Les alternatives au Rotablator

Dr Nicolas LHOEST

GERC

STRASBOURG

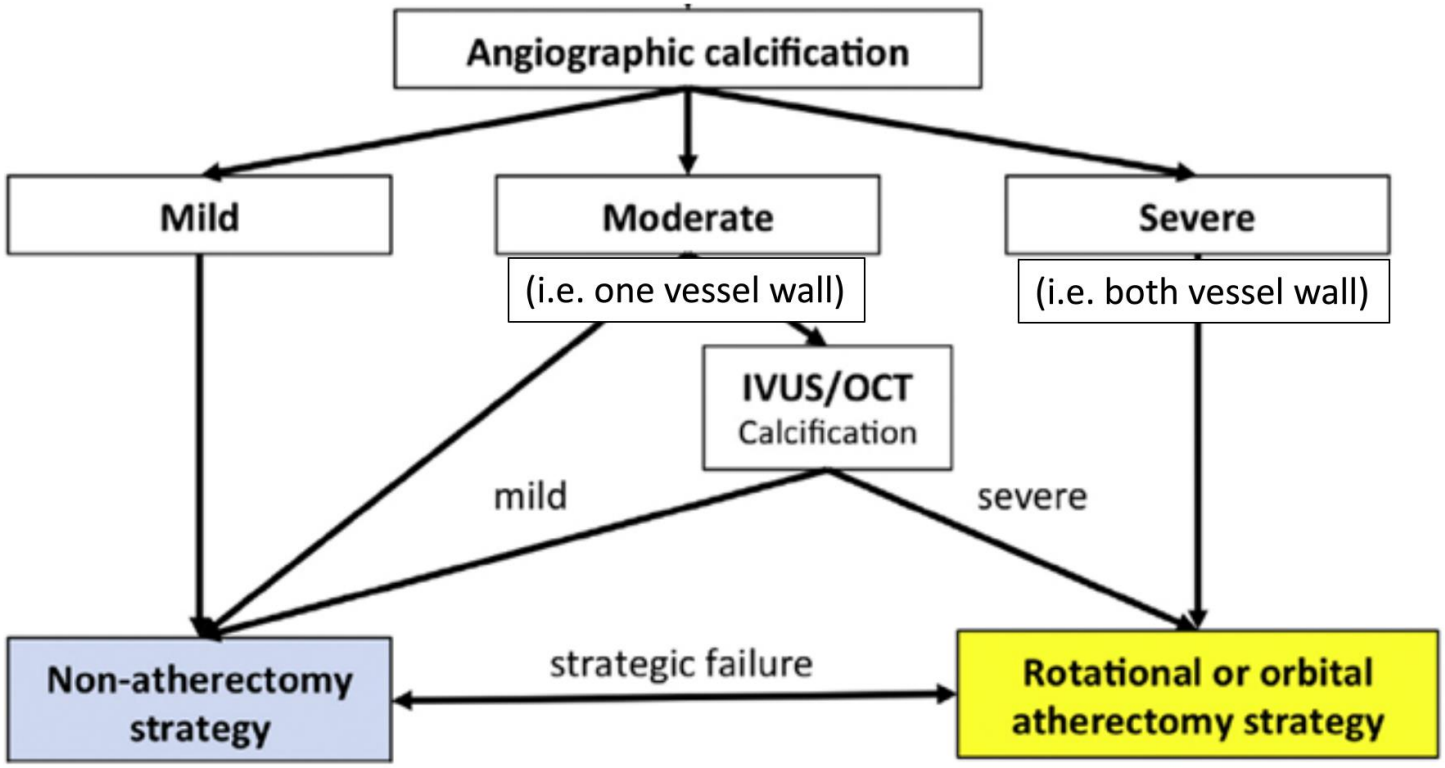
DÉCLARATION DE LIENS D'INTÉRÊT AVEC LA PRÉSENTATION

Intervenant : Prénom Nom, Ville

☑ Je déclare les liens d'intérêt suivants :

☑Honoraires: Boston, Biotronik, Teleflex, Alvimedica

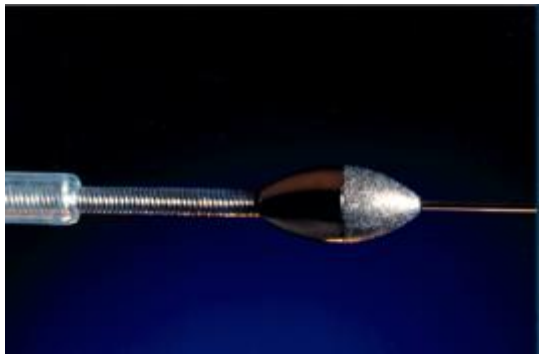
Le calcium

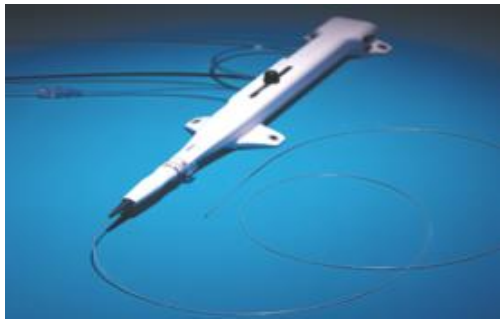


Tomey *J Am Coll Cardiol Intv* 2014;7:345–53

Pourquoi une alternative?

- Le Rotablator reste le « Gold standart »
- Pour simplifier ?....
- Le Coût?



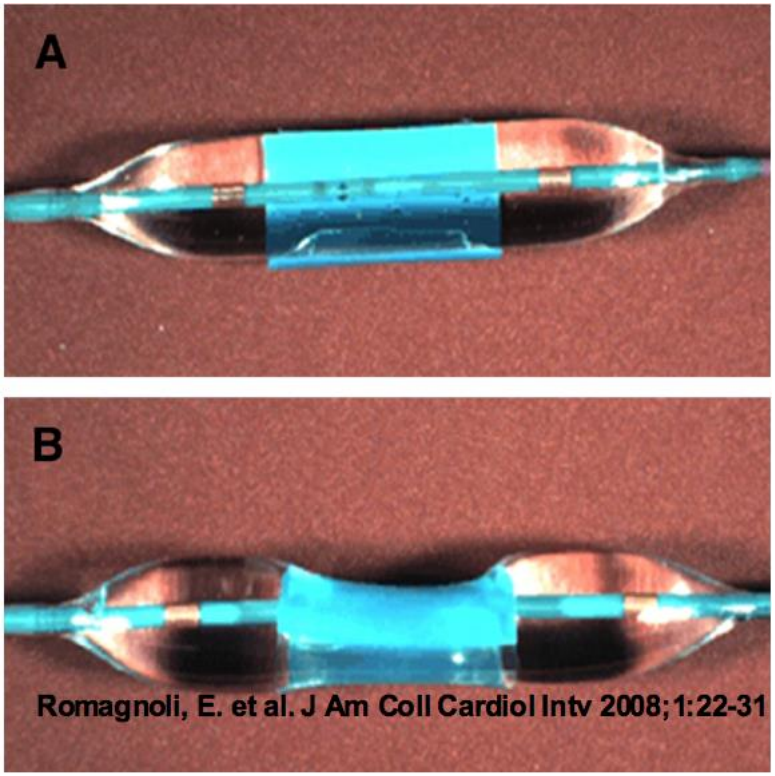


- IL faut positionner le Rotawire, parfois impossible…

Plan

- Ballon NC
- Ballon NC et plusieurs buddy wire
- Ballon HPN
- Cutting ballon
- Scoring ballon
- Laser
- Schock wave

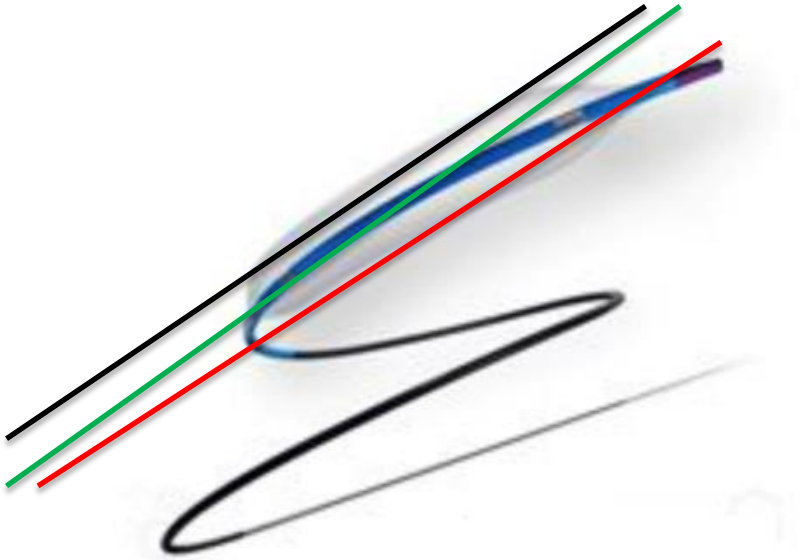
Ballon non compliant



- Outil de première intention
- Simple d'utilisation
- Bonne Alternative, parfois de belles surprises
- Ne résout pas les non franchissement d'un petit ballon

Ballon non compliant et buddywire

- Encore appelé le cutting du « pauvre »
- Efficace ?



OPN NC - Super High Pressure PTCA Balloon

- Twin layer balloon construction with virtually zero dog – boning effect
- Super high pressure PTCA balloon (RPB 35atm)
- Long tapared tip design for a better cross ability
- Better crossing profile (0.028'' 2.0mm) than scoring - and cutting balloons
- Min. guiding catheter: 5F
- Two platinum markers for all sizes: available from 1.5 – 4.5mm diameter
- Linear compliance curve up to over 40atm

Balloon Compliance:

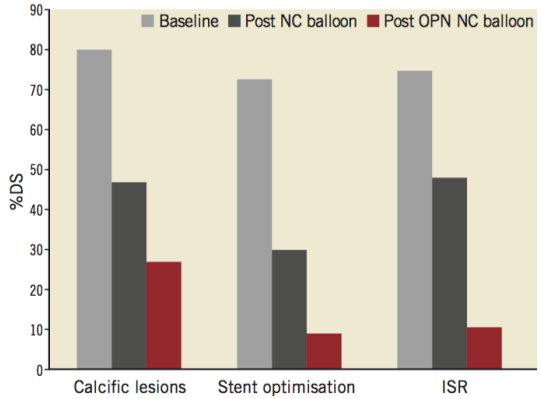
Bar	MPa	mm	
10	**1.0**	**2.50**	**NOM**
20	2.0	2.60	
30	3.0	2.70	
35	**3.5**	**2.77**	**RBP**

SIS MEDICAL

Swiss | Interventional | Systems

Very high pressure dilatation for undilatable coronary lesions: indications and results with a new dedicated balloon

Gioel Gabrio Secco[1,2,3], MD; Matteo Ghione[1], MD; Alessio Mattesini[1], MD; Gianni Dall'Ara[1], MD; Liviu Ghilencea[1], MD; Kadriye Kilickesmez[1], MD; Giuseppe De Luca[2], MD, PhD; Rossella Fattori[4], MD, PhD; Rosario Parisi[4], MD; Paolo Nicola Marino[2], MD; Alessandro Lupi[3], MD; Nicolas Foin[1], MsC; Carlo Di Mario[1]*, MD, PhD, FESC, FACC, FRCP, FSCAI

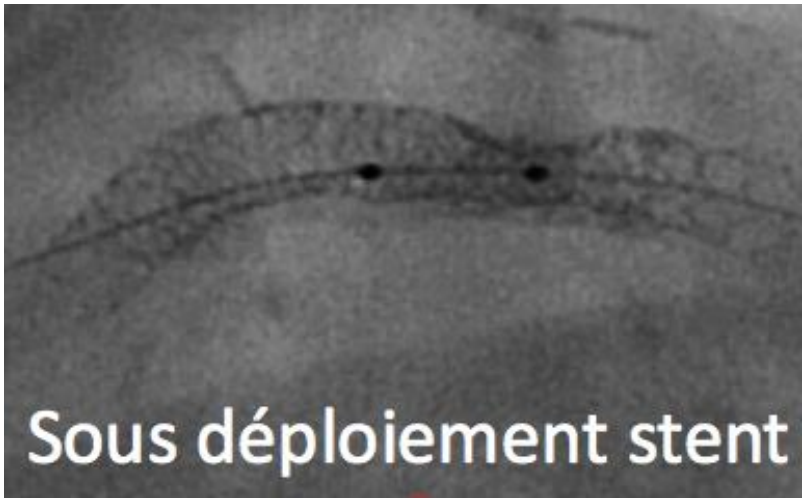


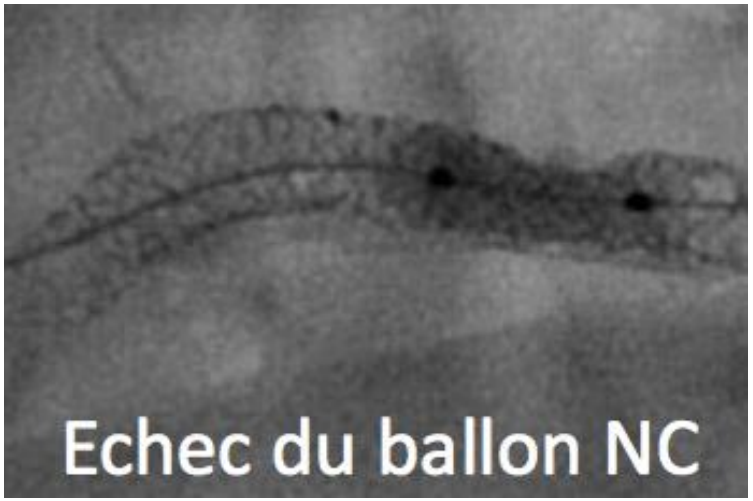
91 patients
Résultat sub-optimal avec ballon NC à 20 ATM
Ballon OPN à 37 ATM
Succès 92%

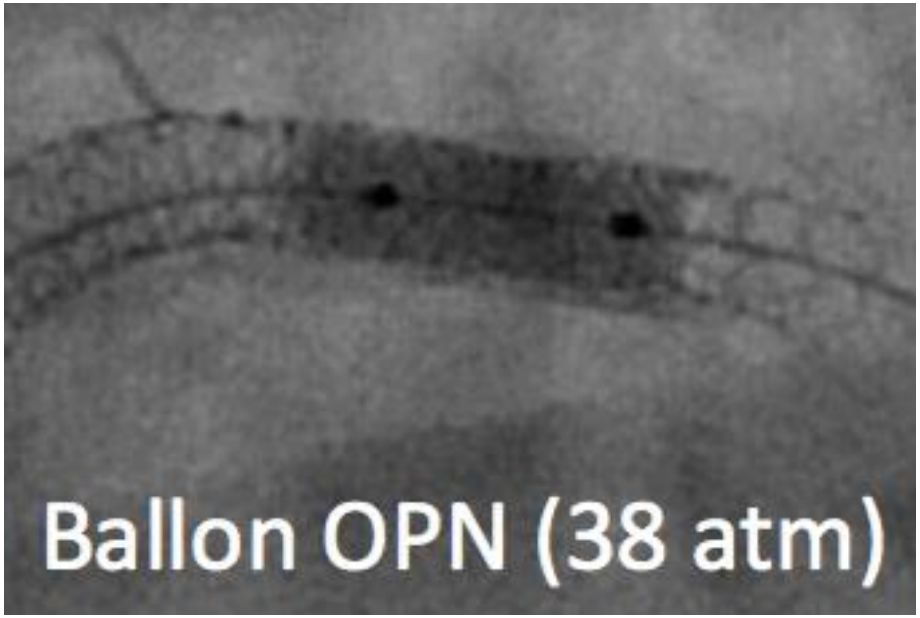
	Baseline	Post NC balloon	Post OPN NC balloon	*p*-value
RD (mm)	2.6±0.8	–	–	<0.001
MLD	0.7±0.3	1.7±0.8	2.4±0.9	
% DS	73.6±9.9	41.1±15.8	20.2±14.9	<0.001
Lesion length	11.9±6.4	–	–	
Acute gain (mm)	–	1.1±0.7	1.9±0.8	<0.001
Incremental gain (mm)	–	–	0.8±0.4	

DS: diameter stenosis; MLD: minimum lumen diameter; RD: reference diameter

EuroIntervention 2015;11-online publish-ahead-of-print June 2015

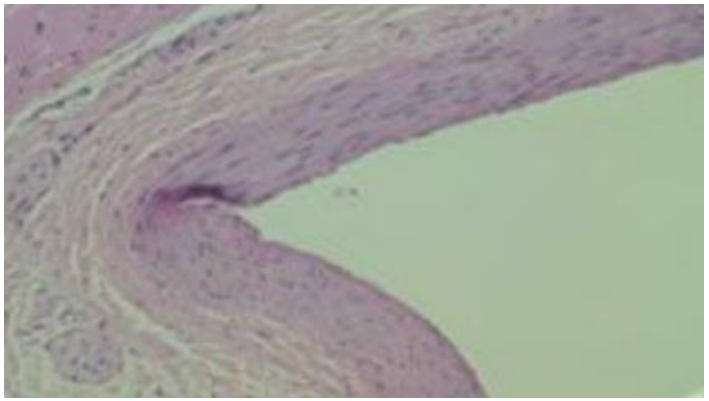

Sous déploiement stent


Echec du ballon NC


Ballon OPN (38 atm)

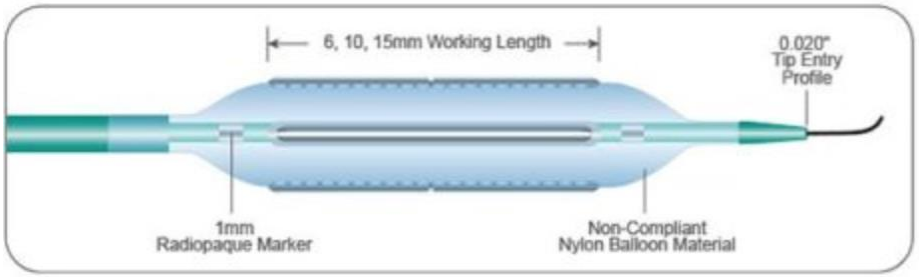
Cutting ballon

- 3 ou 4 athérotomes montés longitudinalement
- Sur un ballon non compliant
- Création d'une incision

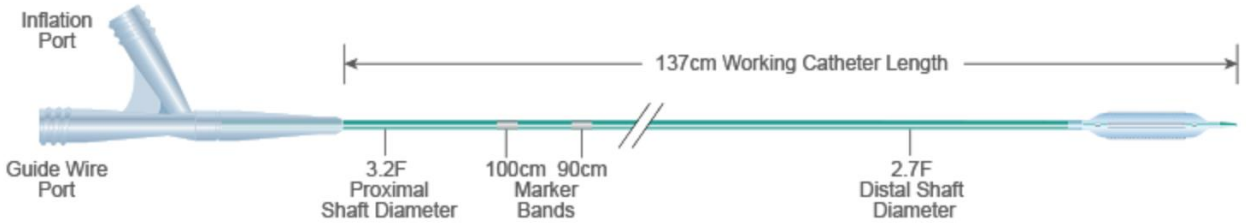


FLEXTOME™

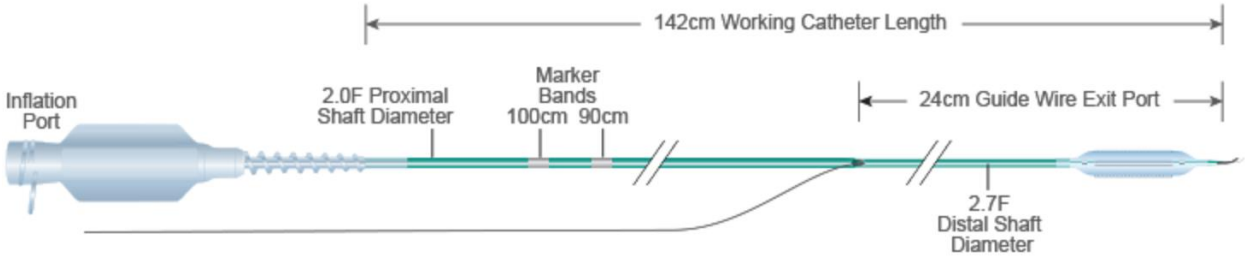
Cutting Balloon™ Dilatation Device



Over-the-Wire Catheter



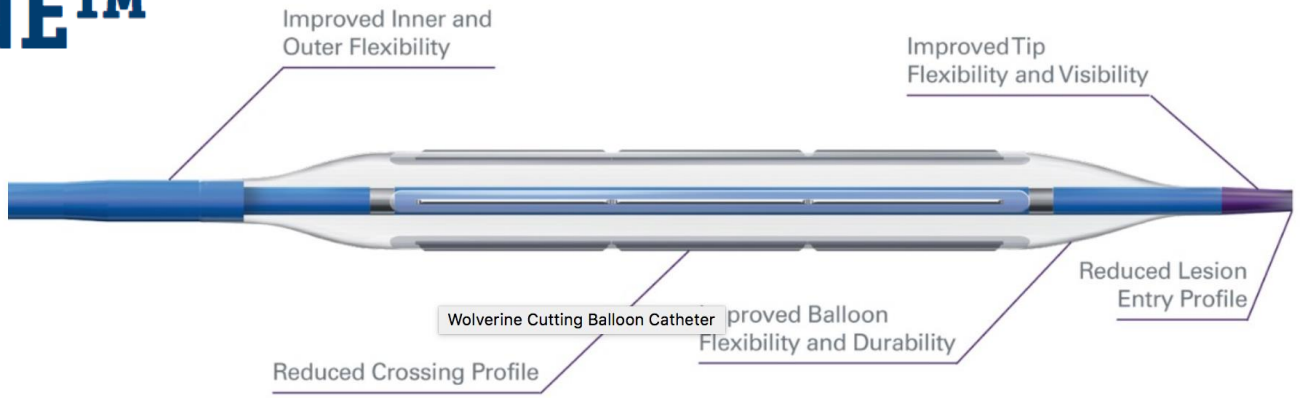
Monorail® Catheter



Boston Scientific
Advancing science for life™

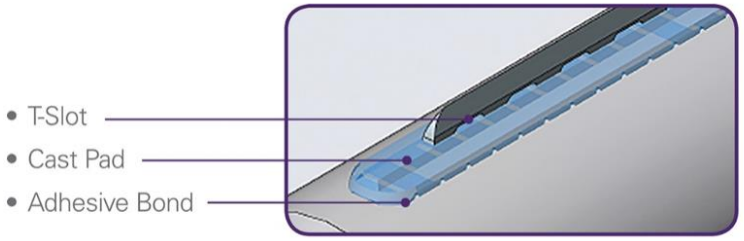
WOLVERINE™

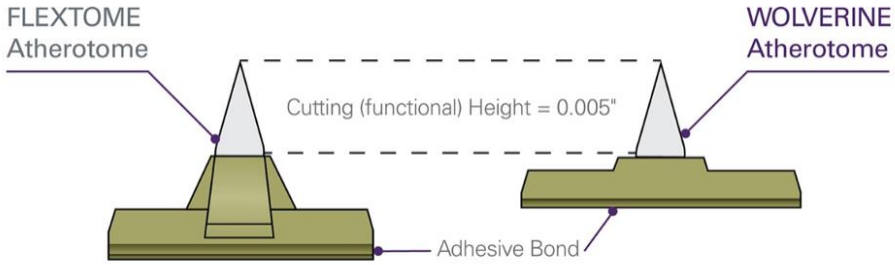
Cutting Balloon



Atherotome Comparison

A smaller profile is achieved through the reduction in the T-Slot height.





Meilleur profil

Boston Scientific
Advancing science for life™

Wolverine® vs Flextome ®

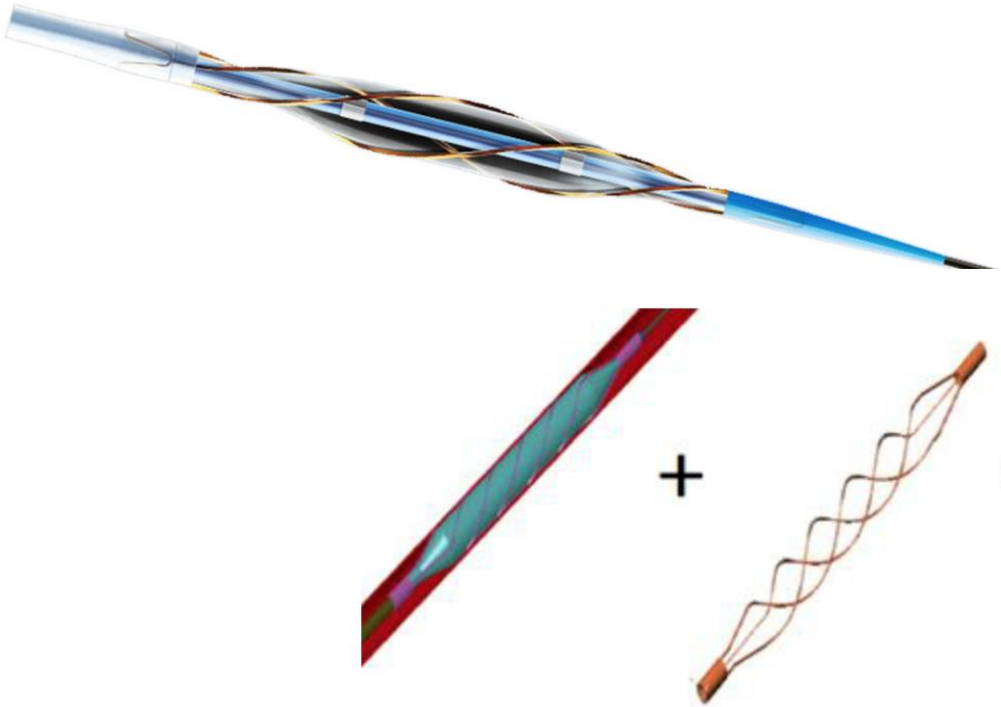
CARACTERISTIQUES	FLEXTOME ™	WOLVERINE™
Matériaux du ballon :	100% Vestamid® L2101F	**OD: Vestamid® L2101F (85%) ID : Pebax® 7033 (15%)**
Design du corps :	Monosegment	**Intérieur Bi-segment (technologie idem ballons Emerge™)**
Composition de l'âme :	Extrémité arrondie en acier inoxydable	**Effilée/conique en acier inoxydable**
Revêtement :	Bioslide™	**Z-Glide™**
Corps proximal :	2.0F hypotube en acier inoxydable revêtu en PTFE	**1.8F hypotude en acier inoxydable**
Profil d'entrée dans la lésion :	0.533 mm	**0,431 mm**
Profil de franchissement :	1,066 mm	**0.914 mm**
Comptabilité en French :	6F	**5F jusqu'à 3.25mm / 6F à partir 3.5mm**
Matrice des tailles : Diamètres (mm)	2, 2.25, 2.5, 2.75, 3, 3.25, 3.5, 3.75, 4	**2, 2.25, 2.5, 2.75, 3, 3.25, 3.5, 3.75, 4**
Matrice des tailles: Longueurs (mm)	6, 10, 15	**6, 10, 15**
Pressions (ATM)	NOM: 6 RBP: 12	**NOM: 6 RBP: 12**
Longueur effective (cm)	142	**143**
Compliance du ballon	Non-compliant	**Non-compliant**

Scoring ballon

- Angiosculpt
- Angiosculpt X
- Scoreflex
- Blimp

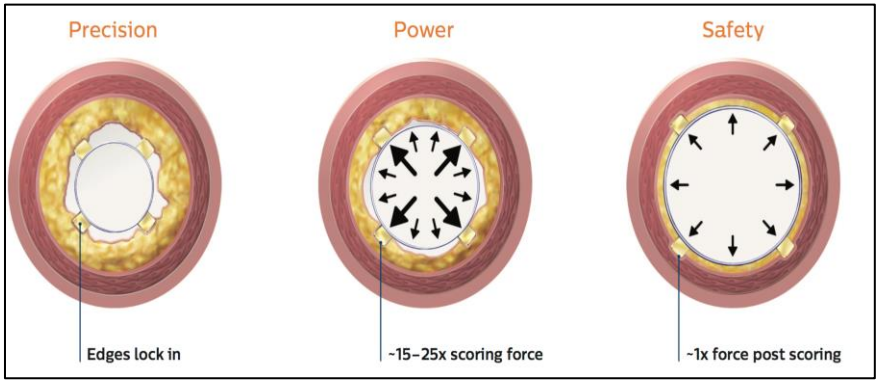
AngioSculpt®

PTA Scoring Balloon Catheter



-Ballon non compliant+ structure en nitinol hélicoïdale

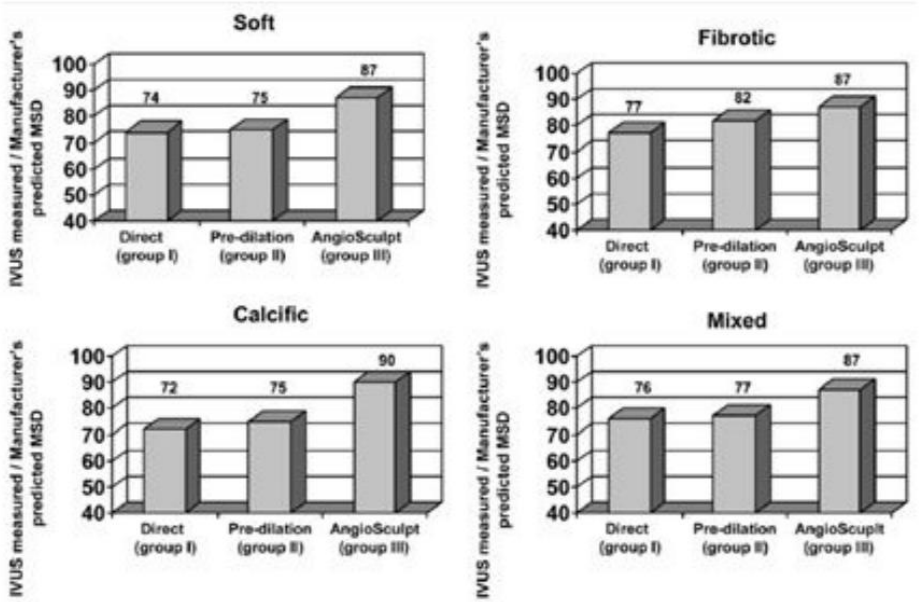
- Pression nominale 8 ATM
- Pression de rupture 20 ATM



PHILIPS

AngioSculpt®

PTA Scoring Balloon Catheter



- 299 lesions
  - Direct stentint (n=145)
  - Pre-dilatation ballon (n=117)
  - Pre-dilatation Angiosculpt® (n=37)
  - Analyse en IVUS de l'expansion de stent
  - Meilleure expansion de stent avec Angiosculpt quelque soit le type de plaque

Costa Am J Cardiol 2006

AngioSculpt®

PTA Scoring Balloon Catheter

TABLE 3 Angiographic Follow-Up at 6 to 8 Months

	Scoring Balloon (n = 103)	Control (n = 100)	p Value
Diameter stenosis (%), in segment	35.0 ± 16.8	40.4 ± 21.4	0.047
Minimal luminal diameter (mm), in segment	1.95 ± 0.55	1.77 ± 0.68	0.032
Late lumen loss (mm)	0.31 ± 0.59	0.41 ± 0.74	0.27
Recurrent binary restenosis	19 (18.5)	32 (32.0)	0.026
Characteristics of recurrent restenotic lesions	(n = 19)	(n = 32)	
Diameter stenosis (%), in segment	62.5 ± 12.4	66.8 ± 14.0	0.28
Lesion length	10.7 ± 4.6	9.9 ± 5.5	0.58
Restenosis morphology			0.22
Focal margin	1 (5.3)	1 (3.1)	
Focal body	12 (63.2)	18 (56.3)	
Multifocal	2 (10.5)	1 (3.1)	
Diffuse	3 (15.8)	10 (31.3)	
Proliferative	0 (0.0)	1 (3.1)	
Occlusive	1 (5.3)	1 (3.1)	

Values are mean ± SD or n (%) on the basis of in-segment analysis.

- RIS actif 252 pts, drug eluting ballon
- Préparation ou non par Angiosculpt
- 203 pts suivis à 9 mois
- Supériorité de la stratégie Angiosculpt

Kufner 2017 JACC

AngioSculpt X

Drug-Coated PTCA
Scoring Balloon Catheter

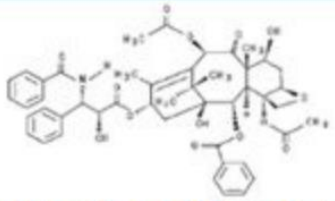
AngioSculpt X
Drug-Coated PTCA
Scoring Balloon Catheter

1) Plaque Scoring

Controlled Dissections

- ü Higher Stability and Dilation Power
- ü Better acute Luminal Gain and lower Recoil
- ü Lower Major Dissection Rate

2) Drug Delivery

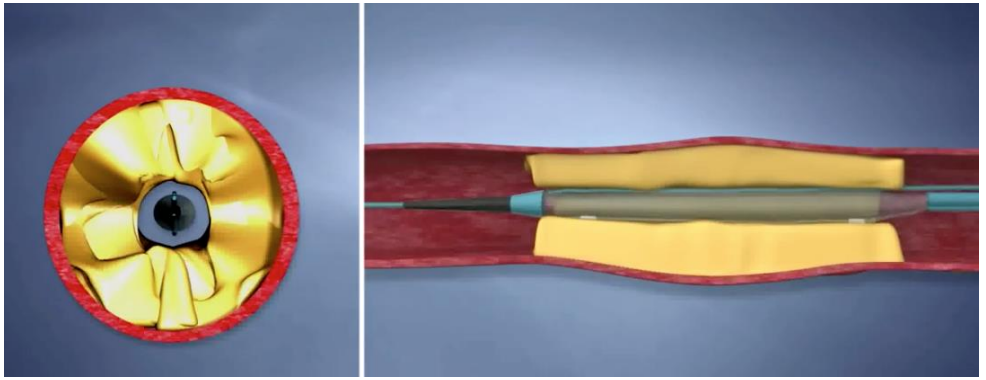


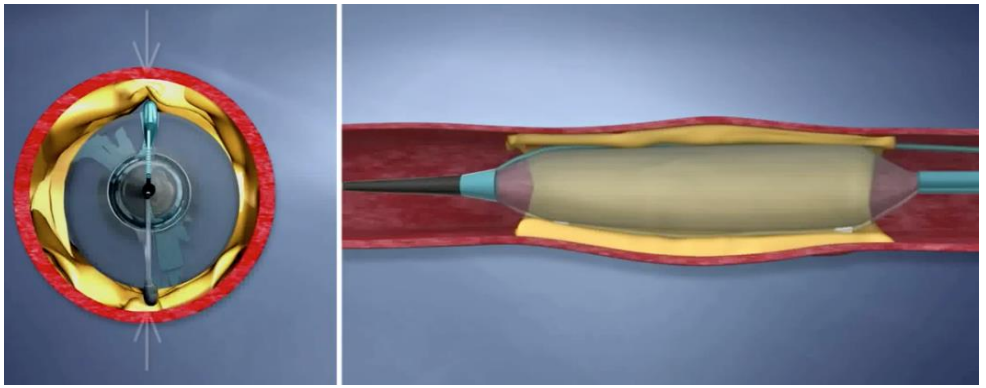
Sustained Anti-restenotic Effect

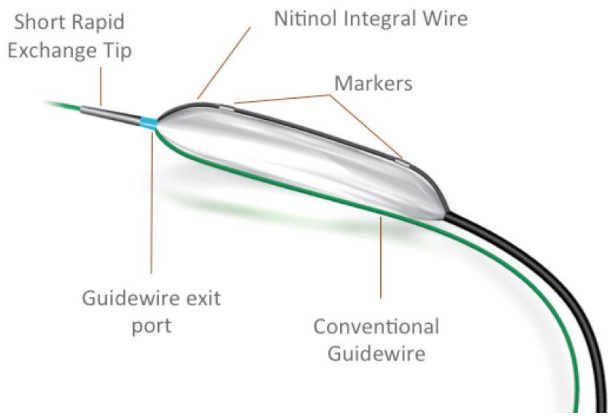
- ü DCB: Class IA recommendation in ISR
- ü Potentially enhanced drug uptake by optimizing the balloon/vessel contact-ratio.

Dual wire balloon

-Deux guides
-Monorail court

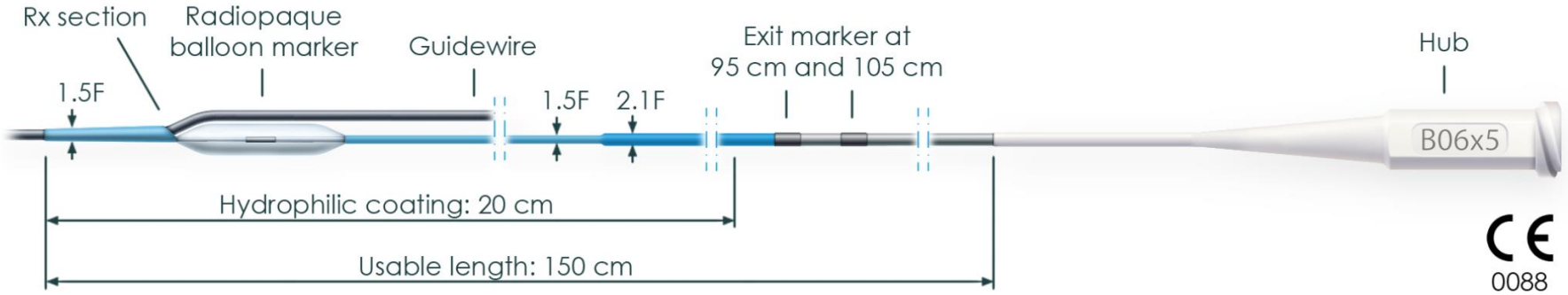


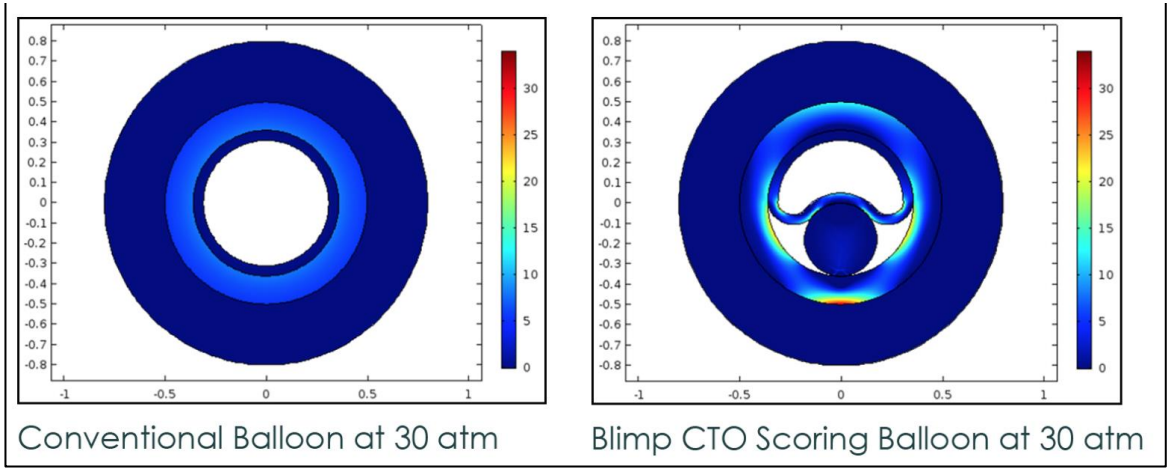




OrbusNeich®
Pioneers in life-changing technologies

Blimp



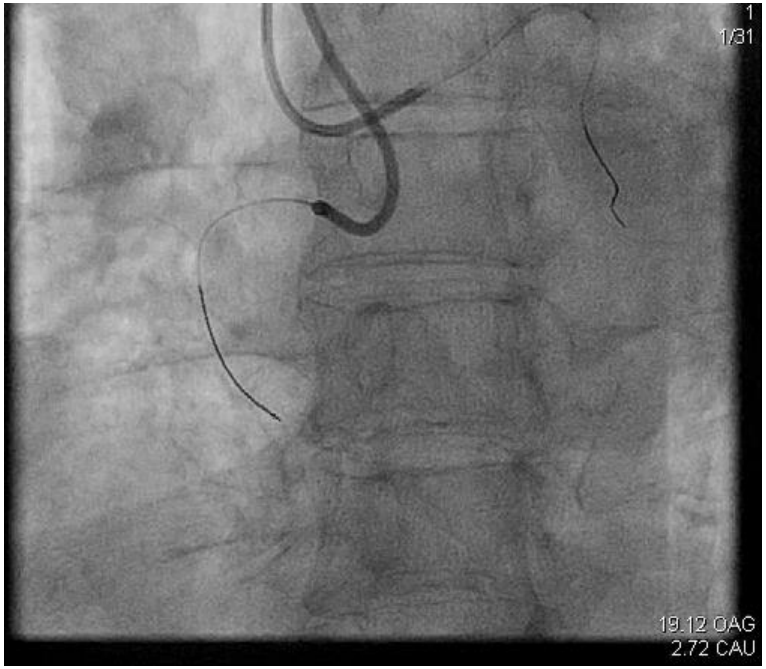


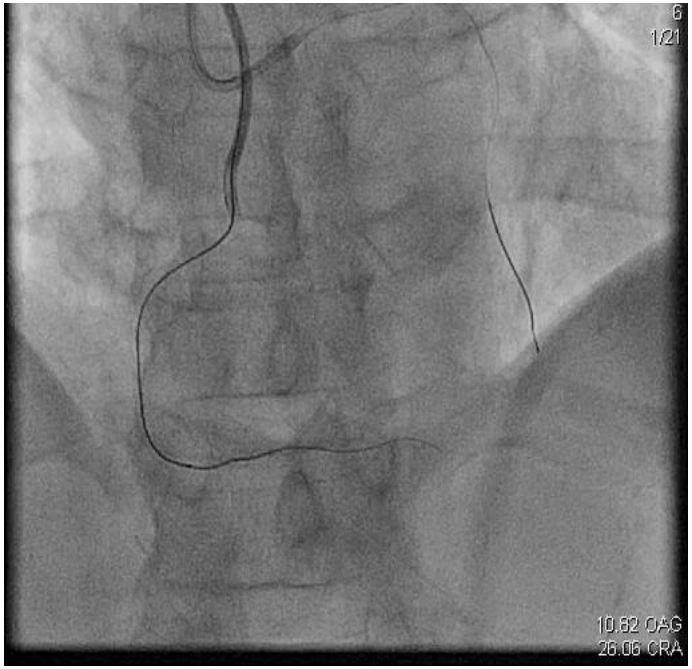
Nominal Pressure **25 atm**

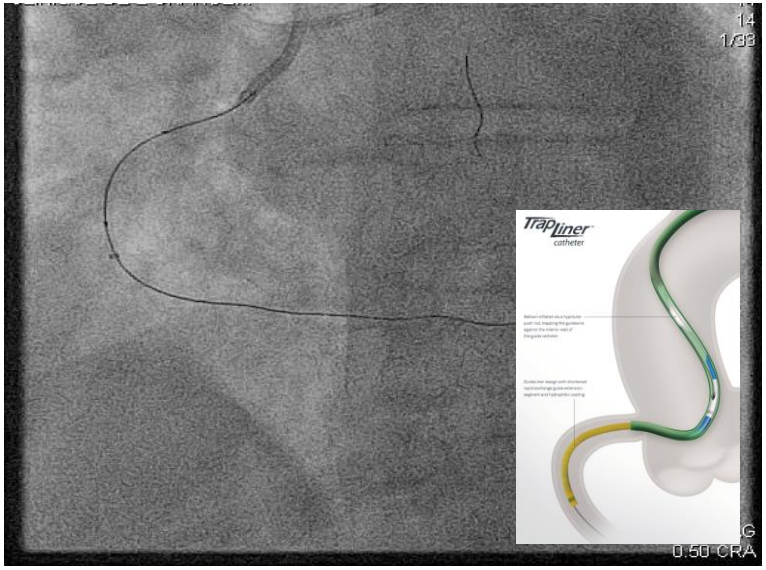
Rated Burst Pressure **30 atm**

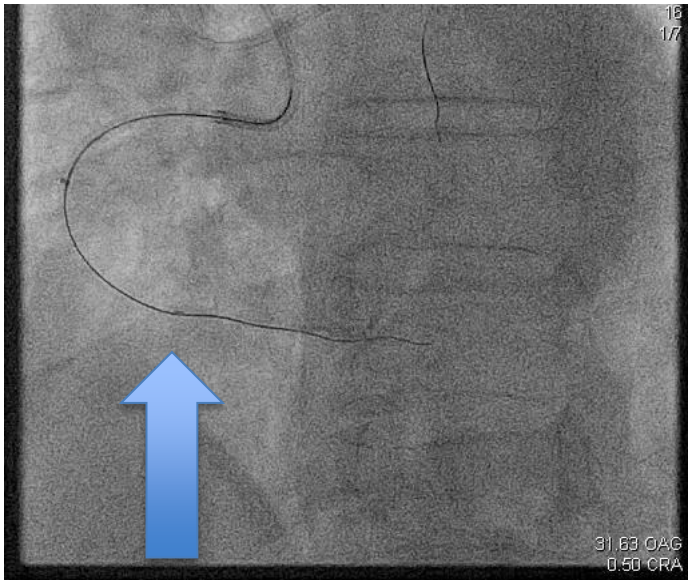
BIOTRONIK
excellence for life

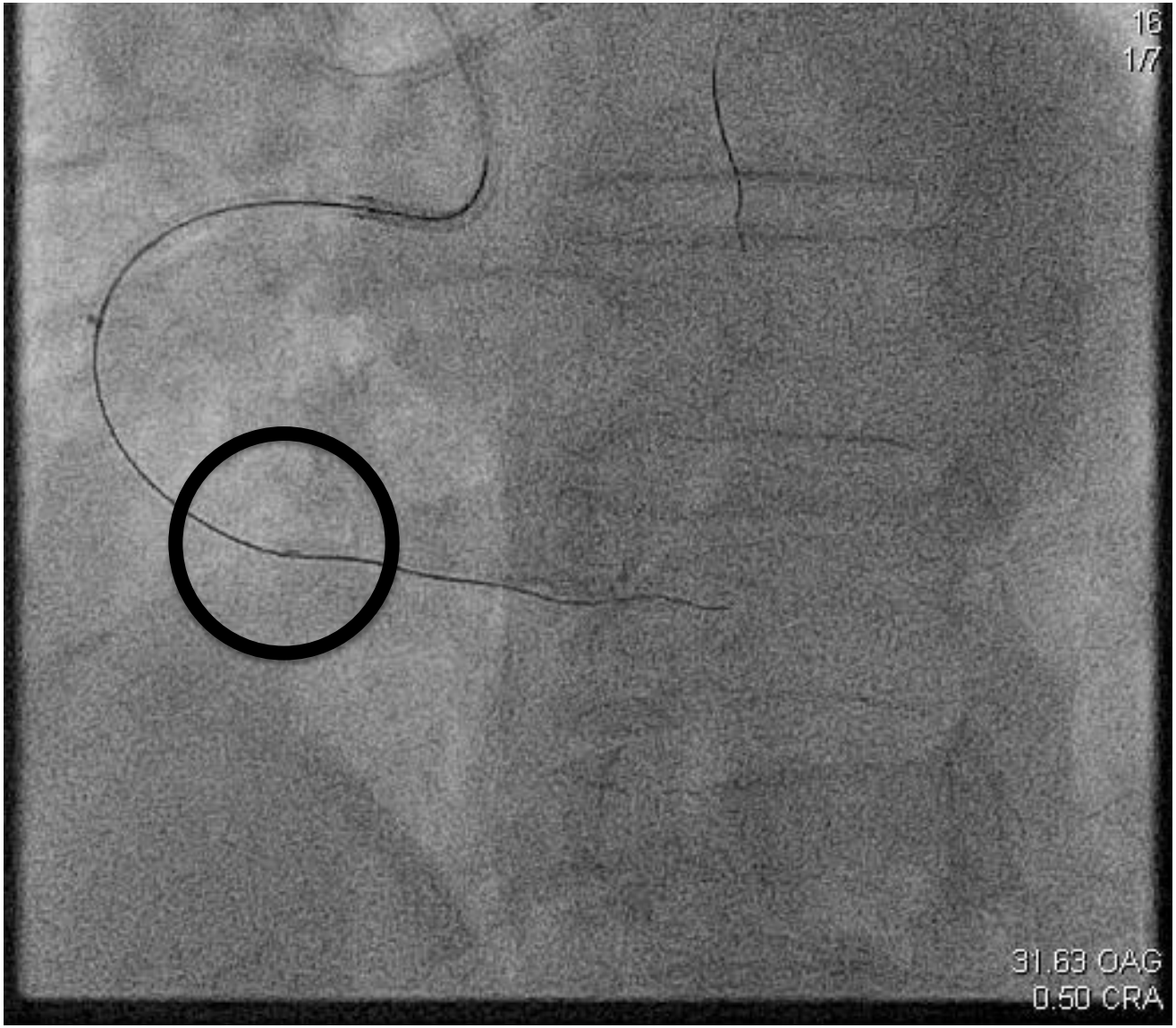
IMDS

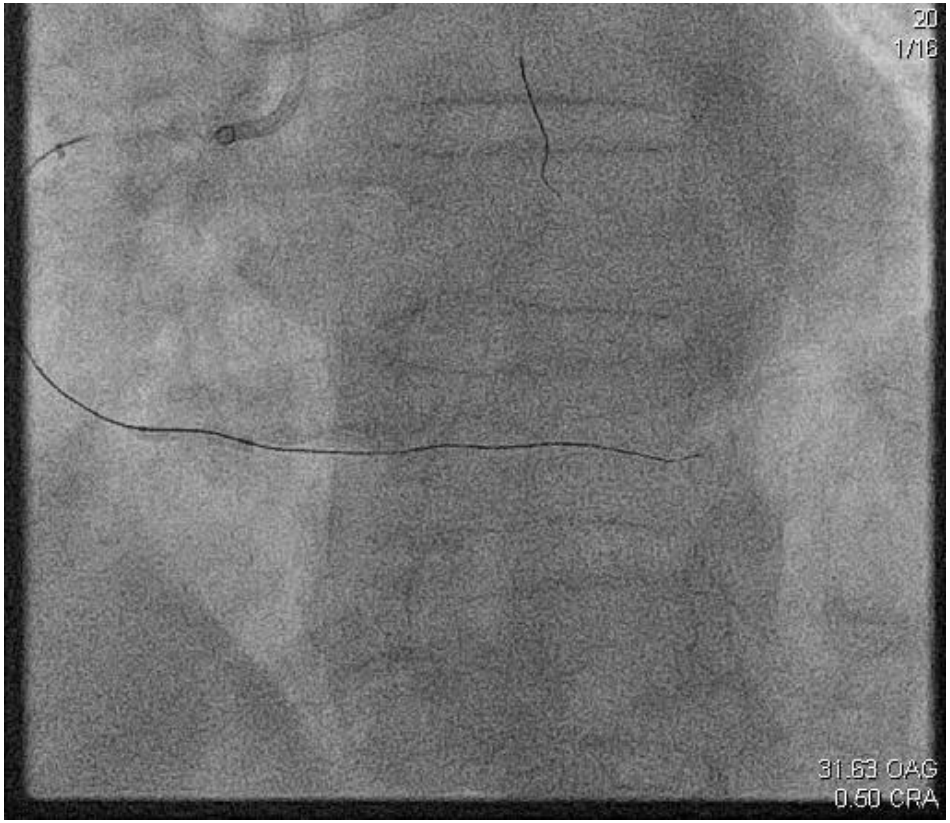

1
1/31
19.12 OAG
2.72 CAU


6
1/21
10.62 OAG
26.06 CRA


14
1/33
TrapLiner
catheter
0.50 CRA


16
1/7
31.63 OAG
0.50 CRA


16
1/7
31.63 OAG
0.50 CRA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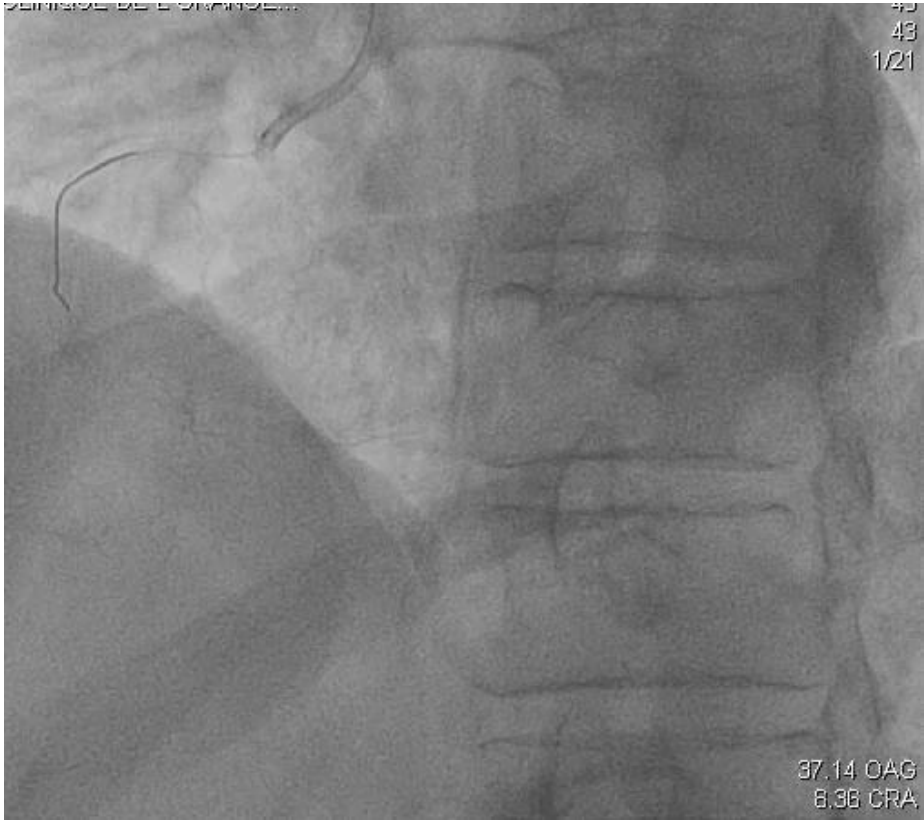
1/18
31.63 OAG
0.50 CRA


43
1/21
37.14 OAG
8.36 CRA

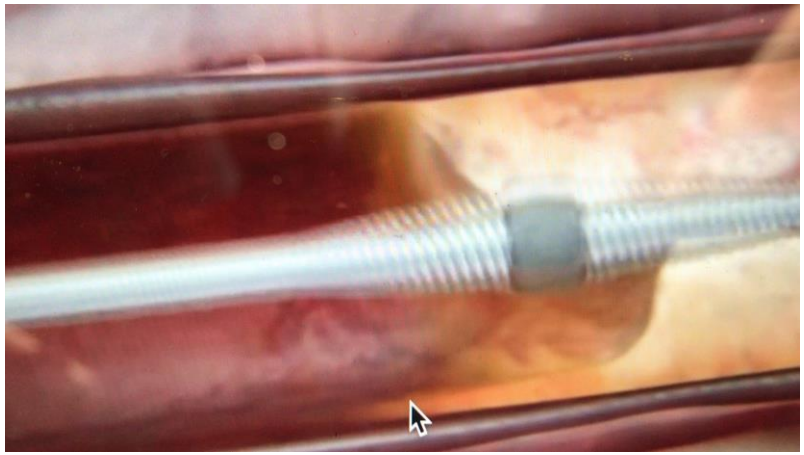
Diamondback 360® Coronary Orbital Atherectomy System

DIAMONDBACK 360®

CORONARY ORBITAL ATHERECTOMY SYSTEM

CSI® CARDIOVASCULAR SYSTEMS, INC.

- Fraise de 1.25 en couronne sur une gaine rotative
- Mouvement orbital desaxé sous l'effet de la rotation
- Athérectomie à l'avancement et au retrait
- 6F compatible
- FDA aprouve depuis 2013
- Pas de marquage CE pour les coronaires



Orbital atherectomy
Comparaison Rota et OA

Experience UCLA 67 Rotablators *vs.* 50 OA

Table 2
Procedural characteristics

Variable	RA (N=67)	OA (N=50)	p-value
Anticoagulation			
Heparin	67 (100%)	50 (100%)	>0.9
Patients pretreated with clopidogrel	65 (97%)	48 (96%)	0.9
Vascular access			0.7
Transfemoral	66 (99%)	47 (94%)	
Transradial	1 (1%)	3 (6%)	
Maximum burr size (mm)	1.5 ± 0.1	NA	
OA device speed (revolutions/min)			
Low only, 80,000	NA	14 (28%)	
Low and high, 80,000 and 120,000	NA	36 (72%)	
Burr(s) per case	1.3 ± 0.2	NA	
Passes per case	3.6 ± 1.2	3.3 ± 1.3	0.7
Type of stent			0.9
Drug-eluting	61 (91%)	46 (92%)	
Bare metal	7 (9)	4 (8)	
Stents per case	1.4 ± 0.6	1.5 ± 0.4	0.7
Vessels treated	1.3 ± 0.2	1.3 ± 0.3	0.9
Temporary pacemaker	5 (7%)	0	0.2
Intra-aortic balloon pump	6 (9%)	2 (4%)	0.3
Impella	2 (3%)	1 (2%)	0.9
Extracorporeal membrane oxygenation	0	1 (2%)	0.9
Bail-out use of GP IIb/IIIa inhibitors	0	0	>0.9
Final TIMI flow			>0.9
0-1	0	0	
2	0	0	
3	67 (100%)	50 (100%)	
French size			0.6
6F	63 (94%)	50 (100%)	
8F	4 (6%)	0	

NA = not applicable; OA = orbital atherectomy; RA = rotational atherectomy.

Table 3
Angiographic complications

Variable	RA (N=67)	OA (N=50)	p value
Procedural success	67 (100%)	50 (100%)	>0.9
Perforation	0	1 (2%)	0.9
Cardiac tamponade	0	1 (2%)	0.9
Dissection leading to less than TIMI grade 3 flow	0	0	>0.9
No reflow	5 (7%)	2 (4%)	0.4
Stent loss	0	0	>0.9

OA = orbital atherectomy; RA = rotational atherectomy.

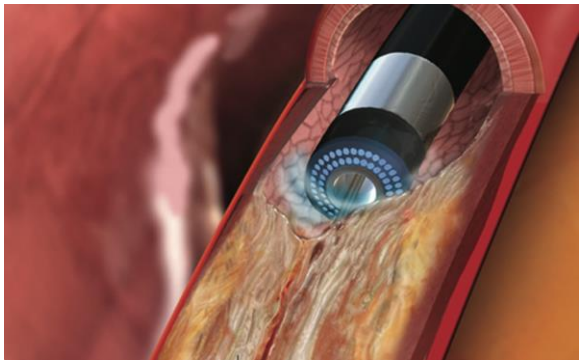
Table 4
Clinical Events at 30 days

Variable	RA (N=67)	OA (N=50)	p value
Major adverse cardiac and cerebrovascular events	4 (6%)	3 (6%)	>0.9
Cardiac death	0	1 (2%)	0.8
Myocardial infarction	4 (6%)	2 (4%)	0.7
Target vessel revascularization	0	0	>0.9
Stroke	0	0	>0.9
Stent thrombosis	0	0	>0.9

OA = orbital atherectomy; RA = rotational atherectomy.

Lee 2017 AM J Cardiol p1380

Spectranetics Excimer Laser



Light

Amplification by

Stimulated

Emission of

Radiation

It is the only coronary laser-emitting device currently approved by the US Food and Drug Administration.

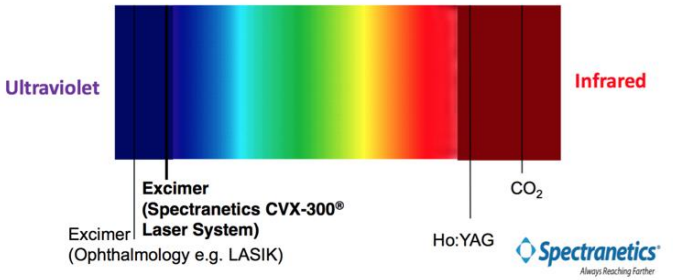
ELCA™ CORONARY LASER ATHERECTOMY CATHETER
Treatment Versatility for Coronary Interventions

Laser de Contact et Pulsatil

Unidirectionnel

Intensité élevée 308 nm

Monochromatique bleu (ultraviolet)= laser froid



Méchanisme d'action

RUPTURE DES LIAISONS DE COVALENCE

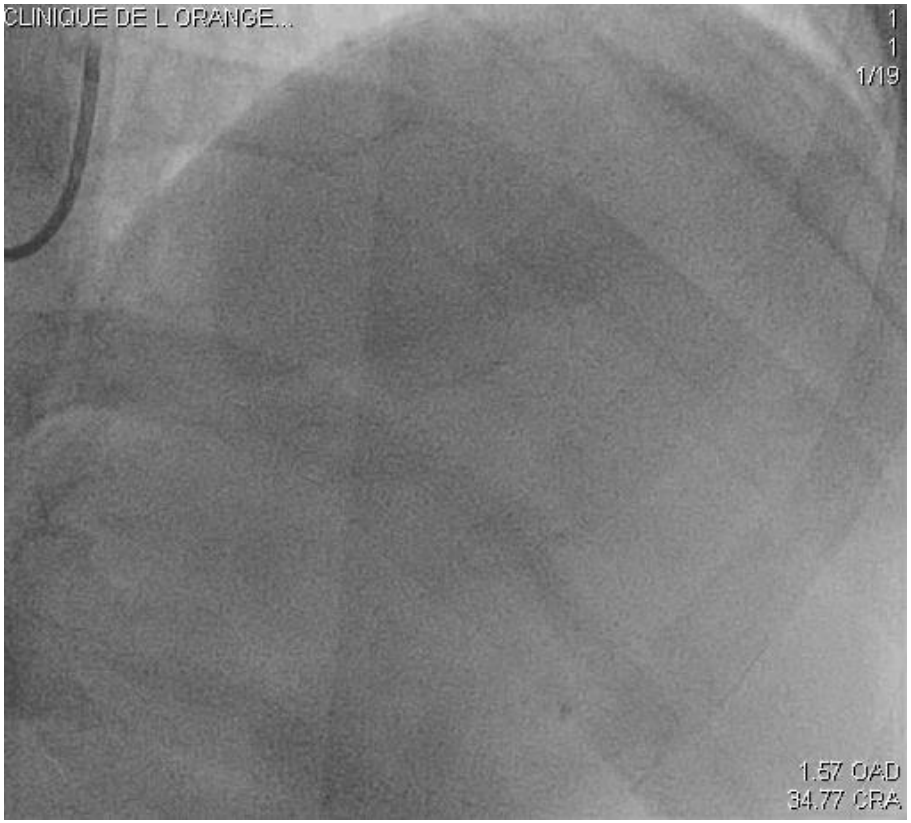
A 308 nm l'intensité lumineuse est + puissante que les liaisons intracellulaires. Ce qui entraine la séparation des ponts de covalence. En se séparant ils produisent des microparticules de – de 5microns qui en mouvement créés de l'énergie.

VAPORISATION CELLULAIRE

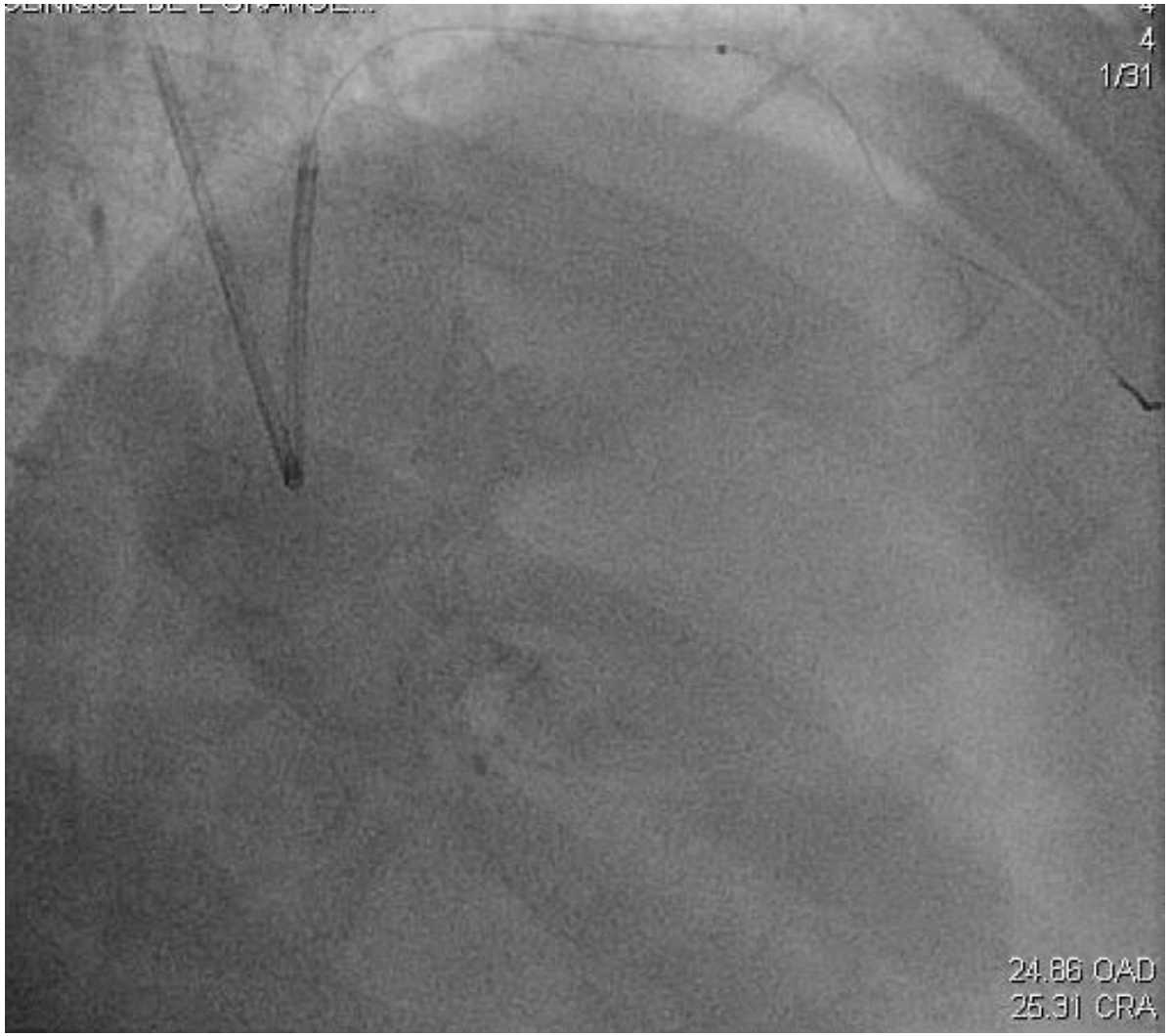
L'énergie et les mouvements produits à l'intérieur de la cellule entrainent la vaporisation du liquide intracellulaire.

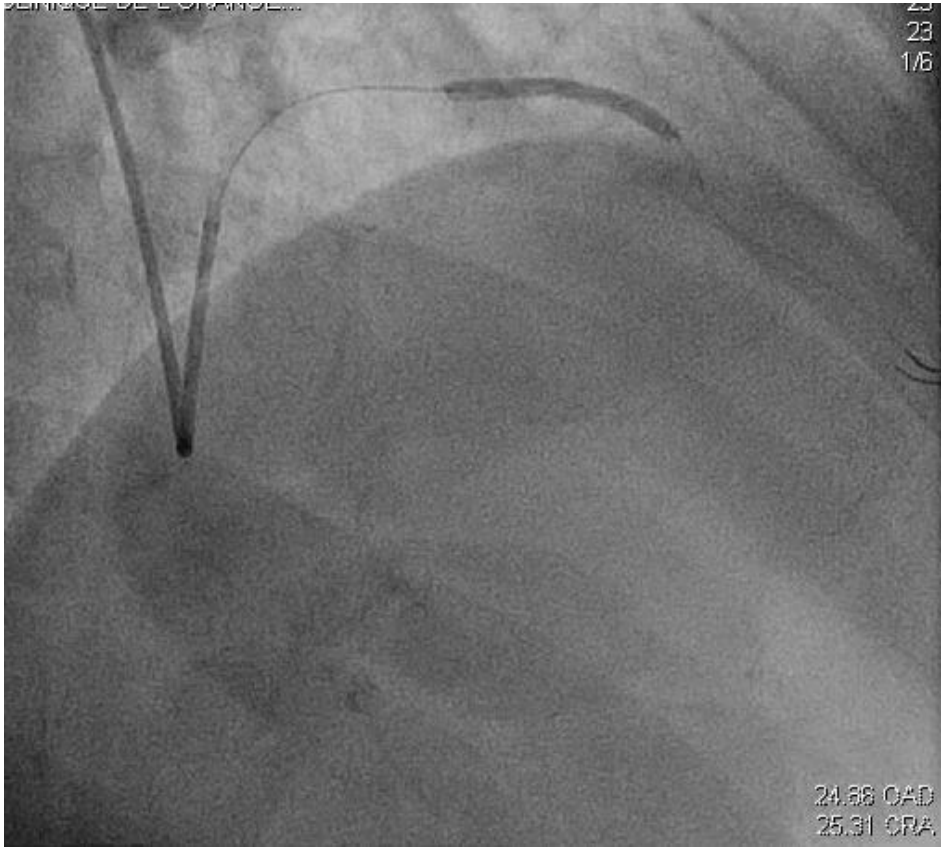
EFFET PHOTOKINETIQUE

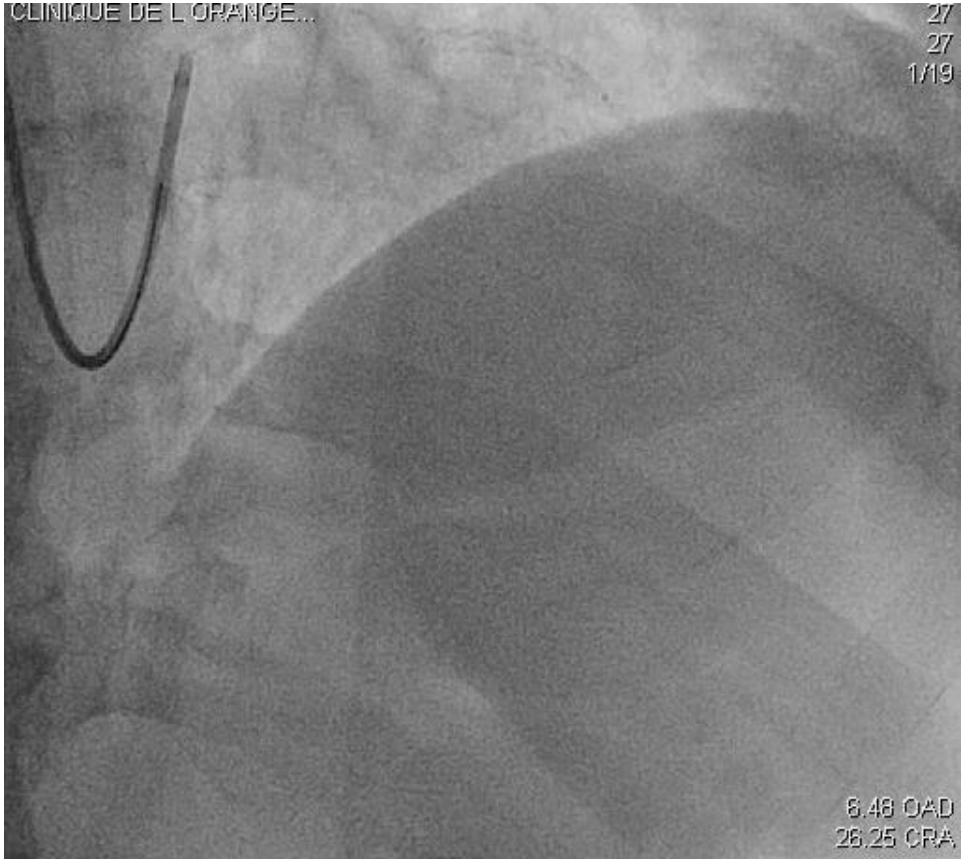
L'expansion des bulles et de la vapeur générée à l'extrémité de la fibre optique permettent sa progression à travers la lumière de l'artère.


CLINIQUE DE L ORANGE...
1
1
1/19
1.57 CAD
34.77 CRA


CLINIQUE DE L ORANGE...
8
8
1/9
24.86 CAD
25.31 CRA


4
1/31
24.86 OAD
25.31 CRA


23
1/6
24.66 OAD
25.31 CRA


CLINIQUE DE L'ORANGE...
27
27
1/19
8.48 OAD
26.25 CRA

THE RASER TECHNIQUE

Coronary Intervention with the Excimer Laser: Review of the Technology and Outcome Data

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Abstract

Excimer laser coronary atherectomy (ELCA) is a long-established adjunctive therapy that can be applied during percutaneous coronary intervention (PCI). Technical aspects have evolved and there is an established safety and efficacy record across a number of clinical indications in contemporary interventional practice where complex lesions are routinely encountered. The role of ELCA during PCI for thrombus, non-crossable or non-expandable lesions, chronic occlusions and stent under-expansion are discussed in this review. The key advantage of ELCA over alternative atherectomy interventions is delivery on a standard 0.014-inch guidewire. Additionally, the technique can be mastered by any operator after a short period of training. The major limitation is presence of heavy calcification although when rotational atherectomy (RA) is required but cannot be applied due to inability to deliver the dedicated RotaWire™ (Boston Scientific), ELCA can create an upstream channel to permit RotaWire passage and complete the case with RA – the RASER technique.

Keywords

Excimer laser coronary atherectomy (ELCA); percutaneous coronary intervention (PCI); non-crossable lesions; chronic total occlusions (CTO); intra-coronary thrombus; under-expanded stents; rotational atherectomy (RA)

Disclosure: ST and PO are European Proctors for Spectranetics. JR and JD have no conflicts of interest to declare.
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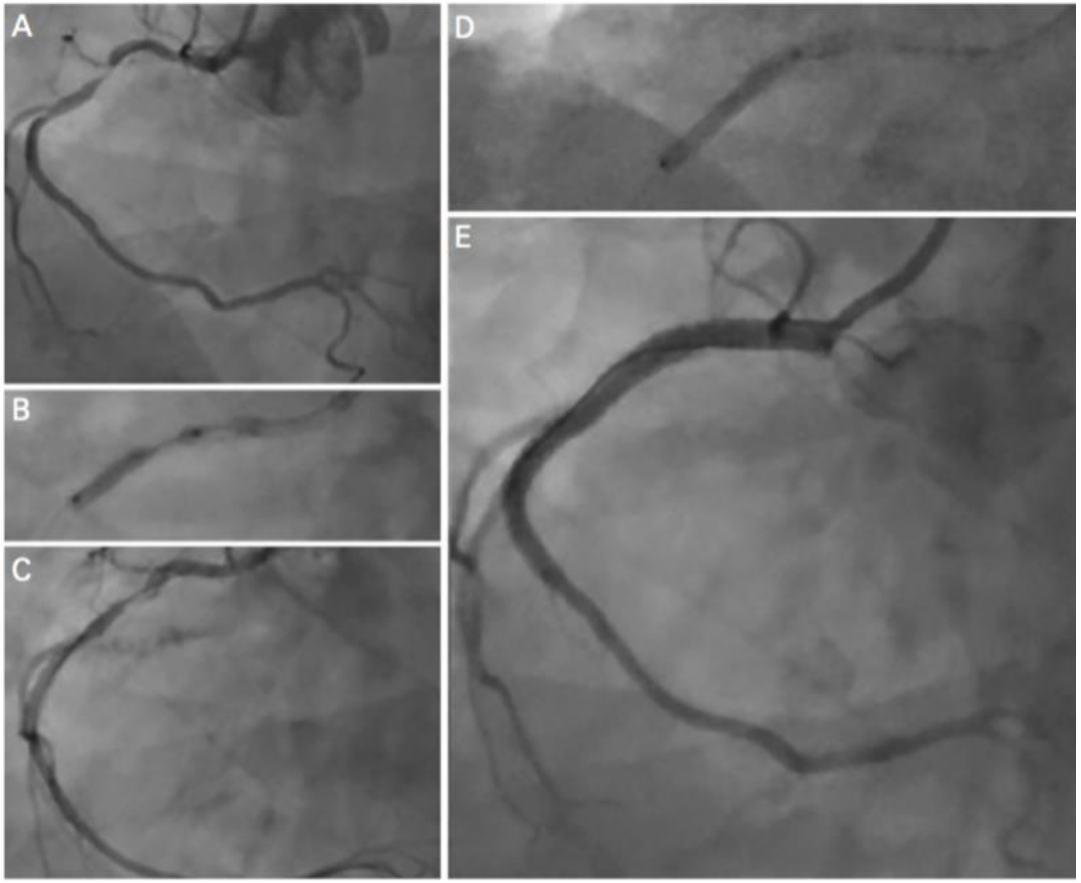
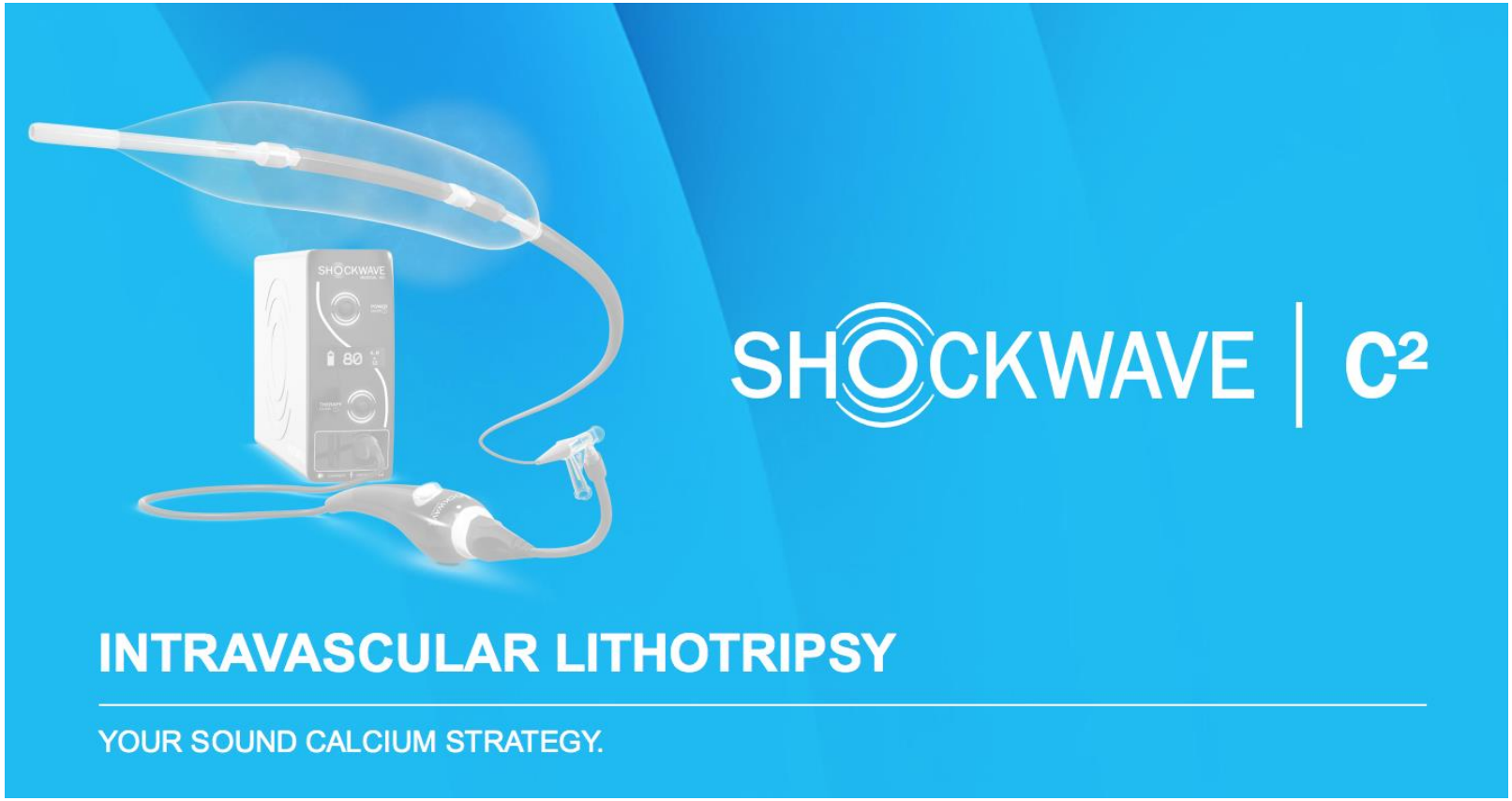
E: peter.o'kane@rbch.nhs.uk



-La combinaison du laser et du rotablator est la RASER technique
-Intéressant dans les cas difficiles sans possibilité de franchir la lésion avec un microcathéter

Lithoplasty balloon



Extracorporeal Lithotripsy

30 years of safety data in kidney stone treatment

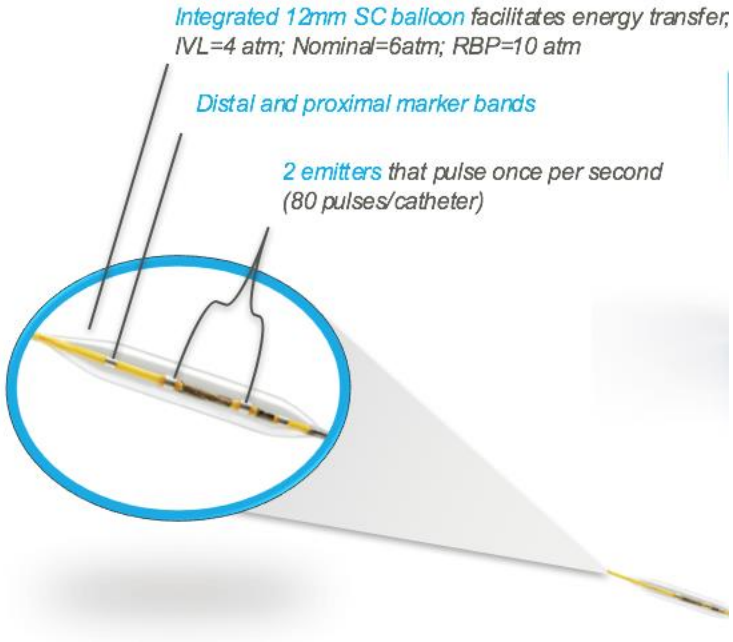
Sonic Pressure Waves preferentially impact hard tissue, disrupt calcium, leave soft tissue undisturbed

Intravascular Lithotripsy (IVL)

Miniaturized and arrayed lithotripsy emitters for localized lithotripsy at the site of the vascular calcium

Optimized for the treatment of vascular calcium

En urologie, La lithotritie extracorporelle (LEC) est la fragmentation des calculs par des ondes de choc acoustiques créées par un générateur extracorporel.
La LEC fragmente les calculs par distorsion et compression.
Ce principe est disponible maintenant en cardiologie

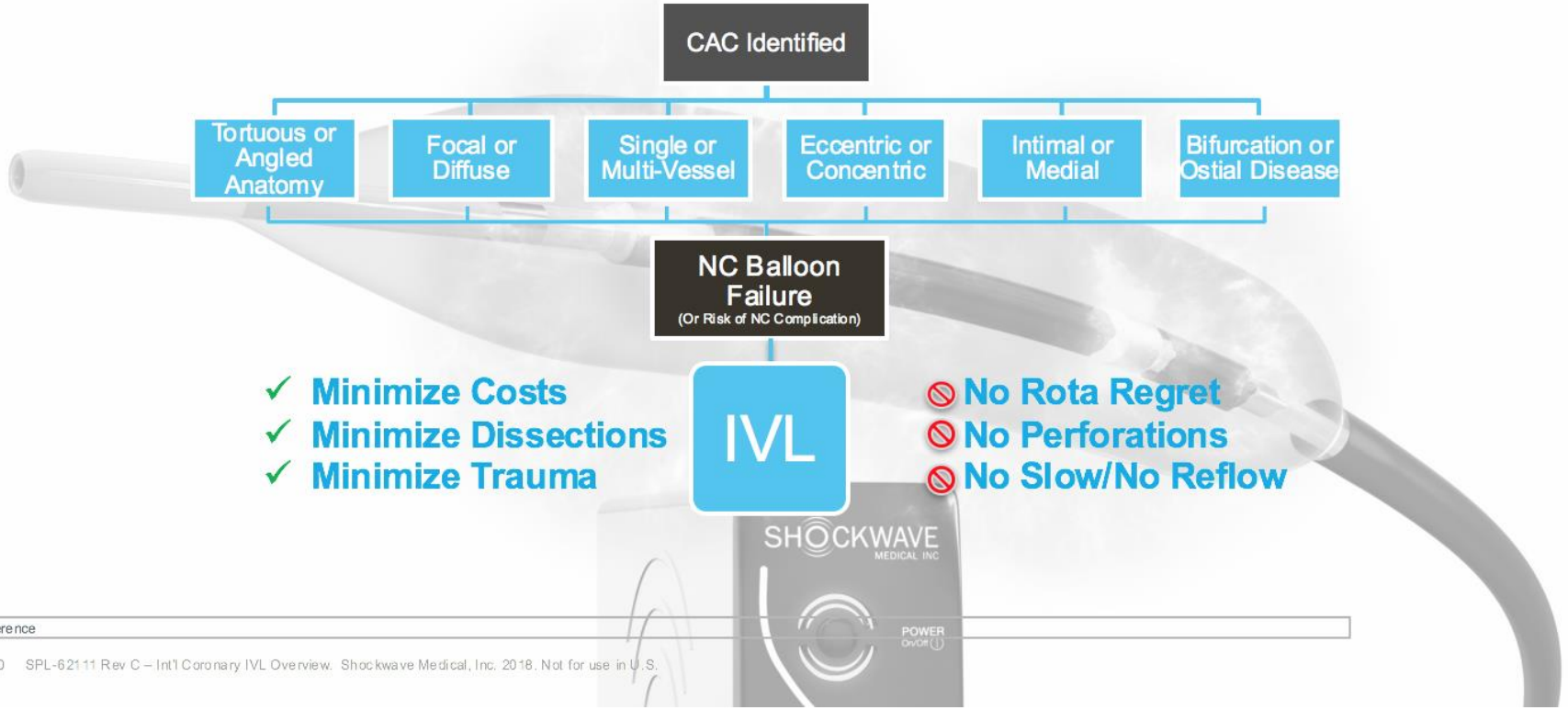


Shockwave C² IVL Catheter Specs

Diameter (mm)	Length (mm)	Max Pulse Count	Guidewire Compatibility (in)	Guide Catheter Compatibility	Working Length (cm)	Tip Profile (in)*	Crossing Profile (in)*
2.5	12	80	0.014	6F	138	0.023	0.042
3.0	12	80	0.014	6F	138	0.023	0.042
3.5	12	80	0.014	6F	138	0.023	0.042
4.0	12	80	0.014	6F	138	0.023	0.042

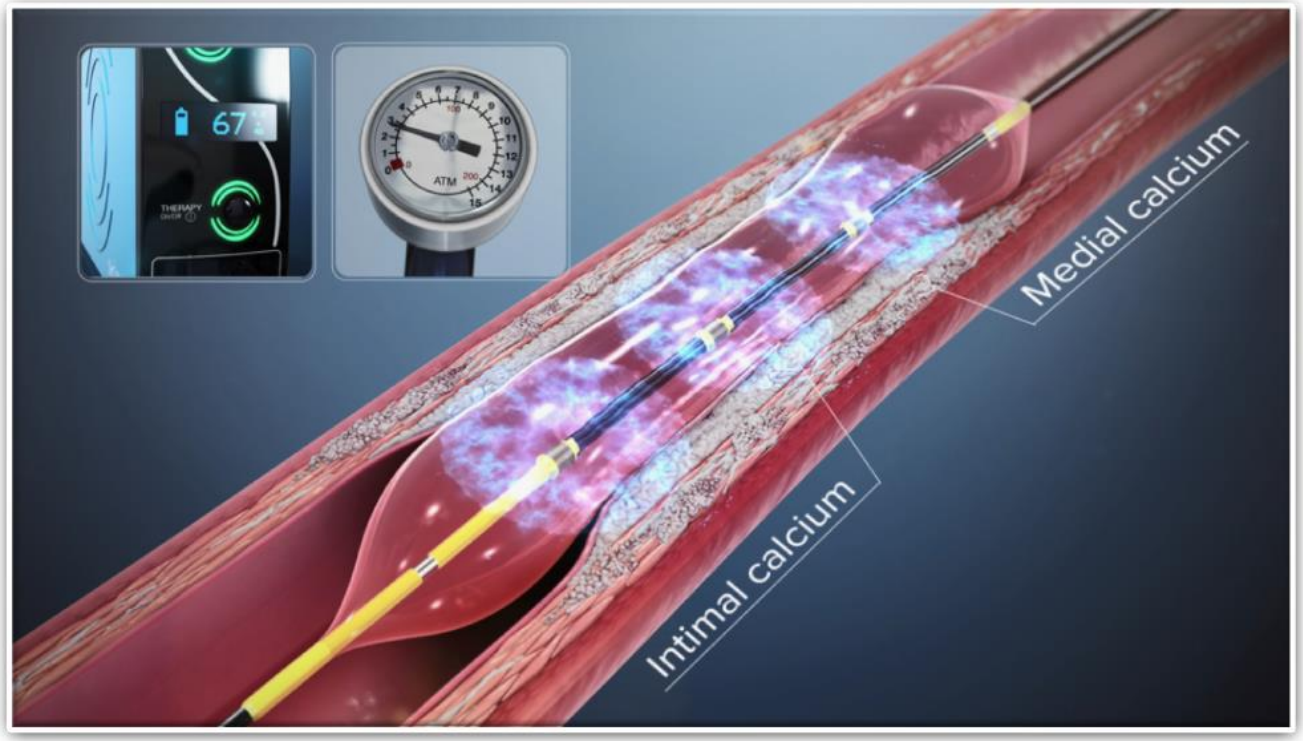
- Minimise le traumatisme en concentrant son effet sur le calcium
- Simplifie la procédure car simple d'utilisation

A Simple Algorithm to Simplify Procedures



Reference

How IVL Cracks Calcium In Situ



After inflating the integrated balloon to 4-atm, a small spark at the emitters vaporizes the saline-contrast solution and creates a bubble which rapidly expands and collapses within the balloon; this expanding and collapsing bubble **creates a short burst of sonic pressure waves**.

The sonic pressure waves travel through the coronary tissue, while reflecting off and cracking calcium with an effective pressure of **~50 atm**. The emitters along the length of the device create a **localized field effect** within the vessel to fracture both **intimal and medial** calcium.

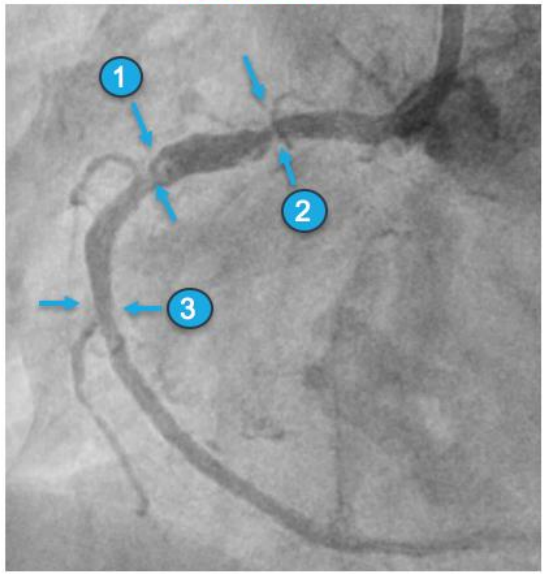
The integrated balloon plays a unique role; its apposition to the vessel wall **facilitates efficient energy transfer** during IVL, after which, it is used to dilate the lesion to maximize lumen gain.

Case: Multi-Lesion RCA

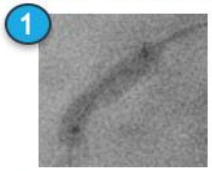
Courtesy of Jonathan Hill, King's College London

Summary: Multi-lesion RCA; Couldn't advance guideliner to distal lesion despite predilation; advanced 3.5mm IVL catheter as far as possible (1); delivered one cycle (10 pulses) and vessel opened; pulled back to the ostium (2) and vessel opened after one cycle (10 pulses); advanced to distal lesion (3) and vessel opened after one cycle (10 pulses); easily delivered 80mm of DES.

Baseline

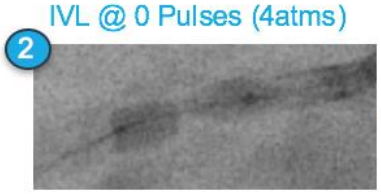


IVL @ 0 Pulses (4atms)

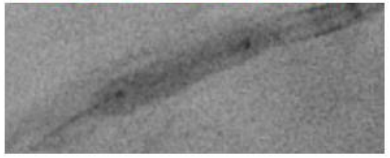


IVL @ 10 Pulses (4atms)

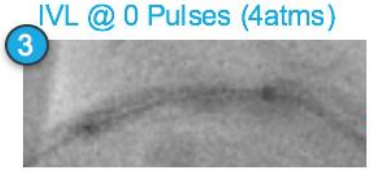
IVL @ 0 Pulses (4atms)



IVL @ 10 Pulses (4atms)



IVL @ 0 Pulses (4atms)



IVL @ 10 Pulses (4atms)

Post-Stent

Reference

Indications

- Lésions calcifiées
- En alternative au rotablator notamment si rotablator difficile
- Dans les stents non ouverts

Conclusions

- Beauco
- Mais pa
- C’est pc te ans!!!