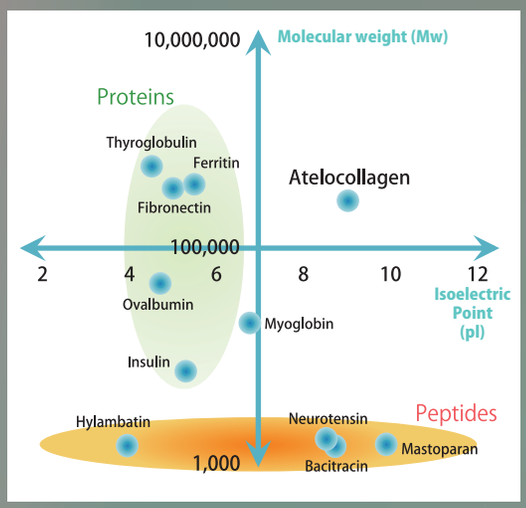
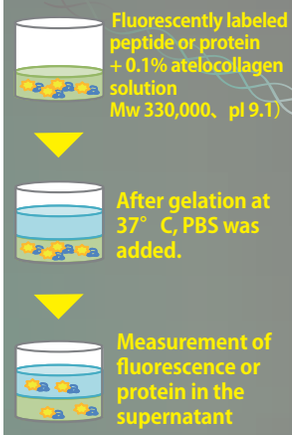
Scaffold for 3D culture・Co-culture **AteloCell®**

Sustained release of bioactive substances using Atelocollagen

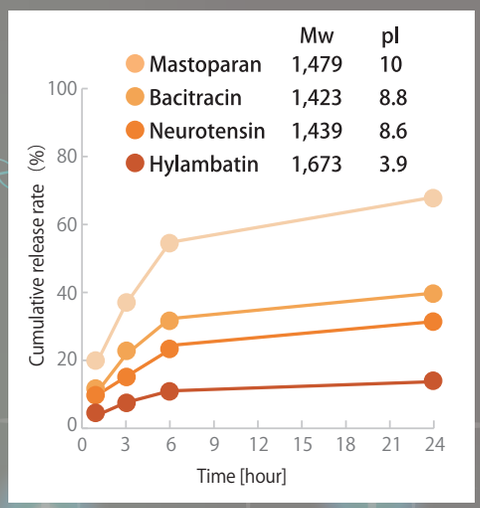
Evaluation of Sustained Release Capability of Atelocollagen





Atelocollagen, which forms a gel under physiological conditions, has been commercialized as an in vivo transfection reagent with sustained-release properties under the product name AteloGene®.To assess its potential for sustained release of bioactive substances other than nucleic acids in vivo, in vitro evaluation was conducted.

Retention Effect by low Isoelectric Point

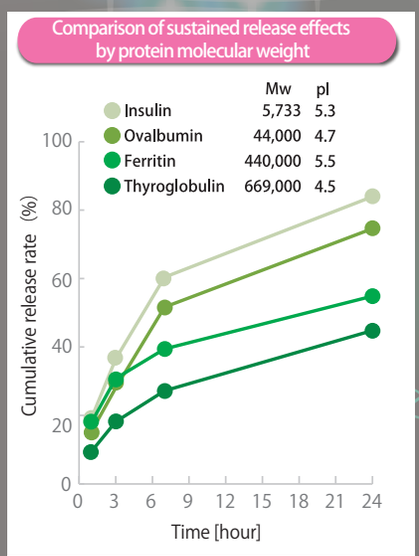


Peptides with lower isoelectric points (pI) exhibited stronger electrostatic interactions with atelocollagen, resulting in enhanced retention. (pI values reflect those prior to fluorescent labeling.)

(Data: Internal experiment)

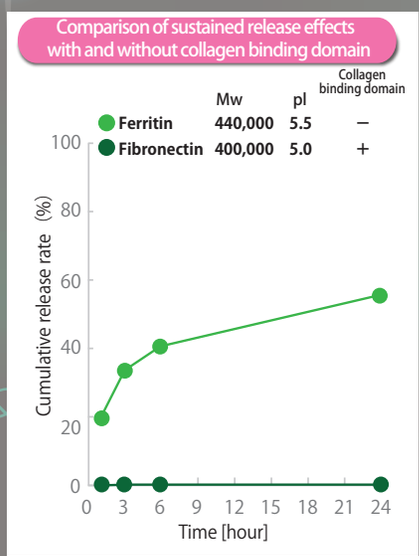
Sustained Retention of Large Molecular Weight Proteins

Comparison of sustained release effects by protein molecular weight



Proteins with larger molecular weights had a higher sustained release effect from the gel.

Comparison of sustained release effects with and without collagen binding domain

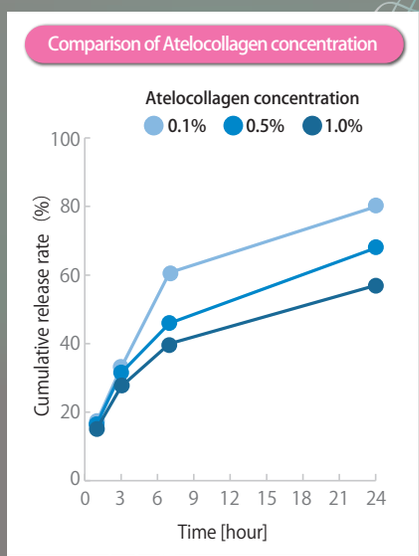


Proteins with collagen binding domains were retained longer in the gel.

(Data: Internal experiment)

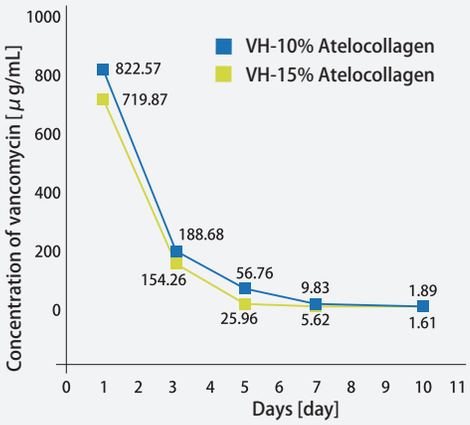
Concentration-Dependent Release of Myoglobin

Comparison of Atelocollagen concentration

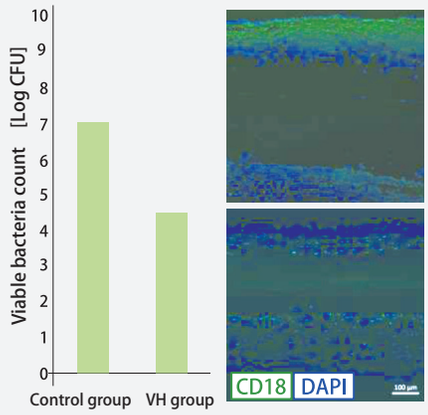


Sustained release of myoglobin increased in a concentration-dependent manner with atelocollagen. (Data: Internal experiment)

Sustained release of antibiotics using cross-linked atelocollagen gel



Sustained release evaluation of vancomycin-containing cross-linked atelocollagen gel (VH) in PBS (37℃)

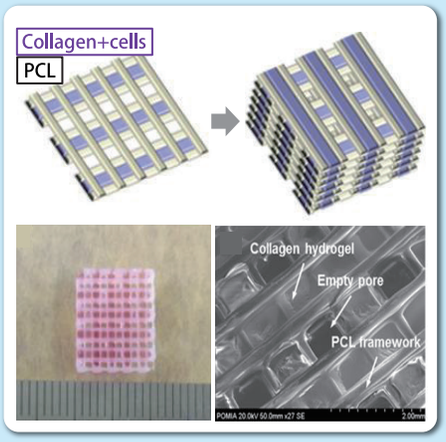


Viable bacterial count on day 3 after infection with Staphylococcus aureus after gel transplantation (left). Immunostaining image of rabbit cornea after the same experiment (control group: upper right, VH group: lower right).

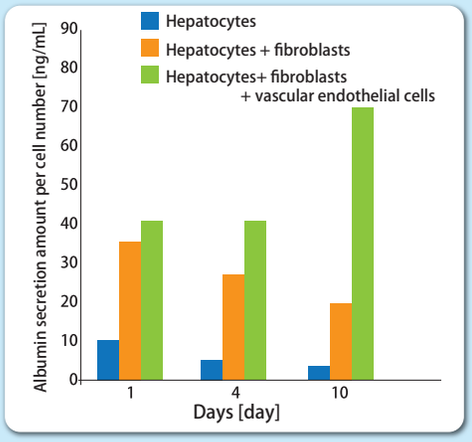
After mixing 10% or 15% atelocollagen solution and vancomycin, a cross-linked gel (VH) was prepared by EDC/NHS reaction.
The sustained release of vancomycin from VH was evaluated. As a result, sustained release of vancomycin exceeding the minimum inhibitory concentration for Staphylococcus aureus was observed until day 7.

Next, for in vivo sustained release evaluation, the control gel and VH were adjusted to a thickness of 0.2 mm using a 15% atelocollagen solution.
Both gels were transplanted into the corneal stroma of a rabbit and infected with Staphylococcus aureus.
The results showed that in the VH group, not only was there a significant bacterial growth inhibitory effect, but the number of CD18-positive cells, a marker for inflammatory cells, was significantly lower. (Reference 3)

Fabrication of three-dimensional structures using 3D printers



Schematic diagram, appearance, and SEM image of a three-dimensional structure created with a 3D printer



Evaluation of albumin secretion from three-dimensionally cultured hepatocytes

Using a 3D printer, a polycaprolactone (PCL) framework measuring 10.2 × 10.2 × 1.2 mm (length × width × height) was created, and a 2% atelocollagen solution containing cells was seeded into the pores, and a cell-containing 2% atelocollagen solution was seeded into the pores.
Cells were seeded only in every other pore to facilitate oxygen and nutrient penetration.
In the hepatocytes + fibroblasts + vascular endothelial cells s mixed group, not only albumin secretion but also increased urea synthesis was observed compared to the hepatocytes group and the hepatocytes + fibroblasts mixed group. (Reference 2)

Reference

1. Dhand C, *et al.* Bio-inspired in situ crosslinking and mineralization of electrospun collagen scaffolds for bone tissue engineering. (2016) *Biomaterials.* 104:323-38.
2. Lee JW, *et al.* Development of a 3D cell printed construct considering angiogenesis for liver tissue engineering. (2016) *Biofabrication.* 12;8(1):015007.
3. Andri K. *et al.* Collagen-Based Artificial Corneal Scaffold with Anti-Infective Capability for Prevention of Perioperative Bacterial Infections. (2015) *ACS Biomaterials Science & Engineering*. 1 (12), 1324-1334.

Cat. No.	Description	Quantity	Storage
KOU-CLP-01	Atelocollagen powder	500 mg/btl	-20℃

World distributor

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Please don't hesitate to contact us with any questions related to product selection or use.

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