2-year safety and efficacy of the novel Kanshas drug-coated balloon in the treatment of femoropopliteal occlusive disease: First-in-human KANSHAS 1 study outcomes

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on behalf of the KANSHAS 1 study investigators

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Conflict of Interest Disclosure

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

1. Honoraria for lectures: CR Bard, Veniti, AB Medica, Volcano, Optimed GmbH, Straub Medical, Terumo, Biotronik, Veryan

2. Honoraria for advisory board activities: Veniti, Optimed GmbH, Straub Medical, Biotronik, Veryan, Boston Scientific

3. Participation in clinical trials: Biotronik, CR Bard, Veryan, Straub Medical, Veniti, TVA Medical, Boston Scientific, LimFlow

4. Research funding: Biotronik, Boston Scientific, Veryan, Veniti, AB Medica

Background and aim

- **Drug-coated balloon (DCB)** therapy has demonstrated a **higher effectiveness** compared to **standard PTA** and has been widely accepted as a valuable treatment option for patients with **femoropopliteal disease**.

- **Kanshas DCB** has been **developed to address** some **limitations** of the first generation DCBs **related to coating integrity**.

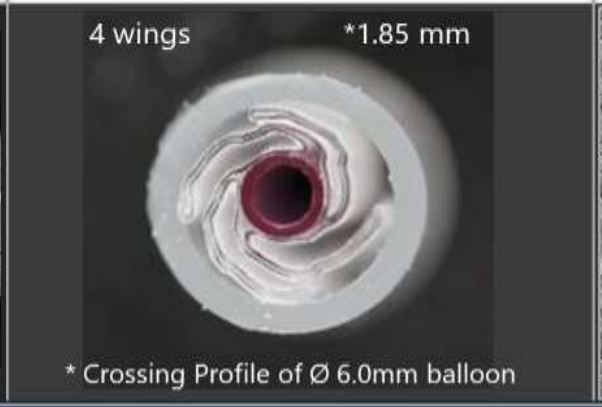
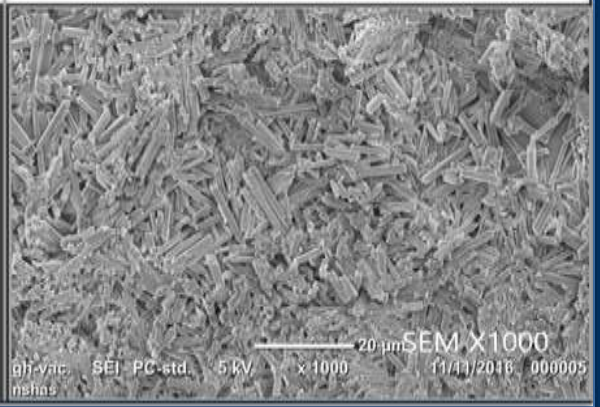
- **KANSHAS 1** first-in-human study aims at **investigating** the **safety** profile and **therapeutic advantages** of the novel **Kanshas DCB** in treatment of **de novo femoropopliteal lesions**.

Kanshas DCB device

Specification:

Drug: Paclitaxel (3.2µg/mm^2)
Balloon diameter: 4.0 – 7.0 mm
Catheter length: 150 cm
Nominal pressure: 8 atm (RBP 10-14 atm)

Excipient: L-Serine Ethyl Ester HCl
Balloon length: 40 – 200 mm
Compatible GW size: 0.018″
Rapid exchange type

Uniform coating	Crossing profile	Microcrystalline Paclitaxel
		

CE marked since June 2018

KANSHAS 1 study

To assess **safety** and **efficacy** of the Kanshas DCB catheter in the treatment of **de novo lesions** in the **superficial femoral** and/or **popliteal arteries**

Prospective, multi-center, open-label, single arm study

50 patients enrolled at 6 sites in Germany and Belgium from April 2017 to January 2018

- Karolinen-Hospital: Klinikum Arnsberg
- Universitäts-Herzzentrum Freiburg-Bad Krozingen
- Ev Luth Diakonissenanstalt zu Flensburg Zentrum für Gesundheit und Diakonie
- RoMed Klinikum Rosenheim

- AZ St. Blasius Dendermonde
- Imelda Ziekenhuis Bonheiden

Enrollment **completed** /
Follow-up **ongoing (extended to 5-years)**

Study management

- Steering Committees
- Clinical Event Committee (CEC)
- Data Monitoring Committee
- Angiographic Core Laboratory (BIDMC)
- Ultrasound Core Laboratory (Vascore)
- Monitors (Genae, Terumo Europe)
- Managed and sponsored by Terumo Europe

100% source data verification and **independent Core laboratory** assessment. Adverse events **adjudication by CEC**

Clinical Follow-up

Primary endpoint
Freedom from Composite Safety* **at 6 months**

*Defined as freedom from device- and procedure-related deaths through 30 days, freedom from target limb amputation, and clinically-driven target lesion revascularization (TLR) through 6 months

Eligibility and Patient disposition

Main Inclusion Criteria:

- Clinically significant symptomatic leg ischemia, requiring treatment of the **SFA and/or PA**
- **Rutherford Clinical Category of 2-4**
- **Resting ABI of < 0.9 or abnormal exercise ABI**
- **Cumulative lesion length 4-15 cm**
- Clinically and hemodynamically significant **de novo stenosis (>70% stenosis) or occlusion including P3 segment**
- Patent inflow artery (≥50% DS)
- At least one patent outflow artery

Main Exclusion Criteria:

- In-stent restenosis
- **Vessel injuries after predilatation; flow-limiting dissection, requiring stenting, or perforation**
- Subintimal recanalization
- **Severe calcification** in the target lesions that precludes endovascular treatment
- Previous treatment with DCB or DES in target vessel

SFA: superficial femoral artery, PA: popliteal artery, ABI: ankle-brachial index, DS: diameter stenosis, DCB: drug-coated balloon, DES: drug-eluting stent

Baseline patient & lesion characteristics

Patients	N=50
Age, years	69.0 ± 10.5
Male	34 (68.0)
Hypertension	43 (86.0)
Hyperlipidemia (n=49)	36 (73.5)
Diabetes Mellitus	18 (36.0)
Smoker (n=49)	
Current	21 (42.9)
Previous	19 (38.8)
Ischemic heart disease[a]	17 (34.0)
History of PAD (n=49)	23 (46.9)
Renal insufficiency	4 (8.0)
COPD	6 (12.0)
Cerebrovascular disease[b]	6 (12.0)
Rutherford category	
2	8 (16.0)
3	39 (78.0)
4	3 (6.0)
ABI (n=48)	0.67 ± 0.14

Target lesions[c]	N=50
Lesion location	
SFA proximal	1 (2.0)
SFA mid	25 (50.0)
SFA distal	21 (42.0)
Popliteal proximal	9 (18.0)
Popliteal mid	8 (16.0)
Popliteal distal	2 (4.0)
Cumulative lesion length, mm	88.6 ± 36.5
Single lesion	45 (90.0)
Multiple lesion[d]	5 (10.0)
Reference vessel diameter, mm	5.4 ± 0.6
Diameter stenosis, %	91.0 ± 9.4
Calcification	
None	21 (42.0)
Mild	19 (38.0)
Moderate	9 (18.0)
Severe	1 (2.0)
Total occlusion	15 (30.0)
Ipsilateral inflow lesion	4 (8.0)
Successful treatment	4/4 (100.0)
Patent run-off vessels	
1 vessel	13 (26.0)
2 vessels	13 (26.0)
3 vessels	24 (48.0)

Data are shown as mean ± SD or n (%).
COPD: chronic obstructive pulmonary disease, **PAD:** peripheral artery disease
a: History of myocardial infarction, angina pectoris, or previous percutaneus or surgical revascularization. **b:** Known carotid artery disease or history of minor or major stroke or transient ischemic attack. **c:** Assessed by visual estimate.
d: Multiple focal lesions separated by a gap of ≤30mm were counted as one lesion.

Procedure characteristics & outcomes

Procedural characteristics[a] (n=50)	
Pre-dilation	48 (96.0)
Total inflated length, mm	72.1 ± 26.7
Balloon/ artery ratio	0.86 ± 0.10
Residual DS, %	35.6 ± 22.3
DCB per lesion (58/50)	1.2 ± 0.4
Balloon transit time, sec	44.3 ± 54.7
Total inflated length, mm	117.0 ± 48.9
Balloon/ artery ratio	1.04 ± 0.07
Maximum pressure, atm	10.0 ± 1.7
Inflation time/balloon, min	3.2 ± 0.7
Post-dilation	17 (34.0)
Total inflated length, mm	81.8 ± 28.3
Balloon/ artery ratio	0.97 ± 0.11
Stenting*	14 (28.0)
Due to flow-limiting dissection	1 (2.0)
Due to residual stenosis >50%	3 (6.0)

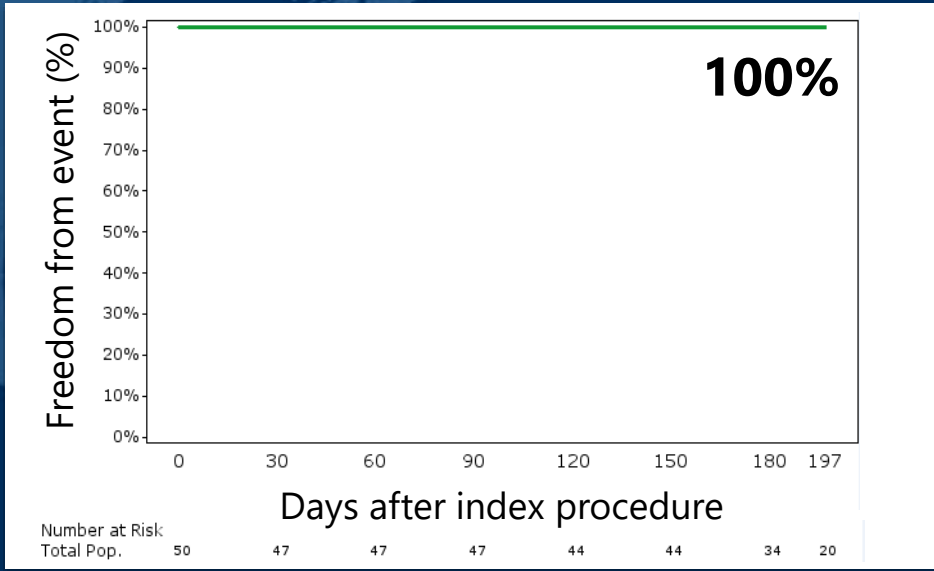
Procedural outcomes	
Device success**	58 (100.0)
Residual diameter stenosis[a] , %	11.2 ± 7.8
Length of hospital stay, days	1.7±0.6

Data are shown as mean ± SD or n (%)
a: Assessed by visual estimate.
* After unsuccessful post-dilatation for a residual stenosis >50% or significant dissection after the use of Kanshas DCB, bailout procedures with commercially available nitinol stents were allowed at the discretion of the operator.
** Device success defined as no device malfunction

Primary Endpoint

composite safety at 6 months

Defined as:
Freedom from device- and procedure-related deaths **through 30 days**, freedom from target limb amputation, and clinically-driven target lesion revascularization (CD-TLR) **through 6 months**



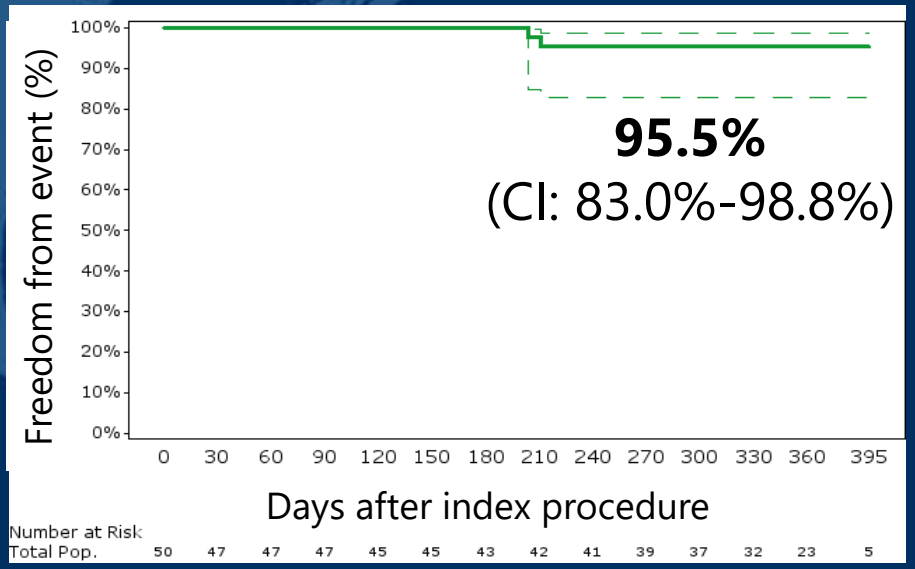
6-month follow-up	
Device-/Procedure-related deaths	None
Target limb amputation	None
CD-TLR	None

No device- and procedure-related Severe Adverse Events (SAE) have been reported up to 6-month FU

Secondary Endpoint

Major Adverse Event (MAE) rate at 12 months

Defined as:
Freedom from all death, target limb amputation, and clinically-driven target lesion revascularization (CD-TLR) through 12 months

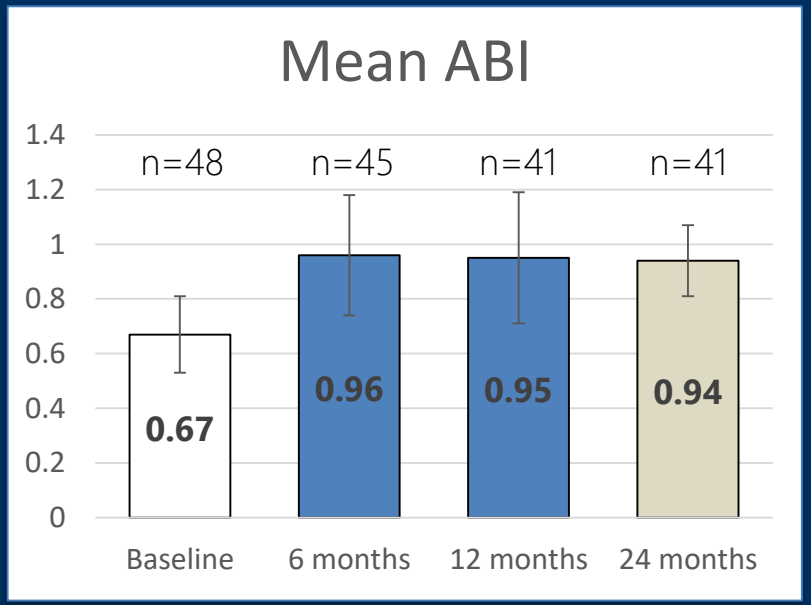


12-month follow-up	
All deaths	None
Target limb amputation	None
CD-TLR	2/42 (4.8%) (1) after 204 days (2) after 211 days

CD-TLR: defined as 50% or more stenosis with worsening symptoms, or more than 70% stenosis without symptoms

Outcomes up to 24-months

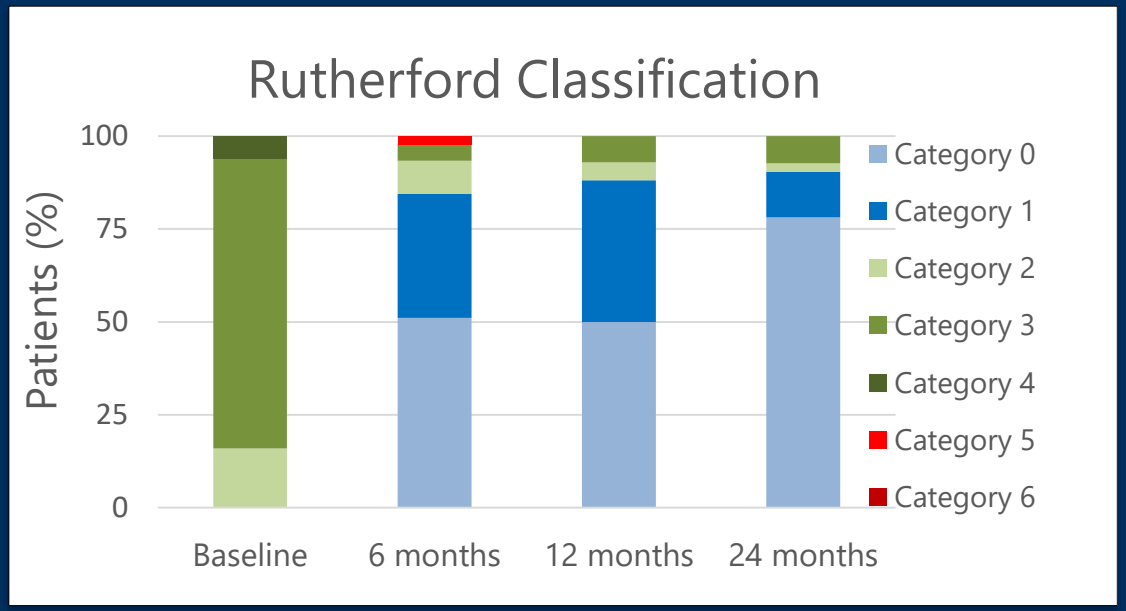
Hemodynamic outcomes				
		6 months	**12 months**	**24 months**
ABI		0.96±0.22 (n=45)	0.95±0.24 (n=41)	0.94±0.13 (n=41)
ABI change vs baseline (matched)		0.28±0.24 (n=43)	0.24±0.16 (n=39)	0.27±0.17 (n=39)
Primary Patency*	Absolute	88.4 (38/43**)	78.1 (32/41)	78.6 (33/42)
	Kaplan-Meier estimate	88.4 (210-day)	83.6 (365-day)	76.4 (730-day)



Data are shown as mean ± SD or % ;
*** Primary patency** is defined as freedom from clinically-driven target lesion revascularization and absence of target lesion stenosis >50% per (analyzable) Duplex Ultrasound (peak systolic velocity ratio (PSVR) ≤2.4), as independently assessed by Core laboratory and CEC. ****** 1 patient missed the 6-month follow-up, but was patent at 8 months visit

Outcomes up to 24-months

Rutherford class change vs. baseline (matched)	
6 months (n=45)	
Improvement	42 (93.3%)
No change	2 (4.4%)
Worsening	1 (2.2%)
12 months (n=42)	
Improvement	39 (92.9%)
No change	2 (4.8%)
Worsening	1 (2.4%)
24 months (n=41)	
Improvement	38 (92.7%)
No change	2 (4.9%)
Worsening	1 (2.4%)



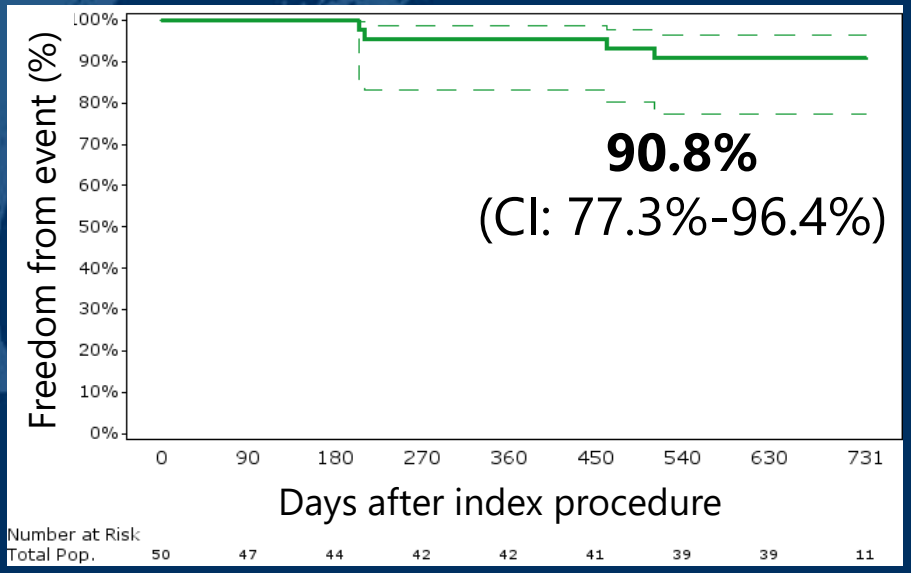
Outcomes up to 24-months

Rutherford class improvement vs. baseline (matched)	
6 months (n=45)	
-1 Category change	6 (13.3%)
-2 Categories change	18 (40.0%)
-3 Categories change	17 (**37.8%**)
-4 Categories change	1 (**2.2%**)
12 months (n=42)	
-1 Category change	4 (9.5%)
-2 Categories change	18 (42.9%)
-3 Categories change	16 (**38.1%**)
-4 Categories change	1 (**2.4%**)
24 months (n=41)	
-1 Category change	2 (4.9%)
-2 Categories change	10 (24.4%)
-3 Categories change	24 (**58.5%**)
-4 Categories change	2 (**4.9%**)

Secondary Endpoint

Major Adverse Event (MAE) rate at 24 months

Defined as:
Freedom from all death, target limb amputation, and clinically-driven target lesion revascularization (CD-TLR) through 24 months



24-month follow-up	
All deaths	1 (suicide)
Target limb amputation	None
CD-TLR	3/42 (7.1%) (1) after 204 days (2) after 211 days (3) after 462 days

CD-TLR: defined as 50% or more stenosis with worsening symptoms, or more than 70% stenosis without symptoms

Conclusions

- Angioplasty using the novel **Kanshas DCB for the treatment of de novo femoropopliteal artery** lesions **is safe and efficient throughout the period of 24 months** following the procedure.
- **Clinical and hemodynamic improvement at 24 months** was achieved in the **great majority of patients treated with Kanshas DCB.**
- **No** sign of **abnormal late mortality signal** was observed in the studied patient population upon the treatment **with Kanshas DCB**.

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