Clinical Plasticity of PLLA – Novel BioResorbable Vascular Platforms from India

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Disclosure

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I do not have any potential conflict of interest.
Current Tx of PVD – Metal Stent Technologies in Abundance

- VALEO
- RX Herculink Elite
- LIFESTRM
- E- LUMINEXX
- BALTON
- LIFEStent SOLO
- COGENT
- CREDEncE BMS
- LIFEStAR
- angiolite
- COVERA
- SMART Control
- Tsunami
- INVATE

...because you haven't reached the maximum!
Limitation of Existing Technologies
The Intuitive Desire in Stenting

Un-caging the vessel wall

STEMI
Bifurcation
CTOs
Carotid
Renal
Iliac
## The Intuitive Promise of BRS

### Leave Nothing Behind

- Un-caging the vessel & restoration of vascular function
- Avoid, positive remodeling of the treated vessel/malapposition
- Avoid/resolve late strut fractures
- Facilitation of repeat treatment – Surgical or Angioplasty
- Restoration of normal vessel curvature
- In-stent restenosis. No need to leave behind more metal
- Early discontinuation of DAPT
- MRI/CT imaging follow-up. No hospital admissions.
- Imminent surgical cases
- Plaque regression. Reduced neoatherosclerosis
- Reduced costs on the system
Credence BtK – Sirolimus Eluting Bioresorbable Peripheral Scaffold System

Size Matrix – 63 SKUs
Ø – 2.50, 2.75, 3.00, 3.25, 3.50, 4.00, 4.50 mm
L – 8, 13, 16, 19, 24, 29, 32, 37, 40 mm

Credence BtK is currently under clinical study and not available for commercial sale.
Hydrolysis randomly cleaves amorphous tie chains, leading to a decrease in molecular weight without altering radial strength. When enough tie chains are broken, the device begins losing radial strength.
Credence BtK – Degradation

- Credence BtK is manufactured from a high molecular weight of 275-300 kDa of PLLA.
- Degradation is led by hydrolysis and entire scaffold is consumed over a period of 2-3 years.

- Hydrolysis occurs via random chain scission of the ester bond.
- Factors affecting hydrolysis – polymer chemistry, enzymatic activity, temperature, implant dimensions, local pH
- Water can only penetrate the amorphous phase.
- Hydrolysis of amorphous tie chains leads to an erosion of radial strength.
**Credence BtK – Study Design**

10 centers across India

*First-in-man Safety and Efficacy* in Patients Critical Limb Ischemia disease due to de novo lesions (length ≤56 mm) in below the knee arteries treated by a Credence BtK in 30 pts

<table>
<thead>
<tr>
<th>Clinical follow-up</th>
<th>Angiographic follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>N = 30</td>
<td>Day-1</td>
</tr>
<tr>
<td></td>
<td>1-month</td>
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<td>6-month</td>
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<td></td>
<td>1-year</td>
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<td>2, 3, 4, 5-years</td>
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</tbody>
</table>

Study

: Prospective, open label, single arm study.

Clinical Endpoints

: Absence of clinical complications at 1 month post-procedure. Scaffold thrombosis as per ARC definition up to 5 years.
Key Eligibility Criteria

Key Inclusion Criteria
• Age ≥ 18 years
• Stenotic (>50%) or occlusive atherosclerotic disease of the below the knee arteries
• Length of lesion ≤ 56 mm
• Reference vessel diameter 2.25–4.50 mm
• A maximum of two lesions in one below the knee vessel treated in the study, or in two vessels of two different legs
• Symptomatic Critical Limb Ischemia (Rutherford 4 and 5)
• Life expectancy of >6 months

Key Exclusion Criteria
• Reference segment diameter not suitable for available scaffold size matrix
• Length of lesion requiring more than one scaffold implantation
• Previously implanted stent(s) or PTA at the same lesion site
• Lesion lying within or adjacent to an aneurysm
• Inflow-limiting arterial lesions left untreated
• Patient history of prior life-threatening contrast medium reaction
Study Endpoints

• **Safety**
  – Absence of clinical complications at 1 month post-procedure
  – Scaffold Thrombosis as per ARC definition up to 5 years

• **Performance Endpoints**
  – Technical success at 48 hrs & clinical success at each follow-up
  – Limb salvage rates at 6 & 12 months
  – Primary patency rate at 1 month, 1, 2, 3, 4 and 5 years
  – Target lesion revascularization (TLR) at 1 month, 6 months, 1, 2, 3, 4 and 5 years
  – Improvement of Ankle-Brachial Index (ABI)

• **Angiographic Endpoints**
  – Late Lumen Loss (LLL) diagnosed at 6 month
  – Primary patency at 6 months
TP-Trunk Artery Stenosis

69 Y/M | Diabetic | Hypertensive | Gangrene in Rt. II Toe | RF Class-4 | ABI-0.57

Pre-Procedure

Peri-Procedure

Post-Procedure

Data on file.
TP-Trunk Artery Stenosis

59 Y/M | Diabetic | Hypertensive | RF Class-5 | ABI-0.76

Pre-Procedure

Peri-Procedure

Post-Procedure

Data on file.
TP-Trunk Artery Stenosis

69 Y/M | Diabetic | History of PTA (Zilver PTX in both linb) | Hypertensive | RF Class-4 | ABI-0.8

Pre-Procedure

Credence BtK – 2.75 x 19mm

Post-Procedure

Credence BtK 2.75 x 19mm

MOZEC SEB 2.50 x 17mm

Data on file.
Credence BRS –
Sirolimus Eluting Bioresorbable Peripheral Scaffold System

- Fully biodegradable scaffold – PLLA back-bone
- Top coat comprising of Sirolimus (1.25 μg/mm²) + PDLLA
- 3 tri-axial RO markers at each end of the scaffold
- 6 F sheath 0.035” guide wire; 135 cm catheter length
- Size matrix –
  - Diameters (mm) : 5.00, 6.00, 7.00, 8.00, 9.00, 10.00
  - Lengths (mm) : 17, 27, 37, 47, 57

Credence BRS 5.0x17 mm in Porcine Lt. External Iliac Artery

Baseline

30-day follow-up

OCT Images Courtesy Skirball Center, NY, US. Dr. Greg Kaluza, Dr. Juan Granada et al. Data on file.
Credence BRS is currently under clinical study and not available for commercial sale.
Melange BRS –
Sirolimus Eluting Bioresorbable Renal Scaffold System

• Fully biodegradable scaffold – PLLA back-bone
• Top coat comprising of Sirolimus (1.25 μg/mm$^2$) + PDLLA
• 3 tri-axial RO markers at each end of the scaffold
• 0.014" g/w; 6 F sheath compatible; 135 cm catheter length
• Size matrix –
  – Diameters (mm) – 5.00, 6.00, 7.00 & Lengths (mm) – 12, 15, 19
• Melange BRS is currently under FiM Clinical Study

Melange Renal BRS 5.0x12 mm in Porcine Rt. Renal Artery

OCT Images Courtesy Skirball Center, NY, US. Dr. Greg Kaluza, Dr. Juan Granada et al. Data on file.
Melange BRS is currently under clinical study and not available for commercial sale.
Promesa BRS –
Braided Peripheral BioResorbable Scaffold

Unmet Clinical Need

- A drug eluting BioResorbable peripheral scaffold system which ensures fracture free, long term patency

Device Description

- Drug Eluting Self-Expanding BioResorbable Peripheral OTW Scaffold
  - Diameters: 3.00 to 10 mm
  - Lengths: 20 to 200 mm
  - Employs 3.0 µg/mm² of Sirolimus timed to elute from a biodegradable polymer platform
  - Low profile for ease in navigation
  - Might be utilized in carotids, SFA, popliteal, iliac and below the knee lesions

PromesaBRS is currently under clinical study and not available for commercial sale.
Promesa BRS –
Braided Peripheral BioResorbable Scaffold

Data on file.
Conclusion

• The current generation of metal stents for treatment of peripheral vascular disease have their definite disadvantages – restenosis, strut fractures, aneurysms etc are commonly associated with metal stents.

• The concept of Bioresorbable vascular scaffolds with a promise of leaving nothing behind is clinically compelling.

• First generation of indigenously developed Peripheral BRS technologies have now entered human clinical trials.

• Soon clinical usefulness of these promising developments will be evaluated in RCT`s against standard treatment.
Thank You...!
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