Instructions for Use (IFU)

Pipeline™ Embolization Device

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1 Indications for Use

The Pipeline™ Embolization Device (PED) is indicated for the endovascular treatment of adults (22 years of age or older) with large or giant wide-necked intracranial aneurysms (IAs) in the internal carotid artery from the petrous to the superior hypophyseal segments.

2 Contraindications

- Patients with active bacterial infection.
- Patients in whom dual antiplatelet therapy (aspirin and clopidogrel) is contraindicated.
- Patients who have not received dual antiplatelet agents prior to the procedure.
- Patients in whom a pre-existing stent is in place in the parent artery at the target aneurysm location.

3 Warnings

- While advancing the PED inside the microcatheter, do not pull back on or torque the wire. This may make device release more difficult or impossible.

- Do not rotate the delivery wire for more than 10 full turns. Over-rotation may cause delivery wire breakage. If PED does not open after 10 turns, remove the entire system (microcatheter and PED delivery system) simultaneously.

- If the capture coil tip of the delivery system becomes stuck in the mesh of a delivered PED, rotate the wire clockwise while advancing the wire to try to release it, then slowly pull back on the delivery wire.

4 Precautions

- Do not use product if the sterile package is damaged.
- Do not use PED in patients in whom angiography demonstrates inappropriate anatomy, such as severe pre- or post-aneurysmal narrowing.
- PED should be used only by physicians trained in percutaneous, intravascular techniques and procedures at medical facilities with the appropriate fluoroscopic equipment.
- Physicians should undergo appropriate training prior to using PED in patients.
- PED is provided sterile for single use only. Store in a cool, dry place.
- Carefully inspect the sterile package and device components prior to use to verify that they have not been damaged during shipping. Do not use kinked or damaged components.
- Use PED system prior to the "Use Before" date printed on the package.
- The appropriate anti-platelet and anti-coagulation therapy should be administered in accordance with standard medical practice.
- A thrombosing aneurysm may aggravate pre-existing, or cause new, symptoms of mass effect and may require medical therapy.
- Placement of multiple PEDs may increase the risk of ischemic complications.

5 Potential Complications

Potential complications, some of which could be fatal, include, but are not limited to the following:

Adverse reaction to antiplatelet/anticoagulation agents or contrast media, intracerebral, bleeding, coma, device fracture, device migration or misplacement, dissection of the parent artery, embolism, groin injury, headache, hemorrhage, hydrocephalus, infection, intracerebral bleeding, ischemia, mass effect, neurological deficits, parent artery stenosis, perforator occlusion, post-procedure bleeding, ruptured or perforated aneurysm, seizure, stroke, thromboembolism, transient ischemic attack (TIA), vasospasm, vessel occlusion, vessel perforation and vision impairment.

6 Device Description

The Pipeline Embolization Device™ (PED) consists of a permanent implant combined with a guidewire-based delivery system. The PED implant is a braided, multi-alloy, mesh cylinder woven from platinum/tungsten and cobalt-chromium-nickel alloy wires. A photograph of PED is shown in **Figure 1a** and the design of the distal delivery system is shown in **Figure 1b**. The woven wires of the device provide approximately 30% metal coverage of the arterial wall surface area. The implant is designed for placement in a parent vessel across the neck of an intracranial aneurysm (IA). The PED implant is available in diameters from 2.5 to 5.0 mm and lengths from 10 to 35 mm. **Table 1** shows the available sizes of PED. The expanded or un-constrained diameter is 0.25 mm larger than the labeled diameter.

The tip and protective coils are made of platinum-tungsten alloy, the proximal marker a platinum-iridium alloy, and the distal, mid and proximal solder joints are a tin-silver mixture. The protective coil is designed to hold PED in the collapsed state until PED is deployed in the parent vessel. Other than being held in place by the protective coil, PED is not physically attached to the guidewire. The proximal pusher allows the user to push PED out of the microcatheter when the wire is advanced. A proximal marker soldered to the core wire allows fluoroscopic localization.

PED is provided with the implant mounted on a 175-190 cm 304 stainless steel micro-guidewire and compressed inside an introducer sheath. The PED is designed to be delivered **only** through a microcatheter of 0.027 inch (0.69 mm) inside diameter.

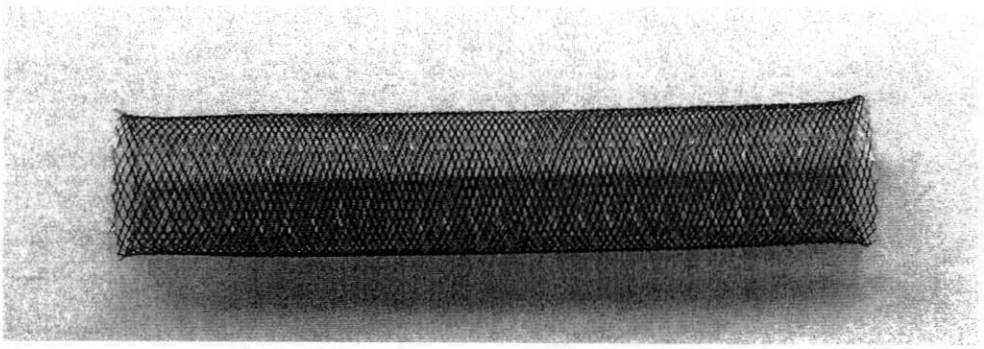


Figure 1a: The Pipeline Embolization Device.

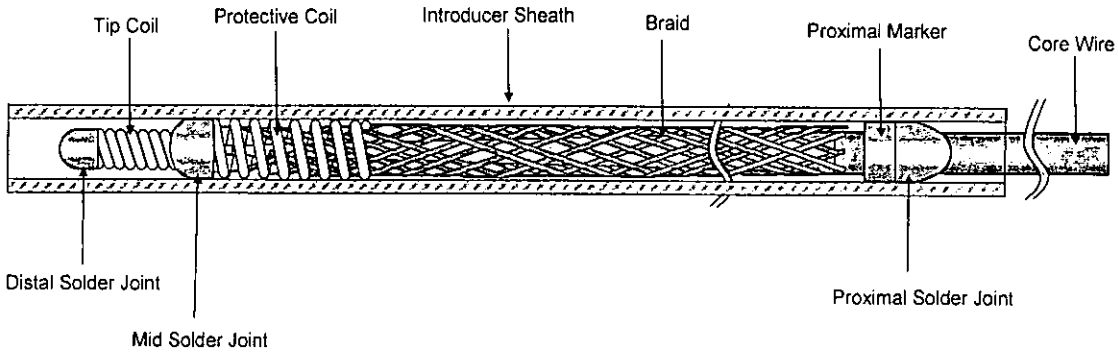


Figure 1b. Pipeline Embolization Device.

Table 1. Size ranges of PED.

Labeled Diameter (mm)	Self Expanded Diameter (mm)	Labeled Lengths (mm)
2.5	2.75	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
2.75	3.00	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
3.0	3.25	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
3.25	3.50	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
3.5	3.75	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
3.75	4.00	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
4.0	4.25	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
4.25	4.50	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
4.5	4.75	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
4.75	5.00	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35
5.0	5.25	10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35

7 Magnetic Resonance Imaging

Non-clinical testing has demonstrated that the PED is MR Conditional. It can be scanned safely under the following conditions:

- Static magnetic field of 3 Tesla or less.
- Spatial gradient field of 720 Gauss/cm or less
- Maximum whole-body-averaged specific absorption rate (SAR) of 4.0 W/kg for 15 minutes of scanning.

In non-clinical testing, the PED produced a temperature rise of less than 0.6°C at a maximum whole body averaged specific absorption rate (SAR) of 4.0 W/kg for 15 minutes of MR scanning in a 3 Tesla MR system.

The PED may create local field inhomogeneity and susceptibility artifacts which may degrade the diagnostic quality of the MRI images. Based on the non-clinical testing of the 5.0 mm device using standard views, the worst case maximum artifact was < 3mm when subjected to 3.0 Tesla. Local field artifact from the PED may decrease the accuracy of MR angiogram in assessing vessel luminal patency.

MR image quality may be compromised if the area is in the exact same area or relatively close to the position of the PED. Therefore, it may be necessary to optimize MR imaging parameters for the presence of this metallic implant.

8 Observed Adverse Events

PUFS was a prospective, multicenter international study of patients with large and giant unruptured aneurysms of the internal carotid artery. 108 subjects were enrolled and treated. Serious adverse events reported to one year follow-up are shown in **Table 2** and non-serious adverse events are shown in **Table 3**. Ten strokes occurred in 9 subjects (9.3%), of which 5 were ischemic and 4 were hemorrhagic. Five occurred in the peri-procedural period (prior to discharge) and 5 in the post-procedural period. Two of the events were fatal, both intracerebral

hemorrhages. One peri-procedural ischemic stroke and 2 post-procedural ischemic strokes were associated with parent artery occlusion.

Table 2. Serious adverse events in PUFS by MedDRA® *category and term – cumulative incidence at 180 days and one year (N=107 subjects).

MedDRA® category	MedDRA® term	180 days	1 year
Nervous system disorders		17 (15.9%)	19 (17.8%)
	Headache	5 (4.7%)	5 (4.7%)
	Haemorrhage intracranial	4 (3.7%)	4 (3.7%)
	Amaurosis fugax	3 (2.8%)	5 (4.7%)
	Ischemic stroke	3 (2.8%)	3 (2.8%)
	Cerebral haematoma	1 (0.9%)	1 (0.9%)
	Thrombotic stroke	1 (0.9%)	1 (0.9%)
Neurological disorders NEC	Dizziness	0 (0%)	2 (0.9%)
Vascular disorders NEC	Arteriovenous fistula	2 (1.9%)	2 (1.9%)
Arteriosclerosis, stenosis, vascular insufficiency and necrosis	Compartment syndrome	1 (0.9%)	1 (0.9%)
	Carotid artery occlusion	0 (0%)	1 (0.9%)
Cardiac arrhythmias	Atrial fibrillation	1 (0.9%)	1 (0.9%)
	Sinus bradycardia	1 (0.9%)	1 (0.9%)
	Sudden cardiac death	1 (0.9%)	1 (0.9%)
Decreased and nonspecific blood pressure disorders and shock	Procedural hypotension	1 (0.9%)	1 (0.9%)
Ear and labyrinth disorders	Tinnitus	1 (0.9%)	1 (0.9%)
Embolism and thrombosis	Deep vein thrombosis postoperative	1 (0.9%)	1 (0.9%)
	Retinal artery thrombosis	1 (0.9%)	1 (0.9%)
Gastrointestinal hemorrhages	Colitis (excl infective)	1 (0.9%)	1 (0.9%)
	Rectal haemorrhage	1 (0.9%)	1 (0.9%)
Infections - pathogen unspecified	Urinary tract infection	1 (0.9%)	1 (0.9%)
Neoplasms benign, malignant and unspecified	Breast cancer recurrence	0 (0%)	1 (0.9%)
Pulmonary vascular disorders	Post procedural pulmonary embolism	1 (0.9%)	1 (0.9%)
Reproductive system and breast disorders	Female genital tract fistula	1 (0.9%)	1 (0.9%)
Respiratory tract neoplasms	Lung squamous cell carcinoma stage 1	0 (0%)	1 (0.9%)
Vascular disorders	Aneurysms and dissections site specific NEC	1 (0.9%)	1 (0.9%)
Vascular hemorrhagic disorders	Epistaxis	1 (0.9%)	1 (0.9%)
	Retroperitoneal haemorrhage	1 (0.9%)	1 (0.9%)
Vision disorders	Diplopia	1 (0.9%)	1 (0.9%)
Visual field disorders	Visual field defect	1 (0.9%)	1 (0.9%)
Total		**37 (34.6%)**	**44 (41.1%)**

MedDRA®: Medical Dictionary for Regulatory Activities

Table 3. Non-serious adverse events occurring in PUFS by 180 days – by decreasing incidence (N=107 subjects).

MedDRA® Category	MedDRA® Term	180 Days
Nervous system disorders – headache		19 (17.8%)
	Headache	18 (16.8%)
	Post-traumatic headache	1 (0.9%)
Procedural and device related injuries and complications NEC*	Procedural headache	16 (15%)
Vascular hemorrhagic disorders		14 (13.1%)
	Conjunctival haemorrhage	1 (0.9%)
	Epistaxis	3 (2.8%)
	Subcutaneous haematoma	1 (0.9%)
	Urogenital haemorrhage	2 (1.9%)
	Vessel puncture site hemorrhage	7 (6.5%)
Gastrointestinal signs and symptoms		13 (12.1%)
	Nausea	5 (4.7%)
	Procedural nausea	7 (6.5%)
	Procedural vomiting	1 (0.9%)

MedDRA® Category	MedDRA® Term	180 Days
Vision disorders		10 (9.3%)
	Diplopia	6 (5.6%)
	Photopsia	3 (2.8%)
	Vision blurred	1 (0.9%)
Ocular neuromuscular disorders		9 (8.4%)
	Eyelid ptosis	4 (3.7%)
	IIIrd nerve disorder	1 (0.9%)
	IVth nerve disorder	1 (0.9%)
	VIth nerve disorder	3 (2.8%)
Infections - pathogen unspecified		6 (5.6%)
	Acute sinusitis	1 (0.9%)
	Pharyngitis	2 (1.9%)
	Puncture site infection	1 (0.9%)
	Urinary tract infection	2 (1.9%)
Neurological disorders NEC		5 (4.7%)
	Dizziness	2 (1.9%)
	Hyperesthesia	1 (0.9%)
	Hypoesthesia	1 (0.9%)
	Hypoesthesia facial	1 (0.9%)
Vascular disorders	Ecchymosis	4 (3.7%)
Visual field disorders	Visual field defect	3 (2.8%)
Blood and lymphatic system disorders	Anemia	2 (1.9%)
Body temperature conditions	Postoperative fever	2 (1.9%)
Embolism and thrombosis	Deep vein thrombosis postoperative	2 (1.9%)
Allergic conditions	Drug eruption	1 (0.9%)
Ear and labyrinth disorders	Tinnitus	1 (0.9%)
Epidermal and dermal conditions	Pruritis	1 (0.9%)
Eye disorders NEC	Eye pain	1 (0.9%)
Gastrointestinal disorders	Constipation	1 (0.9%)
Gastrointestinal hemorrhages	Lower gastrointestinal haemorrhage	1 (0.9%)
General system disorders	Discomfort	1 (0.9%)
	Facial pain	1 (0.9%)
	Peripheral edema	1 (0.9%)
Injuries NEC	Corneal abrasion	1 (0.9%)
Musculoskeletal and connective tissue disorders NEC	Back pain	1 (0.9%)
	Pain in extremity	1 (0.9%)
Reproductive system and breast disorders	Menometrorrhagia	1 (0.9%)
	Menorrhagia	1 (0.9%)
Skin and subcutaneous tissue disorders	Skin bacterial infection	1 (0.9%)
Skin appendage conditions	Application site alopecia	1 (0.9%)
Total		**122**

*NEC; not elsewhere classified

9 Potential Adverse Events

Potential adverse effects, some of which can be fatal, from use of PED, the PED placement procedure and general anesthesia include:

- Bleeding, including intracerebral, retroperitoneal or in other locations
- Blindness
- Complications of arterial puncture including pain, local bleeding, local infection and injury to the artery, vein or adjacent nerves
- Confusion, coma or other change in mental status
- Cranial neuropathy
- Device fracture, migration or misplacement
- Dissection or perforation of the parent artery
- Embolism of air, blood clots, cholesterol fragments or device components
- Headache
- Hydrocephalus
- Infection
- Mass effect
- Neurologic deficits
- Perforation or rupture of aneurysm sac or parent artery
- Reactions to antiplatelet/anticoagulant agents
- Reactions due to radiation exposure
- Reactions to anesthesia and related procedures
- Reactions to contrast agents including allergic reactions and renal failure
- Seizure
- Stenosis or thrombosis of the parent artery within PED or a branch vessel covered by PED
- Transient ischemic attack (TIA) or ischemic stroke
- Vasospasm
- Visual impairment

10 Clinical Trial Results – PUFS (Pipeline for Uncoilable or Failed Aneurysms) Study

10.1 Purpose

The purpose of the PUFS study was to evaluate the safety and effectiveness of PED for the endovascular treatment of patients with unruptured large and giant intracranial aneurysms of the internal carotid artery from the petrous to superior hypophyseal segments.

10.2 Design

PUFS was a prospective, multi-center, single-arm, open label clinical study conducted at 8 sites in the US and 2 sites outside of the US. PUFS subjects were adults with a single target aneurysm on the internal carotid artery with size ≥10 mm and neck ≥4 mm. Patients were excluded if they had recent surgery or subarachnoid hemorrhage, if they had a bleeding disorder and if a stent was already in place. All patients received perioperative aspirin (325 mg daily for 2 days prior to PED and 325 mg daily for 6 months after PED) and clopidogrel (75 mg daily for 7 days [or a 650 mg oral bolus the day prior to the procedure] and 75 mg daily for 3 months after PED).*

The primary effectiveness endpoint of the study was complete occlusion of the target aneurysm on 180-day cerebral angiography in the absence of use of other treatments and in the absence of major (>50%) stenosis of the parent artery. The primary effectiveness endpoint was judged by a core radiologic laboratory. The primary safety endpoint was the occurrence of major ipsilateral stroke or neurologic death by 180 days. The primary safety endpoint was judged by a clinical events committee. Based on a literature review, PUFS was designed to be considered a success if the primary effectiveness endpoint rate was statistically greater than 50% and the primary safety endpoint rate was statistically <20%. A Bayesian statistical approach with non-informative prior distributions was used for the primary endpoint analysis.

* The use of antiplatelet agents after these time periods was at the discretion of the treating physician.

10.3 Demographics

Demographic characteristics of the study population were typical for patients with large and giant wide-necked intracranial aneurysms (**Table 4**). Subjects were predominantly female and hypertension was common. There was a history of subarachnoid hemorrhage in 8 (7.4%), one of which had occurred within 60 days of treatment. Target IAs (**Table 5**) were predominantly in the cavernous and paraophthalmic portions of the internal carotid artery.

Table 4. Baseline characteristics – PUFS (n=108).

Characteristic	Value
Age, mean (SD, range)	57.0 (11.3, 30.2 – 75.1)
Female gender, n (%)	96 (88.9%)
Race	
White	99 (91.7%)
Black	6 (5.6%)
Not reported	3 (2.8%)
Ethnicity, % Hispanic or Latino	6 (5.6%)
Medical history	
Subarachnoid hemorrhage	8 (7.4%)
Stroke	7 (6.5%)
Coronary artery disease	6 (5.6%)
Hypertension	60 (55.6%)
Diabetes	7 (6.5%)
Previous cocaine use	1 (0.9%)
Smoking	
Never smoker	46 (42.6%)
Current smoker	31 (28.7%)
Previous smoker	31 (28.7%)
Prior treatments for target IA	
Coil embolization	6 (5.6%)
Surgery	1 (0.9%)
Other	1 (0.9%)

Table 5. Target IA characteristics in PUFS (n=108).

Characteristic	N (%) or Mean (range)
Side	
Left	57 (52.8%)
Right	51 (47.2%)
Location	
Petrous	4 (3.7%)
Cavernous	45 (41.7%)
Carotid cave	2 (1.9%)
Superior hypophyseal	10 (9.3%)
Lateral clinoidal	2 (1.9%)
Paraophthalmic	35 (32.4%)
Supraclinoid	9 (8.3%)
Posterior communicating	1 (0.9%)
Maximum fundus diameter (mm), mean (SD, range)	18.2 (6.4, 6.2 – 36.1)
"Small" (<10 mm), N (%)	1 (0.9%)
"Large" (>10 mm), N (%)	85 (78.7%)
"Giant" (>25 mm), N (%)	22 (20.4%)
Neck (mm), mean (SD, range)	8.8 (4.3, 4.1-36.1)
Dome (mm), mean (SD, range)	14.6 (5.5, 4.4 – 29.5)
Dome/neck ratio, mean (SD, range)	1.8 (0.6, 0.6 – 4.1)
Target IA partially thrombosed, N (%)	17 (15.7%)

10.4 Technical Results

PED was placed successfully in 107 of 108 attempted (99.0%) subjects. In one subject, the parent artery distal to the IA could not be catheterized and the PED procedure was abandoned. A mean of 3.1 PEDs was placed per subject (**Table 6**). PEDs of most diameters and lengths were used (**Table 7**).* Mean procedure time was 124 minutes and mean fluoroscopy time was 48.4 minutes.

Table 6. Number of PEDs placed per subject in PUFS (n = 107 subjects)

# of PEDs placed	N (%)
1	2 (2%)
2	34 (32%)
3	50 (47%)
4	12 (11%)
5 or more	9 (8%)
Mean (range)	3.1 (1-15)

* Lengths greater than 20 mm were not available during the study.

Table 7. Length and diameter of PEDs used in PUFS

Length, mm	N
10	13
12	55
14	62
16	67
18	63
20	81
Diameter, mm	**N**
3.25	3
3.50	31
3.75	88
4.00	91
4.25	64
4.50	39
4.75	12
5.00	13
Total	341

10.5 Patient Follow-Up

Of the 104 subjects with 106 IAs in the IAs treated population, 97 subjects with 99 treated IAs had angiography 180 days after treatment and 89 subjects with 91 treated IAs had angiography 1 year after treatment. Clinical and angiographic follow-up was obtained in 96% of available subjects at 180 days.

10.6 Results

The analysis of effectiveness was evaluated in three populations (**Table 8**). The posterior probability that the study met its primary effectiveness endpoint was >0.9999 in all three analyses. Complete IA occlusion was seen in 81.8% of subjects at 180 days and 85.7% at 1 year (**Table 9**).

Table 8. Analyses of proportion of PUFS subjects who met the primary effectiveness endpoint.

Population	180 day	Posterior Probability ***	1 year
Intracranial aneurysms treated (N=106)	78/106; 73.6% (64.4, 81.0)*	>0.9999	75/106; 70.8% (61.1, 79.2)**
Subjects treated (N=104)	76/104; 73.1% (63.8, 80.7)*	>0.9999	73/104; 70.2% (60.4, 78.7)**
Intracranial aneurysms attempted (N=110)	80/110; 72.7% (63.7, 80.2)*	>0.9999	77/110; 70.7% (58.6, 76.7)**

*: 95% posterior credible interval
**: 95% exact confidence interval
***Probability that observed effectiveness rate was >50%

Table 9. IA occlusion status at 180 days and 1 year for subjects with angiographic data.

Occlusion ranking	180 days (N=99 IAs)	1 year (N=91 IAs)
Complete occlusion	81 (81.8%)	78 (85.7%)
Residual neck	8 (8.1%)	5 (5.5%)
Residual aneurysm	6 (6.1%)	5 (5.5%)
Other	4* (4.0%)	3** (3.3%)
Total	99 (100%)	91 (100%)

*: 1 subject with carotid-cavernous fistula and 3 subjects with carotid occlusion in whom IA not visualized
**: 2 subjects with carotid occlusion, 1 transvenous coil embolization in whom IA not visualized

The analysis of the primary safety endpoint was based on the safety cohort of 107 subjects treated with PED. The study's primary safety endpoint, ipsilateral major stroke or neurologic death by 180 days after treatment, occurred in 6 subjects (5.6%, 95% posterior credible interval CI 2.6 - 11.7%). The posterior probability that the major safety endpoint rate was less than 20%, the predetermined safety success threshold, was 0.999979.

Both the effectiveness and safety endpoint posterior probability values exceeded the pre-study probability threshold of 0.975, indicating that both results were statistically significant.

Adverse events are listed in **Section 8**.

10.7 Conclusions

The study met the pre-specified primary effectiveness and safety endpoints at 180 days which remained statistically significant at one year.

11 Directions for Use

1. Using standard interventional radiographic technique, place the microcatheter tip at least 20mm past the distal edge of the aneurysm. Gently retract the microcatheter to reduce slack in the microcatheter prior to inserting PED.

2. Choose a PED with labeled diameter that approximates the target vessel diameter.

3. Choose a PED with labeled length that is at least 6 mm longer than the aneurysm neck.

4. Remove packaging hoop from the pouch and detach wire from the white rubber wire-holder.

5. Carefully remove delivery wire and introducer sheath out of the packaging coil.

6. Insert introducer sheath into the rotating hemostatic valve at the catheter hub. Visually confirm that the tip of the sheath is seated deeply in the hub of the microcatheter.

7. Secure introducer sheath to the hub by locking down the rotating hemostatic valve tightly.

8. Advance the PED into the microcatheter by pushing the delivery wire until the tip of the delivery wire aligns with the tip of the microcatheter.

Caution: Do not torque or pull back on delivery wire during insertion.

9. Once the tip of delivery system and microcatheter are aligned, verify that the PED is in the desired location. Distal end of PED should be placed at least 2-3 mm past the distal edge of the aneurysm.

10. Unsheath the PED by slowly retract the microcatheter while maintaining the position of the PED until the tip of the microcatheter is proximal to the distal end of the PED

11. Push the delivery wire to continue to expose the PED. After about 10mm of PED is exposed the distal end may detach from the delivery wire. Detachment can be facilitated by slowly rotating the delivery wire in the clockwise direction.

Warning: Never rotate the delivery wire more than 10 full turns. If PED does not open after 10 turns, remove the entire system (microcatheter and PED delivery system together).

12. After the distal end of PED has successfully expanded, deploy the remainder of PED by alternately advancing the delivery core wire and allowing the microcatheter to retract slightly.

Caution: Under fluoroscopy, carefully monitor the tip of the core wire during PED deployment. The core wire can be rotated and maneuvered as needed after the distal end of the PED has detached.

13. After the entire PED is deployed, advance the microcatheter through the PED. When the microcatheter tip is distal to the PED, retract while gently rotating the delivery core wire **clockwise** to prevent entanglement with the deployed PED and the microcatheter tip.

14. Carefully inspect the deployed PED under fluoroscopy to confirm that it is completely apposed to the vessel wall and not kinked. If the device is not fully opposed or is kinked, consider using an angioplasty balloon to fully open it.

- Select an appropriately sized PED such that it is fully expanded diameter is equivalent to that of the proximal parent vessel. An incorrectly sized PED may result in inadequate device placement, incomplete opening or distal migration.
- Anchor PED at least 2-3 mm into the proximal and distal segments of the parent artery, preferably in a straight portion of the parent artery.
- Use fluoroscopy to carefully monitor the tip of the core wire during PED deployment.
- PED foreshortens substantially (50-60%) during deployment. Take device foreshortening into account when deploying PED.
- If the delivery wire cannot be retracted into the microcatheter, carefully remove the delivery core wire and microcatheter simultaneously.
- Rotate the delivery wire only in a clockwise direction. Rotating in a counter-clockwise direction may make device release more difficult or impossible.

12 Packaging and Storage

Store in a cool, dry place.

Questions and Answers

Q If excessive friction is experienced during the insertion of delivery system at anytime during the delivery of PED, what should I do?
A Carefully remove the entire system simultaneously (microcatheter and delivery system).

Q Can I retrieve the PED if the distal end of the PED has expanded at an undesirable location?
A Yes. A partially deployed PED can be retrieved. Carefully pull back the delivery core wire until the PED is secured at the tip of the microcatheter. Then, if there is no resistance, simultaneously remove the entire system (microcatheter and delivery system).

Q Can I retrieve a fully deployed PED?
A Once fully deployed, the PED cannot be removed. A second PED can be deployed if needed.

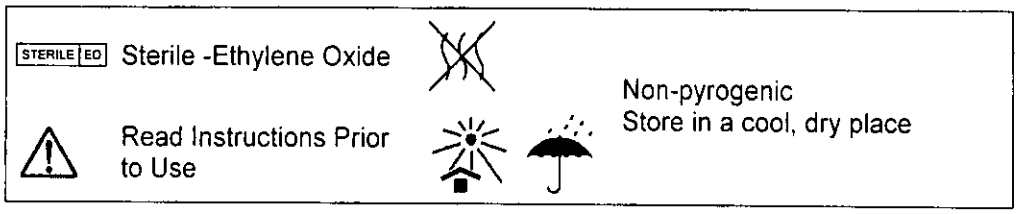
Q Can I place a second PED inside another PED?
A Yes. A second PED can be placed inside another PED. After placing the first PED, advance the microcatheter over the delivery wire while keeping the delivery core wire across the PED. Position the microcatheter at the desired location and retrieve the delivery wire. Select a new appropriate PED and deploy it as normal.

Caution: Placement of multiple PEDs may increase the risk of ischemic complications.

Q If there is a difference between the proximal and distal diameter, which PED diameter do I choose?
A Choose a PED that matches larger (typically proximal) vessel diameter to ensure proper anchoring.

Definitions of Symbols

	For Single Use Only (Do not Re-use)		Caution: Federal law (USA) restricts this device to sale by or on the order of a (licensed healthcare practitioner).



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A Pipeline Embolization Device Patient Information Card that includes both patient information, implant information and MRI guidelines is included with each device. All patients should be instructed to keep this card in their possession at all times for procedure/device identification.