



Palindrome™
Family of Chronic Dialysis Catheters



A full spectrum of chronic catheters to meet the challenges of dialysis care.



Palindrome™ Family

Preserving access. Protecting the catheter. Promoting optimal patient care. From their reliable underlying design to their innovative coating technologies, the Palindrome family of chronic hemodialysis catheters from Covidien reflects the company-wide commitment to delivering advanced products that will help to improve patient outcomes.

■ Palindrome Symmetric Tip Dialysis Catheter†

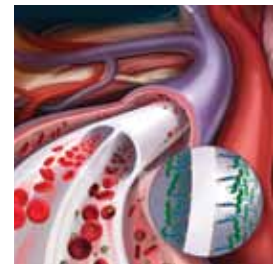
Unique symmetric tip and laser-cut side slots minimize recirculation and the likelihood of positional occlusion, as well as reduce clot formation by decreasing debris attachment.



Symmetric Tip ■ ■ ■ ■ ■

■ Palindrome H–Heparin Coated Dialysis Catheter†

Decreases the likelihood of clot formation and inhibits fibrin sheath propagation with its non-eluting heparin coating.



Heparin Coating ■ ■

■ Palindrome SI–Silver Ion Antimicrobial Dialysis Catheter†

Reduces microbial colonization on the catheter surface with a silver ion sleeve.



Silver Ion Antimicrobial Sleeve ■ ■

■ Palindrome HSI–Heparin Coated and Silver Ion Antimicrobial Dialysis Catheter†

Incorporating the heparin coating and silver ion sleeve, the Palindrome HSI catheter is the premier dialysis catheter – reducing the likelihood of clot formation AND microbial colonization on the catheter surface.

■ Palindrome RT–Reverse-Tunneled Dialysis Catheter†

Allows for precise tip placement and ideal tunnel trajectory using the retrograde tunnel technique.



Reverse-Tunneled ■

■ Palindrome Dialysis Catheter

Preserving catheter access. Reducing Reinterventions.

The Palindrome catheter is a high flow, 14.5 Fr hemodialysis catheter with a unique symmetric tip design and laser-cut side slots which reduce recirculation and minimize the likelihood of positional occlusion.†

Maximum Flow Rates

The Palindrome dialysis catheter — with its Double-D™** lumen design, 14.5 Fr diameter, and durable Carbothane™** material — is able to consistently deliver high flow rates.†

- High tensile strength Carbothane and Double-D design optimize inner diameter integrity without compromising flexibility or kink resistance

Dependable Patency

Unique symmetric tip design and laser-cut side slots promote catheter patency beyond certain competitive split-tip catheters.¹

- Specifically designed side slots minimize the likelihood of positional occlusion
- Laser-cut surfaces decrease likelihood of clot formation by minimizing debris attachment
- Unique tip design promotes continuous flow between dialysis treatments



Covidien's symmetric tip catheter reduces the likelihood of re-intervention.¹



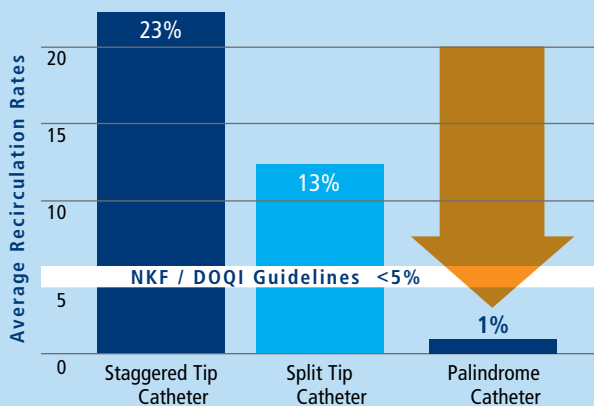
Reduced Intervention Rate

- Patients are six times more at risk for intervention due to thrombosis with Bard HemoSplit™* catheter tip design versus Palindrome catheter ¹
- Palindrome catheter significantly reduced re-intervention rates compared to Bard HemoSplit catheter tip design ¹

Reduces Recirculation

The Palindrome catheter minimizes recirculation when in forward or reverse flow.

- Studies show that dialysis lines are frequently reversed ²
- When lines are reversed, blood recirculation increases ³
- The results of a study comparing the recirculation rates of three major catheter designs in reverse flow are outlined below ⁴



Safety and Durability Designed for the Patient

Covidien's dialysis catheter back-end design has been setting the standard of quality for over twenty years:

- Halkey-Roberts™* clamps and Ultem™* adapters are composed of durable materials
- Silicone extensions minimize kinking or crimping



■ H—Heparin Coating

Decreasing the likelihood of clot formation. Inhibiting fibrin sheath propagation.

CLINICAL CHALLENGE: **CLOTTING**

- As many as 40% of catheter failures are attributed to venous thrombosis and fibrin sheath formation ⁵
- Approximately 17%-33% of catheter removals are attributed to thrombosis ⁶
- Complications from thrombosis result in inadequate flow rates, longer dialysis times and increased costs ⁷

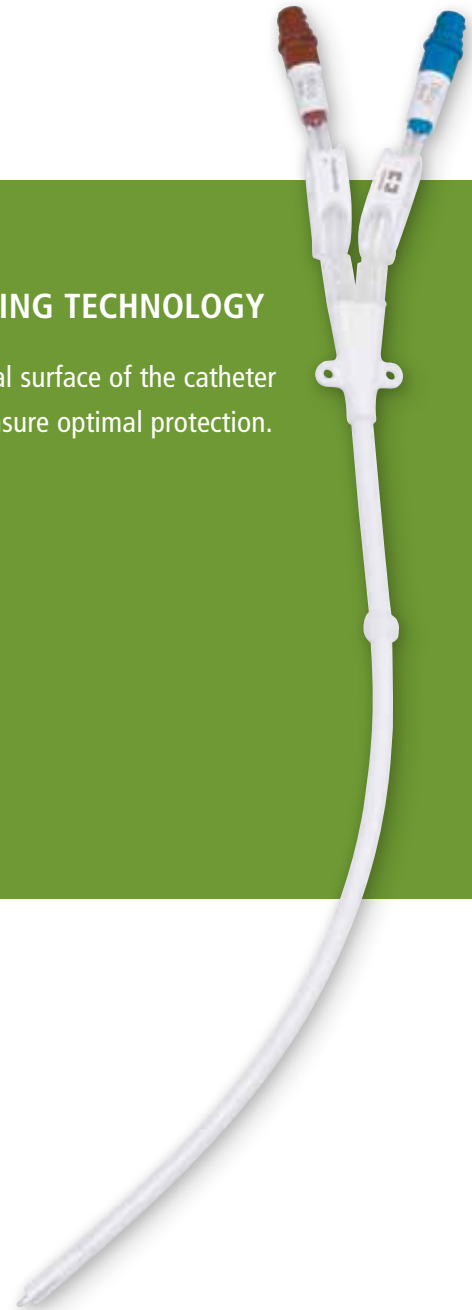
THE SOLUTION: **NON-ELUTING HEPARIN COATING TECHNOLOGY**

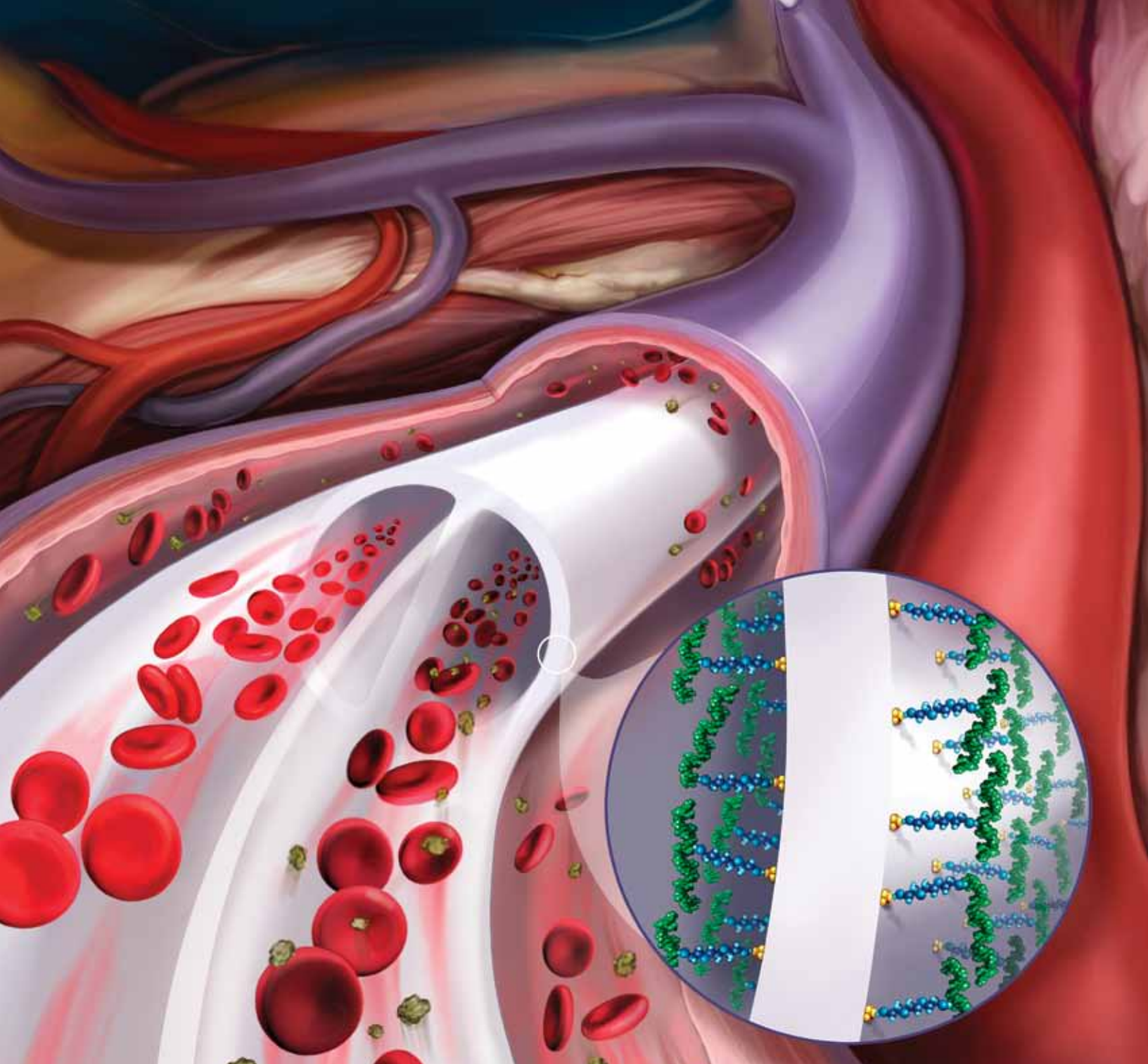
Covidien's non-eluting heparin coating covers the external surface of the catheter from tip to cuff, and internally from tip to adapters, to ensure optimal protection.

The heparin coating has a triple-action formula:

- Heparin — Anti-Thrombogenic
- Negative Charge — Non-Thrombogenic
- Hydrophilicity — Non-Thrombogenic

Covidien's non-eluting heparin coating reduces the likelihood of clot formation on the catheter surface.[†]





TECHNOLOGY IN PRACTICE

1 Decreases likelihood of clot formation

In vivo testing demonstrated an 82% reduction in thrombus accumulation.[†]

In vitro testing showed a 60% reduction in platelet adhesion on the surface.[†]

2 Inhibits fibrin sheath propagation

Supported by *in vivo* data, the non-eluting heparin coating has been shown to inhibit fibrin sheath propagation.[†]

3 Long-lasting effectiveness

Tested in a shear flow model, the heparin coating remained intact after 720 hours of continuous flow, simulating thirteen months of dialysis treatment.[†]

■ SI–Silver Ion Antimicrobial Sleeve

Reducing microbial colonization with effective antimicrobial technology.

CLINICAL CHALLENGE: **CATHETER COLONIZATION**

- The skin surrounding the catheter insertion site is one of the most common sources of microbes that colonize central venous catheters ⁸
- Central venous catheters colonized by skin organisms develop biofilms and ultimately catheter-related infections ⁸
- The removal rate of catheters with exit-site infections is greater than 50%, and in instances of tunnel tract infections, the rate of removal is as high as 70% ⁹

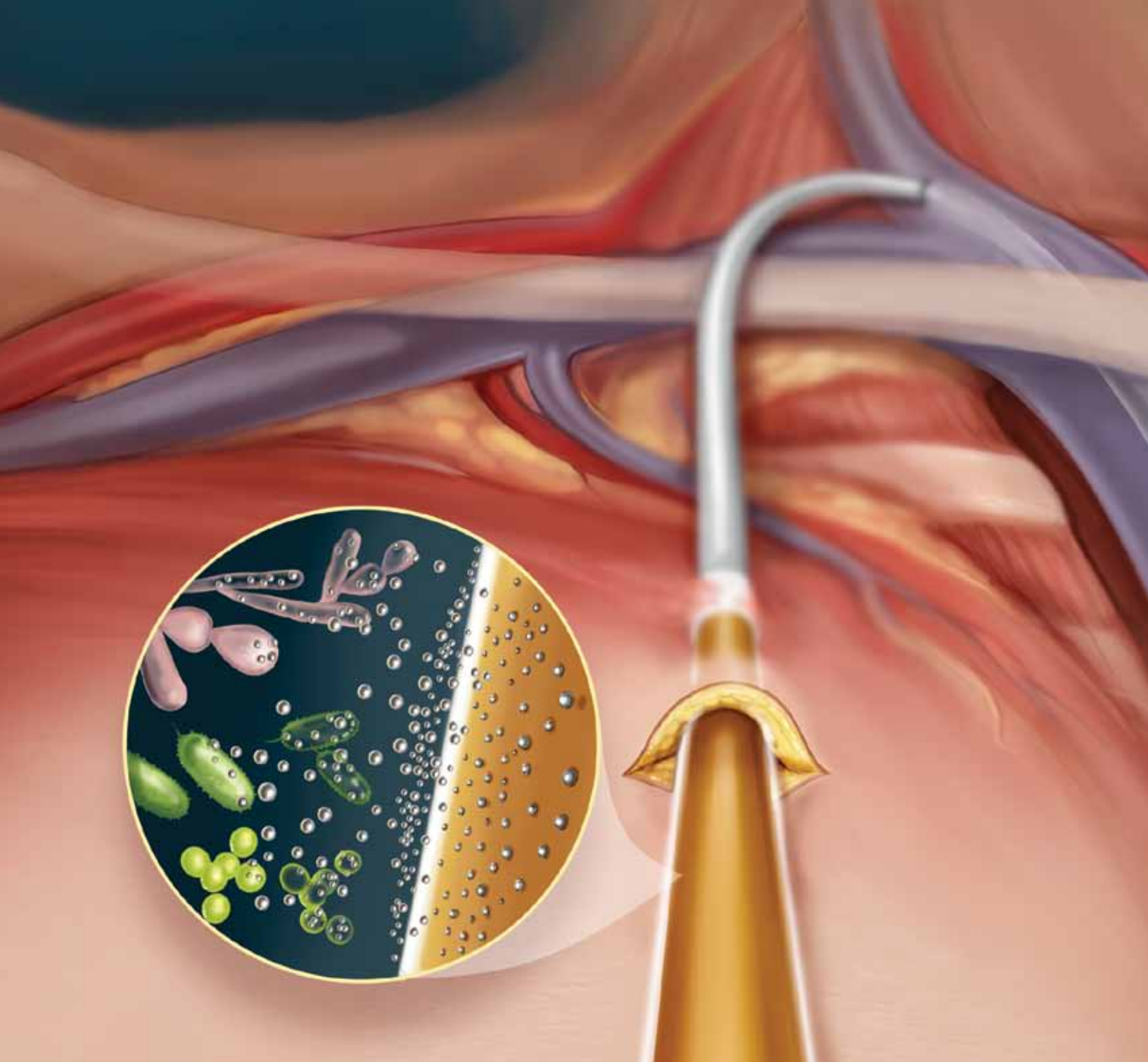
THE SOLUTION: **SILVER ION ANTIMICROBIAL SLEEVE**

Covidien's silver ion antimicrobial sleeve, situated between the cuff and the hub, is permanently bonded to the catheter surface to ensure durability

- Antimicrobial silver ions work to reduce the colonization of clinically relevant microbes in the subcutaneous tissue
- Unique silver-polymer system delivers a controlled release of silver ions specifically designed for the dialysis catheter environment

Covidien's silver ion sleeve minimizes microbial colonization on the catheter surface.[†]





TECHNOLOGY IN PRACTICE

1 Reduces microbial colonization on catheter surface in the tunnel tract

In vitro testing demonstrated a reduction of microbial colonization by 99.2%-99.999%.[†]

In vivo testing resulted in a reduction of microbial colonization by 99.7%-99.999%.[†]

2 Effective against a broad spectrum of micro-organisms

Protects against Gram Positive and Negative Bacteria, Yeast and Fungi, including *Staphylococcus aureus*, Coagulase-negative Staphylococcus, *Candida albicans* and *Escherichia coli*.[†]

3 Proven durability and safety

The antimicrobial sleeve utilizes a controlled release mechanism that delivers a sustained elution of silver ions in a safe and effective manner.[†]

■ HSI—Combined Heparin Coating and Silver Ion Antimicrobial Sleeve

Combining innovative technologies. Providing Covidien's ultimate catheter.

CLINICAL CHALLENGE: **CLOTTING AND CATHETER COLONIZATION**

- As many as 40% of catheter failures are attributed to venous thrombosis and fibrin sheath formation ⁵
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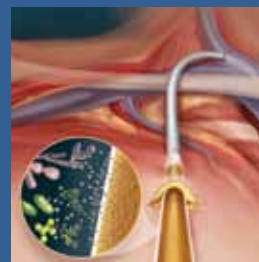
THE SOLUTION: **COMBINING TECHNOLOGIES**

Covidien's ultimate catheter.

- The first chronic catheter to combine antimicrobial and antithrombogenic technologies to preserve access
- Dual protection against clotting and microbial colonization on the catheter surface



Heparin Coating



Silver Ion Antimicrobial Sleeve

Minimizes microbial colonization and reduces the likelihood of clot formation on the catheter surface.[†]



A Full Spectrum of Chronic Catheter Options

Benefits	Features	Palindrome	H-Heparin Coating	SI-Silver Ion Antimicrobial Sleeve	HSI-Heparin Coating and Silver Ion Antimicrobial Sleeve	RT-Reverse-Tunneled
Reduced Microbial Colonization	Silver-ion antimicrobial sleeve					
Patency						
Anti-thrombogenic Inhibition of Fibrin Sheath Propagation	Non-eluting Heparin coating					
Kink Resistance	Carbothane material					
Reduces Likelihood of Positional Occlusion	Laser-cut side slots and symmetric tip design					
Reduces Clot Formation by Decreasing Debris Attachment	Laser-cut side slots Continuous flow between dialysis treatments due to symmetric tip design and laser-cut side slots					
Safe & Durable	Ultem adapters Silicone extensions Laser-printed priming volumes					
Minimal Recirculation (forward or reverse)	Symmetric tip design					
High Flow	14.5F (15.5F for RT) Double-D Design					

Palindrome Hemodialysis Catheter Repair Kit

Palindrome Hemodialysis Catheter Repair Kit

- Preserves vascular access and reduces potential need for hemodialysis catheter exchange
- Both venous and arterial repair assemblies in one package
- Easy to use measurement guide and priming volume label sheet

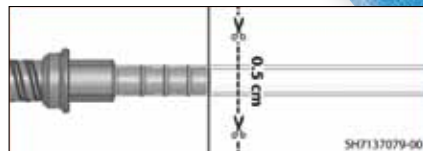


Priming Volume Label Sheet*

Note: Only record information for lumen(s) being repaired.

	Arterial	Venous
Current Priming Volume (mL)	<input type="text"/>	<input type="text"/>
+ 0.5 mL		
New Priming Volume (mL)	<input type="text"/>	<input type="text"/>
Lot Number	<input type="text"/>	

Measurement Guide*



*Measurement Guide and Priming Volume Label Sheet not represented at scale.

■ RT–Reverse-Tunneled Dialysis Catheter

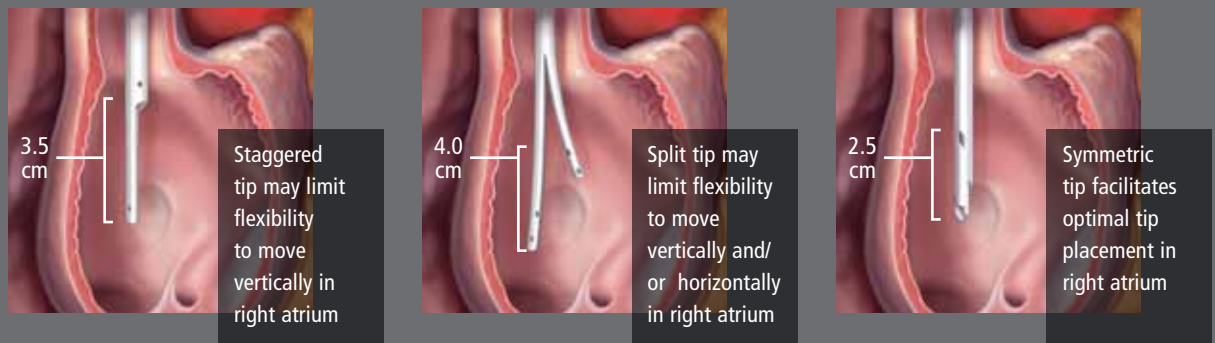
Facilitating precise tip placement and defined tunnel tract creation.

CLINICAL CHALLENGE: **PRECISE CATHETER PLACEMENT**

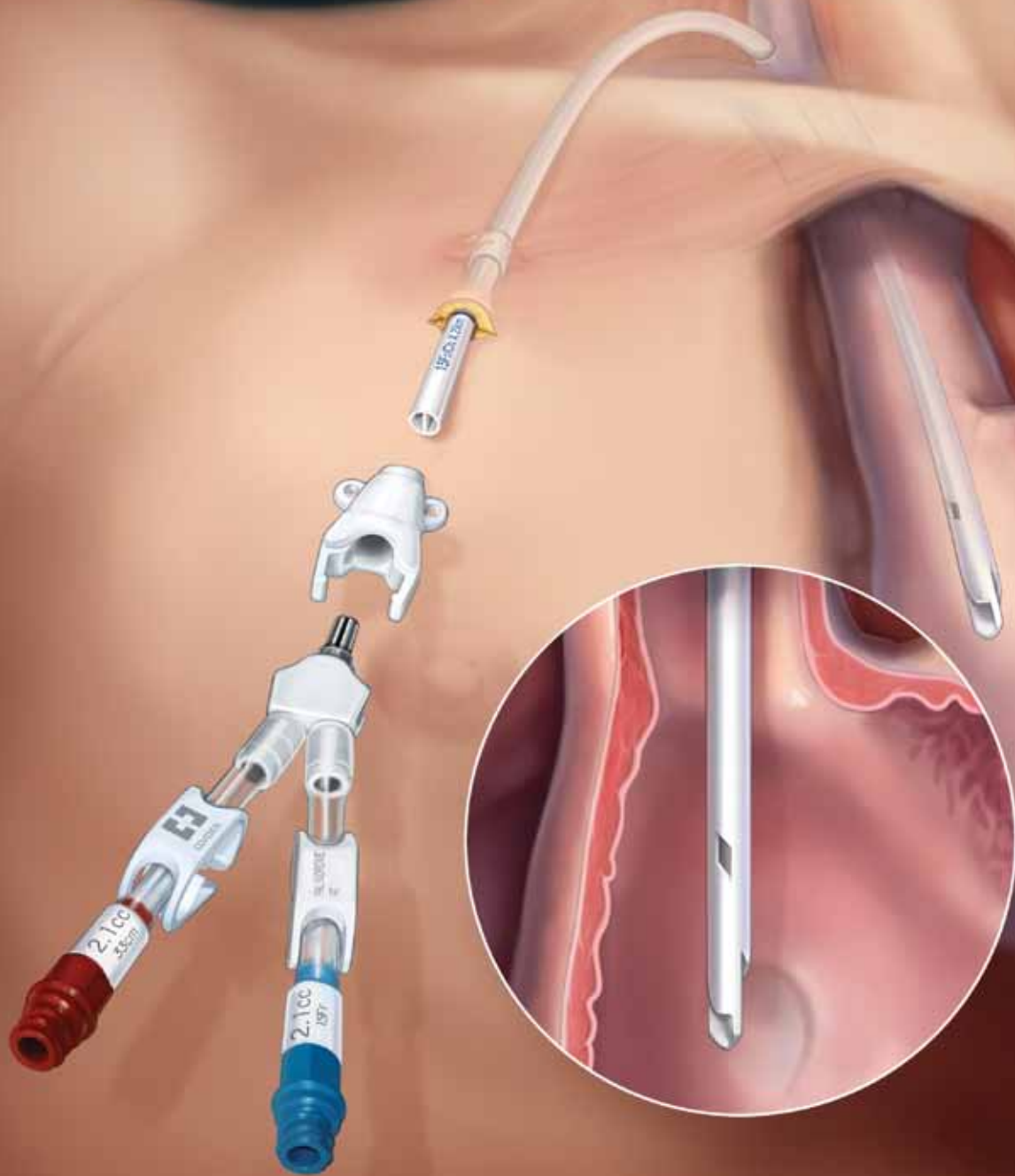
- Poor tip positioning accounts for 20% of early catheter removals¹⁰
- Post-insertion, early causes of low, catheter blood flow rates include catheter malposition and mechanical problems such as kinking⁵
- Successful catheter performance depends on accurate catheter tip positioning^{11,12}

THE SOLUTION: **PALINDROME RT–REVERSE-TUNNELED CATHETER[†]**

Covidien's unique self-flushing symmetric tip has a compact functional end versus other competitor tip designs. This affords the inserter greater real estate in the right atrium, allowing more flexibility in positioning the catheter tip within the mid-right atrium as recommended by NKF KDOQI Guidelines.¹³



Covidien's reverse-tunneled catheter with unique symmetric tip design facilitates precise tip placement.



TECHNOLOGY IN PRACTICE

1 Precise tip placement

Compact symmetric catheter tip can be placed precisely in the right atrium with increased flexibility for positioning.

Combined reverse-tunneled technique and the Palindrome RT—reverse-tunneled tip design increases the opportunity to maintain catheter tip location within the right atrium.

2 Defined tunnel trajectory

Reverse-tunnel technique allows for precise placement of the catheter cuff in the tunnel tract after the tip has been placed.

Proper tunnel and arc creation demonstrate model insertion techniques essential for optimal catheter placement.

3 Easy “click” hub connection assembly

Unique snap lock hub assembly facilitates easy attachment of the catheter to the back-end extensions, minimizing catheter manipulation post-tip placement.

Product Selection and Ordering

Palindrome Family of Chronic Dialysis Catheters

Catheter	Product Codes		Insertion Length	Overall Length	Qty
	Kits	Sport Packs			
Palindrome [‡]	8888145014	8888119360	19 cm	36 cm	5
	8888145015	8888123400	23 cm	40 cm	5
	8888145016	8888128450	28 cm	45 cm	5
	8888145017	8888133500	33 cm	50 cm	5
	8888145018		55 cm	72 cm	5
Palindrome with Tal VenaTrac™ Insertion Stylets	8888145039	8888119364	19 cm	36 cm	5
	8888145040	8888123404	23 cm	40 cm	5
	8888145041	8888128454	28 cm	45 cm	5
	8888145042	8888133504	33 cm	50 cm	5
Pre-Curved Palindrome	8888145058	8888119370	19 cm	36 cm	5
	8888145059	8888123410	23 cm	40 cm	5
	8888145060	8888128460	28 cm	45 cm	5
	8888145061	8888133510	33 cm	50 cm	5
Palindrome H–Heparin Coating	8888145043	8888119365	19 cm	36 cm	5
	8888145044	8888123405	23 cm	40 cm	5
	8888145045	8888128455	28 cm	45 cm	5
	8888145046	8888133505	33 cm	50 cm	5
Pre-Curved Palindrome H–Heparin Coating	8888145068	8888119371	19 cm	36 cm	5
	8888145069	8888123411	23 cm	40 cm	5
	8888145070	8888128461	28 cm	45 cm	5
	8888145071	8888133511	33 cm	50 cm	5
Palindrome SI–Silver Ion Antimicrobial Sleeve	8888145062	8888119368	19 cm	36 cm	5
	8888145063	8888123408	23 cm	40 cm	5
	8888145064	8888128458	28 cm	45 cm	5
	8888145065	8888133508	33 cm	50 cm	5
	8888145066 †		55 cm	72 cm	5
Palindrome HSI–Heparin Coating and Silver Ion Antimicrobial Sleeve	8888145057	8888119369	19 cm	36 cm	5
	8888145048	8888123409	23 cm	40 cm	5
	8888145049	8888128459	28 cm	45 cm	5
	8888145050	8888133509	33 cm	50 cm	5
Palindrome RT–Reverse Tunneled	8888541019		19 cm	39 cm	5
	8888541023		23 cm	43 cm	5
	8888541028		28 cm	48 cm	5
	8888541033		33 cm	53 cm	5
	8888541044		44 cm	64 cm	5
	8888541055		55 cm	75 cm	5

† Does not include VenaTrac

Components

Palindrome Base, H, SI, and HSI Catheters	Qty	Sport Packs	Kits
14.5 Fr Symmetric Tip Catheter	1	•	•
Tal VenaTrac™ Over-the-Wire Insertion Stylets	2	•	•
16 Fr Valved Pull-Apart Safety Sheath	1	•	•
Bifurcated Tunneler	1	•	•
12 Fr Tissue Dilator	1	•	•
14 Fr Tissue Dilator	1	•	•
Injection Sealing Caps	2	•	•
Introducer Needle, 18G	1		•
J/Straight 0.038" Guidewire	1		•
Syringe, 12 mL	1		•
#11 Scalpel	1		•
Telfa™ Island Dressings	2		•
4" x 4" Cotton Gauze Sponges	4		•



Components


Palindrome RT–Reverse Tunneled Catheter	Qty
Catheter/valve adapter assembly	1
Hub/back-end assembly with colored end cap	1
Hub snap connector	1
Tunneler	1
Additional tunneler cap	1
Syringe	1
4" x 4" Cotton Gauze Sponges	4
12Fr (4.0 mm) dilator	1
14Fr (4.7 mm) dilator	1
16Fr (5.3 mm) valved pull-apart safety sheath/introducer	1
Telfa™ Island Dressings	1
Smooth Jawed Forceps	2
Sealing caps	2
External measuring kit (includes 18G (1.2 mm) introducer needle, #11 scalpel, 0.038 in (0.965 mm) J/straight guidewire)	1

Color Key


- Palindrome Base Catheter
- Palindrome H–Heparin Coated Dialysis Catheter
- Palindrome SI–Silver Ion Antimicrobial Catheter
- Palindrome HSI–Heparin Coated and Silver Ion Antimicrobial Dialysis Catheter
- Palindrome RT–Reverse Tunneled Catheter

Repair Kits

	Product Codes	Qty
Hemodialysis Catheter Repair Kit 	8888200001	1
Components		
Hemodialysis Catheter Repair Kit 		Qty
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

Palindrome RT–Reverse-Tunneled Kit Code 	Length	Corresponding Palindrome RT–Reverse-Tunneled Repair Kit
8888541019	19 cm	8888541119
8888541023	23 cm	8888541123
8888541028	28 cm	8888541128
8888541033	33 cm	8888541133
8888541044	44 cm	8888541144
8888541055	55 cm	8888541155

Note: Ensure that the catheter repair kit corresponds to the same implant length as the indwelling catheter so that the pre-calculated priming volumes located on the repair hub/back-end assembly match.

Components	
Hemodialysis Catheter Repair Kit 	Qty
Hub/back-end assembly	1
Hub snap connector	1
Smooth jawed forceps	2
Sealing caps	2
Drape	1
Ruler	1

Clinical References

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† Data on file.



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