SUMMARY OF SAFETY AND EFFECTIVENESS DATA (SSED)

I. GENERAL INFORMATION

Device Generic Name:	Scaffold, Dissection Repair
Device Trade Name:	Tack Endovascular System® (6F)
Device Procode:	QCT
Applicant's Name and Address:	Intact Vascular, Inc. 1285 Drummers Lane, Suite 200 Wayne, PA 19087
Date of Panel Recommendation:	None
Premarket Approval Application (PMA) Number:	P180034
Date of FDA Notice of Approval:	04/11/2019

II. INDICATIONS FOR USE

The Tack Endovascular System® (6F) is intended for use in the superficial femoral and proximal popliteal arteries ranging in diameter from 3.5mm to 6.0mm for the repair of post percutaneous transluminal balloon angioplasty (PTA) dissection(s).

III. CONTRAINDICATIONS

The Tack Endovascular System® (6F) is contraindicated for the following:

1. Patients with residual stenosis in the treated segment equal to or greater than 30% after PTA.
2. Tortuous vascular anatomy significant enough to prevent safe introduction and passage of the device.
3. Patients with a known hypersensitivity to nickel-titanium alloy (Nitinol).
4. Patients unable to receive standard medication used for interventional procedures such as anticoagulants, contrast agents and antiplatelet therapy.

IV. WARNINGS AND PRECAUTIONS

The Warnings and Precautions can be found in the Instructions for Use for the Tack Endovascular System® (6F).

V. DEVICE DESCRIPTION

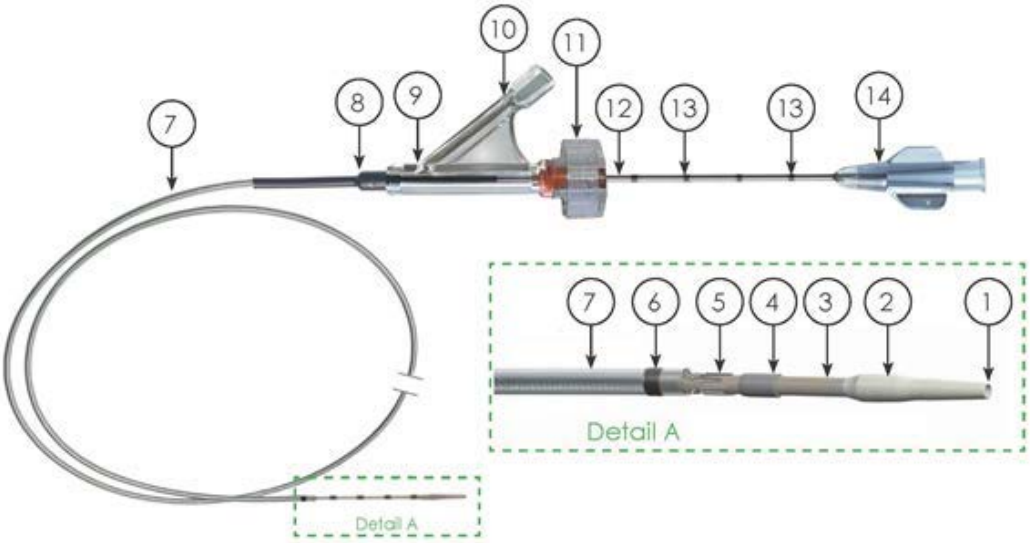
The Tack Endovascular System® (6F) is designed to treat vascular dissections with Tack implant(s) following angioplasty in the superficial femoral and proximal popliteal arteries, ranging 3.5mm to 6.0mm in diameter. The 6F (2.0mm) catheter contains 6 independent self-expanding Tack implants made of a nickel-titanium alloy (Nitinol). When deployed, the Tack implants are designed to treat acute dissections of the inner wall or lining of an artery by "tacking" the damaged tissue to the inner luminal surface through a low outward radial force.

The Tack Endovascular System® (6F) consists of 6 self-expanding Nitinol implants and a 6F (2.0mm) Delivery Catheter (see **Figure 1**). The numbers in parentheses in the following section refer to those in **Figure 1.**

The Tack implants are approximately 6mm in length and expand to an unconstrained diameter of 7.3 mm. The Tack implants are designed with a relatively flat chronic outward force curve and may be used across all reference vessel diameters (RVDs) ranging from 3.5 to 6.0mm. Six Radiopaque (RO) Markers (16) as well as six pairs of Anchors (17) are located around the centerline of each Tack implant. The anchors assist in maintaining proper Tack implant position.

The delivery catheter has effective lengths of 80cm, 120cm and 135cm. The 6F Outer Braided Sheath (7), which constrains the Tack implants, is bonded proximally to the Bifurcation Luer (9) within the Strain Relief (8). The Hemostatic Valve (11) is integrated proximally to the Bifurcation Luer. The Inner Core Shaft (3) slides within the Hemostatic Valve and has seven Proximal Inner Core Markers (13). The number of visible reference marks corresponds to the number of undeployed Tack implants remaining in the distal end of the delivery system. A soft, tapered Distal Tip (2) is bonded to the distal end of the Inner Core Shaft for ease of advancement in the blood vessel. Constrained within the Outer Braided Sheath, each self-expanding Tack implant is positioned on the Inner Core Shaft (3) between two radiopaque Distal Inner Core Markers (4) spaced approximately 7mm apart. A 1mm radiopaque Target Band (6) is located on the distal end of the Outer Braided Sheath.

The catheter is flushed prior to the procedure through the side port of the Bifurcation Luer and the Guidewire Port. Tack implant positioning is achieved prior to deployment by using as reference the Middle RO Markers on the Tack implant and the Target Band on the outer sheath. During Tack implant deployment; the Hemostatic Valve is unlocked by rotating the valve counter-clockwise. The Tack implants are individually unsheathed by pinning the Proximal Inner Core Shaft and pulling back on the outer sheath the distance between proximal inner core markers. After each deployment, the Hemostatic Valve is locked by rotating the valve clockwise, ensuring that the proximal edge of the Target Band is secured directly over a Distal Inner Core Marker. Between deployments, both the proximal inner core markers and the distal inner core markers serve to visually represent the number of remaining Tack implants in the delivery catheter.



1. Guidewire Lumen
2. Distal Tip
3. Inner Core Shaft
4. Distal Inner Core Marker
5. Crimped Tack
6. Target Band (Outer Sheath RO Marker)
7. Outer Braided Sheath
8. Strain Relief
9. Bifurcation Luer
10. Side port
11. Hemostatic Valve
12. Inner Core Shaft
13. Proximal Inner Core Markers
14. Guidewire Port
15. Unconstrained Tack
16. Middle RO Marker
17. Anchor

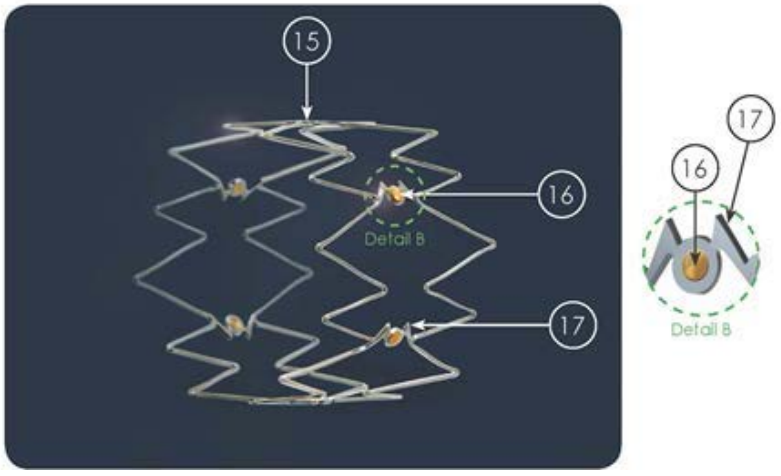


Figure 1. The Tack Endovascular System® (6F)

VI. ALTERNATIVE PRACTICES AND PROCEDURES

In the United States, there are currently no approved devices specifically intended for dissection treatment in peripheral arteries. As such, many dissections are left untreated, treated with extended PTA balloon inflation time, or treated with off-label stents.

VII. MARKETING HISTORY

The Tack Endovascular System® (6F) has not been marketed in the United States or any foreign country. In the European Union, the Tack Endovascular System® (6F) is CE-marked under Council Directive 93/42/EEC. While Intact Vascular, Inc. (IVI) has elected not to market the device in Europe to date, there has been limited use of the device in live-case settings at European medical society meetings in Germany.

VIII. POTENTIAL ADVERSE EFFECTS OF THE DEVICE ON HEALTH

The following complications may be associated with intravascular Tack device implantation:

- Access failure or abrupt closure
- Allergic / anaphylactoid reaction to anticoagulant and/or antithrombotic therapy or contrast medium
- Allergic reaction to Nitinol
- Amputation of lower extremity
- Anemia
- Angina / coronary ischemia / myocardial infarction
- Arrhythmia
- Arterial occlusion / (re) stenosis / dissection / thrombus
- Arterial spasm
- Arteriovenous fistula
- Blue toe syndrome
- Claudication or rest pain, worsened
- Death
- Disseminated intravascular coagulation
- Embolism
- Emergent repeat hospital intervention
- Fever
- Gangrene
- Gastrointestinal bleed from anticoagulation / antiplatelet medication
- Hematoma / hemorrhage
- Hypotension / hypertension
- Inadvertent venipuncture
- Infection / abscess at insertion site / Cellulitis
- Inflammation
- Multi-organ failure
- Pain
- Pseudoaneurysm
- Renal insufficiency or failure
- Reperfusion pain
- Respiratory distress or failure
- Septicemia / bacteremia (sepsis)

- Swelling / Edema, peripheral
- Tachycardia
- Tack implant embolization
- Tack implant migration (device moves over time)
- Tack implant occlusion / restenosis
- Tissue necrosis
- Trauma to adjacent structures
- Stroke / TIA (hemorrhagic / embolic)
- Vascular complications which may require surgical repair

For the specific adverse events that occurred in the TOBA II clinical study, please see **Section X** below.

IX. SUMMARY OF NON-CLINICAL STUDIES

A. Engineering Bench Testing

In vitro bench testing to assess the initial safety and effectiveness of the Tack Endovascular System® (6F) was conducted based on IVI's Quality System design control requirements and consistent with FDA Guidance, *Non-Clinical Engineering Tests and Recommended Labeling for Intravascular Stents and Associated Delivery Systems, April 18, 2010* and *Select Updates for Non-Clinical Engineering Tests and Recommended Labeling for Intravascular Stents and Associated Delivery Systems, August 15, 2015*. The relevant *in vitro* tests outlined in the guidance document and included in support of the Tack Endovascular System® (6F) are summarized in **Table 1.** Unless otherwise specified, all test units were 2x sterilized using a validated Ethylene Oxide sterilization process.

Table 1. Summary of Bench Testing of the Tack Endovascular System® (6F)

Test	Purpose	Acceptance Criteria	Results
Material Characterization			
Material Composition (Tack implant)	To verify that the Tack implant materials conform to the chemical composition requirements of *ASTM F2063 (nitinol),* and *ASTM B562 (gold)*	The Tack implant materials (nitinol and gold) must meet *ASTM F2063* and *ASTM B562* specifications.	Pass
Material Composition (Delivery Systems)	To verify the material composition of the delivery system	All materials and components must meet specifications	Pass

Table 1. Summary of Bench Testing of the Tack Endovascular System® (6F)			
Test	**Purpose**	**Acceptance Criteria**	**Results**
Shape, Memory & Elasticity	To verify the transition temperature of the nitinol	The Af temperature shall be between 14-24^{0}C	Pass
Corrosion Resistance	To evaluate the susceptibility of the Tack implant material to corrosion, including pitting and fretting for overlapped Tack implants and galvanic corrosion for Tacks of dissimilar materials. (Nitinol and gold.)	Fretting Corrosion Any fretting corrosion mass loss that may result in Nickel release shall be less than the Permitted Daily Dose (PDE) derived from the ICH Guideline Q3D: Guideline for Elemental Impurities	Pass
		Pitting and Crevice Corrosion Implant shall be tested for resistance to corrosion following fatigue cycling per ASTM F2129. The Implant shall have a breakdown potential ≥ 600mV.	Pass
		Galvanic corrosion The corrosion mass-loss rate for the test specimen implants needs to be less than 116µg of Nitinol released per day per device.	Pass
Tack implant Dimensional and Functional Attributes			
Diameter & Length Verification	To verify the Tack implant dimensions post-deployment	The diameter and length should meet the labeled specifications	The acceptance criteria were met.
Percent Surface Area	To determine the Tack implant surface area that contacts the vessel	The percent surface area was measured for characterization only based on product drawings.	The percent surface area in the minimum 3.5mm RVD is 18.7%. The percent surface area in the maximum 6.0mm RVD is 11.2%.

Table 1. Summary of Bench Testing of the Tack Endovascular System® (6F)

Test	Purpose	Acceptance Criteria	Results
Foreshortening	To report the decrease in length of the Tack implant between the catheter-loaded condition and the deployed diameter	Foreshortening was determined for characterization only	<table><tr><th>Diameter</th><th>Length</th></tr><tr><td>1.8 mm (Constrained implant)</td><td>6.5</td></tr><tr><td>3.5 mm (Deployed implant)</td><td>6.4</td></tr><tr><td>6.0 mm (Deployed implant)</td><td>6.2</td></tr><tr><td>7.3 mm (Unconstrained implant)</td><td>6.1</td></tr></table>
Tack Implant Integrity	To report any defects on the deployed Tack implant	No Tack implant should demonstrate damage (cracks, broken struts, gouges or dents) or permanent set.	The acceptance criteria were met.
Radial Outward Force	To characterize the radial outward force of self-expanding stents	Implant shall have a maximum radial force of 3 Newtons	The acceptance criteria were met.
Mechanical Properties	To specify mechanical properties of the Tack implant material pre and post- processing	Raw materials must meet incoming acceptance specifications. Post-processing study was for characterization purposes.	Mechanical properties of the raw materials met specifications.
Stress/Strain and Fatigue Analysis	To characterize the stress/strains that the Tack implant will experience within the intended vasculature to support fatigue analysis To evaluate the device durability based on results of the stress and strain analysis	The safety factor determined by the fatigue analysis must be equal or greater than 1 for all fatigue loads.	The acceptance criterion was met
Accelerated Durability Testing	To evaluate Tack implant structural durability under physiologically relevant loading conditions, including radial pulsatile, axial compression,	The Tack implant must maintain structural integrity over a 10-year equivalent *in vitro* loading, simulating arterial conditions	The acceptance criterion was met.

Table 1. Summary of Bench Testing of the Tack Endovascular System® (6F)			
Test	**Purpose**	**Acceptance Criteria**	**Results**
	bending, and torsional loads.	within the indicated range. No strut fracture after 400 million cycles.	
MRI Safety & Compatibility	To evaluate MRI safety and compatibility of the Tack implant	For characterization purposes only, the conditions under which the device can be safely scanned are provided in the product labeling.	The implanted single and overlapped Tack implants were determined to be "MR Conditional" to 1.5 and 3 Tesla.
Radiopacity	To evaluate the radiopacity of the Tack implant	The delivery system and Tack implant must be visible under fluoroscopy.	The radiopaque design features of both the delivery system and the implantable Tack were adequate for base-line delivery, deployment and identification under fluoroscopy
Crush Resistance	To demonstrate the ability of the Tack implant to recover its desired size and shape after application and removal of external loads, deformations, or both.	Following an acute crush event and load release, the Tack implant diameter must meet diametrical specification	The acceptance criterion was met.
Delivery System Dimensional and Functional Attributes			
Dimensional Verification	To verify the key dimensions of the delivery system	The delivery system must meet the relevant design specifications.	The acceptance criteria were met
Delivery, Deployment, and Retraction	To demonstrate that the delivery catheter can safely and reliably deliver the Tack implants to the intended location without adversely affecting the Tack implants by the delivery catheter during deployment and withdrawal	The Tack implants must be able to be delivered to the target zone with no anomalies or Tack implant damage upon deployment and delivery system withdrawal.	The acceptance criteria were met
Catheter Bond Strength	To verify the bond strength of the delivery	The delivery system bonds must maintain integrity	The acceptance criteria were met

Table 1. Summary of Bench Testing of the Tack Endovascular System® (6F)			
Test	**Purpose**	**Acceptance Criteria**	**Results**
	system bond joints for the intended use.	above the specified load. Various acceptance criteria were specified for outer sheath bonds, and support member and tip.	
Tip Pull Test	To determine the tensile force that will separate the distal tip from the catheter		
Flexibility & Kink Test	To verify that the Tack implant delivery system will not kink at a worst-case bend radius that is appropriate for the intended anatomy	The delivery system must not kink when bent around at worst case curvature.	The acceptance criterion was met
Torque Strength	To evaluate the torque strength of the Tack implant delivery system	With the distal tip fixed and unable to rotate, the delivery system must withstand a minimum number of rotations before exhibiting failure.	The acceptance criterion was met
Coating Integrity/ Particulate Evaluation	To measure the total number of particulates and size of the particulates generated during the simulated Tack implant delivery and deployment	Characterization Study	N/A

B. Biocompatibility

Biocompatibility testing was performed in accordance with applicable Good Laboratory Practices (21 CFR 58) and ISO 10993-1 - Biological Evaluation of Medical Devices. All testing was conducted on 2x sterilized product. For biocompatibility testing, the Tack implant portion of the system was classified as an implant device in permanent contact (> 30 days) with blood. The Tack implant delivery system was classified as external communicating device, in limited contact (< 24 hours) with circulating blood. **Table 2** summarizes the biocompatibility testing conducted on devices representative of the final design.

Table 2. Biocompatibility Testing Summary on the Tack Endovascular System® (6F)				
Biologic Effect	**Test Name / Description**	**Tack**	**Delivery System**	**Results**
Cytotoxicity	ISO MEM Elution Assay w/ L-929 Mouse Fibroblast Cells	√	√	Non-cytotoxic
Sensitization	ISO Guinea Pig Maximization Sensitization Test Extract	√	√	Non-Sensitizing
Irritation /	ISO Intracutaneous Reactivity Test	√	√	Non-irritating

Table 2. Biocompatibility Testing Summary on the Tack Endovascular System® (6F)				
Biologic Effect	**Test Name / Description**	**Tack**	**Delivery System**	**Results**
Intracutaneous Reactivity				
Systemic Toxicity (acute)	ISO Acute Systemic Injection Test	√	√	No evidence of systemic Toxicity
Pyrogenicity	USP Rabbit Pyrogen Study, Material Mediated	√	√	Non-pyrogenic
Genotoxicity	ISO Bacterial Mutagenicity Test – AMES Assay	√	√	Non-mutagenic
Hemocompatibility	ASTM Hemolysis (Direct and Indirect Contact) Assay	√	√	Non-hemolytic
	Complement Activation (C3a & SC5b-9 Assay)	√	√	Non-activating
	In Vivo Thromboresistance Study in the Canine Jugular Vein	N/A	√	Tack implant: Thrombogenicity was assessed in the *in vivo* animal studies described in Section E and leveraged for new supplier based on comparative chemistry and surface morphology. Delivery System: In the absence of anticoagulation, there were moderate levels of thrombus observed on some test articles and controls in the canine study. However, no thromboembolic events were observed during the TOBA II clinical study (n=213 patients).

Chemical characterization and toxicological risk assessment were conducted to address the endpoints of subchronic/chronic systemic toxicity, genotoxicity, and carcinogenicity.

C. Sterilization

The Tack Endovascular System® (6F) is sterilized in compliance with ISO 11135-1 - Sterilization of Healthcare Products – Ethylene oxide – Requirements for the development, validation and routine control of a sterilization process for medical devices. Routine testing of biological indicators is performed to confirm that the sterilization process is effective in eradicating viable microorganisms. Results from

sterilization studies demonstrate that the Tack Endovascular System® will maintain a Sterility Assurance Level (SAL) of 10^{-6}.

D. Packaging and Shelf Life

Packaging qualification testing (visual inspection, package integrity (bubble leak/dye penetration), and seal strength testing) demonstrated the ability of the packaging to protect the product and maintain a sterile barrier through shipping and shelf life. The Tack Endovascular System® (6F) are packaged in a preformed tray, sealed in a packaging pouch and placed in a folding carton. A shelf life of 2 years has been established for the Tack Endovascular System® based on product and package shelf life testing.

E. *In Vivo* Animal Studies

IVI performed a series of sub-chronic and chronic animal studies to support the safety and feasibility of the Tack Endovascular System® (6F). The preclinical animal studies primarily focused on the inflammatory response, procedural techniques and the overall safety of the device *in vivo* in porcine models. The results of these animal studies demonstrated that the Tack implants produce minimal injury, inflammation, and neointimal hyperplasia following implantation in porcine arteries. **Table 3** summarizes the results of the GLP studies conducted on devices representative of the final device design.

Table 3. Tack Endovascular System® (6F) Animal Study Summary

Title	Methods/Description	Results
Comparison to control stent	• 16 Yucatan mini swine • 72 Tack implants, 14 control stents placed in femoral arteries • 10/16 – survived 28 days, each with 4 Tacks and 1 control stent placed contralaterally • 4/16 – survived 90 days, each with 4 Tacks and 1 control stent placed contralaterally • 2/16 – survived 90 days, 4 Tacks placed bilaterally	• @ 28 days – nearly complete healing and endothelialization of Tack implants only • @ 90 days – nearly complete healing and endothelialization for both the Tack implant and control stent • Histopathology showed less neointimal response, lower stenosis, and lower injury scores for the Tack implants
Tack Spacing Study I	• 3 domestic Yorkshire swine • 60 Tack implants placed in superficial femoral and profunda arteries • 90-day survival	• Tack implants spaced 2±2mm or at 8±2mm • @ 90 days there was evidence of malapposed struts and strut fractures within 7/60 Tack implants • Fractures were most likely caused by 75% weight increase in animals

Table 3. Tack Endovascular System® (6F) Animal Study Summary		
Title	**Methods/Description**	**Results**
		used for the study and implantation in the profunda • Tack implants performed well and had nearly complete endothelia-lization and minimal neointimal response.
Tack Spacing Study II	• 3 Yucatan mini swine • 60 Tack implants placed in superficial femoral and profunda arteries • 90-day survival	• Tack implants spaced 2±2mm or at 8±2mm • @ 90 days - evidence of malapposed struts but no strut fractures in any Tack implants • Tacks had nearly complete endothelialization and minimal neointimal response both when spaced closely together and further apart
Non-GLP Acute Porcine Animal	Verified the functionality and radiopacity of the Tack Endovascular System when deployed in the peripheral arteries of a porcine model.	The Tack Endovascular System met the predefined acceptance criteria for guidewire compatibility, introducer sheath compatibility, atraumatic tip, delivery catheter flexibility, tack and delivery catheter radiopacity and delivery system retraction

X. SUMMARY OF PRIMARY CLINICAL STUDY

The applicant performed the TOBA II pivotal study to establish a reasonable assurance of safety and effectiveness of the Tack Endovascular System® (6F) in the treatment of post-PTA dissections in the superficial femoral and proximal popliteal arteries in the US and Austria under G150029. Data from this clinical study is presented below.

A. TOBA II Study Design

The prospective, multi-center, single-arm, non-blinded TOBA II study investigated the safety and efficacy of the Tack Endovascular System® (6F) for the treatment of dissection(s) type(s) A through F resulting from percutaneous transluminal balloon angioplasty (PTA) using standard (POBA) or drug-coated balloon (DCB) angioplasty in the superficial femoral and proximal popliteal arteries. Patients were treated between September 29, 2015 and April 7, 2017. The database for this PMA reflected data collected through June 17, 2018 and the study enrolled 213 subjects at 33 clinical sites in the United States and Austria.

The primary objectives of this study were to demonstrate the following outcomes:

- Safety: Freedom from the occurrence of any new-onset major adverse events (MAEs) defined as index limb amputation above the ankle, Clinical Events

Committee (CEC) adjudicated clinically-driven target lesion revascularization (CD-TLR), or all-cause death at 30 days.

- Effectiveness: Primary patency defined as freedom from CEC adjudicated clinically-driven target lesion revascularization (CD-TLR) and freedom from core lab adjudicated duplex ultrasound derived binary restenosis at 12 months (defined as peak systolic velocity ratio (PSVR) >2.5).

These endpoints were evaluated against performance goals (PGs), as described below. The primary statistical method was a one-sample exact test comparing the proportion of subjects with primary patency to the performance goal using a one-sided $\alpha = 0.025$. The exact two-sided 95% confidence interval for the proportion of subjects with primary patency was calculated.

An independent CEC consisting of a team of clinical experts with experience in the conduct of clinical trials was formed to review clinical events reported by the investigators that had potential to be classified as Major Adverse Events (MAE, as defined by the clinical protocol). Additionally, an independent board of multi-disciplinary physicians and subject matter experts was convened to serve as the Data Safety and Monitoring Board (DSMB) for the study. All study-related angiographic, duplex ultrasound (DUS) and X-ray imaging were reviewed and analyzed by independent core laboratories.

1. TOBA II Inclusion and Exclusion Criteria

   Subjects enrolled in the TOBA II study were required to meet ALL of the following inclusion criteria prior to enrollment:

   1. Male or non-pregnant Female ≥ 18 years of age at the time of consent
   2. Female subjects of childbearing potential must have a negative pregnancy test prior to treatment and must use some form of contraception (abstinence is acceptable) through the duration of the study
   3. Target limb requires no additional treatment aside from the target lesion and the iliac artery(ies) during the index procedure
   4. Subject has been informed of and understands the nature of the study and provides signed informed consent to participate in the study. If the subject possesses the ability to understand and provide informed consent but due to physical inability, the subject cannot sign the informed consent form (ICF), an impartial witness may sign on behalf of the subject
   5. Willing to comply with all required follow-up visits
   6. Rutherford Classification 2, 3 or 4
   7. Estimated life expectancy >1 year
   8. Eligible for standard surgical repair, if necessary

9. Subject is ambulatory (assistive devices such as a cane or walker is acceptable).

Subjects were to be excluded from the TOBA II study if they met ANY of the following exclusion criteria:

1. Rutherford Classification 0, 1, 5 or 6
2. Is pregnant or refuses to use contraception through the duration of the study
3. Previous infrainguinal bypass graft in the target limb
4. Planned amputation on the target limb
5. Systemic infection or Infection within the target limb and/or immunocompromised
6. Endovascular or surgical procedure (not including diagnostic procedures) on the target limb within 30 days prior to or within 30 days after the index procedure
7. Endovascular or surgical procedure (not including diagnostic procedures) on the non-target limb within 14 days prior to the index procedure or planned procedure within 30 days after the index procedure
8. Prior coronary artery bypass graft (CABG) or percutaneous coronary intervention (PCI) procedure within 30 days prior to the index procedure or planned CABG/PCI within 30 days after the index procedure
9. Any other previous or planned surgical or endovascular procedure (not including diagnostic procedures) within 14 days prior to or 30 days post index procedure
10. Planned atherectomy, cryoplasty, stenting or any other treatment (with the exception of a crossing device) of the target lesion other than PTA during the index procedure
11. Known coagulopathy, hypercoagulable state, bleeding diathesis, other blood disorder, or a platelet count less than 80,000/microliter or greater than 500,000/microliter.
12. Known hypersensitivity or allergy to antiplatelet or anticoagulant therapy
13. Myocardial infarction within 30 days prior to enrollment
14. History of stroke within 90 days prior to enrollment
15. Serum creatinine of >2.5 mg/dL
16. Requires treatment of tibial or outflow vessels at the index procedure, which include the P2 and P3 segments of the popliteal artery and the tibioperoneal vessels.
17. Known hypersensitivity or contraindication to nickel-titanium alloy (Nitinol)

18. Participating in another ongoing investigational clinical trial that has not completed its primary endpoint
19. Has other comorbidities that, in the opinion of the investigator, would preclude them from receiving this treatment and/or participating in study required follow-up assessments
20. Known hypersensitivity or allergy to contrast agents that cannot be medically managed
21. Thrombolysis of the target vessel within 72 hours prior to the index procedure, where complete resolution of the thrombus was not achieved

2. Patient Follow-up Schedule

After hospital discharge, subjects were required to return to the study center for clinical assessments on Day 30 (-2 days/+14 Days), 6 months ± 30 days, 12 months ± 30 days, 24 months ± 30 days and 36 months ± 30 days. Adverse events and complications were recorded at all visits. A time and events schedule for all assessments is provided in **Table 4** below.

Table 4. Time and Events Schedule

Assessment	Baseline	Implant Procedure	Pre-Discharge	30-day (-2 days/ +14 Days)	6 Month (±30 Days)	12 Month (± 30 Days)	24 Month (± 30 Days)	36 Month (± 30 Days)	Unscheduled
Informed Consent	X								
Medical History / Physical Exam	X								
Serum Creatinine	X								
PT/ INR	X								
Urine pregnancy test if female	X								
Ankle Brachial Index (ABI)	X		X	X	X	X	X	X	X
Rutherford Classification	X			X	X	X	X	X	X
Pre-procedural Medications		X							
Angiogram		X							X
Study Medications		X	X	X	X	X	X	X	X
Duplex Ultrasound (DUS)				X	X	X			X
X-ray of Implanted Tacks						X			X

Table 4. Time and Events Schedule									
Assessment	**Baseline**	**Implant Procedure**	**Pre-Discharge**	**30-day (-2 days/ +14 Days)**	**6 Month (±30 Days)**	**12 Month (± 30 Days)**	**24 Month (± 30 Days)**	**36 Month (± 30 Days)**	**Unscheduled**
Adverse Event Assessment		X	X	X	X	X	X	X	X
Peripheral Artery Questionnaire (PAQ)	X			X	X	X	X	X	X
EQ-5D-3L	X			X	X	X	X	X	X
Walking Impairment Questionnaire (WIQ)	X			X	X	X	X	X	X

3. Clinical Endpoints

Primary Safety Endpoint

With regards to safety, the primary endpoint was freedom from the occurrence of any new-onset MAEs defined as index limb amputation (above the ankle), CEC adjudicated clinically-driven target lesion revascularization (CD-TLR), or all-cause death at 30 days. The performance goal for the primary safety endpoint was set at 88% per the recommendations of the VIVA physicians group[1]. The primary statistical analysis was conducted in subjects who met the intent-to-treat (ITT) definition and have observed data for the primary safety endpoint. A subject was considered an ITT patient and officially enrolled in the study once the Tack Endovascular System® (6F) was advanced through the introducer sheath. A per protocol (PP) analysis was also performed and included a subset of the ITT population with evaluable data that met the definition for device success, excluding subjects with major protocol deviations such as a major inclusion / exclusion criterion violation; or major procedural deviation. For safety, the primary statistical method was a one-sample exact test comparing the proportion of subjects free from a MAE to the performance goal using a one-sided $\alpha = 0.05$. The exact one-sided 95% confidence interval for the proportion of subjects free from MAE was calculated.

Primary Effectiveness Endpoint

With regards to effectiveness, the primary endpoint was patency defined as freedom from CEC adjudicated clinically driven target lesion revascularization (CD-TLR) and freedom from core lab adjudicated duplex ultrasound derived binary restenosis at 12 months (defined as PSVR >2.5). As the TOBA II study investigated the Tack

Endovascular System® (6F) in subjects treated with either standard PTA (POBA) or DCB angioplasty, a composite performance goal was derived from the LEVANT 2 pivotal clinical study using the lower bound 95% confidence interval of patency rates observed from the Test DCB and Control POBA arms. The performance goal for primary efficacy was set at 52.7% based on the ratio of POBA and DCB subjects in the TOBA II study at time of enrollment completion. To meet the study primary patency endpoint, the TOBA II 12-month primary patency lower 95% confidence bound must be greater than 52.7%. The TOBA II clinical study protocol required physicians to treat any dissection (Type A – F) that was observed following POBA or DCB treatment. The study protocol did not require an attempt to resolve dissections with an alternative method prior to tacking.

Observational endpoints

Observational endpoints include the following:

- Device Success - successful deployment of the Tack(s) at the intended target site(s) and successful withdrawal of the delivery catheter from the introducer sheath. If the study device was introduced but the subject did not receive a Tack due to user error and not a device malfunction, this device was not included in the device success assessment.
- Device Success per patient - Device success as an observational endpoint was measured per device but the per protocol analysis definition required that all devices used in a single patient that were evaluable per the device success observational endpoint were successes.
- Procedure Success - demonstrated vessel patency (<30% residual diameter stenosis, by visual estimate) without the use of a bailout stent or the occurrence of MAE upon completion of the index procedure.

In addition, the following observational endpoints were assessed at various time points through 36 months:

- All-cause death
- Amputation of the target limb (above the ankle)
- Clinically-driven target vessel revascularization (CD-TVR)
- Clinically-driven target lesion revascularization (CD-TLR)
- Target vessel revascularization (TVR)
- Target lesion revascularization (TLR)
- Changes from Baseline in Rutherford Classification
- Changes from Baseline in Ankle Brachial Index (ABI) measurement
- Changes from Baseline in the Peripheral Artery Questionnaire (PAQ)
- Changes from Baseline in the EQ-5D-3L quality of life questionnaire

- Changes from Baseline in the Walking Impairment Questionnaire (WIQ)
- Tack Integrity via X-ray (only performed at 12-month visit)
- Duplex Ultrasound (DUS) derived lesion and vessel patency (performed at each visit through 12 months)

B. Accountability of PMA Cohort

A total of 213 patients were enrolled in this trial. A summary of subject accountability is provided in **Figure 2** below.

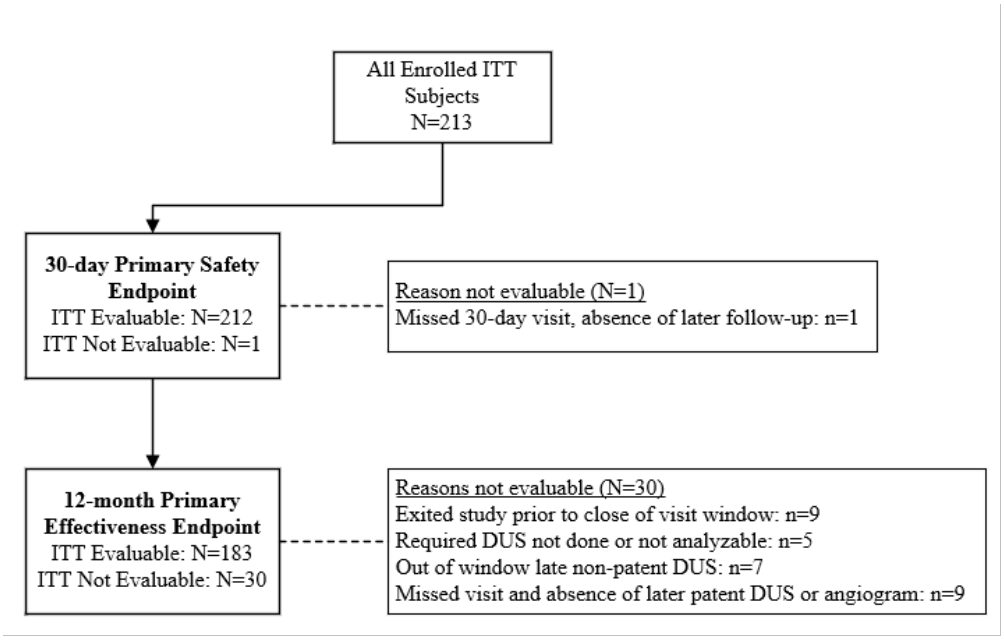


Figure 2. TOBA II Subject Accountability

The Per Protocol (PP) group was defined as the subset of the ITT population with evaluable data that met the definition for device success, excluding subjects with major protocol deviations. Device Success was not achieved in nine enrolled subjects. In two cases, a Tack was not deployed at the target site while in the remaining seven cases, the Tack implant did not remain in position from deployment to the end of the procedure. The remaining 204 subjects make up the PP population.

C. Study Population Demographics and Baseline Parameters

The demographics of the study population are comparable to other interventional peripheral vascular studies conducted in the United States and European Union. The TOBA II population demographics, medical history and risk factors are summarized in **Tables 5-7**, below.

Table 5. Baseline Demographics			
	ITT Subjects		
	ALL	**DCB**	**POBA**
Age at baseline (years), Mean ± SD (N) (Min, Median, Max)	68.2 ± 9.1 (213) (40.0,68.0,91.0)	66.8 ± 9.5 (123) (40.0,65.0,91.0)	70.2 ± 8.3 (90) (53.0,69.5,87.0)
Gender, n/N (%)			
Male	151/213 (70.9%)	88/123 (71.5%)	63/90 (70.0%)
Female	62/213 (29.1%)	35/123 (28.5%)	27/90 (30.0%)
Ethnicity, n/N (%)			
Hispanic or Latino	17/213 (8.0%)	4/123 (3.3%)	13/90 (14.4%)
Not Hispanic or Latino	195/213 (91.5%)	118/123 (95.9%)	77/90 (85.6%)
Unknown	1/213 (0.5%)	1/123 (0.8%)	0/90 (0.0%)
Decline to answer	0/213 (0.0%)	0/123 (0.0%)	0/90 (0.0%)
Race (Check all that apply), n/N (%)			
American Indian or Alaskan Native	0/213 (0.0%)	0/123 (0.0%)	0/90 (0.0%)
Asian	3/213 (1.4%)	0/123 (0.0%)	3/90 (3.3%)
Black or African American	29/213 (13.6%)	22/123 (17.9%)	7/90 (7.8%)
Native Hawaiian or Pacific Islander	0/213 (0.0%)	0/123 (0.0%)	0/90 (0.0%)
White	181/213 (85.0%)	101/123 (82.1%)	80/90 (88.9%)
Other	0/213 (0.0%)	0/123 (0.0%)	0/90 (0.0%)
Unknown	0/213 (0.0%)	0/123 (0.0%)	0/90 (0.0%)
Decline to answer	0/213 (0.0%)	0/123 (0.0%)	0/90 (0.0%)
BMI, Mean ± SD (N) (Min, Median, Max)	29.3 ± 6.1 (212) (15.4,28.5,67.4)	29.9 ± 6.8 (122) (15.4,28.6,67.4)	28.5 ± 4.7 (90) (18.2,28.2,42.7)
BMI ≥30, n/N (%)	83/212 (39.2%)	52/122 (42.6%)	31/90 (34.4%)
ABI in treated leg, Mean ± SD (N) (Min, Median, Max)	0.76 ± 0.21 (200) (0.30,0.75,1.37)	0.71 ± 0.20 (118) (0.31,0.71,1.37)	0.83 ± 0.19 (82) (0.30,0.83,1.28)
Non-compressible	7	3	4
ABI in contralateral limb, Mean ± SD (N) (Min, Median, Max)	0.90 ± 0.18 (190) (0.31,0.92,1.28)	0.90 ± 0.17 (105) (0.48,0.90,1.26)	0.90 ± 0.18 (85) (0.31,0.92,1.28)
Rutherford Classification, n/N (%)			
2	68/213 (31.9%)	22/123 (17.9%)	46/90 (51.1%)
3	136/213 (63.8%)	94/123 (76.4%)	42/90 (46.7%)
4	9/213 (4.2%)	7/123 (5.7%)	2/90 (2.2%)

A summary of the medical history for all subjects is provided in **Table 6** below. The subjects presented with a host of comorbidities: 89.7% had arterial hypertension while 87.2% were hyperlipidemic; 60.7% had coronary artery disease with 41.7% having undergone some form of prior coronary revascularization; 43.2% were diabetic; 80.8% were current or former smokers; 13.6% of subjects had already experienced at least one

intervention on the target limb while 33.3% had undergone treatment on the non-target limb.

Table 6. Medical History and Risk Factors			
	ITT Subjects n/N (%)		
	ALL	**DCB**	**POBA**
Coronary Artery Disease	128/211 (60.7%)	70/123 (56.9%)	58/88 (65.9%)
Myocardial Infarction (MI)	45/200 (22.5%)	27/116 (23.3%)	18/84 (21.4%)
Coronary revascularization	88/211 (41.7%)	52/122 (42.6%)	36/89 (40.4%)
Coronary Artery Bypass Graft (CABG)	33	16	17
Percutaneous Coronary Intervention (PCI)	55	36	19
Chronic angina pectoris	15/208 (7.2%)	11/120 (9.2%)	4/88 (4.5%)
Congestive heart failure	24/211 (11.4%)	12/121 (9.9%)	12/90 (13.3%)
Cerebrovascular event	24/209 (11.5%)	11/120 (9.2%)	13/89 (14.6%)
Transient Ischemic Attack (TIA)	10	4	6
Stroke – Cerebrovascular Accident (CVA)	14	7	7
Gastrointestinal / genitourinary bleeding	5/212 (2.4%)	2/123 (1.6%)	3/89 (3.4%)
Chronic renal insufficiency	19/213 (8.9%)	11/123 (8.9%)	8/90 (8.9%)
On dialysis	1/213 (0.5%)	0/123 (0.0%)	1/90 (1.1%)
Coagulopathy, hypercoagulable state, bleeding diathesis, or other blood disorder	0/213 (0.0%)	0/123 (0.0%)	0/90 (0.0%)
Smoking			
Current	66/213 (31.0%)	39/123 (31.7%)	27/90 (30.0%)
Former	106/213 (49.8%)	66/123 (53.7%)	40/90 (44.4%)
Never	41/213 (19.2%)	18/123 (14.6%)	23/90 (25.6%)
Diabetes mellitus	92/213 (43.2%)	48/123 (39.0%)	44/90 (48.9%)
Type I	3	0	3
Type II	89	48	41
Arterial hypertension	191/213 (89.7%)	108/123 (87.8%)	83/90 (92.2%)
Controlled with medication	180	101	79
Not controlled with medication	11	7	4
Hyperlipidemia	184/211 (87.2%)	108/121 (89.3%)	76/90 (84.4%)
Controlled with medication	174	103	71
Not controlled with medication	10	5	5

Table 6. Medical History and Risk Factors			
	ITT Subjects n/N (%)		
	ALL	DCB	POBA
Family history of premature atherosclerotic disease (e.g. MI, CABG, PCI before age 60)	51/119 (42.9%)	27/67 (40.3%)	24/52 (46.2%)
History of claudication	191/213 (89.7%)	110/123 (89.4%)	81/90 (90.0%)
History of previous peripheral artery intervention in target limb	29/213 (13.6%)	14/123 (11.4%)	15/90 (16.7%)
History of previous peripheral artery intervention in non-target limb	71/213 (33.3%)	30/123 (24.4%)	41/90 (45.6%)

Baseline lesion and vessel assessments are summarized in **Table 7** below. Nearly all treated lesions were de novo lesions. By core lab assessment, 87.2% of lesions existed in the superficial femoral artery (SFA) alone. The average lesion length was 74.3mm with an average stenosis of 73.5%. 23.2% of lesions were occluded while 59.2% were moderately or severely calcified. 82.5% of lesions treated were single lesions while 17.5% were tandem or combination lesions.

Table 7. Baseline Angiogram						
	ITT Subjects					
	ALL		DCB		POBA	
	Investigator Reported	Core Lab Adjudicated	Investigator Reported	Core Lab Adjudicated	Investigator Reported	Core Lab Adjudicated
Target Lesion Type, n/N (%)						
De novo	202/213 (94.8%)	N/A	118/123 (95.9%)	N/A	84/90 (93.3%)	N/A
Restenotic	11/213 (5.2%)		5/123 (4.1%)		6/90 (6.7%)	
Target Vessel, n/N (%)						
SFA	192/213 (90.1%)	184/211 (87.2%)	107/123 (87.0%)	104/121 (86.0%)	85/90 (94.4%)	80/90 (88.9%)
P1	7/213 (3.3%)	12/211 (5.7%)	4/123 (3.3%)	7/121 (5.8%)	3/90 (3.3%)	5/90 (5.6%)
SFA and P1	14/213 (6.6%)	15/211 (7.1%)	12/123 (9.8%)	10/121 (8.3%)	2/90 (2.2%)	5/90 (5.6%)

Table 7. Baseline Angiogram						
	ITT Subjects					
	ALL		DCB		POBA	
	Investigator Reported	Core Lab Adjudicated	Investigator Reported	Core Lab Adjudicated	Investigator Reported	Core Lab Adjudicated
Most distal target lesion location, n/N (%)						
Proximal SFA	12/213 (5.6%)	9/211 (4.3%)	3/123 (2.4%)	2/121 (1.7%)	9/90 (10.0%)	7/90 (7.8%)
Mid SFA	91/213 (42.7%)	43/211 (20.4%)	45/123 (36.6%)	22/121 (18.2%)	46/90 (51.1%)	21/90 (23.3%)
Distal SFA	89/213 (41.8%)	132/211 (62.6%)	59/123 (48.0%)	80/121 (66.1%)	30/90 (33.3%)	52/90 (57.8%)
P1	21/213 (9.9%)	21/211 (10.0%)	16/123 (13.0%)	13/121 (10.7%)	5/90 (5.6%)	8/90 (8.9%)
P2	0/213 (0.0%)	6/211 (2.8%)	0/123 (0.0%)	4/121 (3.3%)	0/90 (0.0%)	2/90 (2.2%)
Target lesion length (mm), Mean ± SD (N) (Min, Median, Max)	80.5 ± 39.3 (213) (10.0,75.0, 170.0)	74.3 ± 40.6 (210) (8.3,66.8, 222.6)	85.5 ± 40.4 (123) (10.0,80.0, 170.0)	85.1 ± 40.6 (120) (8.3,81.7, 222.6)	73.5 ± 36.7 (90) (20.0,70.0, 150.0)	59.8 ± 35.8 (90) (10.3,52.0, 152.4)
Lesion type, n/N (%)						
Single	183/213 (85.9%)	174/211 (82.5%)	102/123 (82.9%)	92/121 (76.0%)	81/90 (90.0%)	82/90 (91.1%)
Combination	16/213 (7.5%)	33/211 (15.6%)	13/123 (10.6%)	27/121 (22.3%)	3/90 (3.3%)	6/90 (6.7%)
Tandem	14/213 (6.6%)	4/211 (1.9%)	8/123 (6.5%)	2/121 (1.7%)	6/90 (6.7%)	2/90 (2.2%)
Proximal reference vessel diameter (mm), Mean ± SD (N) (Min, Median, Max)	5.3 ± 0.7 (213) (3.0,5.2,6.0)	5.3 ± 0.7 (211) (3.3,5.4,7.5)	5.2 ± 0.7 (123) (3.0, 5.0, 6.0)	5.2 ± 0.7 (121) (3.3, 5.2, 6.7)	5.4 ± 0.6 (90) (4.0, 5.5, 6.0)	5.5 ± 0.7 (90) (3.7, 5.5, 7.5)
Distal reference vessel diameter (mm), Mean ± SD (N) (Min, Median, Max)	5.3 ± 0.7 (213) (3.5,5.0,6.0)	5.5 ± 0.7 (211) (3.5,5.5,7.3)	5.2 ± 0.6 (123) (3.5, 5.0, 6.0)	5.4 ± 0.8 (121) (3.5, 5.5, 7.2)	5.4 ± 0.7 (90) (4.0, 5.5, 6.0)	5.5 ± 0.7 (90) (3.5, 5.6, 7.3)

Table 7. Baseline Angiogram						
	ITT Subjects					
	ALL		DCB		POBA	
	Investigator Reported	Core Lab Adjudicated	Investigator Reported	Core Lab Adjudicated	Investigator Reported	Core Lab Adjudicated
Baseline target lesion percent diameter stenosis (%), Mean ± SD (N) (Min, Median, Max)	87.5 ± 10.6 (213) (70.0,90.0, 100.0)	73.5 ± 18.2 (211) (35.8,71.6, 100.0)	90.5 ± 9.9 (123) (70.0,95.0, 100.0)	79.3 ± 17.8 (121) (35.8,77.1, 100.0)	83.5 ± 10.2 (90) (70.0,80.0, 100.0)	65.8 ± 15.7 (90) (41.9,62.4, 100.0)
Total Occlusion, n/N (%)	45/213 (21.1%)	49/211 (23.2%)	38/123 (30.9%)	41/121 (33.9%)	7/90 (7.8%)	8/90 (8.9%)
Presence of thrombus, n/N (%)	0/213 (0.0%)	0/211 (0.0%)	0/123 (0.0%)	0/121 (0.0%)	0/90 (0.0%)	0/90 (0.0%)
Calcification, n/N (%)						
None / Mild	131/213 (61.5%)	86/211 (40.8%)	84/123 (68.3%)	56/121 (46.3%)	47/90 (52.2%)	30/90 (33.3%)
Moderate	81/213 (38.0%)	113/211 (53.6%)	39/123 (31.7%)	58/121 (47.9%)	42/90 (46.7%)	55/90 (61.1%)
Severe	1/213 (0.5%)	12/211 (5.7%)	0/123 (0.0%)	7/121 (5.8%)	1/90 (1.1%)	5/90 (5.6%)
Number of patent infrapopliteal vessels, n/N (%)						
0	0/213 (0.0%)	6/207 (2.9%)	0/123 (0.0%)	3/120 (2.5%)	0/90 (0.0%)	3/87 (3.4%)
1	56/213 (26.3%)	72/207 (34.8%)	33/123 (26.8%)	40/120 (33.3%)	23/90 (25.6%)	32/87 (36.8%)
2	96/213 (45.1%)	86/207 (41.5%)	50/123 (40.7%)	50/120 (41.7%)	46/90 (51.1%)	36/87 (41.4%)
3	61/213 (28.6%)	43/207 (20.8%)	40/123 (32.5%)	27/120 (22.5%)	21/90 (23.3%)	16/87 (18.4%)

D. Safety and Effectiveness Results

1. Safety Results

Primary Safety Endpoint

The primary safety endpoint for the TOBA II study is freedom from the occurrence of any new-onset major adverse events (MAEs) defined as index limb amputation above the ankle, CEC adjudicated clinically-driven target lesion revascularization (CD-TLR), or all-cause death at 30 days. The primary safety endpoint was MET as no MAEs were reported in the first 30 days of follow-up. See **Table 8** below.

Table 8. Primary Safety Endpoint at 30 days in ITT Subjects

Event Type	n/N (%) (95% CI)[1]	VIVA Performance Goal	p-value[1]	Study Endpoint
Freedom from MAE	212/212 (100.0%) (98.6%)	88%	<0.0001	MET
Index Limb Amputation	0/212 (0.0%)	N/A	N/A	N/A
CD-TLR	0/212 (0.0%)			
All-Cause Death	0/212 (0.0%)			

[1] Fisher's exact test for one proportion, p-value and 95% CI are one-sided

Adverse Effects that occurred in the PMA clinical study

Table 9 below presents an overall summary of adverse events that have been reported through 390 days, displaying the events by device or procedure-related and by severity. No events were determined to be unanticipated. The types and occurrences of events that were reported are within expected rates.

Table 9. Adverse Events with Onset Date within 390 Days Post Index Procedure

Body System Organ Class	Adverse Events		Device or Procedure Related Events		Serious Adverse Events		Serious Device or Procedure Related Events	
	# of events	#(%) of pts	# of events	#(%) of pts	# of events	#(%) of pts	# of events	#(%) of pts
Blood and lymphatic system disorders	5	5 (2.3%)	.	.	2	2 (0.9%)	.	.
Cardiac disorders	52	26 (12.2%)	.	.	40	23 (10.8%)	.	.
Congenital, familial and genetic disorders	1	1 (0.5%)	.	.	.	.	.	.
Ear and labyrinth disorders	4	4 (1.9%)	.	.	.	.	.	.
Endocrine disorders	1	1 (0.5%)	.	.	.	.	.	.
Eye disorders	7	5 (2.3%)	.	.	5	4 (1.9%)	.	.

Table 9. Adverse Events with Onset Date within 390 Days Post Index Procedure								
Body System Organ Class	**Adverse Events**		**Device or Procedure Related Events**		**Serious Adverse Events**		**Serious Device or Procedure Related Events**	
	# of events	**#(%) of pts**	**# of events**	**#(%) of pts**	**# of events**	**#(%) of pts**	**# of events**	**#(%) of pts**
Gastrointestinal disorders	22	18 (8.5%)	.	.	13	11 (5.2%)	.	.
General disorders and administration site conditions	28	26 (12.2%)	7	7 (3.3%)	14	12 (5.6%)	4	4 (1.9%)
Hepatobiliary disorders	6	6 (2.8%)	.	.	2	2 (0.9%)	.	.
Immune system disorders	3	3 (1.4%)	1	1 (0.5%)	2	2 (0.9%)	1	1 (0.5%)
Infections and infestations	42	31 (14.6%)	1	1 (0.5%)	17	15 (7.0%)	.	.
Injury, poisoning and procedural complications	53	41 (19.2%)	20	20 (9.4%)	29	25 (11.7%)	13	13 (6.1%)
Investigations	1	1 (0.5%)	.	.	.	.	.	.
Metabolism and nutrition disorders	6	6 (2.8%)	.	.	.	.	.	.
Musculoskeletal and connective tissue disorders	40	28 (13.1%)	1	1 (0.5%)	10	9 (4.2%)	1	1 (0.5%)
Neoplasms benign, malignant and unspecified (incl cysts and polyps)	3	3 (1.4%)	.	.	1	1 (0.5%)	.	.
Nervous system disorders	30	19 (8.9%)	.	.	12	10 (4.7%)	.	.
Renal and urinary disorders	8	7 (3.3%)	1	1 (0.5%)	4	4 (1.9%)	1	1 (0.5%)
Reproductive system and breast disorders	5	4 (1.9%)	.	.	.	.	.	.
Respiratory, thoracic and mediastinal disorders	25	20 (9.4%)	.	.	8	8 (3.8%)	.	.
Skin and subcutaneous tissue disorders	8	8 (3.8%)	.	.	1	1 (0.5%)	.	.
Vascular disorders	107	77 (36.2%)	21	19 (8.9%)	74	57 (26.8%)	17	17 (8.0%)
TOTAL	**457**	**139 (65.3%)**	**52**	**47 (22.1%)**	**234**	**115 (54.0%)**	**37**	**36 (16.9%)**

2. Effectiveness Results

Primary Effectiveness Endpoint

Primary patency was defined as freedom from CEC adjudicated clinically driven target lesion revascularization (CD-TLR) and freedom from core lab adjudicated duplex ultrasound derived binary restenosis at 12 months (defined as PSVR >2.5). As shown in **Table 10** below, the TOBA II primary patency at 12 months was 65.6% with a lower 95% confidence bound of 58.2%, which met the PG of 52.7%.

	Table 10. Primary Patency at 12 Months					
Analysis Population			**n/N (%) (95% CI)[1]**	**Target Performance Goal**	**p-value[1]**	**Study Endpoint**
ITT	Primary Patency		120/183 (65.6%) (58.2%, 72.4%)	52.7%	0.0006	MET
	Reason for Lack of Patency	CD-TLR	31/183 (16.9%)	N/A	N/A	N/A
		Binary Restenosis	32/183 (17.5%)			
PP	Primary Patency		116/176 (65.9%) (58.4%, 72.9%)	52.7%	0.0005	MET
	Reason for Lack of Patency	CD-TLR	29/176 (16.5%)	N/A	N/A	N/A
		Binary Restenosis	31/176 (17.6%)			

[1] Fisher's exact test for one proportion, p-value and 95% CI are two-sided.

3. Observational Endpoints

Table 11 displays the Device and Procedure Success analysis. Both device and procedure success were acceptably high indicating that the investigators were able to deploy and place the Tack implants where needed with no major adverse events during the procedure.

Table 11. Device and Procedure Success		
Event Type	**ITT Subjects n/N (%)**	**PP Subjects n/N (%)**
Device Success per device introduced	230/239 (96.2%)	N/A
Device Success per patient	204/213 (95.8%)	N/A
Procedural Success per subject	212/213 (99.5%)	204/204 (100.0%)

Table 11. Device and Procedure Success		
Event Type	**ITT Subjects n/N (%)**	**PP Subjects n/N (%)**
Device Success is defined as successful deployment of the Tack(s) at the intended target site(s) and successful withdrawal of the delivery catheter from the introducer sheath. If the study device was introduced but the subject did not receive a Tack due to user error and not a device malfunction, this device was not included in the device success assessment. **Device Success per patient** - Device success as an observational endpoint was measured per device but the per protocol analysis definition required that all devices used in a single patient that were evaluable per the device success observational endpoint were successes. **Procedure Success** is defined as demonstrated vessel patency (<30% residual diameter stenosis, by visual estimate) without the use of a bailout stent or the occurrence of MAE upon completion of the index procedure.		

Table 12 details the Kaplan-Meier estimates of the other safety-related endpoints that were pre-defined for the trial for the ITT population. No device-related deaths or major amputations have occurred through 12 months.

Table 12. Summary of Other Endpoints (Kaplan Meier Analysis) – ITT Population			
Parameter	**Estimate # events, # at risk**		
	30 Day	**180 Day**	**360 Day**
Survival	100.0% 0, 213	99.5% 1, 207	97.9% 4, 153
Freedom from amputation of the target limb (above the ankle)	100.0% 0, 213	100.0% 0, 207	100.0% 0, 153
Freedom from clinically driven target vessel revascularization (CD-TVR)	100.0% 0, 213	95.7% 9, 198	85.5% 29, 134
Freedom from clinically driven target lesion revascularization (CD-TLR)	100.0% 0, 213	96.2% 8, 199	86.5% 27, 136
Freedom from target vessel revascularization (TVR)	100.0% 0, 213	95.7% 9, 198	85.0% 30, 134
Freedom from target lesion revascularization (TLR)	100.0% 0, 213	96.2% 8, 199	86.5% 27, 136

Table 13 details the Rutherford classification and changes from baseline through 12 months. By 12 months, 71.7% of subjects in the ITT population reported either no symptoms or mild claudication (Rutherford 0-1). Also, importantly, only five subjects were reported with critical limb ischemia (Rutherford 4-6) at the same time-period. 81.2% are reported to show an improvement of one or more Rutherford class from baseline to 12 months.

Table 13. Rutherford Classification and Changes in Rutherford Class from Baseline in ITT Patients				
Parameter	***Baseline***	***30 Day***	***6 Month***	***12 Month***
Rutherford Class, n/N(%)				
0-Asymptomatic	0/213 (0.0%)	119/208 (57.2%)	104/196 (53.1%)	102/191 (53.4%)
1-Mild Claudication	0/213 (0.0%)	36/208 (17.3%)	38/196 (19.4%)	35/191 (18.3%)
2-Moderated Claudication	68/213 (31.9%)	35/208 (16.8%)	27/196 (13.8%)	30/191 (15.7%)
3-Severe Claudication	136/213 (63.8%)	14/208 (6.7%)	20/196 (10.2%)	19/191 (9.9%)
4-Ischemic Rest Pain	9/213 (4.2%)	4/208 (1.9%)	5/196 (2.6%)	3/191 (1.6%)
5-Minor Tissue Loss	0/213 (0.0%)	0/208 (0.0%)	2/196 (1.0%)	2/191 (1.0%)
6-Ulceration or gangrene	0/213 (0.0%)	0/208 (0.0%)	0/196 (0.0%)	0/191 (0.0%)
Rutherford Change from Baseline, n/N(%)				
Worsened 3 classes	N/A	0/208 (0.0%)	0/196 (0.0%)	1/191 (0.5%)
Worsened 2 classes	N/A	2/208 (1.0%)	6/196 (3.1%)	1/191 (0.5%)
Worsened 1 class	N/A	1/208 (0.5%)	6/196 (3.1%)	9/191 (4.7%)
No change	N/A	34/208 (16.3%)	27/196 (13.8%)	25/191 (13.1%)
Improved 1 class	N/A	32/208 (15.4%)	30/196 (15.3%)	33/191 (17.3%)
Improved 2 classes	N/A	49/208 (23.6%)	47/196 (24.0%)	45/191 (23.6%)
Improved 3 classes	N/A	83/208 (39.9%)	75/196 (38.3%)	72/191 (37.7%)
Improved 4 classes	N/A	7/208 (3.4%)	5/196 (2.6%)	5/191 (2.6%)

Ankle Brachial index (ABI) was measured at baseline, discharge and then again at each follow-up visit. **Table 14** describes the results of the changes in ABI from baseline through follow-up in the ITT populations. The average ABI was higher at discharge versus baseline and remained stable throughout follow-up.

Table 14. ABI and Changes in ABI from Baseline in ITT Patients					
Parameter	***Baseline***	***Discharge***	***30 Day***	***6 Month***	***12 Month***
ABI in the Target Limb					
# Non-Compressible	7	9	7	8	9
At follow-up Mean ± SD (N) (Min, Median, Max)	0.76 ± 0.21 (200) (0.30,0.75,1.37)	0.92 ± 0.17 (194) (0.01,0.95,1.38)	0.97 ± 0.15 (199) (0.39,0.97,1.37)	0.91 ± 0.17 (185) (0.33,0.92,1.27)	0.91 ± 0.17 (180) (0.32,0.93,1.38)
Change from Baseline Mean ± SD (N) (Min, Median, Max)	N/A	0.17 ± 0.21 (189) (-1.19,0.16,0.68)	0.22 ± 0.23 (194) (-0.46,0.22,0.83)	0.16 ± 0.24 (180) (-0.46,0.16,0.73)	0.15 ± 0.23 (175) (-0.45,0.13,0.76)

IVI also collected information regarding changes from baseline in PAQ, EQ-5D-3L and WIQ. Positive changes were seen from baseline to 12 months in all three quality of life measures.

An X-ray assessment was required at the 12-month follow-up visit to assess Tack integrity for all subjects in whom at least one Tack was placed during the index procedure. The x-rays were subsequently reviewed by the core lab for embolization, migration or fracture. **Table 15** details the results of the X-ray analysis. The Tack implant is quite durable as evidenced by no fractures visualized 12 months post-procedure. Additionally, no embolization occurred and only one Tack implant migration was noted (1/730 Tack implants in 184 subjects reviewed via X-ray at 12 months for migration). The subject had five Tacks implanted and one of the implants was noted to have moved 2.6mm caudally during the follow-up period. No other adverse events have been reported for this subject and the artery is patent at 12 months.

Table 15. Tack Integrity at 12 Months in the Intent-to-Treat patients

Event	ITT Subjects n/N (%)
Tack Embolization	0/186 (0.0%)
Tack Migration	1/184 (0.5%)
Tack Fracture	0/186 (0.0%)

4. Subgroup Analysis

Subgroup analyses were performed for the following:

- Balloon Type
- Gender
- Geography

The TOBA II study was not powered to demonstrate statistical significance within the subgroups for the primary efficacy and safety endpoints. As noted in **Table 16** below, no differences were noted based on gender. Note, the TOBA II trial was non-randomized so choice of POBA or DCB was at the treating physician's discretion. Results indicate differences in baseline characteristics between the PTA and DCB patients that may correlate to poorer outcomes in the DCB group including clinical trends for a higher Rutherford class, lower ABI, longer lesions, more total occlusions, and more severe pre-treatment percentage stenosis.

Table 16. Subgroup Analyses of Primary Endpoints		
Subgroup	**Primary Safety Endpoint** n/N (%)	**Primary Efficacy Endpoint n/N (%)**
ITT	212/212 (100.0%)	120/183 (65.6%)
Balloon Type		
DCB	123/123 (100.0%)	66/109 (60.6%)
POBA	89/89 (100.0%)	54/74 (73.0%)
Gender		
Male	150/150 (100.0%)	86/131 (65.6%)
Female	62/62 (100.0%)	34/52 (65.4%)
Geography		
Inside United States	172/172 (100.0%)	98/144 (68.1%)
Outside of United States	40/40 (100.0%)	22/39 (56.4%)

5. Applicability to Pediatric Populations

Peripheral artery disease is not typically found in pediatric populations except for rare cases of homozygous lipid disorders. Accordingly, safety and effectiveness of the Tack Endovascular System® (6F) in these patients were not studied in the TOBA II trial.

E. Financial Disclosure

The Financial Disclosure by Clinical Investigators regulation (21 CFR 54) requires applicants who submit a marketing application to include certain information concerning the compensation to, and financial interests and arrangement of, any clinical investigator conducting clinical studies covered by the regulation. The TOBA II pivotal clinical study included 149 investigators. None of the clinical investigators had disclosable financial interests/arrangements as defined in sections 54.2(a), (b), (c), and (f). The information provided does not raise any questions about the reliability of the data.

XI. PANEL MEETING RECOMMENDATION AND FDA'S POST-PANEL ACTION

In accordance with the provisions of section 515(c)(3) of the act as amended by the Safe Medical Devices Act of 1990, this PMA was not referred to the Circulatory System Devices Panel, an FDA advisory committee, for review and recommendation because the information in the PMA substantially duplicates information previously reviewed by this panel.

XII. CONCLUSIONS DRAWN FROM STUDIES

A. Effectiveness Conclusions

The *in vitro* engineering testing conducted on the Tack Endovascular System® (6F) and delivery system demonstrated that the performance characteristics of the device met the product specifications. The test results obtained from sterilization testing demonstrated that the product can be adequately sterilized and is acceptable for clinical use. The shelf life testing has established acceptable performance for a labeled shelf life up to 2 years.

The prospective, multi-center, single-arm, non-blinded TOBA II study investigated the safety and effectiveness of the Tack Endovascular System® (6F) for the treatment of dissection(s) type(s) A through F resulting from percutaneous transluminal balloon angioplasty (PTA) using standard (POBA) and drug-coated balloon (DCB) angioplasty in the superficial femoral and proximal popliteal arteries. The 12-month primary patency rate (where patency was defined as Primary patency was defined as freedom from CEC-adjudicated clinically-driven TLR and freedom from core lab-adjudicated duplex ultrasound derived binary restenosis (defined as PSVR ≥2.5)) in the ITT group was 65.6% with a 95% lower confidence bound of 58.2% with exceeds the target performance goal of 52.7% with a p-value < 0.001; therefore, the effectiveness goal was met.

Although not a prospectively planned sub-analysis, there were noted differences in outcomes by balloon type in that patients treated with DCB plus Tack generally performed worse than those treated with POBA plus Tack. Further assessment suggests that the POBA and DCB populations differed in this nonrandomized study in that there were clinical and angiographic characteristics in the DCB group that that correlate with a more challenging patient population. Other secondary clinical outcomes assessments were adequate with regard to trends in ABI, Rutherford class, walking scores and quality of life assessments.

Device and procedure success per subject were adequate; 95.8% and 99.5%, respectively. Acutely, there were 9 devices with procedural failures either secondary to nondeployment (2) or movement of Tacks before the close of the index procedure (7). At 12 months, no fractures or embolizations were noted, but there was a single 2.6mm migration.

B. Safety Conclusions

The risks of the device are based on nonclinical laboratory and/or animal studies as well as data collected in a clinical study conducted to support PMA approval as described above.

No primary safety events were noted in any subject through 30 days. The primary safety endpoint, 30-day freedom from MAE rate (where MAE was defined as index limb amputation (above the ankle), CEC adjudicated clinically-driven target lesion revascularization (CD-TLR), or all-cause death at 30 days) in the ITT group was 100%

with a 95% lower confidence bound of 98.6% which exceeds the target performance goal of 88% with a p value < 0.001; therefore, the safety goal was met. No unanticipated adverse device effects were observed, and no deaths were attributable to the device or procedure throughout the observed period.

C. Benefit-Risk Determination

The probable benefits of the device are based on data collected in the TOBA II clinical study conducted to support PMA approval as described above. The benefits of the device include:

- The PG regarding effectiveness (patency) was met.
- The device has the ability to treat dissections while leaving less metal behind than stents, and the Tack implants are designed to apply low outward force to the vessel wall in an effort to reduce injury.
- There was no evidence of embolization or fracture of the device in the TOBA II clinical study.
- The PG regarding safety (30-day MAE) was met, with no MAEs reported in the first 30 days of follow-up.
- The use of the Tack Endovascular System® (6F) resulted in similar complications as other available endovascular implant devices used in PTA procedures.

1. Patient Perspectives

   This submission did not include specific information on patient perspectives for this device.

In conclusion, given the available information above, the data support that for the Tack Endovascular System® (6F) the probable benefits outweigh the probable risks.

D. Overall Conclusions

The data in this application support the reasonable assurance of safety and effectiveness of the Tack Endovascular System® (6F) when used in accordance with the indications for use. The results from preclinical and clinical studies indicate that the Tack Endovascular System® (6F) meets safety and performance specifications. The results from the TOBA II multi-center clinical trial support the conclusion that the Tack Endovascular System® (6F) is safe and effective for the treatment of post-PTA dissections in the superficial femoral and proximal popliteal arteries when used in accordance with device labeling and the instructions for use (IFU).

XIII. CDRH DECISION

CDRH issued an approval order on 04/11/2019. The final conditions of approval cited in the approval order are described below.

TOBA II Continued Follow-Up Study. This study should be conducted per protocol CA 0119, Rev B (dated February 10, 2016). This study is a prospective, multi-center follow-up of the TOBA II pivotal study (G150029) that treated 213 subjects from 33 investigational sites. It will evaluate the long-term safety and effectiveness of the Tack Endovascular System® (6F). All 204 remaining subjects, active at the end of the 12-month evaluation, will continue to be followed annually through 36 months. Follow-up at the 2- and 3-year timepoints will include the following: Rutherford Classification, target limb resting ABI, Peripheral Artery Questionnaire (PAQ), EQ-5D-3L, Walking Impairment Questionnaire (WIQ), major adverse event (MAE) occurrence, adverse event occurrence, and review of concomitant medications (antiplatelets/anticoagulants).The applicant's manufacturing facilities have been inspected and found to be in compliance with the device Quality System (QS) regulation (21 CFR 820).

XIV. APPROVAL SPECIFICATION

Instructions for Use: See device labeling.

Potential Hazards from Using the Device: See Indications, Contraindications, Warnings, Precautions and Adverse Events in the labeling.

Post Approval Requirements and Restrictions: See approval order.

XV. REFERENCES

1. Rocha-Singh KJ, Jaff MR, Crabtree TR, Bloch DA, Ansel G on behalf of VIVA Physicians, Inc. Performance Goals and Endpoint Assessments for Clinical Trials of Femoropopliteal Bare Nitinol Stents in Patients with Symptomatic Peripheral Arterial Disease. Catheterization and Cardiovascular Interventions 69: 910 – 919 (2007).