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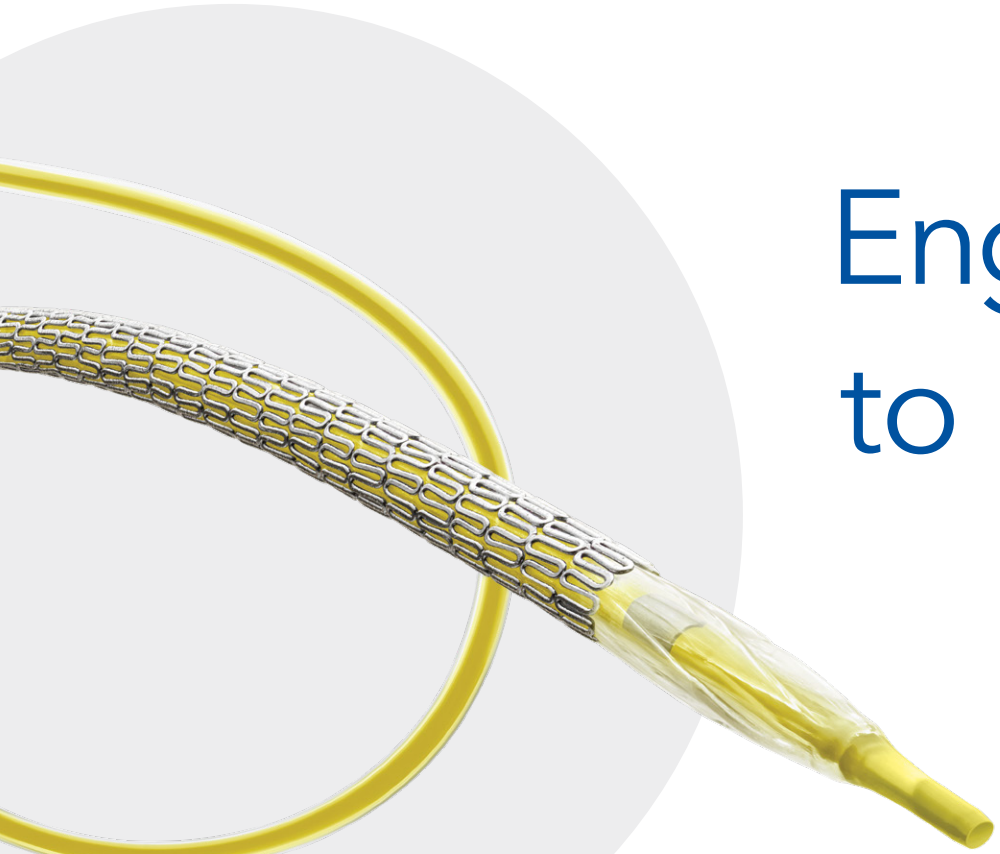
Onyx Frontier™ DES



Engineered to deliver

Engineered to deliver

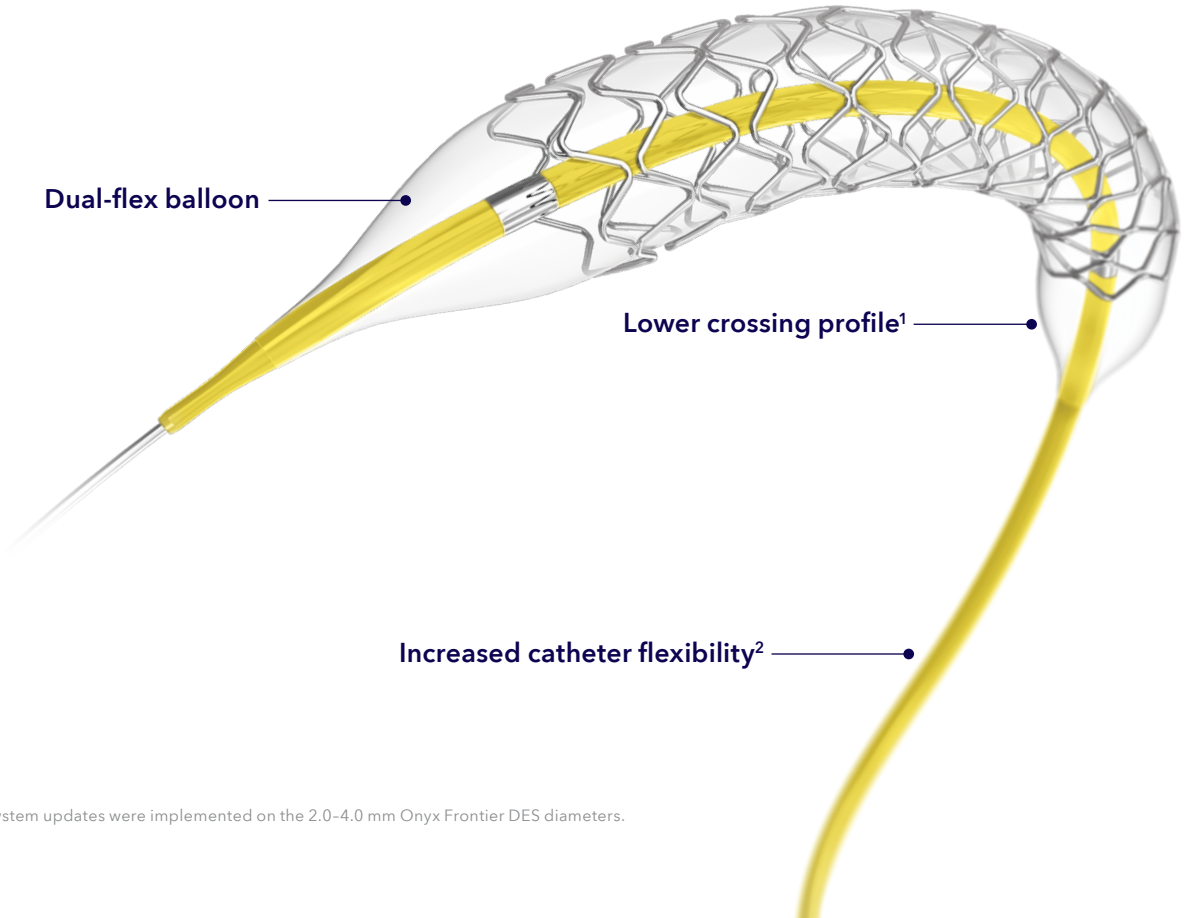
Different by design

Optimized for complex PCI

Engineered to deliver

Onyx Frontier DES introduces an enhanced delivery system† designed to take the acute performance of Resolute Onyx™ DES even further.

Enhanced delivery system features:

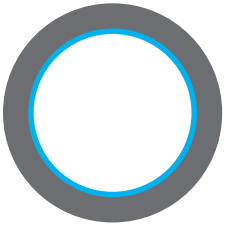


†Stent delivery system updates were implemented on the 2.0–4.0 mm Onyx Frontier DES diameters.

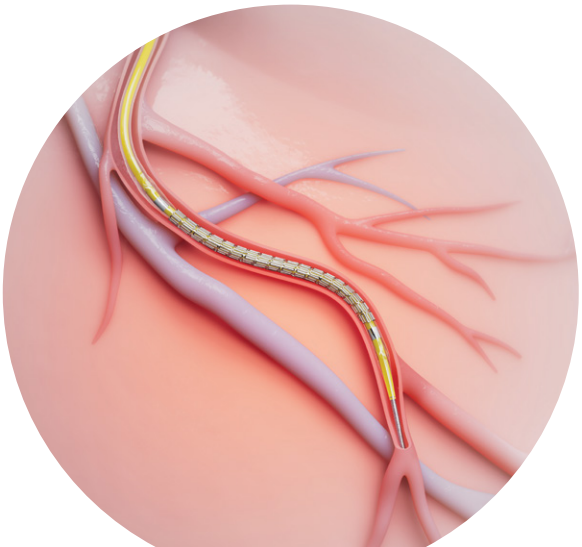
Dual-flex balloon provides increased flexibility and is comprised of two layers[3]:

- Inner layer enhances flexibility[3]
- Outer layer maintains strength[4]

This results in a **thinner balloon** with the same rated burst pressure (RBP) as Resolute Onyx DES.[5]



The dual-flex balloon enables a **7.5% lower crossing profile** than Resolute Onyx DES.[1]



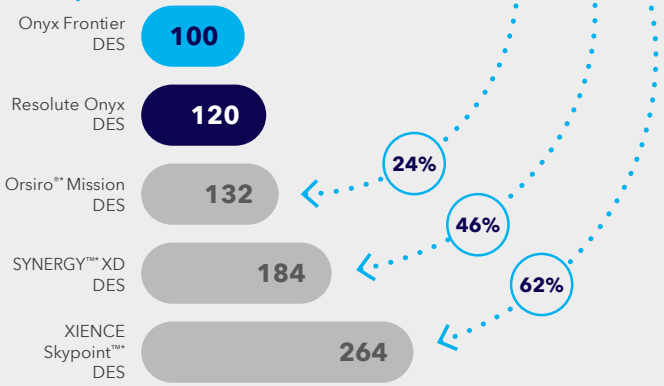
at least

24%

more deliverable than competitive DES[†7]

Deliverability comparison

3.0 mm DES



2-D track maximum force (gf scaled)
Lower is better

An updated manufacturing process applied to the outer shaft results in **increased catheter flexibility**[2] for improved deliverability.[6]

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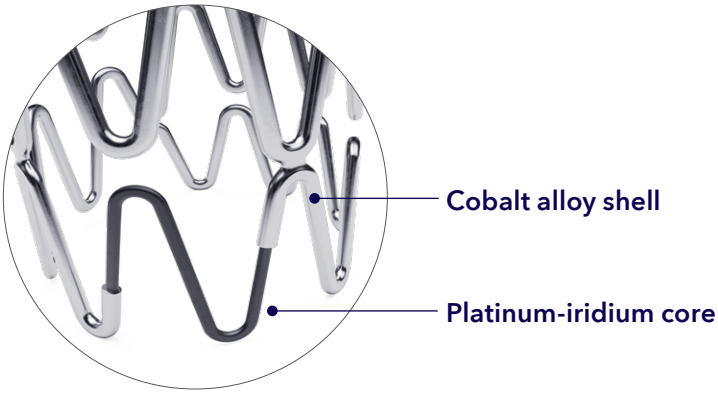
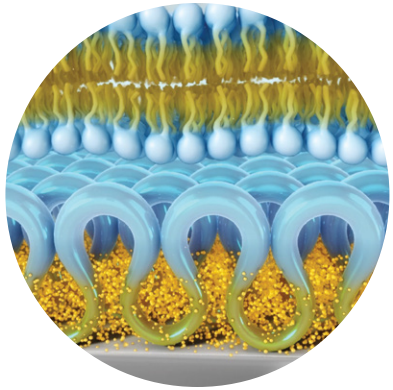
Different by design

Onyx Frontier DES builds off the legacy of Resolute Onyx DES, featuring the same stent design differentiators that provide the conformability,[8] visibility,[9] fast healing,[10] and size matrix you've come to rely on.

Only Medtronic DES are made from a single wire, versus laser cutting, to enable a fluid range of motion and the conformability needed for **superior strut apposition.**[8]



The platinum-iridium core within Onyx Frontier DES is **more visible**[9] than competitive DES while enabling greater radial strength with thin struts.‡[11]



The zotarolimus drug inhibits neointimal growth[12] while the BioLinx™ biocompatible polymer – the only polymer specifically designed for a DES – **promotes faster healing.**[10]

Only Medtronic offers DES in **2.0 mm to 5.0 mm** sizes to treat the broadest range of coronary vessel diameters.

Platform	Diameter (mm)	Stent length (mm)									MSID§ (mm)
Small vessels	2.00	8	12	15	18	22	26	30	––	––	3.50
	2.25	8	12	15	18	22	26	30	34	38	3.50
	2.50	8	12	15	18	22	26	30	34	38	3.50
Medium vessels	2.75	8	12	15	18	22	26	30	34	38	4.00
	3.00	8	12	15	18	22	26	30	34	38	4.00
Large vessels	3.50	8	12	15	18	22	26	30	34	38	5.00
	4.00	8	12	15	18	22	26	30	34	38	5.00
Extra-large vessels	4.50	––	12	15	18	22	26	30	––	––	6.00
	5.00	––	12	15	18	22	26	30	––	––	6.00

Four platforms specifically designed to meet the unique needs of each vessel size.

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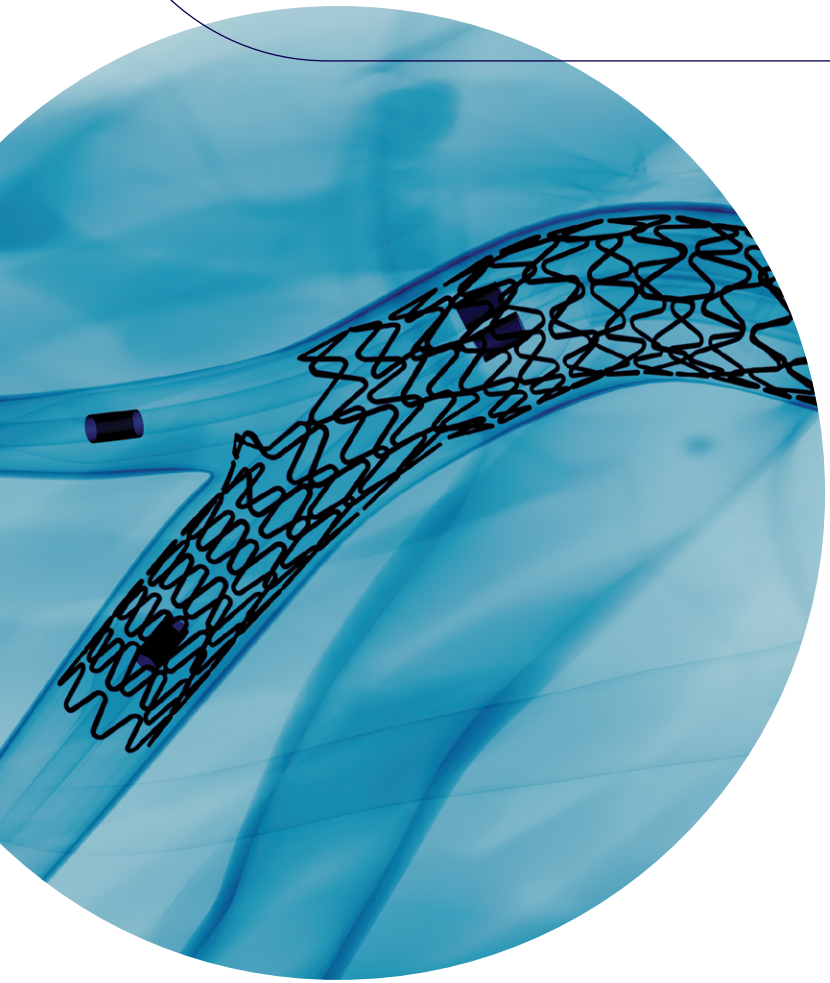
Optimized for complex PCI

An exclusive set of design features and meaningful clinical data inherited from Resolute Onyx DES provide support for your most challenging cases.



Bifurcation PCI

Onyx Frontier DES is built for bifurcation[§] with a unique single-wire design to optimize bifurcation PCI, helping you:

- **Treat** complex bifurcation anatomy with a highly conformable stent platform[13]
- **Access** the side branch more easily with rounded struts[14]
- **Open** the stent cell to the side branch while maintaining consistent scaffolding[15] and strength[16]

[§]Onyx Frontier DES is indicated for use in non-left main bifurcations using the provisional technique.

Chronic total occlusions (CTO)

Demonstrated deliverability[17] and visibility[9] of the Medtronic DES platform make it ideal for CTOs.

1-mo DAPT

Onyx Frontier DES is indicated for high bleeding risk (HBR) patients and labeled for 1-month DAPT[18]

Based on the results from the Onyx ONE Clear Analysis, which evaluated Resolute Onyx DES in the most complex HBR patients. The data is intended to better inform short-DAPT decisions in these patients, including those at high risk of thrombotic events.[19]

COMPLEX PATIENTS

74 years average age

~50% ACS patients

39% diabetes

COMPLEX LESIONS

50% moderate to severe calcified lesions

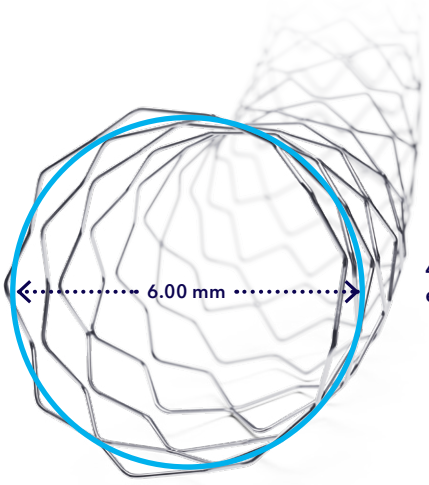
79% B2/C lesions

37 mm average stented length

225 patients with > 60 mm stented length[20]

Extra-large vessels (4.50–5.00 mm)

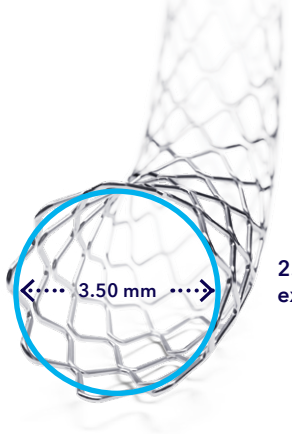
- Features additional crowns and thicker struts[21] (versus core sizes) to provide the radial strength needed[22]
- Expand up to 6.00 mmΩ while maintaining structural integrity and even scaffolding[14]
- Maintain a low profile,[14] allowing for 5 F compatibility



4.50–5.00 mm expand up to 6.00 mm

Extra-small vessels (2.00–2.50 mm)

- Only DES family with a 2.00 mm size
- Low crossing profile – less than 1 mm – makes it ideal to treat extra-small vessels[23]
- Demonstrated 2% target lesion revascularization and 0% stent thrombosis at one year in a complex, small-vessel population[24]



2.00–2.50 mm expand up to 3.50 mm

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™*Third-party brands are trademarks of their respective owners.
†Stent delivery system updates were implemented on the 2.0–4.0 mm Onyx Frontier DES diameter.
‡Onyx Frontier DES has the same platinum-iridium core as Resolute Onyx DES.
ΩStents should not be expanded to a diameter beyond the maximum labeled diameter listed per the IFU. Post-dilation required for overexpansion.

[1] Based on bench test data on file at Medtronic (D00339634). Compared to Resolute Onyx DES. N = 5 of each DES tested (3.0 x 18 mm).
[2] Based on bench test data on file at Medtronic (Frontier Outer Shaft Comparison Study). May not be indicative of clinical performance. Compared to Resolute Onyx catheter. N = 5 of each tested.
[3] Based on bench test data on file at Medtronic (44RD21031-040047). May not be indicative of clinical performance. Compared to Resolute Onyx balloon (3.0 mm). N = 10 of each balloon tested.
[4] Rated Burst Pressure is the same for Resolute Onyx DES and Onyx Frontier DES. Reference IFU for each product.
[5] Based on balloon specification of 3.0mm balloons (Onyx Frontier DES D00121162, Resolute Onyx DES 10041395DOC).
[6] Based on bench test data on file at Medtronic (D00339634, method D00117002). May not be indicative of clinical performance. Compared to Resolute Onyx DES. N = 7 of each DES tested (3.0 x 18 mm).
[7] Based on bench test data on file at Medtronic (D00339634, method D00117002). May not be indicative of clinical performance. N = 7 of each DES tested.
[8] Third-party modeling and analysis on file at Medtronic (Mortier Conformability Testing). May not be indicative of clinical performance. Evaluated the following stent platforms (3.0 mm): Resolute Onyx DES, Synergy DES, and XIENCE Alpine DES (Multi-Link 8 BMS platform).
[9] Based on bench test data on file at Medtronic (University of Budapest Visibility Testing). May not be indicative of clinical performance. N = 3 of each DES tested (3.0 mm): Onyx Frontier DES, Orsiro DES, XIENCE Alpine DES, and Synergy DES.
[10] Roleder T, Kedhi E, Berta B, et al. Short-term stent coverage of second-generation zotarolimus-eluting durable polymer stents: Onyx one-month optical coherence tomography study. *Adv Interv Cardiol.* 2019;15(2):143-150.
[11] Based on bench test data on file at Medtronic (10166182DOC). May not be indicative of clinical performance. Minimum N = 3 of each DES tested (3.0 mm): Onyx Frontier DES, Orsiro DES, XIENCE Sierra DES, and Synergy DES.
[12] Yeh RW, Silber S, Chen L, et al. 5-Year Safety and Efficacy of Resolute Zotarolimus-Eluting Stent: The RESOLUTE Global Clinical Trial Program. *JACC Cardiovasc Interv.* February 13, 2017;10(3):247-254.
[13] Third-party modeling and analysis of 3.0 mm stents on file at Medtronic (Mortier Bifurcation Simulation Report). May not be indicative of clinical performance.
[14] Bench test data on file at Medtronic (Tip Catch Test Analysis) comparing stents with rounded struts versus squared struts (3.0 mm). N = 10 of each design tested. May not be indicative of clinical performance.
[15] Based on bench test data on file at Medtronic (D00821940). May not be indicative of clinical performance. N = 3 of each stent design tested.
[16] Based on modeling of medium-vessel stents on file at Medtronic (D00642693). May not be indicative of clinical performance.
[17] Based on bench test data on file at Medtronic (D00339634, method D00117002). May not be indicative of clinical performance. N = 7 of each DES tested (3.0 mm diameter): Onyx Frontier DES, Resolute Onyx DES, Synergy XD DES, Xience Skypoint DES, Orsiro Mission DES.
[18] Onyx Frontier DES IFU.
[19] Kandzari DE, Kirtane AJ, Windecker S, et al. One-Month Dual Antiplatelet Therapy Following Percutaneous Coronary Intervention With Zotarolimus-Eluting Stents in High-Bleeding-Risk Patients. *Circ Cardiovasc Interv.* November 2020;13(11):e009565.
[20] Kandzari D, et al. Complex PCI with 1-month DAPT in HBR Patients. Presented at TCT 2020.
[21] Based on stent design (10082545DOC).
[22] Based on bench test data on file at Medtronic (D00333762). May not be indicative of clinical performance. N = 5 of 5.0 x 18 mm tested.
[23] Based on bench test data on file at Medtronic (D00339634). May not be indicative of clinical performance. N = 5 of 2.0 x 18 mm tested.
[24] Cuellas C, et al. Use of a Zotarolimus-eluting stent for small vessel disease (DISCO 9 Study). Presented at PCR 2021.

Indications
The Onyx Frontier™ zotarolimus-eluting coronary stent system is indicated for improving coronary luminal diameters in patients, including those with diabetes mellitus or high bleeding risk, with symptomatic ischemic heart disease due to *de novo* lesions of length ≤ 35 mm in native coronary arteries with reference vessel diameters of 2.0 mm to 5.0 mm. In addition, the Onyx Frontier™ zotarolimus-eluting coronary stent system is indicated for treating *de novo* chronic total occlusions and non-left main bifurcation lesions utilizing the provisional bifurcation stenting technique.
Contraindications
The Onyx Frontier™ system is contraindicated for use in: • Patients with a known hypersensitivity or allergies to aspirin, heparin, bivalirudin, clopidogrel, prasugrel, ticagrelor, ticlopidine, drugs such as zotarolimus, tacrolimus, sirolimus, everolimus, or similar drugs or any other analogue or derivative • Patients with a known hypersensitivity to the cobalt-based alloy (cobalt, nickel, chromium, and molybdenum) or platinum-iridium alloy • Patients with a known hypersensitivity to the BioLinx™ polymer or its individual components.
Coronary artery stenting is contraindicated for use in: • Patients in whom antiplatelet and/or anticoagulation therapy is contraindicated • Patients who are judged to have a lesion that prevents complete inflation of an angioplasty balloon or proper placement of the stent or stent delivery system.
Warnings
• Ensure that the inner package has not been opened or damaged as this would indicate the sterile barrier has been breached. • The use of this product carries the same risks associated with coronary artery stent implantation procedures, which include subacute and late vessel thrombosis, vascular complications, and bleeding events. • This product should not be used in patients who are not likely to comply with the recommended antiplatelet therapy.
Precautions
• Only physicians who have received adequate training should perform implantation of the stent.
• Subsequent stent restenosis or occlusion may require repeat catheter-based treatments (including balloon dilatation) of the arterial segment containing the stent. The long-term outcome following repeat catheter-based treatments of previously implanted stents is not well characterized. • The risks and benefits of the stent implantation should be assessed for patients with a history of severe reaction to contrast agents. • Do not expose or wipe the product with organic solvents such as alcohol. • The use of a drug-eluting stent (DES) outside of the labeled indications, including use in patients with more tortuous anatomy, may have an increased risk of adverse events, including stent thrombosis, stent embolization, myocardial infarction (MI), or death.
• Care should be taken to control the position of the guide catheter tip during stent delivery, stent deployment, and balloon withdrawal. Before withdrawing the stent delivery system, confirm complete balloon deflation using fluoroscopy to avoid arterial damage caused by guiding catheter movement into the vessel. • Stent thrombosis is a low-frequency event that is frequently associated with MI or death. Data from the RESOLUTE clinical trials have been prospectively evaluated and adjudicated using the definition developed by the Academic Research Consortium (ARC).
The safety and effectiveness of the stent have not yet been established in the following patient populations: • Patients with target lesions that were treated with prior brachytherapy or the use of brachytherapy to treat in-stent restenosis of the stent • Women who are pregnant or lactating • Men intending to father children • Pediatric patients below the age of 18 years • Patients with coronary artery reference vessel diameters of < 2.0 mm or > 5.0 mm • Patients with evidence of an acute ST-elevation MI within 72 hours of intended stent implantation • Patients with vessel thrombus at the lesion site • Patients with lesions located in a saphenous vein graft, in the left main coronary artery, or ostial lesions • Patients with diffuse disease or poor flow distal to identified lesions • Patients with 3 vessel disease
The safety and effectiveness of the stent have not been established in the cerebral, carotid, or peripheral vasculature. Additionally, the safety and effectiveness of using atherectomy devices with the stent have not been established. The effect of potential drug interactions on the safety or effectiveness of the Onyx Frontier™ stent has not been investigated. Potential interactions of the stent with other drug-eluting or coated stents have not been evaluated and should be avoided whenever possible.
Clinical studies of the Resolute stent did not suggest any significant differences in safety and effectiveness for male and female patients and did not include sufficient numbers of patients to assess for differences in safety and effectiveness due to ethnicity.
Oral Antiplatelet Therapy
Dual antiplatelet therapy (DAPT) using a combination treatment of aspirin with a P2Y12 platelet inhibitor after percutaneous coronary intervention (PCI), reduces the risk of stent thrombosis and ischemic cardiac events, but increases the risk of bleeding complications. The optimal duration of DAPT (specifically a P2Y12 platelet inhibitor in addition to aspirin) following DES implantation is unknown, and DES thrombosis may still occur despite continued therapy. It is very important that the patient is compliant with the post-procedural antiplatelet recommendations.
Per 2016 ACC/AHA guidelines,[1] a daily aspirin dose of 81 mg is recommended indefinitely after PCI. A P2Y12 platelet inhibitor should be given daily for at least 6 months in stable ischemic heart disease patients and for at least 12 months in patients with acute coronary syndrome (ACS). Consistent with the DAPT Study,[2] and the 2016 ACC/AHA guidelines, longer duration of DAPT may be considered in patients at higher ischemic risk with lower bleeding risk. The Academic Research Consortium (ARC) proposed a standardized definition for identifying patients at high bleeding risk (HBR).[3] Additionally, evidence from a dedicated study of Resolute Onyx in HBR patients and those who are unable to tolerate long term DAPT after PCI has been published.[4]
Based on the Onyx ONE Clear Analysis, the Resolute Onyx stent is safe and effective in patients at high risk of bleeding treated with one month of DAPT. The patients evaluated in the Onyx ONE Clear Analysis met the pre-defined criteria for high bleeding risk and were those whom in the opinion of their physician, the potential benefit of 1-Month DAPT outweighed the potential risk. In addition to at least one HBR risk factor, enrollment included 48.6% ACS patients (unstable angina 22.8%, Non-STEMI 21.7% and STEMI 4.2%). Decisions about duration of DAPT are best made on an individual basis and should integrate clinical judgment, assessment of the benefit/risk ratio, and patient preference. Premature discontinuation or interruption of prescribed antiplatelet medication could result in a higher risk of stent thrombosis, MI, or death. Before PCI, if premature discontinuation of antiplatelet therapy is anticipated, physicians should carefully evaluate with the patient whether a DES and its associated recommended DAPT regimen is the appropriate PCI choice.
Following PCI, if elective noncardiac surgery requiring suspension of antiplatelet therapy is considered, the risks and benefits of the procedure should be weighed against the possible risk associated with interruption of antiplatelet therapy. Patients who require premature DAPT discontinuation should be carefully monitored for cardiac events. At the discretion of the patient's treating physician(s), the antiplatelet therapy should be restarted as soon as possible.
Instructions for Stenting of Bifurcation Lesions
The provisional technique of bifurcation stenting recommends a single stent placement in the Main Vessel (MV), finalized with proximal optimization technique (POT). POT includes performing post-dilatation to achieve full apposition of the stent proximal to the bifurcation and reduce the risk of side branch (SB) compromise.
If inadequate results are found in the SB such as: threatened SB closure, TIMI flow <3, dissection type B or worse, or residual stenosis >80%, the provisional bifurcation stenting technique recommends placing a second stent in the SB as a bailout. As per cardiology societal recommendations, two-stent techniques following single stent provisional bifurcation stenting including T, TAP, and Culotte stenting may be utilized as needed. However, the RESOLUTE ONYX PAS Bifurcation Cohort did not evaluate the safety and effectiveness of two-stent bifurcation techniques, including planned (upfront) two-stent bifurcation techniques (such as DK-crush). Additionally, two-stent bifurcation techniques may introduce additional forces and/or failure modes to the stents, and the performance of the Resolute Onyx stent has not been evaluated under these conditions in nonclinical testing.
Potential Adverse Events
Other risks associated with using this device are those associated with percutaneous coronary diagnostic (including angiography and IVUS) and treatment procedures. These risks (in alphabetical order) may include but are not limited to: • Abrupt vessel closure • Access site pain, hematoma, or hemorrhage • Allergic reaction (to contrast, antiplatelet therapy, stent material, or drug and polymer coating) • Aneurysm, pseudoaneurysm, or arteriovenous fistula (AVF) • Arrhythmias, including ventricular fibrillation • Balloon rupture • Bleeding • Cardiac tamponade • Coronary artery occlusion, perforation, rupture, or dissection • Coronary artery spasm • Death • Embolism (air, tissue, device, or thrombus) • Emergency surgery: peripheral vascular or coronary bypass • Failure to deliver the stent • Hemorrhage requiring transfusion • Hypotension/hypertension • Incomplete stent apposition • Infection or fever • MI • Pericarditis • Peripheral ischemia/peripheral nerve injury • Renal failure • Restenosis of the stented artery • Shock/pulmonary edema • Stable or unstable angina • Stent deformation, collapse, or fracture • Stent migration or embolization • Stent misplacement • Stroke/transient ischemic attack • Thrombosis (acute, subacute, or late)
Adverse Events Related to Zotarolimus
Patients' exposure to zotarolimus is directly related to the total amount of stent length implanted. The actual side effects/complications that may be associated with the use of zotarolimus are not fully known. The adverse events that have been associated with the intravenous injection of zotarolimus in humans include but are not limited to: • Anemia • Diarrhea • Dry skin • Headache • Hematuria • Infection • Injection site reaction • Pain (abdominal, arthralgia, injection site) • Rash
The potential adverse reactions in nursing infants from zotarolimus have not been determined. The pharmacokinetic and safety profiles of zotarolimus in infants are not known.
Adverse Events Related to BioLinx™ Polymer
Although the type of risks of the BioLinx™ polymer coating are expected to be no different than those of other stent coatings, the potential for these risks are currently unknown as the coating has limited previous use in humans. These risks may include but are not limited to the following: • Allergic reaction • Focal inflammation at the site of stent implantation • Restenosis of the stented artery
Please reference appropriate product *Instructions for Use* for more information regarding indications, contraindications, warnings, precautions, and potential adverse events.
CAUTION: Federal (USA) law restricts this device to sale by or on the order of a physician.
For further information, please call and/or consult Medtronic at the toll-free numbers or websites listed.
References

[1] Levine GN, et al. 2016 ACC/AHA Guideline Focused Update on Duration of Dual Antiplatelet Therapy in Patients With Coronary Artery Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *J Am Coll Cardiol.* 2016; doi:10.1016/j.jacc.2016.03.513. For full text, please refer to the following website: http//content.onlinejacc.org/article.aspx?doi=10.1016/j.jacc.2016.03.513
[2] Mauri L, et al. Twelve or 30 Months of Dual Antiplatelet Therapy After Drug-Eluting Stents. *N Engl J Med.* 2014;371:2155-66.
[3] Urban P, Mehran R, Colleran R, et al. Defining High Bleeding Risk in Patients Undergoing Percutaneous Coronary Intervention. *Circulation* 2019;140:240-6.
[4] Windecker S, Latib A, Kedhi E, et al. Polymer-based or Polymer-free Stents in Patients at High Bleeding Risk. *The New England Journal of Medicine* 2020:10.1056/NEJMoa1910021.

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