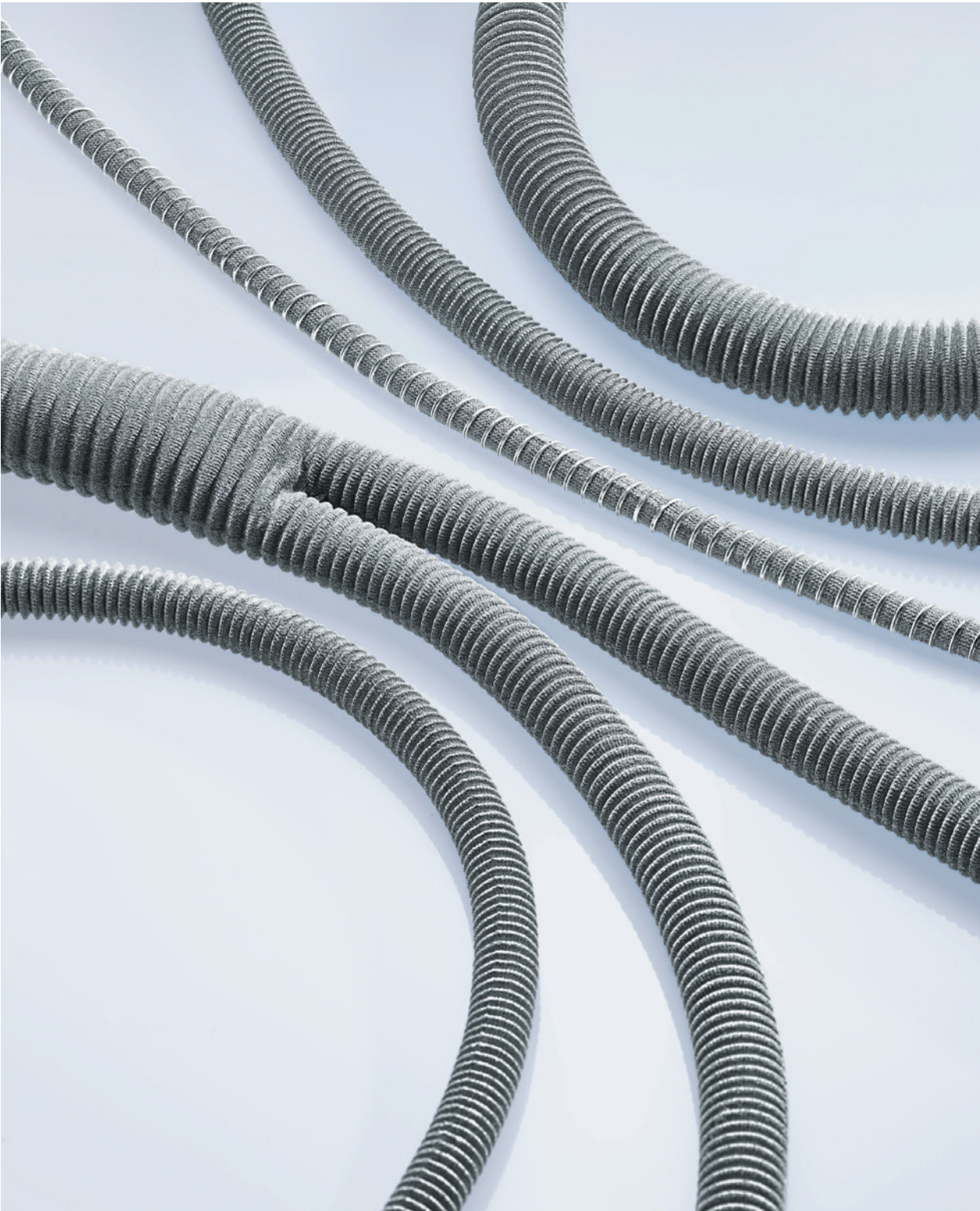




INTERVENTIONAL
VASCULAR THERAPY

Silver Graft

NEXT GENERATION OF ANTIMICROBIAL VASCULAR PROSTHESES

SILVER GRAFT

NEXT GENERATION OF ANTIMICROBIAL VASCULAR PROSTHESES

VASCULAR GRAFT INFECTION

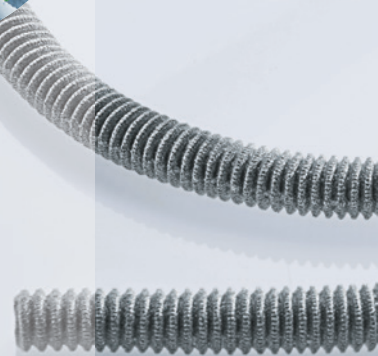
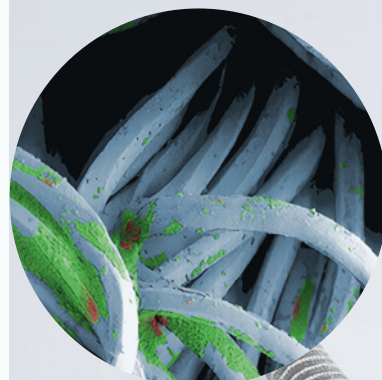
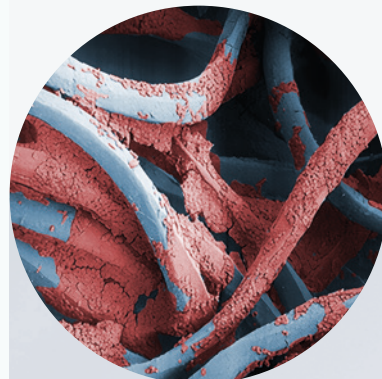
Despite the use of prophylactic antibiotics in vascular surgery, the infection rate remains 2–5 %. Many of these vascular graft infections occur at three months or later. If infected the amputation rate lies between 15 – 60 % and the mortality rate exceeds 25 %.

Besides *Staphylococcus spec.* a broad spectrum of microorganisms can cause graft infections.^{1, 2}

With the approach to prevent bacterial colonization after implantation and to reduce the risk of late infection, Silver Graft was developed.

WHY SILVER?

- Effective in low concentration: Inactivates DNA replication, protein biosynthesis and membrane potential of microorganisms³
- Broad spectrum of efficacy
- No documented silver resistance of pathogenic microorganisms³
- Efficacy against increasingly detected methicillin-resistant *Staphylococcus aureus* (MRSA)^{4, 4a}

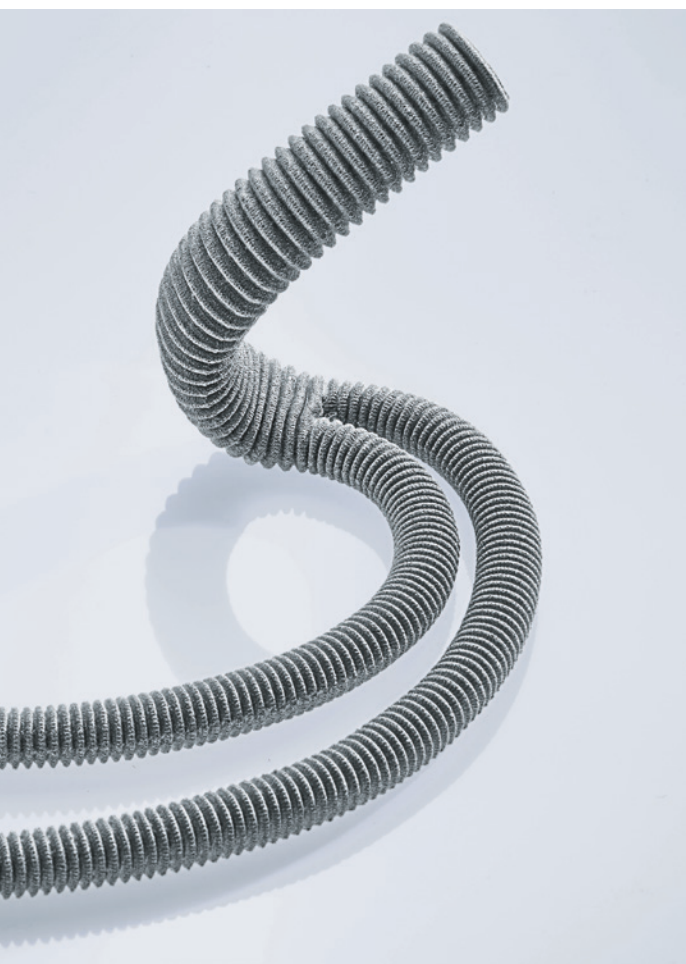


¹ Inui, Taza; Bandyk, Dennis F. (2015): Vascular surgical site infection: risk factors and preventive measures. In: *Seminars in vascular surgery* 28 (3–4), S. 201–207.

² Zühlke, Helmut; Halloul, Zuhir; Zippel, Roland (Hg.) (2019): *Septische Gefäßmedizin*. Stuttgart, New York, Stuttgart: Georg Thieme Verlag; Thieme.

³ Silver S. Bacterial silver resistance: molecular biology and uses and misuses of silver compounds. *FEMS Microbiol Rev.* 2003 Jun;27(2–3):341–53.

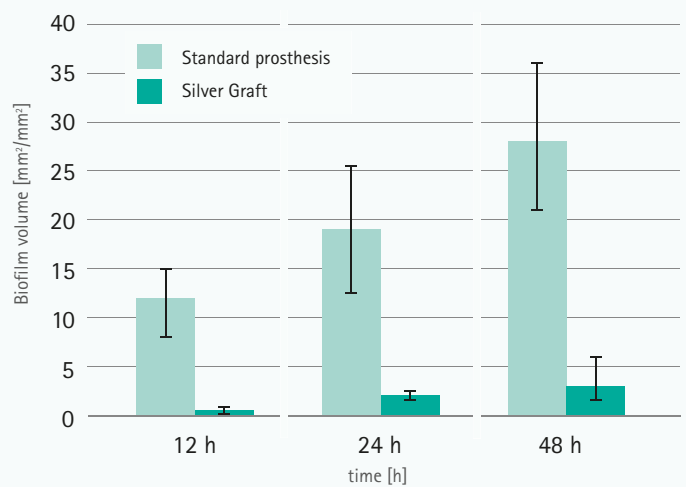
REDUCTION OF BACTERIAL GROWTH



SILVER GRAFT SIGNIFICANTLY REDUCES BACTERIAL GROWTH *IN VITRO* AND *IN VIVO*

Both the extent of biofilm formation and the proportion of viable biofilm cells were significantly diminished on the surface of Silver Graft ^{4, 5}

INCUBATION WITH STAPHYLOCOCCUS AUREUS ⁴



⁴ Strathmann M, Wingender J. 2004. Use of an oxonol dye in combination with confocal laser scanning microscopy to monitor damage to *Staphylococcus aureus* cells during colonization of silver-coated vascular grafts. *Intern J Antimicrobial Agents*, 24: 234-240.

^{4a} Wilson, Walter R.; Bower, Thomas C.; Creager, Mark A.; Amin-Hanjani, Sepideh; O'Gara, Patrick T.; Lockhart, Peter B. et al. (2016): Vascular Graft Infections, Mycotic Aneurysms, and Endovascular Infections: A Scientific Statement From the American Heart Association. In: *Circulation* 134 (20), e412-e460.

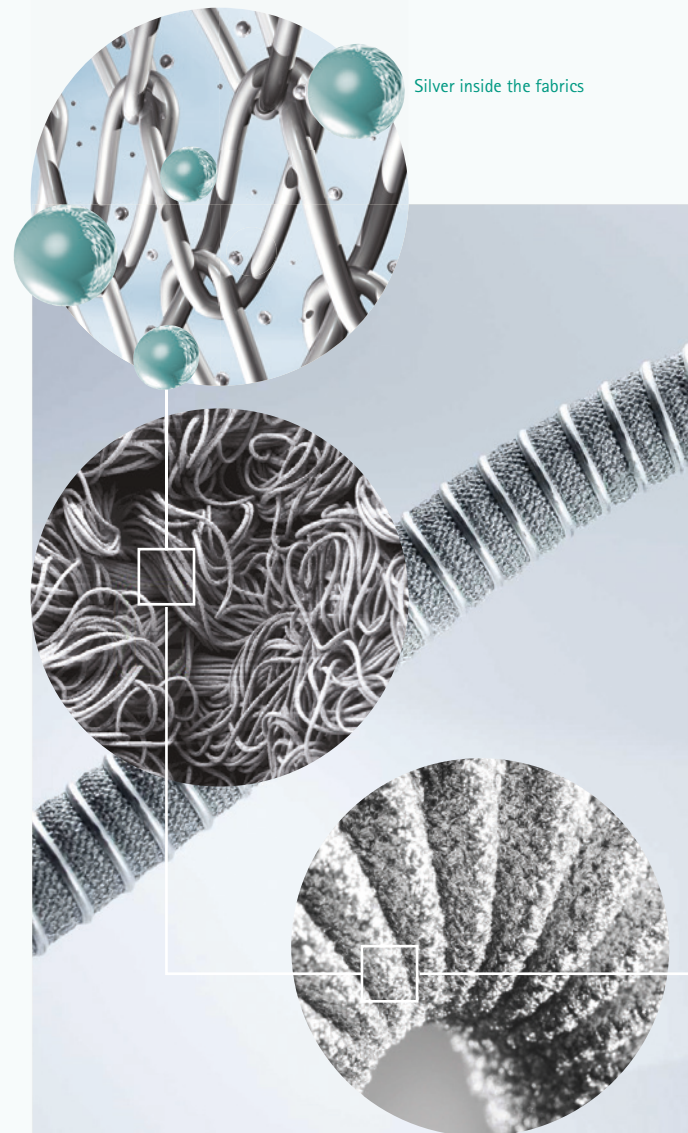
SILVER GRAFT

NEXT GENERATION OF ANTIMICROBIAL VASCULAR PROSTHESES

SILVER IN COATING IS GOLD IN PROTECTION

WHY SILVER GRAFT?

- Facilitates long term inhibition of bacterial colonization due to direct embedding of silver in the textile fabrics ⁴
- Significantly reduces the adhesion of microorganisms *in vitro* and *in vivo* ⁵
- Supports gentle and natural healing ⁵



⁵ Ueberrueck T, Zippel R, Tautenhahn J, Gastinger I, Lippert H, Wahlers T. 2005. Vascular graft infections: *in vitro* and *in vivo* investigations of a new vascular graft with longterm protection. *J Biomed Mater Res B Appl Biomater*, 74(1):601–607.

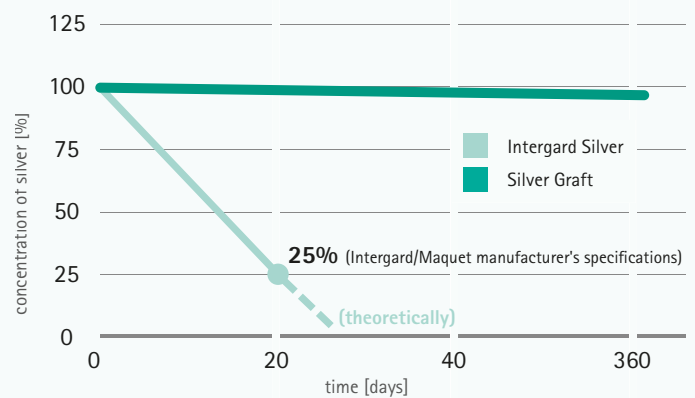
*Designed for
prophylactic long
term protection
against vascular
graft infections.*

FACILITATION OF LONG TERM PREVENTION



To enable an effective long term protection the silver coating is directly embedded in the textile fabric of the prosthesis. Silver Graft retains approx. 98 % of its silver load after one year under laboratory conditions.⁶

ELUTION OF SILVER OVER TIME ⁶

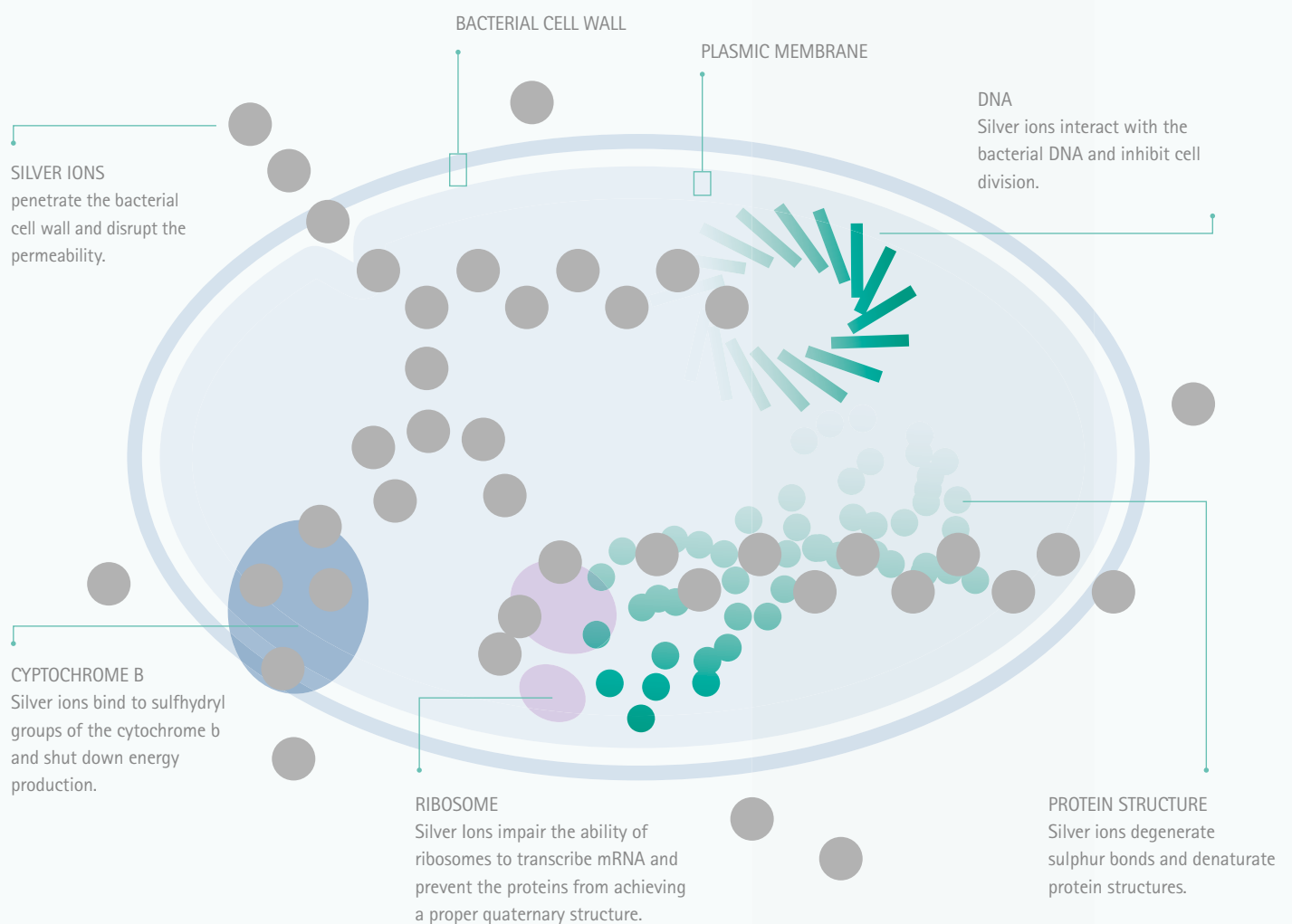


⁶ Ueberrueck T, Meyer L, Zippel R, Nestler G, Wahlers T, Gastinger I. 2005. Healing Characteristics of a New Silver-Coated, Gelatine Impregnated Vascular Prosthesis in the Porcine Model. *Zentralbl Chir*, 130:71–76.

INNOVATIONS FOR VASCULAR SURGERY

DESIGNED FOR PROPHYLACTIC LONG TERM PROTECTION

IMPACT OF SILVER IONS ON BACTERIA⁷



⁷ Kędziora A, Speruda M, Krzyżewska E, Rybka J, Łukowiak A, Bugła-Płoskońska G. Similarities and Differences between Silver Ions and Silver in Nanoforms as Antibacterial Agents. *Int. J. Mol. Sci.* 2018, 19(2), 444.

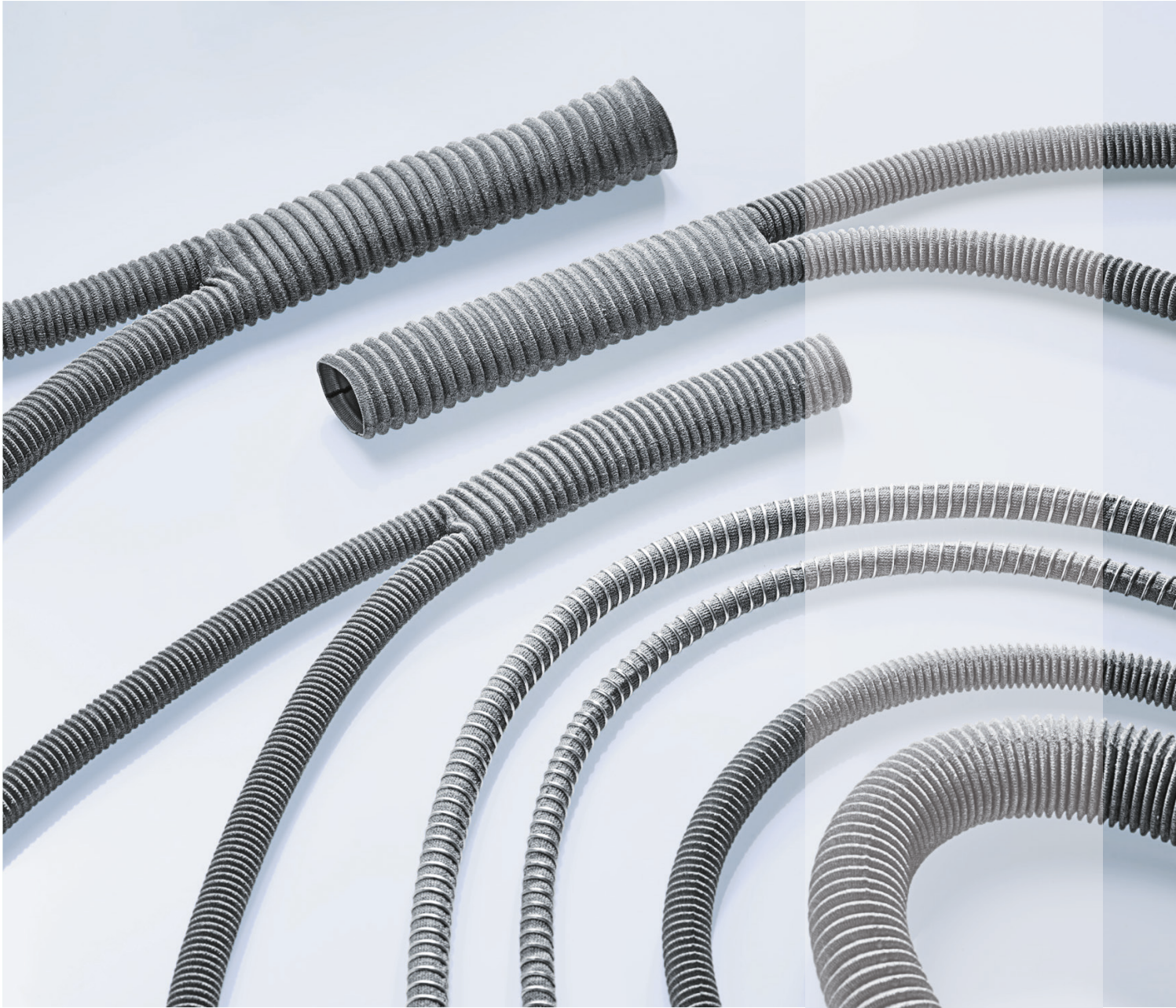
*Silver Graft
significantly
reduces bacterial
growth in vitro
and in vivo^{4, 5}*

- REDUCES THE ADHESION OF BACTERIA
IN VITRO / IN VIVO ^{4, 5}
- PROTECTS AGAINST MICROORGANISMS
IN VITRO / IN VIVO ^{4, 5}
- DESIGNED FOR LONG-TERM INHIBITION OF
VASCULAR GRAFT INFECTION
- CAN IMPLANTED PROPHYLACTICALLY AS
PROTECTION AGAINST VASCULAR GRAFT
INFECTION
- ADDITIONAL SOAKING IN ANTIBIOTICS
(E. G. RIFAMPICIN) IS POSSIBLE
- EXHIBITS EXCELLENT BIOCOMPATIBILITY ⁶
- SUPPORTS COMPLICATION FREE HEALING ⁶
- MRI COMPATIBLE



SILVER GRAFT

NEXT GENERATION OF ANTIMICROBIAL VASCULAR PROSTHESES



STRAIGHT TUBES

Usable Length (cm)	Diameter (mm)	Product Code
15	8	1108000
	10	1108030
	12	1108032
	14	1108034
	16	1108001
	18	1108002
	20	1108003
	22	1108042
	24	1108044
30	8	1108004
	14	1108005
	16	1108006
	18	1108007
	20	1108008
	22	1108062
40	24	1108064
	6	1108009
	7	1108010
	8	1108011
	10	1108050
	12	1108052
60	6	1108012
	7	1108013
	8	1108014

HELIX SUPPORTED

Usable Length (cm)	Diameter (mm)	Product Code
30	8	1108026
40	8	1108027
60	6	1108022
	8	1108023
90	6	1108024
	8	1108025

BIFURCATIONS

Usable Length (cm)	Diameter (mm)	Product Code
40	12 x 6	1108021
	14 x 7	1108017
	16 x 8	1108015
	18 x 9	1108016
	20 x 10	1108018
	22 x 11	1108019
	24 x 12	1108020

AXILLO-BIFEMORAL

Usable Length (cm)	Diameter (mm)	Product Code
90/60	8	1108080



Manufacturer

Aesculap AG | Am Aesculap-Platz | 78532 Tuttlingen | Germany

CE 0123

Distributor

B. Braun Melsungen AG | Vascular Systems | Sieversufer 8 | 12359 Berlin | Germany

Phone +49 30 568207-300 | Fax +49 30 568207-130 | www.bbraun.com