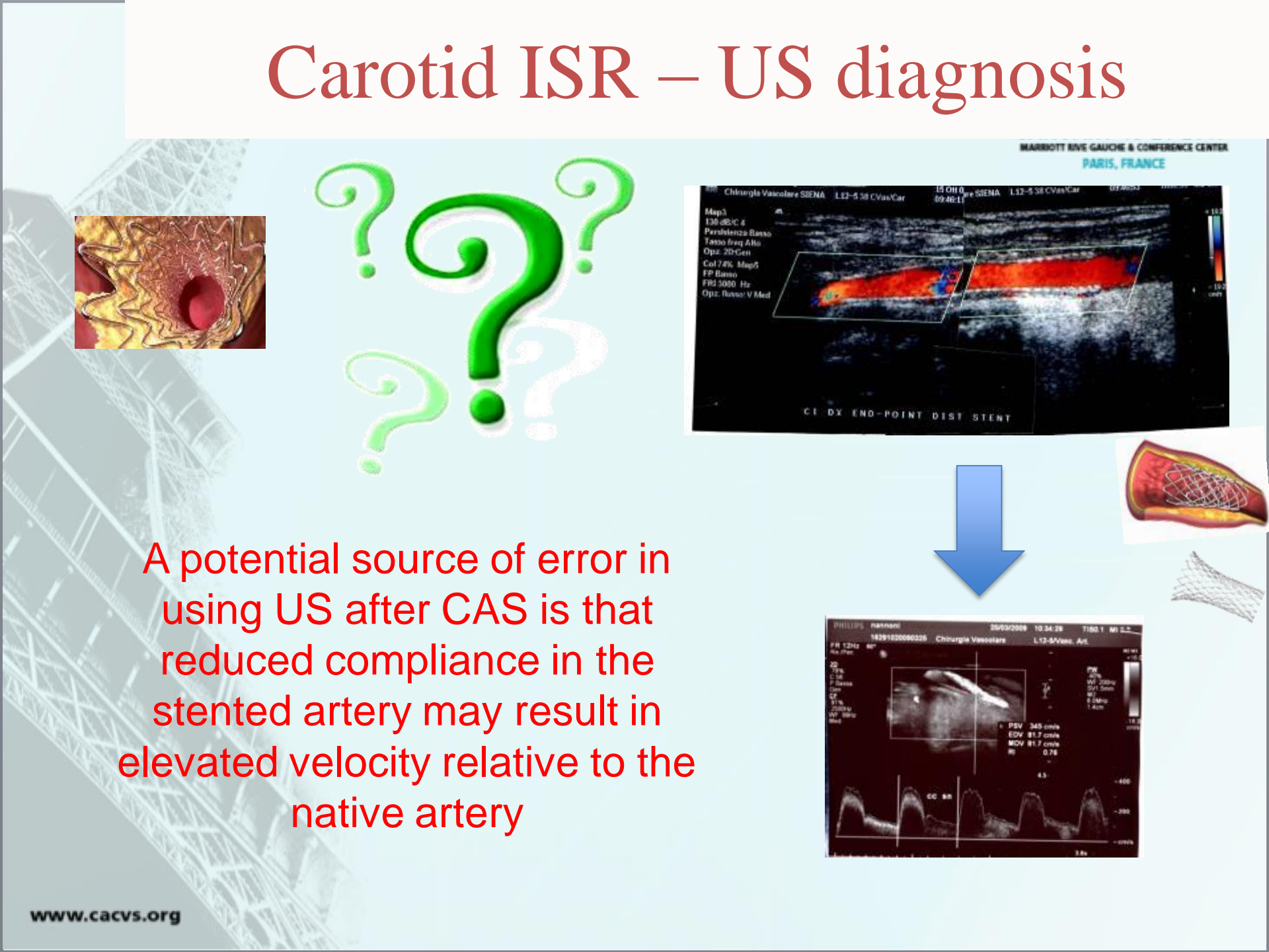
PHILIPS Netron 29/03/2008 10:34:28 T180.1 MI C.P.

PW 12MHz 60°
18291020090326 Chirurgia Vascolare L12-SVasc. Ant.
PW 40% Wt 500Hz Wt 5mm F 2MHz F 4cm
2D-TX
C-R
P-Basso
Opz
CF 31%
200Hz Wt 50Hz Mod

PSV 345 cm/s
EDV 81.7 cm/s
MDV 81.7 cm/s
Ri 0.78

CC SR

www.cacvs.org



CORRECT DIAGNOSIS OF IN-STENT RESTENOSIS

CONTROVERSES ET ACTUALITES EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES
IN VASCULAR SURGERY

JANUARY 19-21 2017
MARBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

% Stenosis	PSV (cm/s)	EDV (cm/s)	ICA/CCA
[<30]	>104	--	--
[30-50]	105 – 174	--	--
[50-70]	175 -299	--	--
[>70]	>300	> 140	> 3.8

American Heart
Association® 
Learn and Live™

* receiver operator
characteristic (ROC) curve

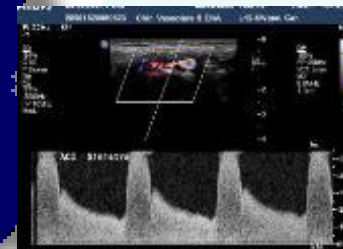
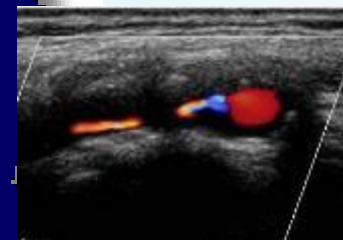
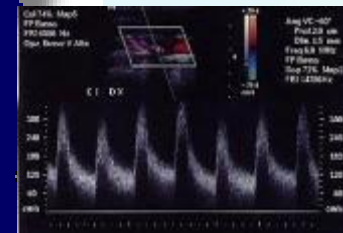
Stroke

JOURNAL OF THE AMERICAN HEART ASSOCIATION

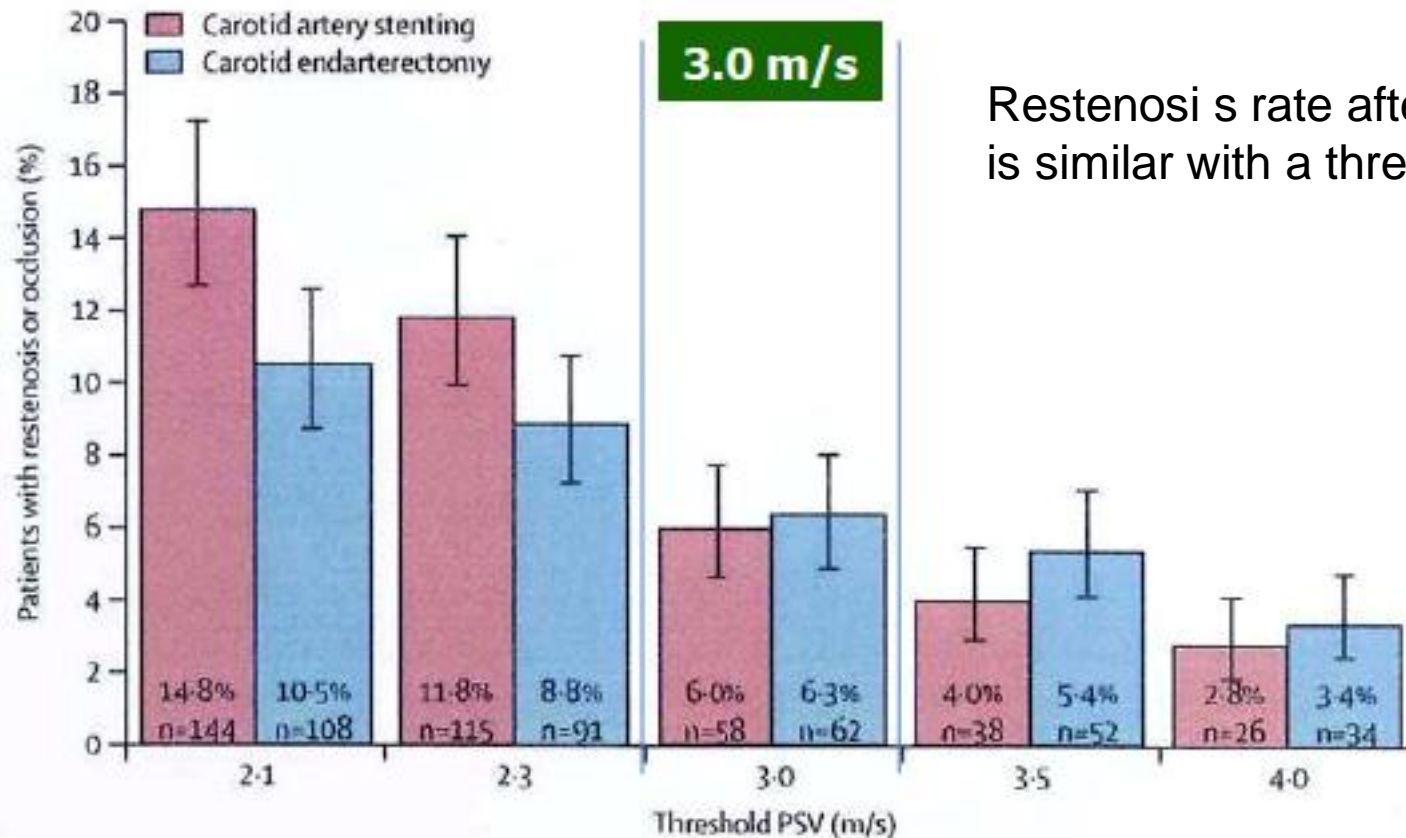
GRADING CAROTID INTRA-STENT RESTENOSIS: A 6 YEAR FOLLOW-UP STUDY

Carlo Setacci, Emiliano Chisci, Francesco Setacci, Francesca Iacoponi, and Gianmarco de Donato

Setacci et al. Stroke 2008;39:1189-96



Result from CREST



Restenosis rate after CAS and CEA is similar with a threshold of 3 m/s

Lal BK et al. Lancet Neurol 2012;11:755

Carotid restenosis after CAS & CEA

CONTROVERSES ET ACTUALITES EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES
IN VASCULAR SURGERY
JANUARY 19-21 2017
MARBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

How to deal with it:

- *Diagnosis*
- *Indication to treatment*
- *Treatment options*



Restenosis after CAS or CEA

Guidelines

RENOUVELLEMENT ET ACTUALITES EN CHIRURGIE VASCULAIRE
CONFERENCE DIVERSES & UPDATES
IN VASCULAR SURGERY



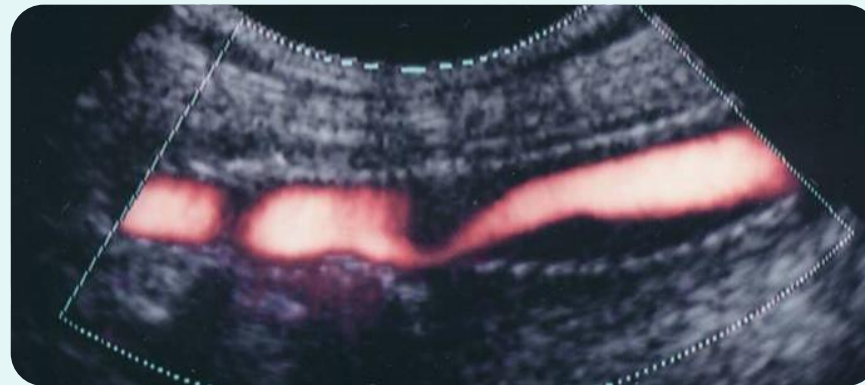
JANUARY 19-21 2017

MARIBOTT RIVE GAUCHE & CONFERENCE CENTER

PARIS, FRANCE

“Restenosis is generally benign and does not require revascularization except when it leads to :

- recurrent ischemic symptoms
- or progresses to preocclusive severity”



“Under these circumstances, it may be justifiable to repeat revascularization, either by CEA in the hands of an experienced surgeon or by CAS”.

2011 ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAIP/SCAI/SIR/SNIS/SVM/SVS Guideline on the Management of Patients With Extracranial Carotid and Vertebral Artery Disease. Brott TG, Halperin JL, Abbara S, Bacharach JM, Barr JD, Bush RL, Cates CU, Creager MA, Fowler SB, Friday G, Hertzberg VS, McIlff EB, Moore WS, Panagos PD, Riles TS, Rosenwasser RH, Taylor AJ. J Am Coll Cardiol. 2011 Feb 22;57(8):1002-44.

Restenosis after CAS or CEA



JANUARY 19-21 2017

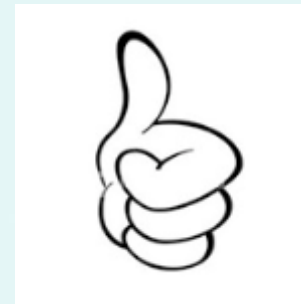
MARBOT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

Indication for treatment of carotid restenosis

symptomatic pts (>50%)

but

asymptomatic pts (>80%)





Carotid restenosis after CAS & CEA

How to deal with it:

- *Diagnosis*
- *Indication to treatment*
- *Treatment options*



Treatment options for restenoses following CEA or CAS

CONFERENCES ET ACTUALITES EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES
IN VASCULAR SURGERY



JANUARY 19-21 2017
MARBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

Endovascular treatment

- PTA
- Cutting balloon angioplasty
- Re-stenting (primary/after PTA, CBA)
- DEB
- DES



Surgical treatment (*stent removal*)

- CEA
- bypass

Therapeutic Options for Carotid In-stent Restenosis: Review of the Literature

J Vasc Intervent Radiol 2010;10:1471-1477

JANUARY 19-21 2017
MARBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

184 patients with ISR

Table 4
Interventions Used for ISR

Intervention to Treat ISR	No. of Pts.	Restenosis after ISR Intervention
Repeat PTA	54	8 (15)
Balloon angioplasty (PTA)	31	7 (23)
Cutting balloon angioplasty	23	1 (4.3)
Repeat CAS	31	4 (13)
Angioplasty and repeat CAS	24	1 (4.2)
Drug-eluting stent	1	0
CEA with stent removal	9	0
Carotid artery bypass	5	0
Interposition graft with reversed RSV	1	0
Interposition graft: PTFE	3	0
ICA-ECA interposition	1	0
Brachytherapy	1	0

Note.—Values in parentheses are percentages. ECA = external carotid artery; ICA = internal carotid artery; PTFE = polytetrafluoroethylene; RSV = reversed saphenous vein.

Conclusion

- Several treatment with acceptable short-term results
- Limited quality of the currently available data (*variability of results and study designs*)
- No recommendation can be made for any specific therapy.

BIC registry

Annual rate



expected number of events per year
per 100 event-free patients

Complication	Annual rate	95% CI
All-cause mortality	3.43	(3-3.9)
Stroke-related mortality	1.31	(1-1.6)
Fatal/disabling stroke	1.70	(1.4-2.1)
All neurological complications	3.45	(3-3.9)
In-stent restenosis (>50%)	1.49	(1.2-1.8)
Reintervention	1.08	(0.8-1.4)

RESULTS

Reintervention



*J Vasc Surg.
2005;42:993-6

SAVOIE & CONFERENCE CENTER
PARIS, FRANCE

Reintervention (64 cases)

- 4 stent removals (2 **acute thrombosis***)
- 60 further endovascular approaches

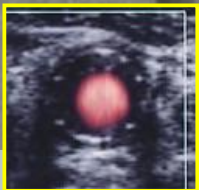
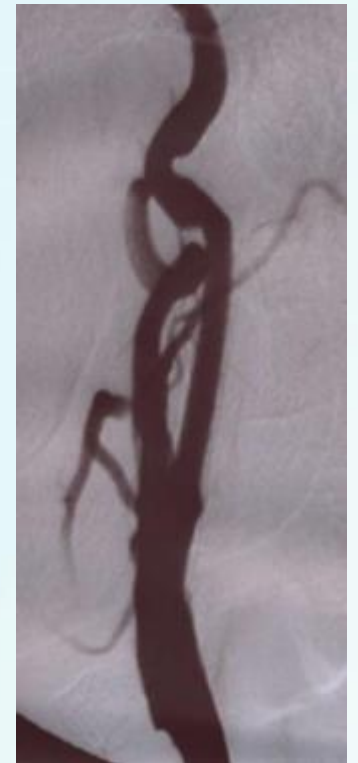


23 PTA

14 PTA + stenting

8 cutting balloon + stenting

15 cutting balloon



RESULTS

Uni- and multivariate analysis for Reintervention

MARBOIT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

Hazard ratios for reintervention in the total population

Risk factor	Hazard ratios	95% CI	P
Stent design (stainless vs nitinol)	0.98	(0.6-1.7)	0.95 NS
Free cell area (mm ²)			0.86* NS
< 2.5	1		
2.5 -5	0.48	(0.1-3.5)	0.47 NS
5-7.5	1.00	(0.4-2.3)	0.99 NS
>7.5	1.16	(0.6-2.3)	0.68 NS

*p-value of global test for association between free cell area and time to in-stent restenosis

stent design material and free cell areas are not significantly associated with the incidence of ISR and incidence of reintervention.

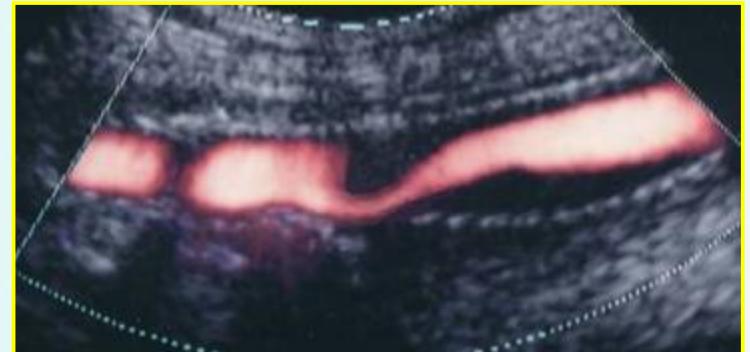
Determinants of In-Stent Restenosis After Carotid Angioplasty: A Case-Control Study

Carlo Setacci, MD,^a Giorgio Pula, MD,^a Irene Baldi, MD,^a Giammarco de Donato, MD,^a Francesco Setacci, MD,^a
Alessandro Cappelli, MD,^a Massimo Pieraccini, MD,^b Alberto Cremonesi, MD,^c Fausto Castriota, MD,

UNIVERSITÄT PARIS VI
PARIS, FRANCE

Univariate e multivariate analysis: results

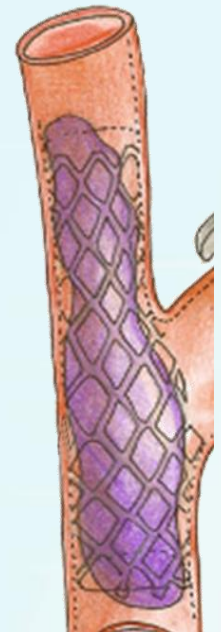
- *prior surgical carotid restenosis ($p=0.039$)*
- *+ postoperative fever ($OR = 5.3$)*
- *+ need of pre-dilatation ($OR = 3.9$)*
- *+ presence of concomitant malignancy or auto immune disease ($OR = 3.4$)*



Early complication after CAS



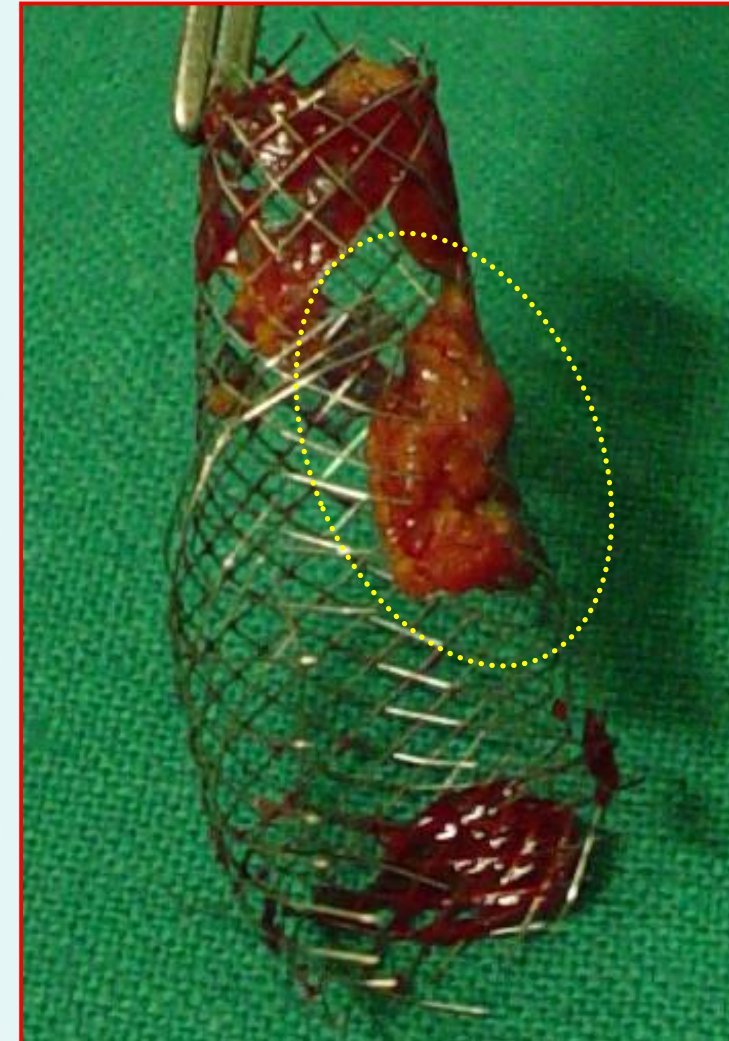
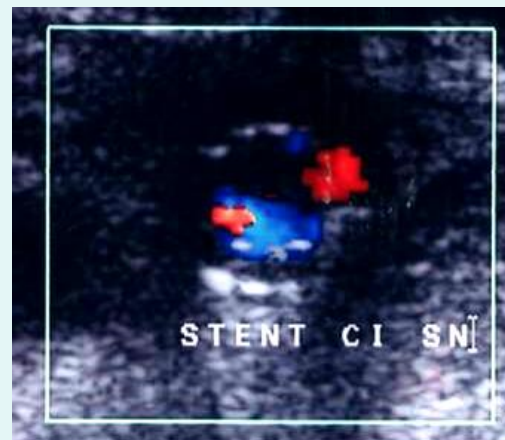
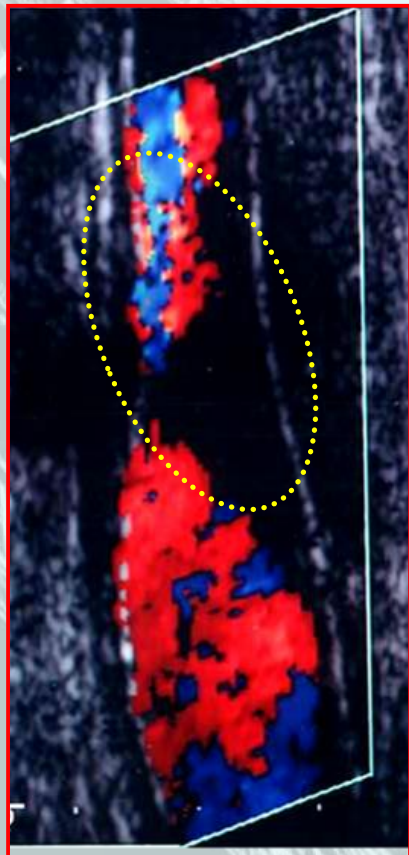
Acute thrombosis post-CAS



Early complication after CAS



Partial thrombosis post-CAS



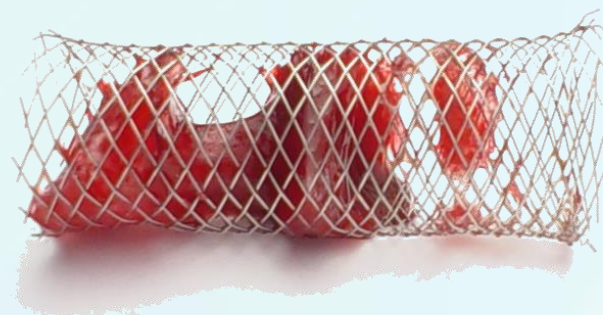


JANUARY 19-21 2017

MARBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

Early complication after CAS

In-stent thrombosis



Early complication after CAS

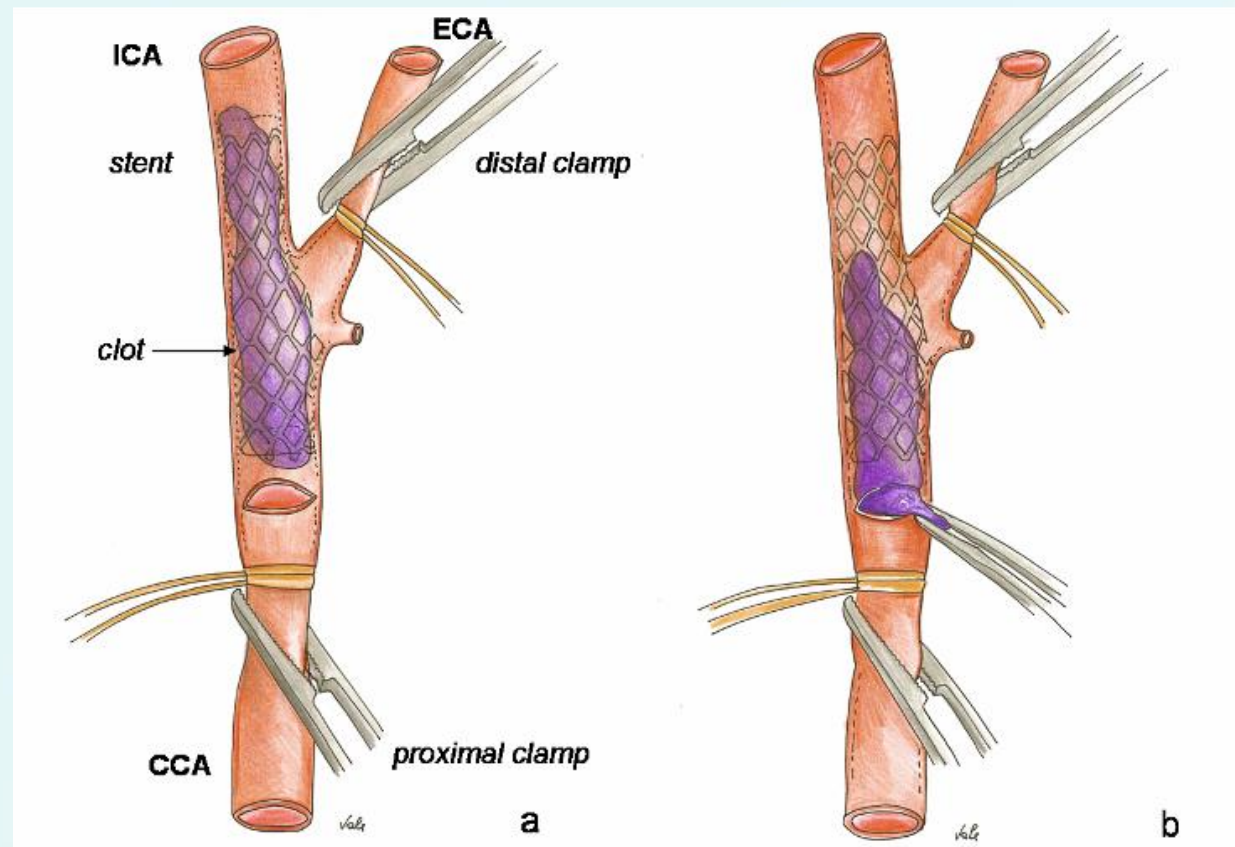
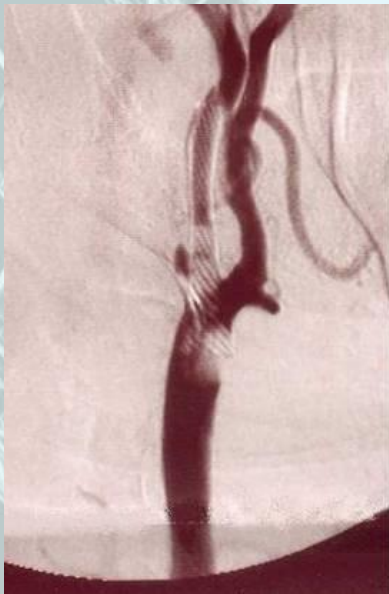
CONTROVERSES ET ACTUALITES EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES
IN VASCULAR SURGERY



JANUARY 19-21 2017

MARBOT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

In-stent thrombosis



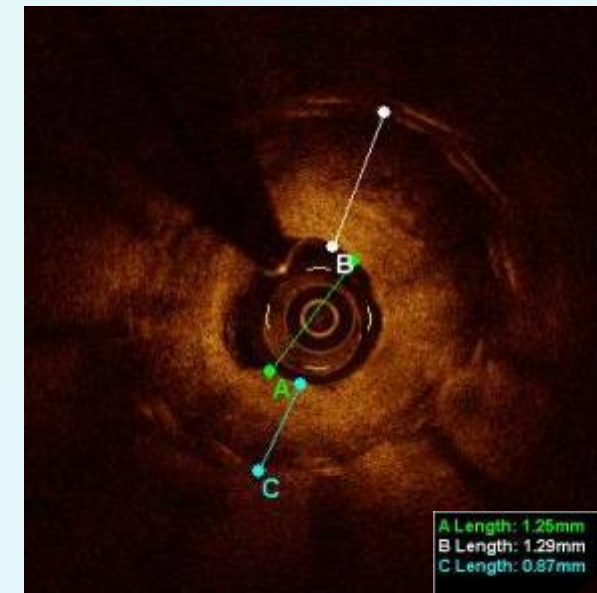
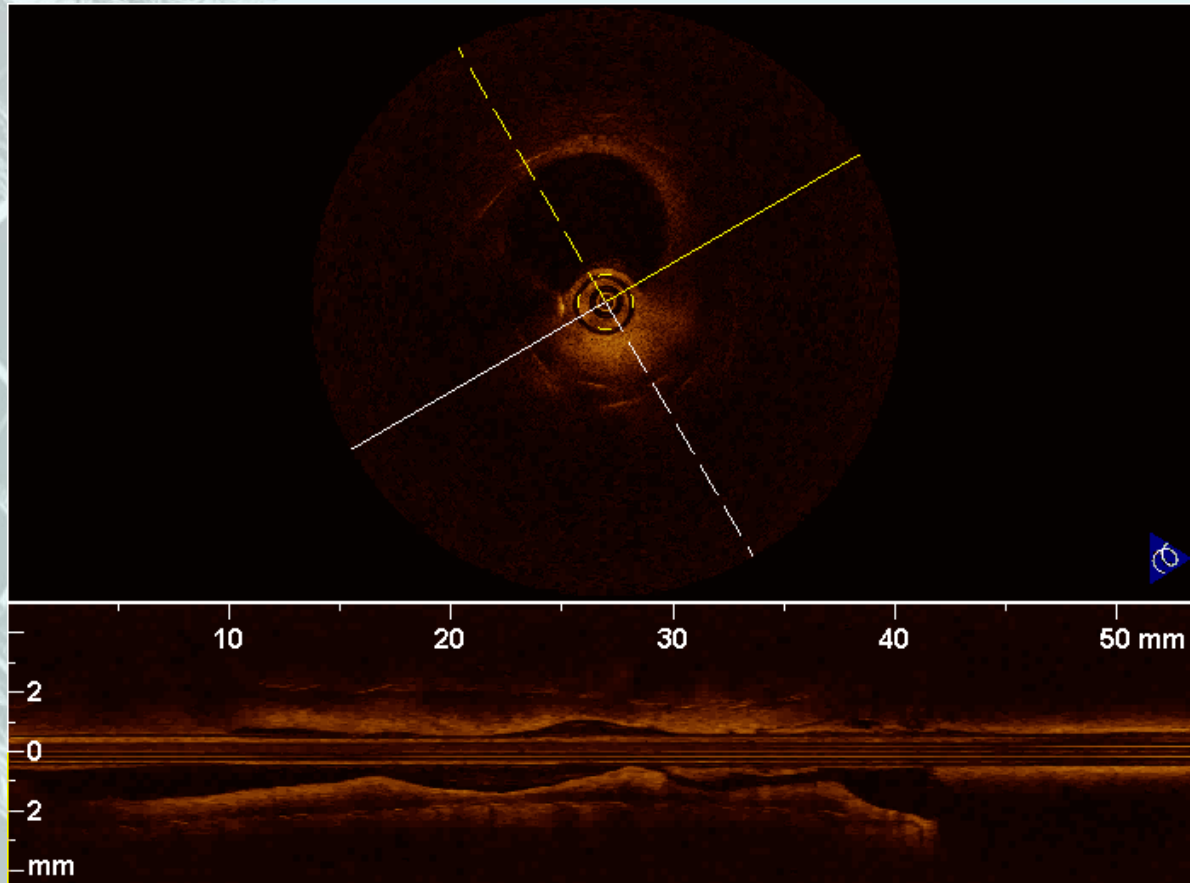
In-stent restenosis by OCT

CONTROVERSES ET ACTUALITES EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES
IN VASCULAR SURGERY



JANUARY 19-21 2017

MARBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

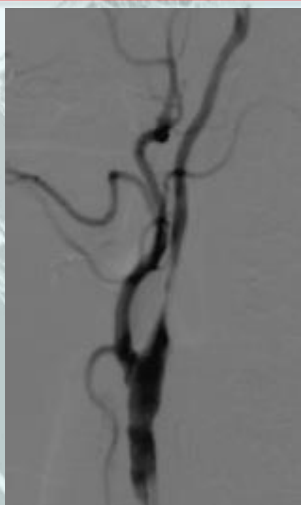


G. de Donato, F. Setacci, P. Sirignano, G. Galzerano, A. Cappelli, C. Setacci.

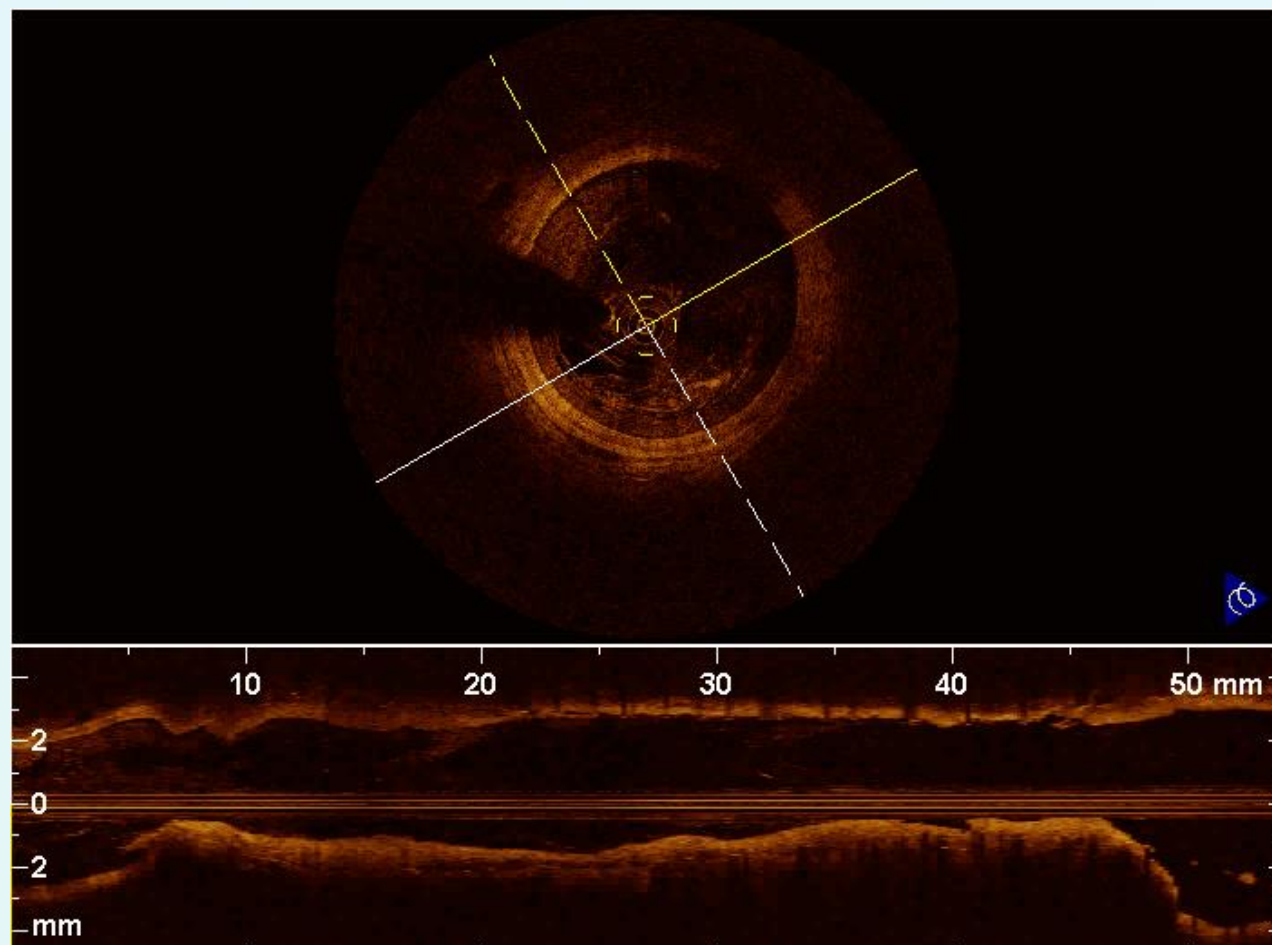
OPTICAL COHERENCE TOMOGRAPHY AFTER CAROTID STENTING: RATE OF STENT MALAPPOSITION, PLAQUE PROLAPSE AND FIBROUS CAP RUPTURE ACCORDING TO STENT DESIGN. *Eur J Vasc Endovasc Surg* 2013;45:579-87

OCT after PTA for in-stent restenosis

Angiography



Post-PTA



Good angiographic result after simple PTA, but

OCT after PTA for in-stent restenosis

CONTROVERSES ET ACTUALITES EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES
IN VASCULAR SURGERY

JANUARY 19-21 2017



LESSON LEARNED:

PTA alone is no more a good option!!

Better re-stenting !

CONTROVERSES ET ACTUALITES EN CHIRURGIE VASCULAIRE
CONTROVERSIES & UPDATES
IN VASCULAR SURGERY



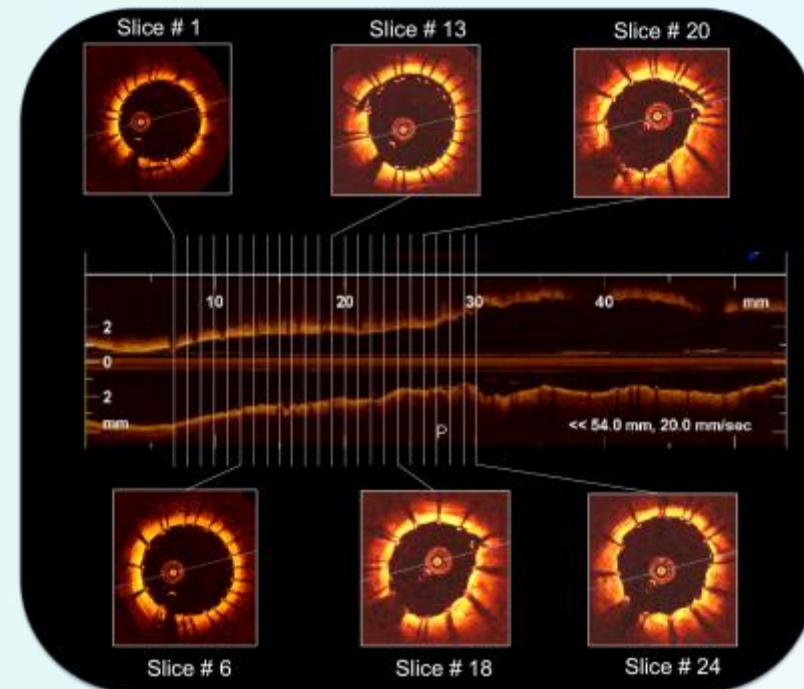
JANUARY 19-21 2017
MARBOTT RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

Disadvantages

- Increase arterial stiffness
- Kink or bend in the distal ICA → major hyperplastic reaction at the distal end of the second stent (?)

Advantage

- Plaque containment



Restenosis after CAS



CEA with removal of the plaque and stent is a viable option for management of ISR in selected patients when distal control can be obtained beyond the stented segment.

CONCLUSIONS

Restenosis after CEA or CAS

How to deal with

- ✓ Correct diagnosis (dedicated US velocity criteria)
- ✓ Clinical relevance is low, indications are debated.
- ✓ Redo endovascular therapy is the most common treatment for ISR (re-stenting better than re-PTA), even though surgical options seems acceptable in selected cases



JANUARY 19-21 2017

MARriott RIVE GAUCHE & CONFERENCE CENTER
PARIS, FRANCE

THANKS FOR THE ATTENTION

