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Collagen Type I Membrane

The natural implantation vehicle for cells

ultrapure collagen type l suturable strong & elastic **excellent** biocompatibility & biodegradability choose between research or medical grade

Collagen Cell Carrier®

Unique carrier membrane for tissue culture, implantation and analysis

Due to its central role in cell adhesion and organ formation, collagen is an ideal substrate for cell culture and tissue engineering. Building on 85 years of experience in purification and processing of collagen from bovine skin, we specialize in preserving the native, complex structure of long, pure collagen type I fibers. These unique fibers enable us to manufacture the ultrathin and elastic Collagen Cell Carrier[®] membrane (CCC). The compact fiber network conveys remarkable strength to the material without the need of extra chemical cross-linking thus ensuring high biocompatibility and biodegradability. The CCC is developed for applications in tissue engineering and regenerative medicine. The scaffold of native collagen fibers provides the natural environment for cell attachment, growth and differentiation – from simple cell monolayer cultures to reconstruction of complex tissues. It uniquely offers the opportunity to easily move the cell-matrix-complex and proceed to various analyses and is especially suited as a biological vehicle for cell implantation.



in R&D and **medical** grade quality



Enhances efficacy & safety and reduces efforts & costs of cell implants

BENEFITS

- Proven biocompatibility and biodegradability in vivo
- Provides natural signals authentic, stable cell performance
- Easy handling & transfer of adhered cell layers
- Fixes cells at desired place
- Supports cells during and after implantation for better survival
- Reduces cell amount required for therapeutic effect
- Easy bench-to-bedside transfer

PROPERTIES

Chemical-Physical Features	Cell Culture & In Vivo Use	Quality
High mechanical strength, no extra chemical cross-linking	Movable with forceps and suturable	Native, strong and pure collagen type l fibers from bovine skin
Ultra-thin (20µm) and elastic membrane	Proven excellent biocompatibility <i>in vivo</i>	Raw material for medical quality from countries with negligible BSE risk
Chemically stable for standard fixation or staining procedures	Successful culture of > 30 primary cell types	Quality control according to ASTM F 2212-02
Thermostable -175°C to +50°C	Allows high cell densities and stratification	Available in R&D and medical grade
Permeable for most soluble factors	Not permeable for cells & not biodegradable in cell culture (under collagenase-free conditions)	Certification: ISO 9001 (ISO 13485 in progress)
Virtually no auto-fluorescence	Completely biodegradable in vivo	Gamma-sterilised



CCC in medical use

Universal carrier for cell-based regenerative therapies

The CCC has been developed for implantology as a biocompatible and suturable vehicle to transfer, fix and support therapeutic cells at the desired place (as a component of an advanced therapy medicinal product, ATMP). When used as a cardiopatch to immobilize adhered stem cells at infarcted heart tissue, significant enhancement of cell retention and survival was observed leading to higher vascularization, improved tissue elasticity and consequently to enhanced heart function in two animal models¹. It also provides a natural scaffold for the cellular recolonization of severely damaged tissues. Various animal studies with the CCC revealed very minor immunoreactions in the recipient^{1,2,3}. Depending on the target tissue, the CCC maintains its integrity in the body for several weeks and is then completely biodegraded^{2,3}. It is permeable for most soluble factors thus allowing tissue

nutrition and paracrine cell-to-cell communication. Its elasticity facilitates tight adherence even to moving recipient organs (like heart muscle) bringing implanted cells in close proximity to the damaged tissue^{1,2}.

Our standardized collagen matrix in medical quality is the ideal tool from bench to bedside for:

- Tissue engineering
- Regenerative medicine
- Cell therapy
- Implantology
- Advanced Therapy Medicinal Products (ATMPs)
- Medical technologies & devices

Literature

- Arana M et al., 2014, Biomaterials, 35(1):143-151
- 2. Arana M et al., 2013, Acta Biomater, 9(4):6075–6083 3. Rahmanian-Schwarz A et al., 2014, J Biomed Mater Res A., 102(4):1173–1179

CCC in research use

Versatile membrane for the analysis of cells in their natural environment

The CCC represents a universal scaffold for adherent primary cells, cell lines and stem cells for *in vitro* and *in vivo* use. Its excellent cell-friendly properties have been demonstrated in numerous cell culture experiments^{4,5,6}. The natural environment supports high cell densities¹ and cell stratification to complex 3D tissues on top of the scaffold^{6,7} facilitating the development of cell based assays with authentic cell performance and high significance. The mechanical characteristics of the carrier enable establishment of co-cultures from both sides⁴. Minimal autofluorescence makes it easily suitable for microscopic monitoring of fluorescently labeled cells^{4,6} and the mechanical strength allows direct lysis for PCR or protein assay with low contamination by collagen proteins.

Last not least, as the CCC is self-supporting, the intact cell-scaffold complex can be transferred from the culture dish for in vitro or in vivo applications, e.g.

- universal culture of adherent cells
- implantation of cell cultures by suturing to the target location
- transferable 2D & 3D cultures on top of the CCC
- · cell culture at liquid-air interface
- · applicable in bioreactors
- fluorescence microscopy (even inverse epifluorescence)
- can be fixed, sectioned and stained for histological analyses

Literature

- 4. Schmidt T et al., 2011, Tissue Eng Part C Methods, 17(12):1161–1117
- Szychlinska MA et al., 2017, Experimental Cell Research 357: 222–235
 Valarmathi MT et al., 2017, Tissue Engineering, Part A, Vol. 24, No. 1–2
 Jannasch M et al., 2015, Experimental Parasitology 150:22–30



Available in research and medical grade!

STANDARD SIZE OR TAILOR YOURSELF?

- shaped for standard well plates (96- to 6-well and 10-cm-dishes)
- squares of 5 x 5 cm and 10 x 15 cm · can be trimmed by customer for
- use in any cell culture vessel

NEED CUSTOMIZED MEMBRANES?

- · scaffolds in alternative sizes, shapes, and individual thicknesses
- adjustable permeability, elasticity, degradation time, tensile strength, swelling properties & other characteristics

