



TauroLock™

CE 0123

ANTIMICROBIAL CATHETER LOCK SYSTEM
TO PROVIDE PATENCY AND INFECTION CONTROL

Prophylaxis against catheter related bloodstream infections:

Central venous catheters (CVC) are used as short or long term vascular access devices in hemodialysis, oncology, ICU and total parenteral nutrition. High risks for CVC malfunction are catheter related infections (CRI). These infections may be triggered by microbial colonization of the catheter and the microorganisms can spread from here to the bloodstream. CRI may develop septic symptoms which require the immediate removal of the catheter.

TauroLock™ catheter lock solutions **do not contain antibiotics** and were developed for prophylactic use. They reduce catheter related infections significantly (~ 90%).

The combination of citrate (4%) with (cyclo)-taurolidine and heparin/urokinase has excellent anticoagulative and anti-microbial properties also against resistant microorganisms like MRSA und VRE.

Therefore TauroLock™ is recommended in different guidelines such as the Hygiene Guidelines completing the German Dialysis Standard, the guidelines from the German Society of applied Hygiene in Dialysis and the evidence-based recommendations of the German Society for Paediatric Oncology and Hematology (GPOH).

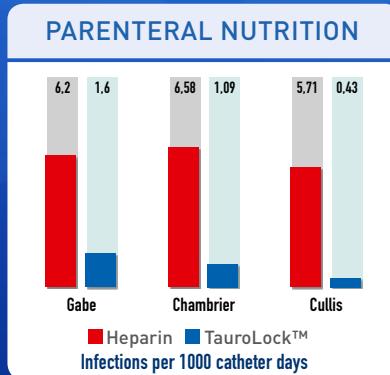
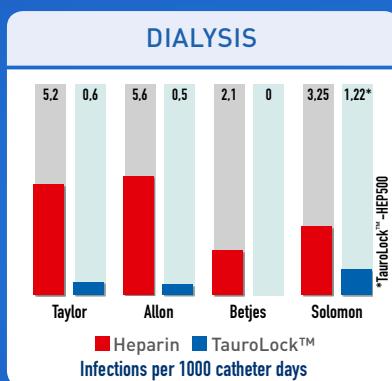
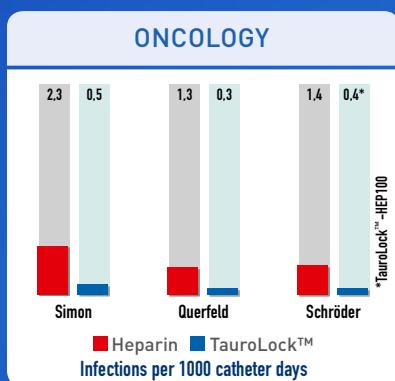
Prophylaxis against biological occlusion in the catheter:

The TauroLock™ Catheter Lock System contains a threefold prophylaxis against occlusion in the catheter: All locking solutions contain 4% citrate as anticoagulant. This concentration removes calcium safely and effectively from the clotting cascade.

The optional use of low concentrated heparin supports an additional anti-coagulative effect via binding to antithrombin. The prophylactic use of TauroLock™-U25.000 (which contains 25.000 IU of urokinase) achieves the best prophylaxis against occlusion by prevention of biological clotting.

The decision which locking solution is most adequate depends on the individual patient situation. The alternative use of different locking solutions in the same catheter (e.g. TauroLock™-HEP500, TauroLock™-U25.000) is possible.

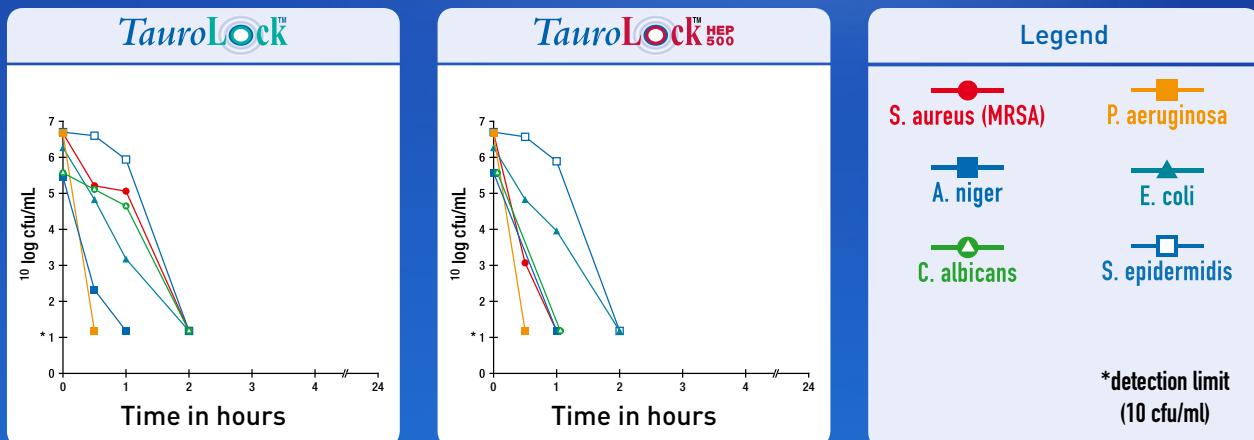
TauroLock™ prevents catheter infections:



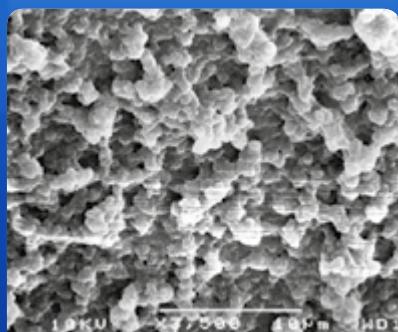
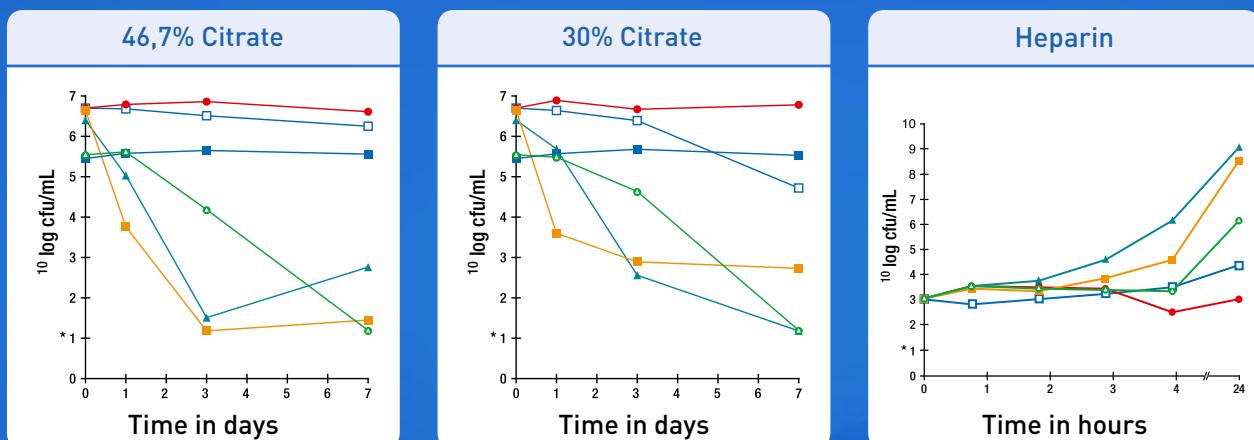
TauroLock™

CE 0123

TauroLock™ is bactericidal and fungicidal within 2 hours:

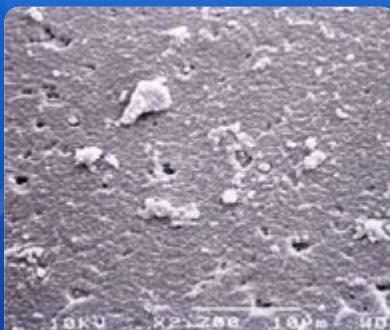


Clearly superior in comparison to the activity of Citrate and Heparin:



Heparin Lock – 7 months implanted – S. epidermidis biofilm covers surface completely

If used prophylactically, TauroLock™ prevents the development of a biofilm on the surface of the catheter lumen:



TauroLock™
5 months implanted –
No colonization

TauroLock™ is safe:

The concentration of 4% citrate in TauroLock™ is safe and efficient - according to the recommendation of the FDA (ref.: FDA Warning Letter, April 2000).

No hypocalcaemic effects are observed in contrast to highly concentrated citrate solutions (30% resp. 46,7%) e.g. arrhythmia, cardiac arrest*, emboli**, tingling fingers and metallic taste***.

TauroLock™ is biocompatible and non toxic.

In contrast to highly concentrated citrate there is no protein precipitation if using TauroLock™****.

* Punt, C.D., Boer, W.E. Cardiac arrest following injection of concentrated trisodium citrate, Clinical Nephrology, 2008, 69: 117-118.

** Willicombe, M.K., Vernon, K., Davenport, A. Embolic Complications From Central Venous Hemodialysis Catheters; Used With Hypertonic Citrate Locking Solutions, American Journal of Kidney Diseases, 2010, 55: pp 348 - 351.

*** Polaschegg, H.-D., Sodemann, K. Risks related to catheter locking solutions containing concentrated citrate, Nephrol. Dial. Transplant. 2003, 18: 2688-2690.

**** Schilcher, G. Polaschegg H.D. et al. Hypertonic Trisodium Citrate Induces Protein Precipitation in Hemodialysis Catheters, Selected ASN Meeting Abstracts, 2011

Instillation of TauroLock™

Follow the manufacturer's instructions that accompany the particular vascular access product utilized. Specific catheter lock volumes are associated with each device.

1. Flush the device with 10 mL of saline.
2. Withdraw TauroLock™ from the container using an appropriate syringe.
3. Instill TauroLock™ slowly (not more than 1 mL per second, infants and children less than two years of age not more than 1 mL per 5 second) into the access device in a quantity sufficient to fill the lumen completely. Consult the manufacturer's instructions for the specific fill volume or specify fill volume during implantation. The volume has to be strictly respected. TauroLock™ will remain inside the access device until the next treatment.
4. If aspiration of TauroLock™ is needed and possible, it should be withdrawn from the port/catheter and discarded prior to initiation of next treatment.
5. Flush the device with 10 mL of saline.

Product selection for application

Product	TauroLock™	TauroLock™ ^{HEP} ₁₀₀	TauroLock™ ^{HEP} ₅₀₀	TauroLock™ ^{HEP} ₂₅₀₀
Dialysis	●		● ● ●	● ●
Oncology	● ● ●	● ● ●		● ●
Parenteral Nutrition	● ● ●	● ● ●		● ●



TauroLock™ catheter lock solutions are available in different containers:

Product	TauroLock™	TauroLock™ HEP 100	TauroLock™ HEP 500	TauroLock™ 25000
Ampoule (10 x 3 mL)	●		●	
Ampoule (10 x 5 mL)	●			●
Vial (100 x 10 mL)	●		●	
Vial (5 x 5 mL)				●

Manufacturer:



TauroPharm GmbH
Jägerstraße 5a
D-97297 Waldbüttelbrunn
Tel.: +49 931 304299-0
Fax: +49 931 304299-29

ISO13485

1. **GUIDELINES AND RECOMMENDATIONS**
 - 1.1. **Hygiene Guidelines Completing 'GERMAN DIALYSIS STANDARD 2006'** German Workgroup for Clinical Nephrology in Cooperation with the Verband Deutsche Nierenzentren der DD nA e.V. and the Society for Pediatric Nephrology: Hygiene Guidelines 2008 completing the German Dialysis Standard 2006.
 - 1.2. **Diagnosis, prevention and treatment of haemodialysis catheter-related bloodstream infections (CRBSI): a position statement of European Renal Best Practice (ERBP)**
R. Vanholder, B. Canaud, R. Fluck, M. Jadoul, L. Labriola, A. Marti-Monros, J. Tordoir, W. Van Biesen, *NDT Plus* (2010) 3: 234–246
 - 1.3. **Vascular Access for Haemodialysis** Renal Association (United Kingdom), R. Fluck, M. Kumwenda (2011)
 - 1.4. **Guidelines for Applied Hygiene in Dialysis** German Society for Applied Hygiene in Dialysis e.V., DGHD 2013, Chapter 9.5.8 Lock Solutions for CVC and Port-Systems, 3rd Edition
 - 1.5. **National Kidney Foundation (NKF): KDOQI Guidelines** KDOQI Guideline, Guideline 7, update 2006.
 - 1.6. **Evidence-based Recommendations for the Use of Permanent CVADs in Paediatrics.** A. Simon, Society of Paediatric Hematology and Oncology, GPOH 2013, 3rd Edition
 - 1.7. **S3 – Guideline of the German Society for Nutritional Medicine (DGEM) in Cooperation with GESKES and AKE: Nutritional support in the homecare and out patient sectors**
S.C. Bischoff et al., *Aktuel Ernährungsmed*, 2013 e101 – e154
 - 1.8. **Guidelines for the Prevention of Intravascular Catheter-related Infections.** 2011 CDC, Center of Disease Control, USA, 2011
2. **PUBLICATIONS: PROPHYLAXIS OF INFECTION IN DIALYSIS**
 - 2.1. **A Meta-analysis of Hemodialysis Catheter Locking Solutions in the Prevention of Catheter-Related Infection**
Y. Jaffer, N. M. Selby, M. W. Taal, R. J. Fluck, and C. W. McIntyre, *Am J Kidney Dis* 51:233–241.
 - 2.2. **Prevention of dialysis catheter-related sepsis with a citrate–taurodilidine–containing lock solution** M. G. H. Betjes and M. van Agteren, *Nephrol Dial Transplant*, 2004, 19:1546–1551. Department of Internal Medicine, Division of Nephrology, Erasmus Medical Center, Dijkzigt Rotterdam.
 - 2.3. **Observational Study of Need for Thrombolytic Therapy and Incidence of Bacteremia using Taurodilidine–Citrate–Heparin (TCH), Taurodilidine–Citrate (TC) and Heparin Catheter Locks in Patients Treated with Hemodialysis** L. R. Solomon, J. S. Cheesbrough, R. Bhargava, N. Mitsides, M. Heap, G. Green, P. Diggle, *Sem Dial* 2011.
 - 2.4. **A Randomized Double-Blind Controlled Trial of Taurodilidine–Citrate Catheter Locks (vs. Heparin (5000 IU/ml) for the Prevention of Bacteremia in Patients Treated With Hemodialysis** L. R. Solomon, J. S. Cheesbrough, L. Ebah, T. Al-Sayed, M. Heap, N. Millband, D. Waterhouse, S. Mitra, A. Curry, R. Saxena, R. Bhat, M. Schulz, P. Diggle, *American Journal of Kidney Disease*, Vol 55, No 6 (June), 2010; pp 1060 – 1068.
 - 2.5. **Prophylaxis against Dialysis Catheter-Related Bacteraemia with a Novel Antimicrobial Lock Solution** M. Allon, *Clin. Infect Dis* 2003, 36:1539–1544.
 - 2.6. **Dialysis Catheter-Related Bacteraemia: Treatment and Prophylaxis** M. Allon, MD, *American Journal of Kidney Diseases*, 2004, 44, 779–791.
 - 2.7. **Two Years' Experience with Dialock and CLST™ (A New Antimicrobial Taurodilidine–Citrate Lock Solution)** K. Sodemann, H.-D. Polaschegg, B. Feldmer *Blood Purif* 2001;19:251–254.
 - 2.8. **The Targeted Use of TAUROLOCK in Reduction of Episodes of Line Sepsis in the „High Risk“ Haemodialysis Population**
M. A. Vernon, J. Goddard, Poster during British Renal 2006, Harrogate P205 (RA6432)
 - 2.9. **Preventing infections of central venous catheters with a taurodilidine/citrate solution**
O. Kramenka, Western Galilee Hospital, Nahariya, Israel, Presentation at EDTNA/ERCA Congress 2006, Madrid.
 - 2.10. **A New Haemodialysis Catheter-Locking Agent reduces infections in Haemodialysis Patients** C. Taylor, J. Cahill, M. Gerrish, J. Little, *Journal of renal Care* 34 (3), 116–120.
 - 2.11. **Approaches to Prolong the Use of Uncuffed Hemodialysis Catheters: Results of a Randomized Trial** V. Filiopoulos, D. Hadjyannakos, I. Koutis, S. Trompouki, T. Micha, D. Lazarou, D. Vlassopoulos; Department of Nephrology, *Am J Nephrol* 2011; 33:260–268.
3. **PUBLICATIONS: PROPHYLAXIS OF INFECTION IN ONCOLOGY**
 - 3.1. **Central Venous Catheters and Catheter Locks in Children with Cancer: a Prospective Randomized Trial of Taurodilidine versus Heparin**
M. Moller Handrup, J. Kjølseth Møller, H. Schröder, *Pediatric Blood Cancer* DOI 10.1002/pbc
 - 3.2. **Randomized controlled trial of taurodilidine citrate versus heparin as catheter lock solution in paediatric patients with haematological malignancies**
M. J. Dümlichen, K. Seeger, H. N. Lode, J. S. Kühl, W. Ebell, P. Degenhardt, M. Singer, C. Geffers, U. Querfeld, *J. Hospital Inf.*, 80 (2012) 304–309.
 - 3.3. **Taurodilidine–citrate lock solution (TauroLock) significantly reduces CVAD-associated gram-positive infections in paediatric cancer patients**
A. Simon, R. A. Ammann, G. Wiszniewsky, U. Bode, G. Fleischhack, M. M. Besuden, *BMC Infectious Diseases* 2008, 8:102.
 - 3.4. **Treatment of long-term catheter-related bloodstream infections with a taurodilidine block: a single cancer center experience**
G.-M. Haag, A.-K. Berger, D. Jäger, *J. Vasc. Access* 2011, DOI: 10.5301/JVA.2011.6265.
 - 3.5. **Taurodilidine is effective in the treatment of central venous catheter-related bloodstream infections in cancer patients**
M. Koldehoff, J. L. Zakerzewski, *Int. J. Antimicrobial Agents* 24 (2004), 491–495.
 - 3.6. **First Report World-Wide of Clinical Use of Taurodilidine – 4% Citrate Catheter Lock Solution To Treat an Intravascular Catheter Colonised With a Mycobacteria: With a Highly Successful Outcome** T. A. Collyns, et al., Leeds Teaching Hospitals NHS Trust, Leeds, United Kingdom, Posterpresentation 47th ICAAC, Chicago.
4. **PUBLICATIONS: PROPHYLAXIS OF INFECTION IN PARENTERAL NUTRITION**
 - 4.1. **Significant Reduction in Central Venous Catheter–related Bloodstream Infections in Children on HPN After Starting Treatment With Taurolidine Line Lock**
H.-P. Chu, J. Brind, R. Tomar, S. Hill, *JPGN* 55 (2012) 403–407.
 - 4.2. **Taurodilidine Lock is highly effective in preventing catheter-related bloodstream infections in patients on home parenteral nutrition: A heparin-controlled prospective trial**
T. M. Bisseling, M. C. Willems, M. W. Versleijen, J. C. Hendriks, R. K. Vissers, G. J. Wanten, *Clinical Nutrition* 2010; 29: 464–468.
 - 4.3. **Taurodilidine lock solution in the secondary prevention of central venous catheter-associated bloodstream infection in home parenteral nutrition patients**
A. Touré, M. Lauverjat, C. Peraldi, M. Boncompain-Gerard, P. Gelas, D. Barnoud, C. Chambrion, *Clinical Nutrition* (2012), doi:10.1016/j.clnu.2012.01.001.
 - 4.4. **Study on the effectiveness of taurodilidine lock in the secondary prevention of infections related to central venous lines in home parenteral nutrition**
E. Lerebours, F. Joly, C. Chambrion, S. Schneider, D. Seguy, E. Fontaine, L. Armengol-Debeir, J. Blot, H. Roth, *Nutrition clinique et métabolisme* 27 (2013) 053
 - 4.5. **Efficacy of Taurodilidine in prevention of catheter related bloodstream infections in patients on Home Parenteral Nutrition**
A. Al-Amin, J. Sarveswaran, J. Wood, C. Donnellan, D. Burke, *Br. J. Surgery* 2012;99 83–222.
 - 4.6. **Taurodilidine Lock – Experience from the West of Scotland** P. S. Cullis, R. F. McKee, *Clinical Nutrition* (2011), doi:10.1016/j.clnu.2010.12.008
 - 4.7. **Effectiveness of Taurolidine™ in preventing recurrent catheter-related bloodstream infections in patients on home parenteral nutrition**
A. Taniguchi, J. Eastwood, A. Davidson, J. Nightingale, S.M. Gabe, *Proceedings of the Nutrition Society* (2009), 68 (OCE1), E58
5. **PROVIDE PATENCY TO ACCESS DEVICES BY USING UROKINASE**
 - 5.1. **German Guideline for Access Devices in Haemodialysis (extract) – Recommendation of German Expert Panel**
M. Hollenbeck, V. Mickley, J. Brunkwall, H. Daum, P. Haage, J. Ranft, R. Schindler, P. Thon, D. Vorwerk, *Nephrologe* 2009, 4, 158–176.
 - 5.2. **National Kidney Foundation, KDOQI Guidelines 2000, Guidelines for Vascular Access, guideline 6, Table III-2. Protocols for Urokinase Administration**
 - 5.3. **Prophylactic Urokinase in the Management of Long-Term Venous Access Devices in Children: A Children's Oncology Group Study**
P. W. Dillon, G. R. Jones, H. A. Bagnall-Reeb, J. D. Buckley, E. S. Wiener, G. M. Haase, *J Clin Oncology*, 2004 (22), 2718–2723.
 - 5.4. **Review and update of the use of urokinase in the prevention and management of CVAD-related complications in paediatric oncology patients**
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6. **PUBLICATIONS ON ANTIBACTERIAL ACTIVITY OF TAUROLOCK – PREVENTION OF BIOFILM**
 - 6.1. **Antimicrobial Activity of a Novel Catheter Lock Solution**
C. B. Shah, M. W. Mittelman, J. W. Costerton, S. Parenteau, M. Pelak, R. Arsenault, L. A. Mermel, *Antimicrob. Agents Chemother.* 2002, 46: 1674–1679
 - 6.2. **Activities of Taurodilidine In Vitro and in Experimental Enterococcal Endocarditis** C. Torres-Viera, C. Thauvin-Eliopoulos, M. Souli, P. DeGirolami, M. G. Farris, C. B. Wennersten, R. D. Sofia, G. M. Eliopoulos, *Antimicrobial Agents and Chemotherapy* 2000, 44: 1720–1724.