Diamondback 360® Coronary Orbital Atherectomy System for Treating De Novo, Severely Calcified Lesions:

1-Year Results of the Pivotal ORBIT II Trial and Economic Analysis
Differential orbital sanding:
- Increased speed = Increased centrifugal force
- Greater centrifugal force = Larger orbital diameter

Continuous flow of blood and saline during orbit
- Minimizes thermal injury
- Potentially decreases no-reflow and periprocedural cardiac enzyme elevation

The crown treats the entire lumen and different vessel diameters can be treated based on orbiting speed
CSI Coronary IDE Timeline

Pre-IDE FDA Meeting
3.13.08
Refine requirements for animal and ORBIT I studies / Plan for randomized trial

First ORBIT I Patient Enrolled
5.27.2008

Pre-IDE FDA Meeting
11.12.08
FDA proposed single arm for pivotal study

IDE Submitted
6.15.09

IDE Conditional Approval
12.22.09

First Patient Enrolled ORBIT II
5.25.2010

Last ORBIT I Patient Enrolled
7.5.2008
Finalized pivotal trial requirements

K071350
Traditional 510(k)
OASIS Peripheral Indication
5.11.07 – 8.22.07 = 104 Days

Pre-IDE FDA Meeting
6.15.09

First Patient Enrolled ORBIT II

PMA Submitted
3.15.2013

Coronary OAS FDA approval
10.21.2013

Last Patient Enrolled ORBIT II

2007
2008
2009
2010
2011
2012
2013
• Pivotal Trial to Evaluate the Safety and Efficacy of the Orbital Atherectomy System in Treating De Novo, Severely Calcified Coronary Lesions (ORBIT II)\textsuperscript{1}

To evaluate safety and efficacy of the Diamondback Coronary OAS to prepare *de novo*, **severely calcified coronary lesions** for enabling stent placement

- Prospective, multi-center trial
- Single arm - As there are no FDA-approved percutaneous treatments for patients with severely calcified lesions.

- N=443 enrolled in 49 U.S. sites
- 30 days follow-up (N=437/440)
- 1 year follow-up (N=433/440)
ORBIT II Inclusion/Exclusion Criteria

**Key Inclusion:**
- The target lesion must have fluoroscopic or IVUS evidence of severe calcium: Presence of radiopacities noted without cardiac motion prior to contrast injection involving both sides of the arterial wall with calcification length of at least 15 mm and extend partially into the target lesion or presence of ≥ 270° of calcium at one cross section via IVUS
- The target vessel reference diameter ≥ 2.5 mm and ≤ 4.0 mm and lesion must not exceed 40 mm in length

**Key Exclusion:**
- Diagnosed with chronic renal failure (CR >2.5 mg/dl) unless under hemodialysis
- Evidence of current LVEF ≤25%
- More than 1 lesion requiring intervention unless the lesions are staged
- In-stent treatment
- Target lesion is an ostial location, bifurcation or has a ≥ 1.5 mm side branch
- Target lesion has thrombus or dissection
- Angio evidence of dissection prior to initiation of OAD
## ORBIT II: DEMOGRAPHICS & LESION/VEssel CHARACTERISTICS

### Demographics

<table>
<thead>
<tr>
<th></th>
<th>N=443</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>64.6%</td>
</tr>
<tr>
<td>Age (yrs)</td>
<td>71.4</td>
</tr>
<tr>
<td>History of diabetes mellitus</td>
<td>36.1%</td>
</tr>
<tr>
<td>History of CABG</td>
<td>14.7%</td>
</tr>
<tr>
<td>History of dislipidemia</td>
<td>91.9%</td>
</tr>
<tr>
<td>History of hypertension</td>
<td>91.6%</td>
</tr>
<tr>
<td>Smoker (current or previous)</td>
<td>66.1%</td>
</tr>
</tbody>
</table>

### Vessel & Lesion Characteristics

<table>
<thead>
<tr>
<th></th>
<th>N=440</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean pre-procedure target lesion length</td>
<td>18.9 mm</td>
</tr>
<tr>
<td>Mean pre-procedure minimum lumen diameter</td>
<td>0.5 mm</td>
</tr>
<tr>
<td>Mean pre-procedure percent stenosis</td>
<td>84.4%</td>
</tr>
</tbody>
</table>

### Types of stents

<table>
<thead>
<tr>
<th></th>
<th>n=542</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMS</td>
<td>11.4%</td>
</tr>
<tr>
<td>DES</td>
<td>88.2%</td>
</tr>
</tbody>
</table>
ORBIT II STUDY OBJECTIVE 1
EFFICACY

Demonstrate that the OAS successfully facilitates stent deployment in severely calcified coronary lesions

Successful Stent delivered: 97.7%*
Less than 50% residual stenosis: 98.6%

*One of the subjects did not have stent placed per Investigator discretion. The Investigator felt that a good result was obtained with OAS followed by balloon inflation (without stent placement); therefore, he determined that it was in the best interest of the subject not to place a stent.
ORBIT II STUDY OBJECTIVE 2
SAFETY

Demonstrate that the OAS is safe in treating *de novo*, severely calcified coronary lesions.

<table>
<thead>
<tr>
<th>Event</th>
<th>30 Days</th>
<th>Change from 30 Days to 1 Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac Death</td>
<td>0.2%</td>
<td>2.8%</td>
</tr>
<tr>
<td>TVR</td>
<td>1.4%</td>
<td>4.5%</td>
</tr>
<tr>
<td>MI (3X CK-MB)</td>
<td>9.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Q-Wave MI</td>
<td>0.9%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Non-Q Wave MI</td>
<td>8.8%</td>
<td>0.0%</td>
</tr>
<tr>
<td>MACE (3X CK-MB)</td>
<td>10.4%</td>
<td>6.0%</td>
</tr>
<tr>
<td>MI (SCAI definition: 10X CK-MB)</td>
<td>2.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>MACE (SCAI definition: 10X CK-MB)</td>
<td>3.2%</td>
<td>6.7%</td>
</tr>
</tbody>
</table>
ORBIT II: 1-YEAR OUTCOMES
TVR/TLR

TVR/TLR: 5.9%
TLR: 4.7%
TVR (non-TLR): 1.9%
**9-12 MONTHS MACE IN PATIENTS WITH SEVERE CORONARY CALCIUM**

<table>
<thead>
<tr>
<th></th>
<th>ORBIT II 9-months OAS+BMS/DES&lt;sup&gt;1&lt;/sup&gt;</th>
<th>ORBIT II 1-year OAS+BMS/DES&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe</td>
<td>14.8%</td>
<td>16.4%</td>
</tr>
</tbody>
</table>

1. Chambers, 2014, Data on file at CSI, ORBIT II, 100% severely calcified lesions
## 9-12 MONTHS MACE IN PATIENTS WITH CORONARY CALCIUM

<table>
<thead>
<tr>
<th></th>
<th>Moderate/severe</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROTAXUS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-months RA+DES⁵²</td>
<td>24.2%</td>
<td></td>
</tr>
<tr>
<td>9-months DES alone⁵²</td>
<td>28.3%</td>
<td></td>
</tr>
<tr>
<td><strong>ACUITY/HORIZONS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-year All PCI⁶³</td>
<td></td>
<td>19.9%</td>
</tr>
</tbody>
</table>

### Notes:
2. Abdel-Wahab 2013, EuroPCR, ROTAXUS, ~50%/50% moderate/severely calcified lesions, and Abdel-Wahab, 2013 JACC:CI
3. Genereux, 2013, TCT, ACUITY/HORIZONS Subanalysis, 100% severely calcified lesions
This summary presentation shows results as presented in the literature, but is not a direct device-to-device comparison since the studies described vary in design.

### MORTALITY

<table>
<thead>
<tr>
<th></th>
<th>ORBIT II 9-months OAS+BMS/DES(^1)</th>
<th>ORBIT II 1-year OAS+BMS/DES(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>0%</td>
<td>4.4%</td>
</tr>
</tbody>
</table>

3.0%

---

1. Chambers, 2014, Data on file at CSI, ORBIT II, 100% severely calcified lesions
# MORTALITY

<table>
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<tr>
<td><strong>ROTAXUS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-months</td>
<td>5.0%</td>
<td>5.8%</td>
</tr>
<tr>
<td>RA+DES²</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROTAXUS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-months</td>
<td>5.8%</td>
<td>6.3%</td>
</tr>
<tr>
<td>DES alone²</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ACUITY/HORIZONS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-year</td>
<td>6.3%</td>
<td></td>
</tr>
<tr>
<td>All PCI³</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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2. Abdel-Wahab 2013, EuroPCR, ROTAXUS, ~50%/50% moderate/severely calcified lesions, and Abdel-Wahab, 2013 JACC:CI
3. Genereux, 2013, TCT, ACUITY/HORIZONS Subanalysis, 100% severely calcified lesions
This summary presentation shows results as presented in the literature, but is not a direct device-to-device comparison since the studies described vary in design.

TARGET LESION REVASCULARIZATION

<table>
<thead>
<tr>
<th></th>
<th>ORBIT II 9-month OAS+BMS/DES¹</th>
<th>ORBIT II 1-year OAS+BMS/DES¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.5%</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

¹. Chambers, 2014, Data on file at CSI, ORBIT II, 100% severely calcified lesions
## Target Lesion Revascularization

<table>
<thead>
<tr>
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<th>Moderate/severe</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ROTAXUS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-months</td>
<td>11.7%</td>
<td></td>
</tr>
<tr>
<td>RA+DES$^2$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROTAXUS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-months</td>
<td>12.5%</td>
<td></td>
</tr>
<tr>
<td>DES alone$^2$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ACUITY/HORIZONS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-year</td>
<td>8.7%</td>
<td></td>
</tr>
<tr>
<td>All PCI$^3$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Abdel-Wahab 2013, EuroPCR, ROTAXUS, -50%/50% moderate/severely calcified lesions, and Abdel-Wahab, 2013 JACC:CI
3. Genereux, 2013, TCT, ACUITY/HORIZONS Subanalysis, 100% severely calcified lesions
# ORBIT II COST SAVINGS ANALYSIS

## Diagnosis code 414.4: *Coronary Atherosclerosis Due to Severely Calcified Coronary Lesions*

Medical resource utilization for both the index procedure and related readmission within 30 days of discharge from the ORBIT II clinical trial were analyzed, as well as device related complication cost.

<table>
<thead>
<tr>
<th>Data</th>
<th>UB-04 Inpatient Hospital Claims for ORBIT II with 414.4</th>
<th>MedPAR Data with 414.4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average Length of Stay</strong></td>
<td>1.8 days</td>
<td>4.24</td>
</tr>
<tr>
<td><strong>Average Charges</strong></td>
<td>$56,586</td>
<td>$77,247</td>
</tr>
<tr>
<td><strong>Average Cost</strong></td>
<td>$13,804</td>
<td>$18,098</td>
</tr>
<tr>
<td><strong>Average Payment</strong></td>
<td>$14,286</td>
<td>NA</td>
</tr>
</tbody>
</table>

Please note: Reimbursement information provided by CSI is gathered from 3rd party sources and is presented for illustrative purposes only. This information does not constitute legal or reimbursement advice.
Index procedure costs savings\textsuperscript{1-3} (via short procedure and low average length of stay)

\textbf{30-day procedure related readmission savings}\textsuperscript{1-3}

- Low rate CABG revascularizations
- Amortized cost of 30-day revascularization procedures across entire treatment population

\textbf{TOTAL}\textsuperscript{1-3}

$3,590 + $704 = $4,294

3. ORBIT II data on file at CSI

Please note: Reimbursement information provided by CSI is gathered from 3rd party sources and is presented for illustrative purposes only. This information does not constitute legal or reimbursement advice.
CONCLUSION

• The Diamondback Coronary Orbital atherectomy System is the first device approved specifically for the treatment of severely calcified coronary arteries.

• At 1-year the ORBIT II MACE rate was very low especially for cardiac death (3.0%) and TVR (5.9%).

• The rate and cost of delay to discharge and low readmission rates within the ORBIT II study suggests that use of the Diamondback Coronary OAS may lead to low costs.

• Using the Diamondback Coronary OAS as a lesion preparation tool prior to stent implantation offers patients with severely calcified coronary lesions a new treatment option with potential cost benefits.
• **Indications:** The DIAMONDBACK 360® Coronary Orbital Atherectomy System (OAS) is a percutaneous orbital atherectomy system indicated to facilitate stent delivery in patients with coronary artery disease (CAD) who are acceptable candidates for PTCA or stenting due to *de novo*, severely calcified coronary artery lesions,

• **Contraindications:** The OAS is contraindicated when the VIPERWIRE guide wire cannot pass across the coronary lesion or the target lesion is within a bypass graft or stent. The OAS is contraindicated when the patient is not an appropriate candidate for bypass surgery, angioplasty, or atherectomy therapy, or has angiographic evidence of thrombus, or has only one open vessel, or has angiographic evidence of significant dissection at the treatment site and for women who are pregnant or children.

• **Warnings/Precautions:**; Performing treatment in excessively tortuous vessels or bifurcations may result in vessel damage; The OAS was only evaluated in severely calcified lesions, A temporary pacing lead may be necessary when treating lesions in the right coronary and circumflex arteries; On-site surgical back-up should be included as a clinical consideration; Use in patients with an ejection fraction (EF) of less than 25% has not been evaluated. See the instructions for use before performing DIAMONDBACK 360 coronary orbital atherectomy procedures for detailed information regarding the procedure, indications, contraindications, warnings, precautions, and potential adverse events. For further information call CSI at 1-877-274-0901 and/or consult CSI’s website at [www.csi360.com](http://www.csi360.com).

• **Caution:** Federal law (USA) restricts this device to sale by or on the order of a physician.
### MACE Study

#### Study Name
Multi-center Prospective Study to Evaluate Outcomes of Moderate to Severely Calcified Coronary Lesions (MACE)

#### Study Design
This study is a prospective, multi-center, non-randomized study. An interim analysis will be performed after 100 subjects have completed the discharge visit.

#### Study Centers
Approximately 50 US centers will participate in this study.

#### Study Population
Up to 500 subjects may be enrolled in up to 50 US study sites. Subjects who are 18 years or older with a clinical indication for coronary angioplasty and who are found to have a *de novo*, coronary lesion will be invited to participate in the study.

#### Objectives
1. To assess current standard of care treatment outcome in none/mild, moderate, and severe calcified coronary lesions.
2. Obtain financial data, and procedure data, to support reimbursement initiatives and health care economics analysis.

#### Number of Participants
Approximately 500 subjects (100: none/mild calcification; 200: moderate calcification; 200: severe calcification) will be treated in this study.

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**Enroll up to 500 subjects**

- **100** subjects with:
  - None/mild:
    - Presence of readily apparent radiopacities within the vascular wall at the site of the stenosis, or
    - Presence of \( \leq 180^\circ \) of calcium at one cross section.

- **200** subjects with:
  - Moderate:
    - Presence of radiopacities only during the cardiac cycle before contrast injection with calcium extended partially into the target lesion, or
    - Presence of \( 181^\circ \) to \( 270^\circ \) of calcium at one cross section.

- **200** subjects with:
  - Severe:
    - Presence of radiopacities noted without cardiac motion prior to contrast injection involving both sides of the arterial wall in at least one location, total length of calcium (including segmented) must be at least 15mm and extend partially into the target lesion, or
    - Presence of \( \geq 271^\circ \) of calcium at one cross section.

1. A maximum of 5 subjects per site  
2. A maximum of 20 subjects per site
## MACE Study

### Primary Endpoints

The primary endpoint is to assess the current standard of care treatment when used to facilitate stent deployment in *de novo*, coronary lesions. This will be measured by a composite of Major Adverse Cardiac Events (MACE) at 30 days and 1-year post procedure.

MACE is composed of:

- Cardiac death.
- MI – defined as a CK-MB level > 3 times the upper limit of lab normal (ULN) value with or without new pathologic Q wave.
- TVR – defined as revascularization at the target vessel (inclusive of the target lesion) after the completion of the index procedure.

### Secondary Endpoints

1. Procedural Success
2. Health Economics