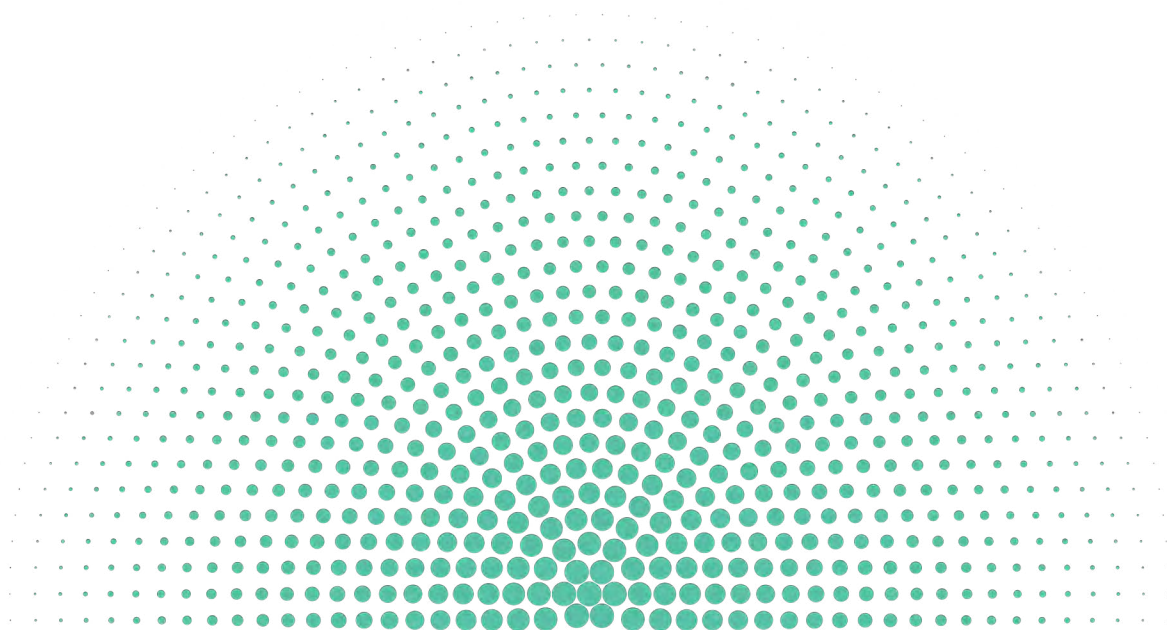
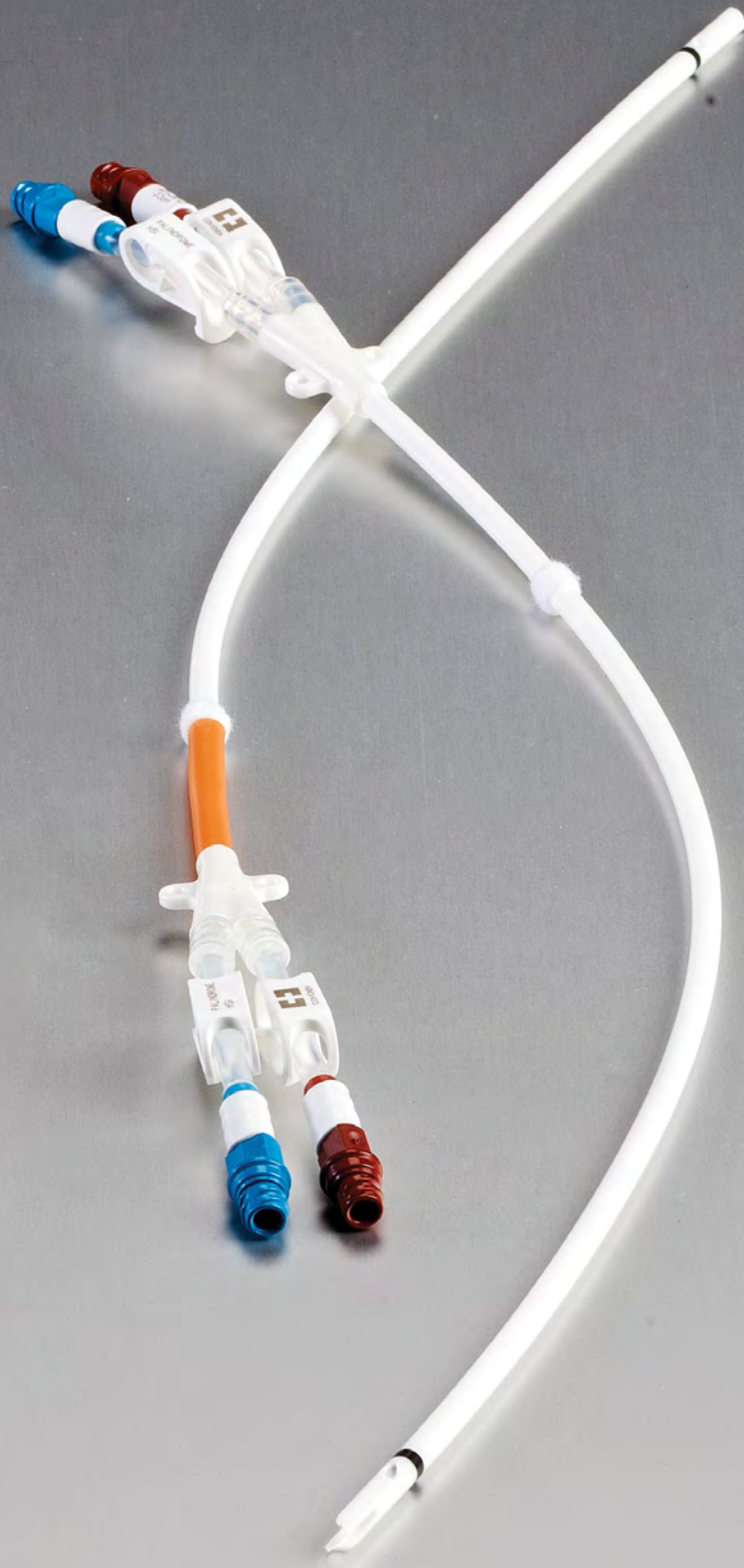


Palindrome™ Precision
Chronic Catheter Family

Dialysis is critical.
Preserving access
is essential.







A leader in patient care

Performance. Confidence. Our Palindrome™ Precision family of chronic hemodialysis catheters features unique design, innovative coatings, symmetrical tip technology — and a legacy you can count on. Internal testing supports the following features unique to the Palindrome™ family of catheters:

Palindrome™ Precision symmetric tip dialysis catheter

The symmetric tip with marker band technology increases tip visualization and reduces recirculation in reverse flow.^{1,1,2} It incorporates a design that promotes adequate flow over the duration of use.³

Palindrome™ Precision H—heparin coated dialysis catheter

An internal and external, noneluting heparin coating is available as an added layer of protection against platelet adhesion and thrombosis.⁴

Palindrome™ Precision SI—silver ion antimicrobial dialysis catheter

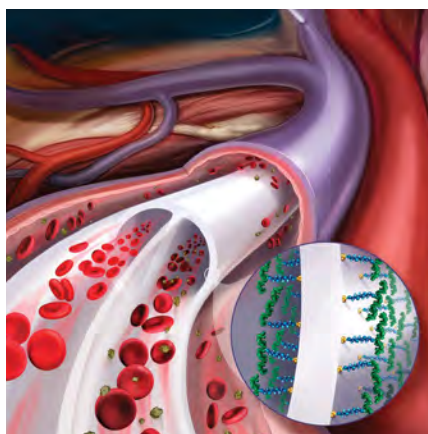
Addressing bacterial colonization, a silver ion sleeve reduces bacteria on the catheter surface for 15 days or more, depending on the organism.⁵

Palindrome™ Precision HSI—heparin coated and silver ion antimicrobial dialysis catheter

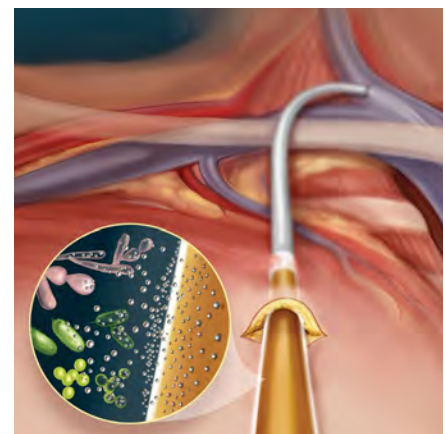
Both a heparin coating and silver ion sleeve are incorporated into the dialysis catheter. Combined, these coatings address platelet adhesion, thrombus, and bacterial colonization in one device.^{4,5}



Symmetric tip



Heparin coating



Silver ion antimicrobial sleeve



† In comparison with step and staggered tip catheters

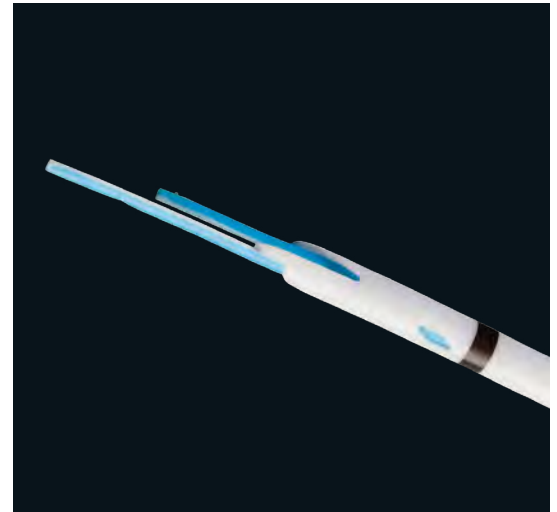
‡ In a pre-clinical animal model

Palindrome™ Precision Symmetric Tip Dialysis Catheter

Maximum Flow Rates

The Palindrome™ Precision dialysis catheter — with its internal lumen design, 14.5Fr diameter, and durable Carbothane™ material — is able to consistently deliver high flow rates.³

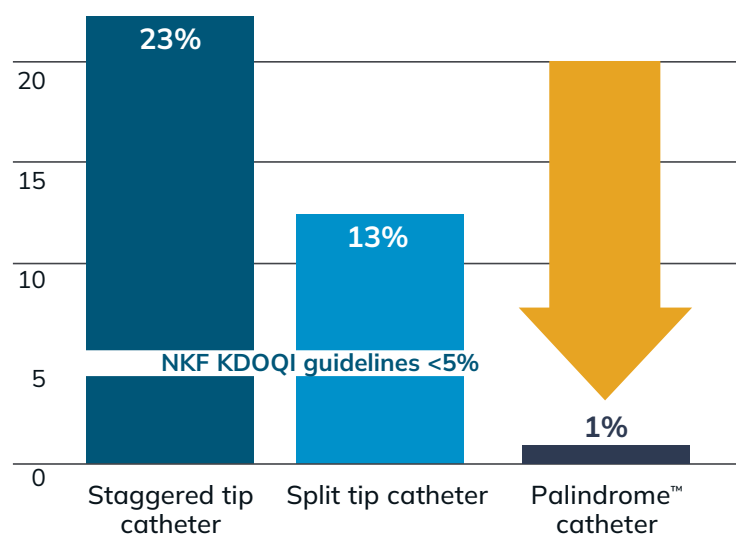
High tensile strength material and internal lumen design optimize inner diameter integrity without compromising flexibility or kink resistance.⁶



Reduces Recirculation

- Studies show that dialysis lines are frequently reversed to improve flow. However, when lines are reversed, blood recirculation increases.⁷
- The Palindrome™ Precision catheter meets NKF/KDOQI guidelines when in forward or reverse flow.³
- Based on a study using a swine model, the Palindrome™ catheter demonstrated reduced recirculation rates in accordance with NKF KDOQI guidelines when in reverse flow.²

Reverse Flow Recirculation



Staggered catheters were Mahurkar™ Maxid non-side hole catheters.
Split tip catheters were Medcomp Split Cath™ catheters.²

Palindrome™ Precision Symmetric Tip Dialysis Catheter

VenaTrac™ Insertion Stylets

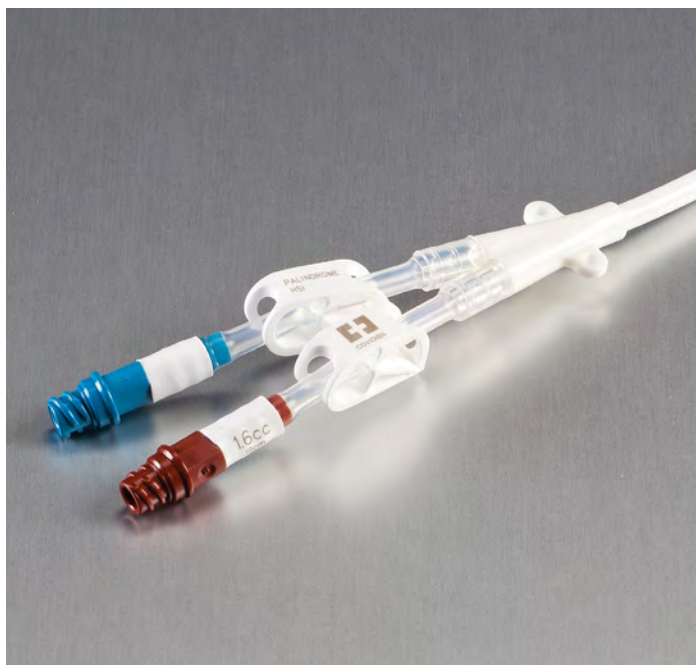
Over-the-wire insertion stylets allow for an over-the-wire insertion technique. This eliminates the need to use a pull-apart sheath.⁸

In a retrospective review of catheter insertions and sheath insertion comparison, this unique design⁹:

- Minimizes incidence of air embolism
- Promotes over-the-wire catheter exchanges
- Allows for sheathless initial catheter insertions

Durability Designed for the Patient

Ultem™ Adapters are made from a high strength resin material, which resists cracking and breakage with repeated use and exposure to cleaning agents.^{10,11}



Palindrome™ Precision Symmetric Tip Dialysis Catheter

The Clinical Challenge: Early Catheter Failure

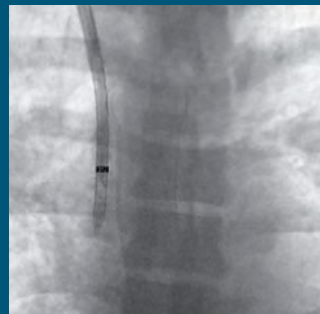
- After insertion, early causes of low catheter blood flow rate include catheter malposition and other mechanical problems.¹²
- Careful attention to catheter tip position could reduce early failure rate.¹³
- Performance and durability of the catheter have been shown to improve when the catheter tip is positioned within the right atrium.¹³

Our Solution: Enhanced catheter visualization

The Palindrome™ Precision dialysis catheter's signature tungsten marker band allows the inserting physician to:¹

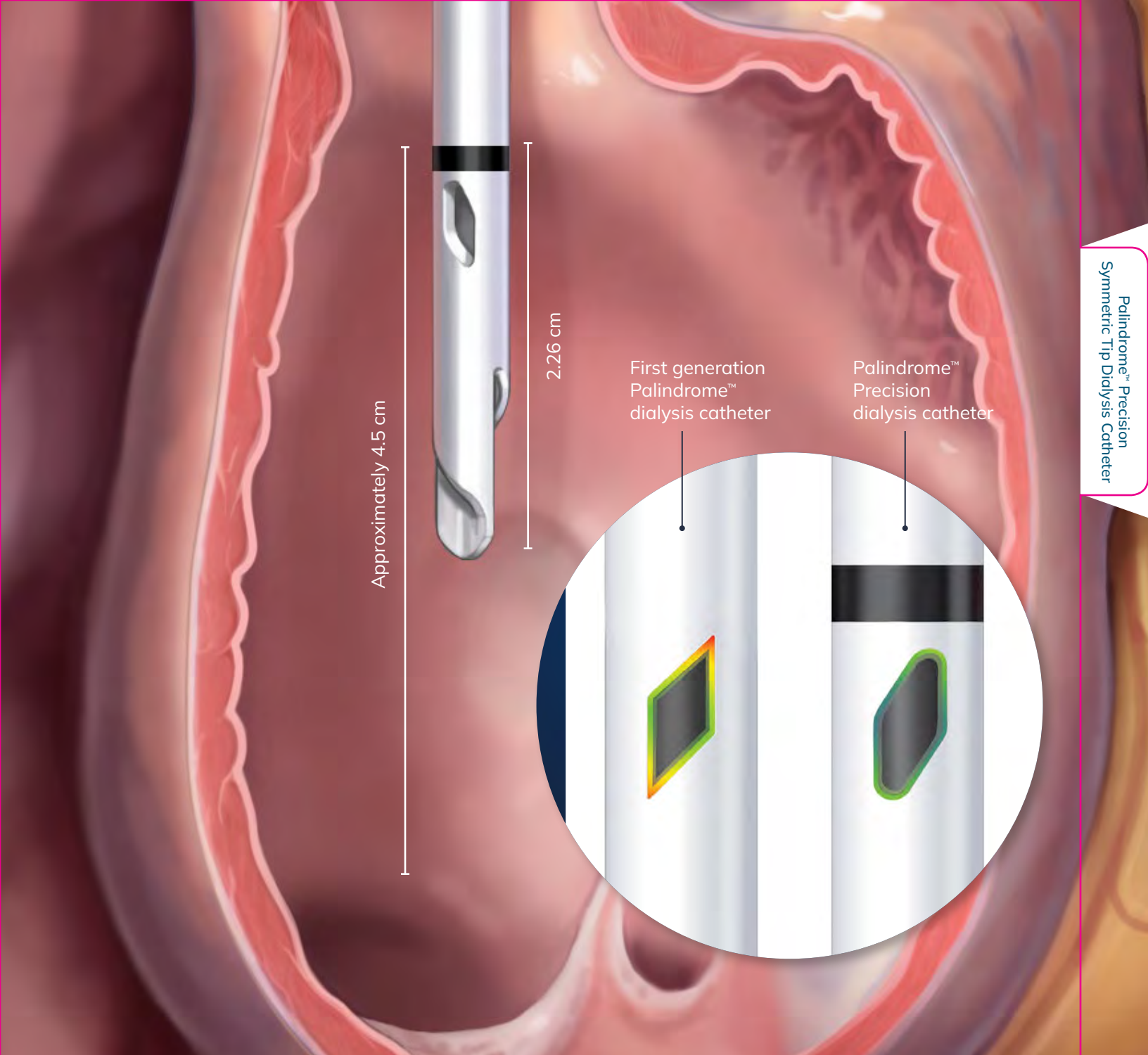
- Easily locate the functional tip of the catheter
- Visualize the accurate placement of the tip into the right atrium using fluoroscopy and X-ray

This marker band technology is securely attached to the catheter using a heat-bonded process.¹ Product testing demonstrates a robust attachment to the catheter with no detectable delamination in vitro.³



Our unique Palindrome™ Precision dialysis catheter facilitates increased tip visualization and accurate tip placement.¹





Supporting evidence: Tungsten marker band technology

1. Radiopaque tungsten marker

Radiopaque tungsten marker band allows the inserter to easily locate the functional tip of the catheter and visualize the placement of the tip in the right atrium on fluoroscopy and X-ray.¹

H-Heparin Coating

The Clinical Challenge: Thrombosis

Catheter thrombosis can present challenges, including:

- As many as 40 percent of catheter failures are attributed to venous thrombosis and fibrin sheath formation.¹²
- Approximately 17–33 percent of catheter removals are attributed to thrombosis.¹⁴
- Complications from thrombosis result in inadequate flow rates, longer dialysis times, and increased costs.¹⁵

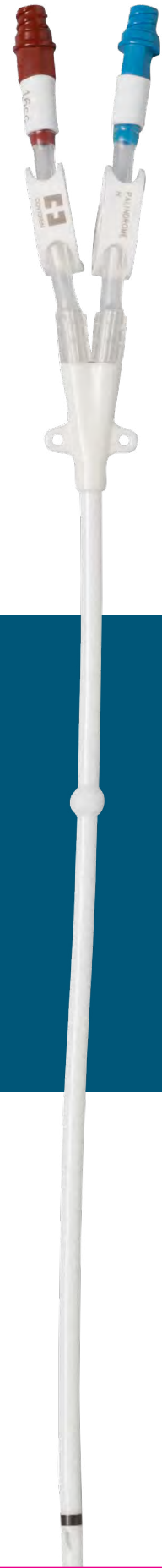
Our Solution: Noneluting Heparin Coating Technology

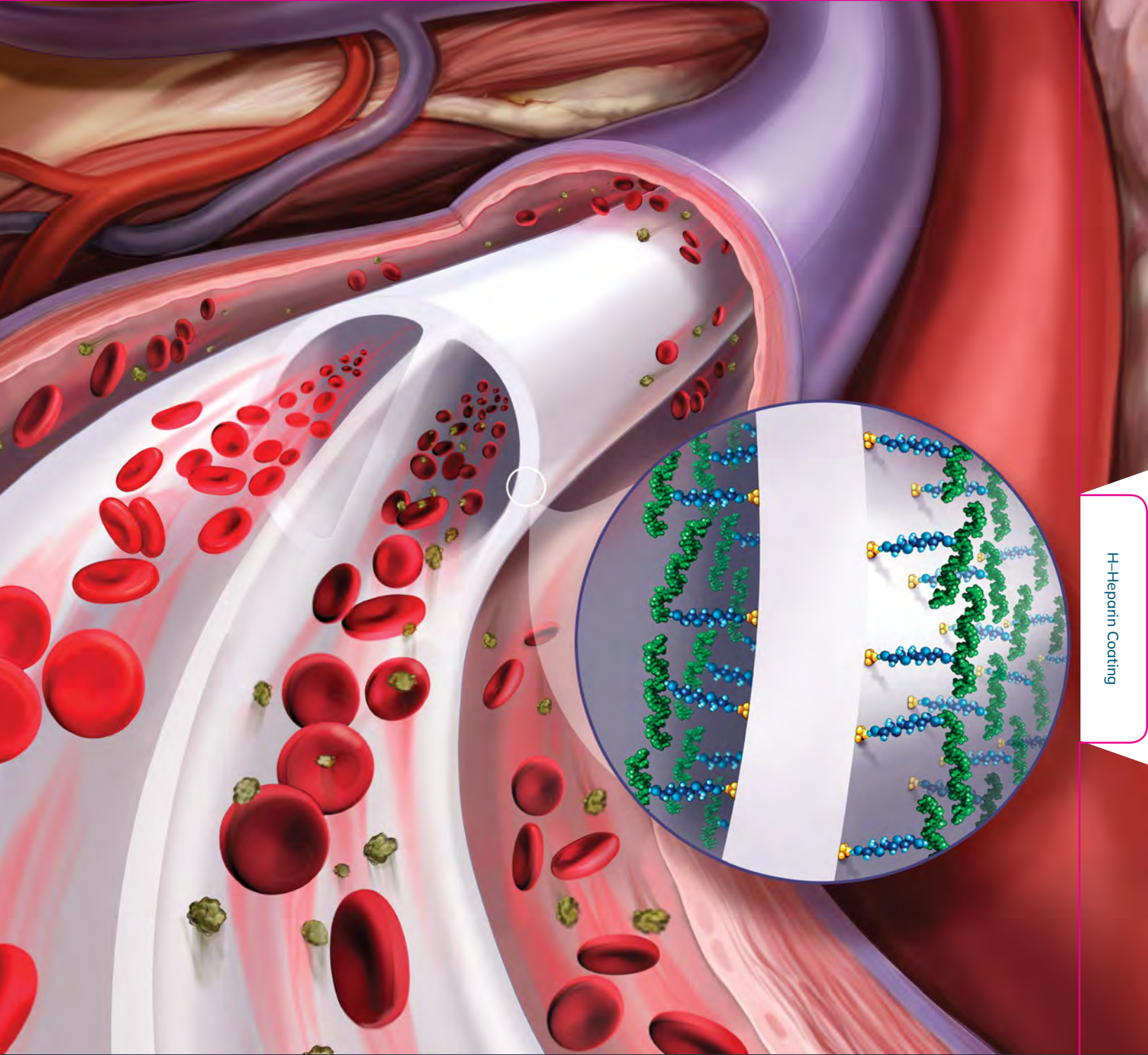
Our noneluting heparin coating covers the external surface of the catheter from tip to cuff and internally from tip to adapters — providing total protection.⁴

The heparin coating contains three non-thrombogenic “elements”⁴:

- Heparin
- Negative charge
- Hydrophilicity

Our noneluting heparin coating reduces the likelihood of platelet adhesion on the catheter surface and inhibits thrombus accumulation.^{†,4}





H-Heparin Coating

Supporting evidence: Heparin coating technology (H)

1. Decreases likelihood of platelet adhesion

In vitro testing showed a 60 percent reduction in platelet adhesion on the surface, when compared with noncoated catheters.^{1,4}

2. Inhibits thrombosis

When compared to noncoated catheters, in vivo data shows the heparin coating reduces thrombus accumulation by 82 percent.^{1,4}

3. Demonstrates long-lasting effectiveness

Tested in a shear flow model, the noneluting heparin coating remained intact after 720 hours of continuous flow, simulating 12 months of dialysis treatment.⁴

SI–Silver Ion Antimicrobial Sleeve

The Clinical Challenge: Catheter Colonization

Catheter bacterial colonization can present challenges, including:

- The removal rate of catheters with exit-site infections is greater than 50 percent.¹⁶
- In instances of tunnel tract infections, the rate of catheter removal is as high as 70 percent.¹⁶

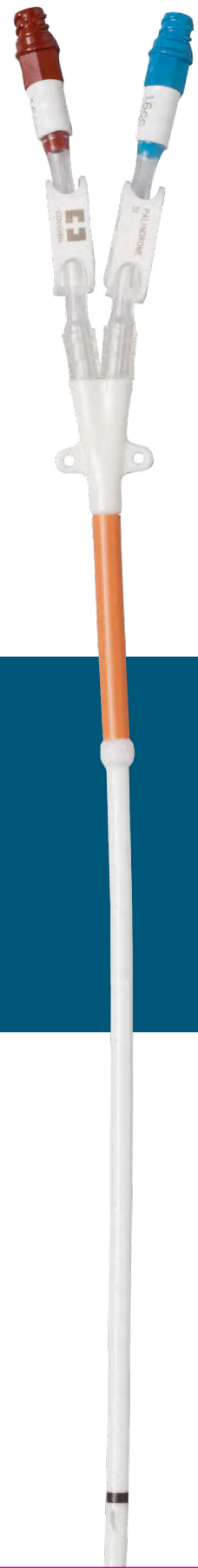
Silver Ion Coating Technology

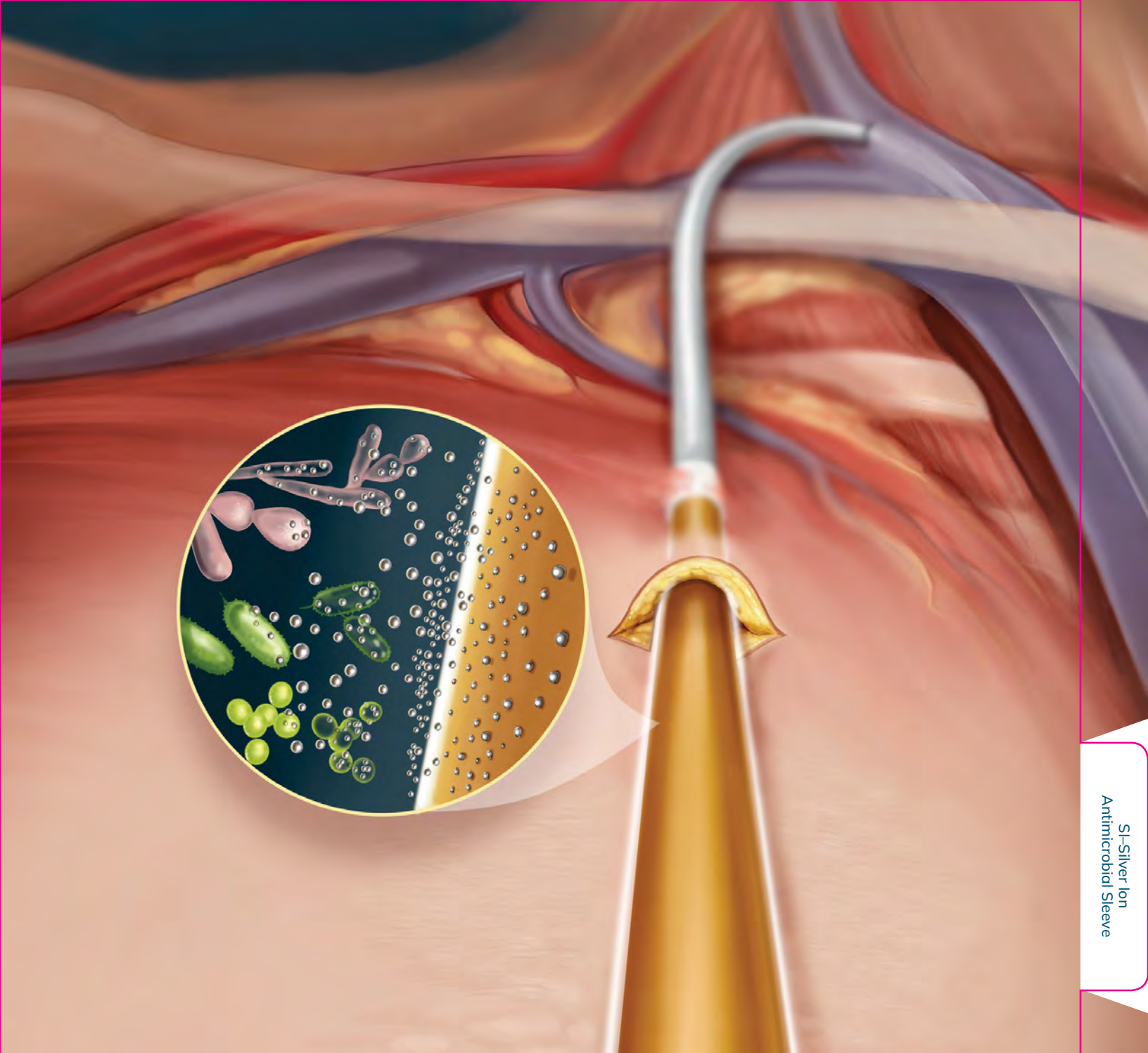
Our silver ion sleeve offers an added layer of antimicrobial protection.

This advanced application addresses common catheter challenges by reducing colonization against a broad spectrum of bacteria on the catheter surface.⁵

Reduced Intervention Rate

In a case-controlled study, the Palindrome™ SI–silver ion antimicrobial dialysis catheter had significantly fewer instances of surgical reintervention due to thrombosis or infection when compared with the HemoSplit™ TCC with BioBloc™ (Palindrome™ catheter = 29, HemoSplit™ TCC with BioBloc™ = 50, n = 199, p = 0.03)⁹





Supporting Evidence: Silver ion antimicrobial sleeve technology (SI)

1. Reduces bacterial colonization on the catheter surface

Both in vitro and in vivo testing demonstrate a significant reduction in microbial colonization, when compared to catheters without the silver ion sleeve.¹⁷

2. Effective against a broad spectrum of bacteria

Protects against colonization of bacteria, yeast, and fungi, including *Staphylococcus aureus*, coagulase-negative *Staphylococcus*, *Candida albicans*, and *Escherichia coli*, compared with catheters without the sleeve.⁵

3. Proven durability

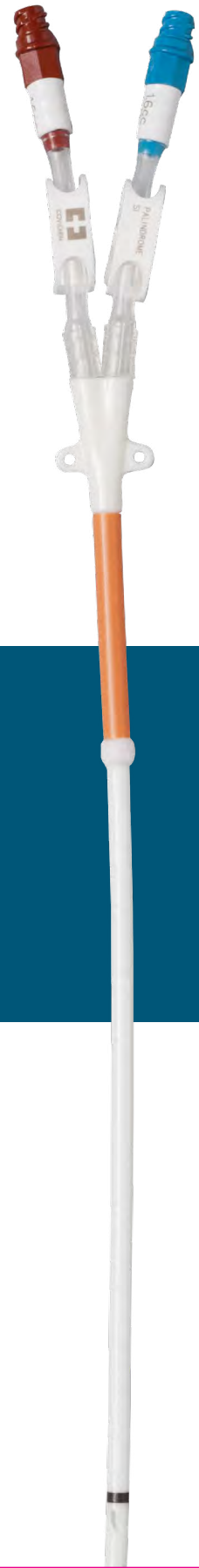
The antimicrobial sleeve uses a controlled release mechanism that delivers a sustained elution of silver ions below daily tolerable intake levels.¹⁸

HSI-Combined Heparin Coating and Silver Ion Antimicrobial Sleeve

The Clinical Challenge: Thrombosis and Catheter Colonization

Catheter thrombosis and bacteria can present challenges, including:

- As many as 40 percent of catheter failures are attributed to venous thrombosis and fibrin sheath formation.¹²
- Approximately 17–33 percent of catheter removals are attributed to thrombosis.¹⁴
- The removal rate of catheters with exit-site infections is greater than 50 percent. In instances of tunnel tract infections, the rate of removal is as high as 70 percent.¹⁶
- Infection is the second highest cause of mortality in end stage kidney disease.¹⁹

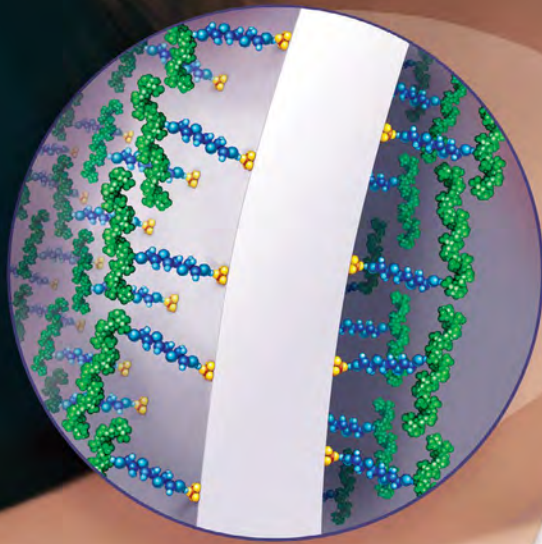


Combining Protective Technologies

Together, our heparin coating and silver ion antimicrobial sleeve provide:

- The first chronic catheter to combine antimicrobial and antithrombogenic technologies to support dialysis access preservation
- Dual protection against platelet adhesion and colonization against a broad spectrum of bacteria on the catheter surface^{4,5,17}

Reduces bacteria and thrombus accumulation.^{4,5,17}



HSI-combined heparin coating and silver ion antimicrobial sleeve technologies applied outcomes

1. Decreases likelihood of platelet adhesion

In vitro testing showed a 60 percent reduction in platelet adhesion on the surface, when compared with noncoated catheters.⁴

2. Inhibits thrombosis

82% reduction in thrombus accumulation, compared to noncoated catheters (with in vivo testing).⁴

3. Reduces colonization

In vitro testing demonstrated that broad-spectrum colonization on the catheter surface was significantly less, when compared with noncoated catheters.^{5,17}

Ordering Information

Palindrome™ Precision chronic catheters

Product Codes Kits	Product Codes Sport Packs	Insertion Length	Overall Length
Palindrome™ Precision catheter			
8888145014P	8888119360P	19 cm	36 cm
8888145015P	8888123400P	23 cm	40 cm
8888145016P	8888128450P	28 cm	45 cm
8888145017P	8888133500P	33 cm	50 cm
8888146044P	n/a	44 cm	61 cm
8888145018P	n/a	55 cm	72 cm
Palindrome™ Precision catheter with VenaTrac™ insertion stylets			
8888145039P	8888119364P	19 cm	36 cm
8888145040P	8888123404P	23 cm	40 cm
8888145041P	8888128454P	28 cm	45 cm
8888145042P	8888133504P	33 cm	50 cm
Pre-Curved Palindrome™ Precision catheter			
8888145058P	8888119370P	19 cm	36 cm
8888145059P	8888123410P	23 cm	40 cm
8888145060P	8888128460P	28 cm	45 cm
8888145061P	8888133510P	33 cm	50 cm
Palindrome™ Precision H chronic catheter - Heparin coating			
8888145043P	8888119365P	19 cm	36 cm
8888145044P	8888123405P	23 cm	40 cm
8888145045P	8888128455P	28 cm	45 cm
8888145046P	8888133505P	33 cm	50 cm
Pre-Curved Palindrome™ Precision H chronic catheter - Heparin coating			
8888145068P	8888119371P	19 cm	36 cm
8888145069P	8888123411P	23 cm	40 cm
8888145070P	8888128461P	28 cm	45 cm
8888145071P	8888133511P	33 cm	50 cm
Precision SI chronic catheter - Silver ion sleeve			
8888145062P	8888119368P	19 cm	36 cm
8888145063P	8888123408P	23 cm	40 cm
8888145064P	8888128458P	28 cm	45 cm
8888145065P	8888133508P	33 cm	50 cm
8888146144P	n/a	44 cm	61 cm
8888145066P	n/a	55 cm	72 cm
Palindrome™ Precision HSI chronic catheter - Heparin coating and silver ion sleeve			
8888145057P	8888119369P	19 cm	36 cm
8888145048P	8888123409P	23 cm	40 cm
8888145049P	8888128459P	28 cm	45 cm
8888145050P	8888133509P	33 cm	50 cm

Components

	Qty	Sport Packs	Kits
Palindrome™ Precision base, H, SI, and HSI catheters			
14.5Fr symmetric tip catheter	1	•	•
VenaTrac™ over-the-wire insertion stylets	2	•	•
16Fr Valved pull-apart safety sheath	1	•	•
Bifurcated tunneler	1	•	•
12Fr Tissue dilator	1	•	•
14Fr Tissue dilator	1	•	•
Injection sealing caps	2	•	•
18g Introducer needle	1		•
J/Straight 0.038" guidewire	1		•
12mL Syringe	1		•
#11 Scalpel	1		•
Telfa™ island dressings	2		•
4" x 4" cotton gauze sponges	4		•

Repair Kits

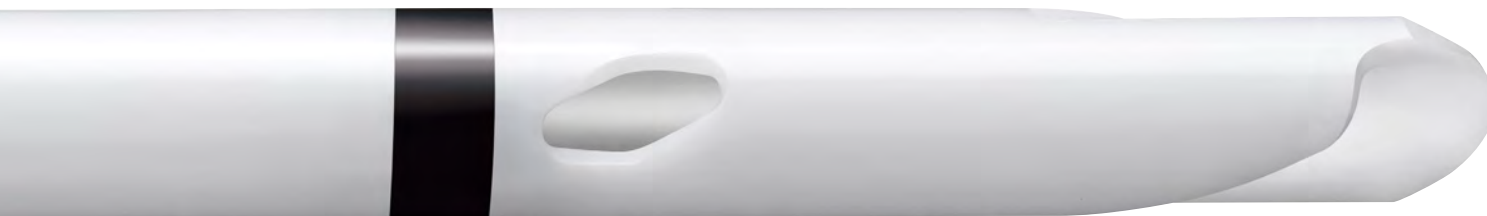
	Product Codes	Qty
Hemodialysis Catheter Repair Kit		8888200001
		1

Components

	Qty
Hemodialysis Catheter Repair Kit	
Arterial repair assembly	1
Venous repair assembly	1
Sealing caps	2
Temporary slide clamps	2
Drape	1
Disposable scissors	1
Measurement guide	1
Priming volume label sheet	1

Color Key

- Palindrome™ Precision chronic catheter (base)
- Palindrome™ Precision H chronic catheter (heparin coated)
- Palindrome™ Precision SI chronic catheter (silver ion sleeve)
- Palindrome™ Precision HSI chronic catheter (heparin coated and silver ion sleeve)



† In comparison with step and staggered tip catheters

‡ In a pre-clinical animal model

†† Testing conducted on Palindrome™ Chronic Catheters

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Palindrome™ HSI Chronic Catheter

The Palindrome™ HSI chronic catheter with heparin coating and silver ion subcutaneous sleeve is intended for acute and chronic hemodialysis, apheresis, and infusion. It may be inserted either percutaneously or by cutdown.

The device is contraindicated in thrombosed vessels or for subclavian puncture when ventilator is in use. This product should not be used in patients with documented hypersensitivity to silver, heparin or porcine based products. Heparin coated catheters should not be used in patients with severe thrombocytopenia, uncontrollable active bleeding disorders, or with skin necrosis from previous heparin use. In case of infection, the silver in the catheter does not replace the need for using systemic anti-infective agents. Clinicians/ Healthcare Professionals should be aware that there are very limited data on prolonged and repeated use of silver containing products and particularly in children and neonates.

See the device manual for detailed information regarding the implant procedure, indications, contraindications, warnings, precautions, and potential complications/adverse events.

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