PhytoCellTec™ Exosomes

Dual exosome power for rejuvenation

in-cosmetics global
Innovation Zone Best Ingredient Award 2025
Active Ingredient
BRONZE

BSB Innovation Award® Cosmetics 2025
2. Prize Category Most Innovative Raw Material

PHYTOCELLTEC.CH

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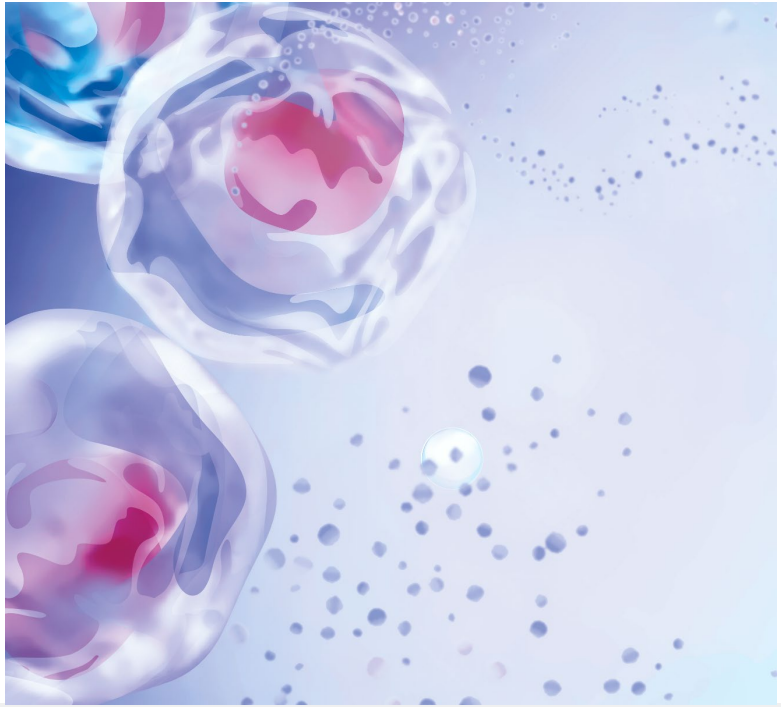
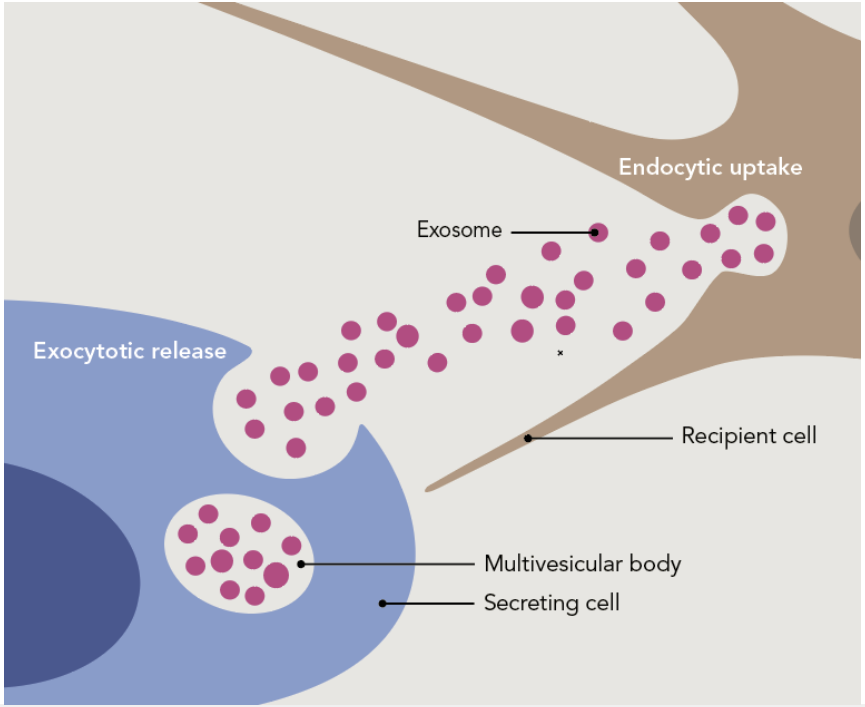
Exosomes – a Trending Topic with Real Potential



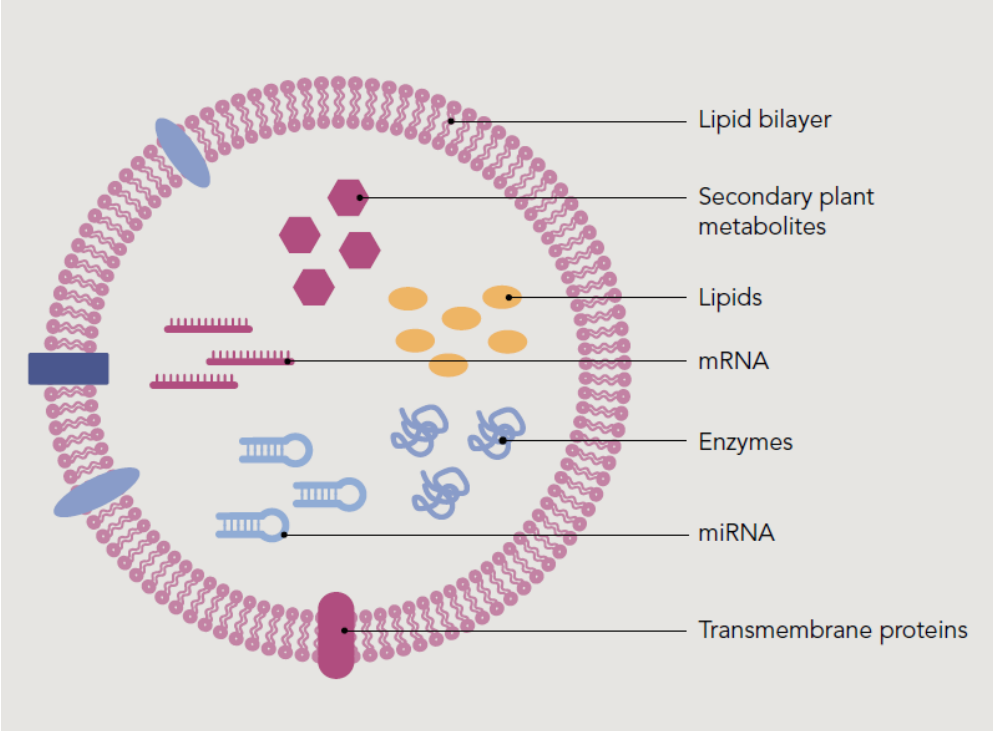
- Exosomes have been increasingly discussed in the past few years due to their potential for the **diagnosis** and therapy of **diseases**, such as cancer and neurodegenerative diseases.
- Cutaneous **medical aesthetics** use effect of exosomes on wound healing, skin pigmentation, and hair loss.
- In the meantime, exosomes have also evolved into a hot topic in the world of **cosmetics**.

What is the Function of Exosomes?

- Exosomes are an important component of cellular **communication** systems.
- Exosomes released by one cell are e.g. **taken up by the recipient cell** (endocytic uptake) → response in this cell is initiated.
- Signaling via exosomes plays a **major role** in many **cellular processes**, such as signal transduction and immune response.



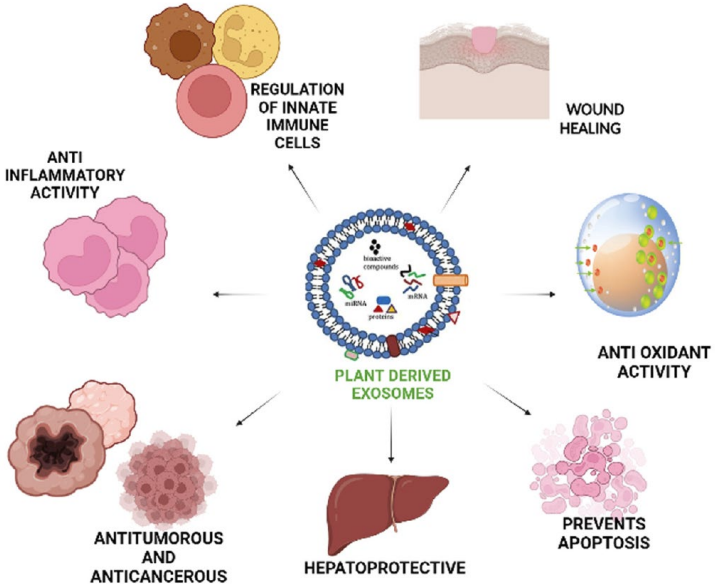
Plant-Derived Exosomes



- Similar to human cells, plant cells use extracellular vesicles to transfer messages from cell to cell (RNAs, proteins, lipids, and secondary metabolites).
- Plant-derived exosome-like nanovesicles → "**plant exosomes**"
- Function in the plant: intercellular communication, defense system or cell wall organization.
- **Similar composition, size and function** as in skin tissue.

Plant-Derived Exosomes

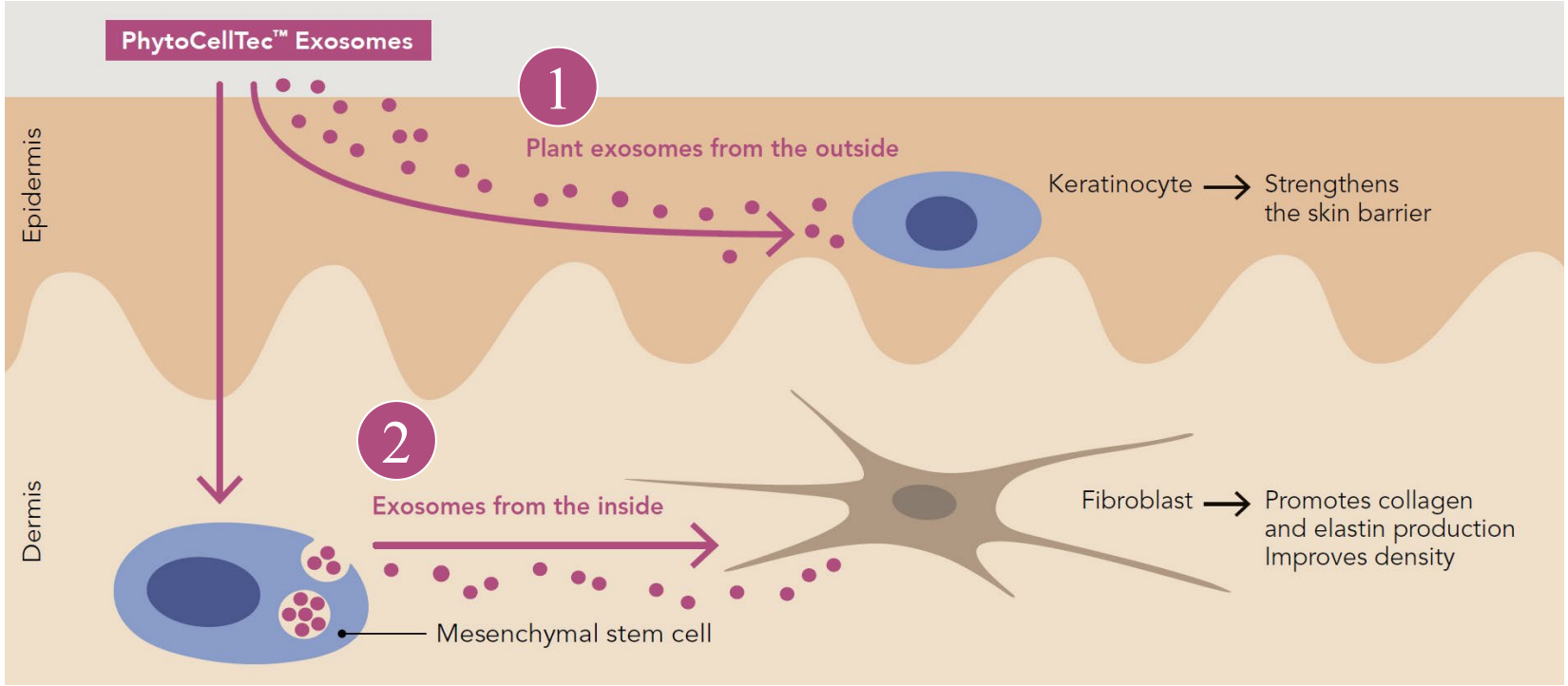
- Plant-derived exosomes can be **taken up by mammalian cells** and have a beneficial effect on human health!
- Exosomes from different plants showed anti-inflammatory, antioxidant, anti-tumor, or wound healing potential in human (1, 2).
- Recent research results confirmed the **anti-aging** potential of **plant exosomes** for the skin (3).
- **Plant exosomes** can be taken up by the **skin** where they unleash their full potential.



Schematic representation of different therapeutic potential of plant exosomes
D. Subha, K. Harshnii, K.G. Madhikiruba et al. Plant Nano Biology 3 (2023) 100022

(1) Subha, D. et al. (2023) Plant Nano Biology 3:100022.
(2) Mu, N. et al. (2023) Int J Nanomedicine 18:4987 – 5009.
(3) Trentini, M. et al. (2022) Cells 11:3950.

PhytoCellTec™ Exosomes: A Dual Activity to Rejuvenate the Skin



Dual Approach of PhytoCellTec™ Exosomes

1. Plant exosomes from the outside

- Goji stem cell-derived exosomes act directly on the outer cell layer, the **keratinocytes**, to strengthen the barrier and to protect skin from aggressive external factors and dehydration.

→ **Strengthened skin barrier, reduction of fine wrinkles.**

2. Endogenous exosomes produced by mesenchymal stem cells

- Increased production of exosomes mesenchymal stem cells (MSCs) release
- Fibroblast in the dermis are activated through exosomes to produce more collagen and elastin

→ **Production of extracellular matrix, increase of skin density, reduction of sagging skin, V-shaped face and lifted breasts.**

Stem Cells from Goji Plant Contains Valuable Exosomes

- Bush up to 3 m in height native to Southeast Europe and Asia.
- Belongs to the nightshade family such as potatoes and tomatoes.
- Legend: Goji berries were first discovered by a Buddhist monk. The monks who incorporated them into their diets lived longer than those who didn't.
- Goji berries are considered superfruits / health food.
- Food supplements claiming anti-aging, immune boosting, energizing improvement of memory.
- Recent studies demonstrated that exosomes from goji plants provide health benefits (muscle atrophy and spinal cord injuries)*.

**Zhou, X. et al. (2024) J Nanobiotechnology 22(1):276. Wang, Q. et al. (2024) Bioeng Transl Med. 9(4):e10646.*

Plant Stem Cells are an Ideal Source for Exosomes

It is **difficult** to extract pure exosomes from plants due to the cell walls and intricate structure of plant cells!

- → **Plant stem cells** are an ideal **source** for exosomes
- → No **rigid cell walls**, no chlorophyll, have a high number of exosomes inside and around the cells.
- → Additionally, they provide the **positive effects** of **plant stem cells** on **skin stem cells**.

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Plant Stem Cells for Skin Stem Cells

The stem cells of a goji seedling, obtained and cultivated by Mibelle Biochemistry's PhytoCellTec™ technology, are the basis of the active ingredient PhytoCellTec™ Exosomes.

Goji seedling

Stem cells on agar plate

Stem cell culture

Goji plant stem cell extract containing:

- **exosomes** from plant stem cells
- **epigenetic factors** that have a vitalizing effect on skin stem cells

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PhytoCellTec™ Exosomes Composition

Lycium Barbarum Cell Culture Extract (dry)	0.8 %
Isomalt	93 %
Phospholipids	0.8 %
Aqua (residual moist)	~6 %

INCI (EU/PCPC) Declaration

Lycium Barbarum Callus Culture Extract (and) Isomalt (and) Lecithin (and) Aqua/Water

Recommended Use Level: 0.4 - 1 %

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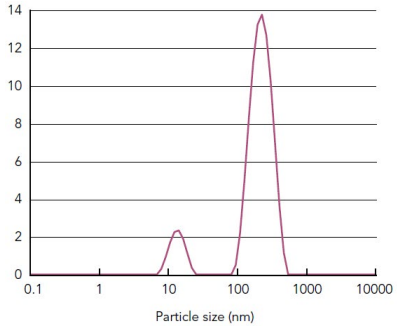
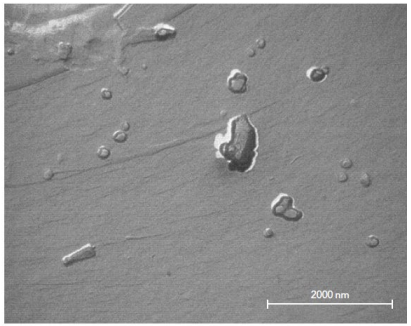
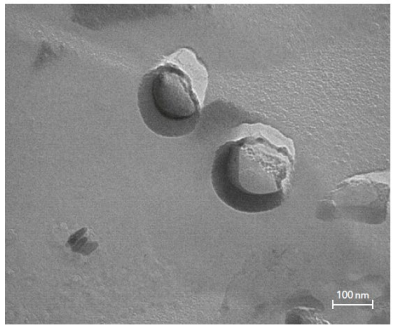
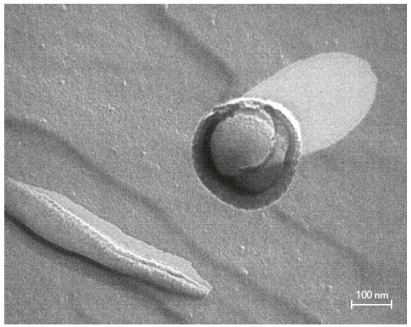
PhytoCellTec™ Exosomes Contains Exosomes









S-1301 / S-1305

Test sample:
Goji stem cell extract
Parameter:
- Vesicle size of exosomes
  (Zeta Sizer Nano ZS from Malvern Panalytical)
- Pictures (freeze-fracture transmission electron microscopy)

- PhytoCellTec™ Exosomes naturally contains **exosomes** derived from the **plant stem cells** of a **goji seedling**.
- Exosomes are of a size of approximately **200 nm.**
- **Images** confirmed the presence and the size of these exosomes that are enclosed by a **double-layer membrane**.

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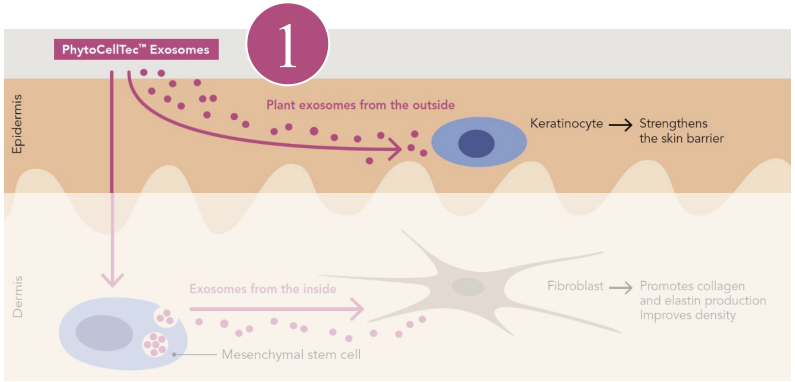
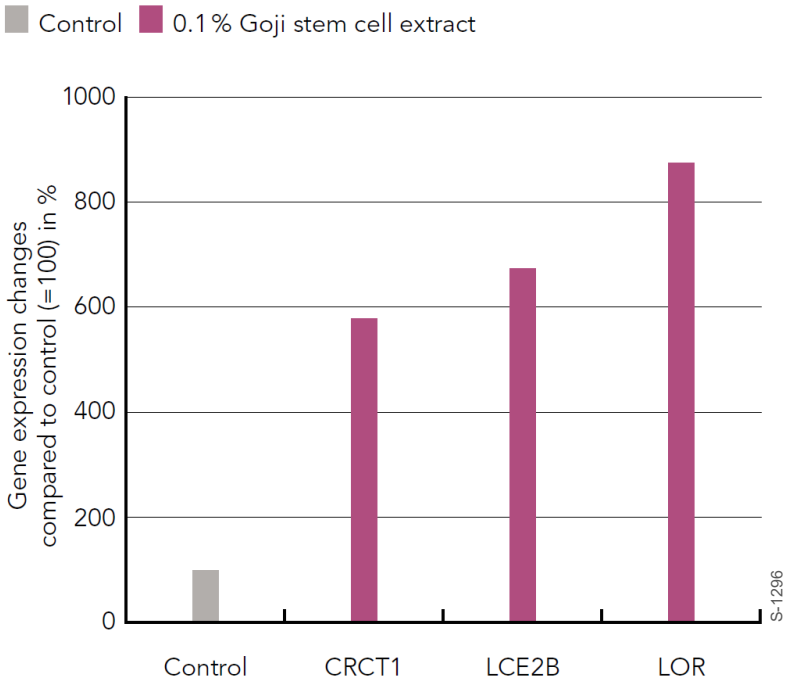
Plant Exosomes for Improved Skin Barrier Function



To assess the **first part of the dual action**, the effect of plant exosomes on the skin, gene expression in keratinocytes was analyzed.

Cell type:	Normal human epidermal keratinocytes (NHEK)
Test substance:	0.1 % Goji stem cell extract
Treatment:	Application of 0.1% Goji stem cell extract to normal human epidermal keratinocytes for 24 hours
Parameter:	Expression of genes important for the skin barrier and skin function (RT-qPCR)

Improved Skin Barrier Function



Genes involved in the late **differentiation** and **cornification** process of keratinocytes were strongly upregulated (graph):

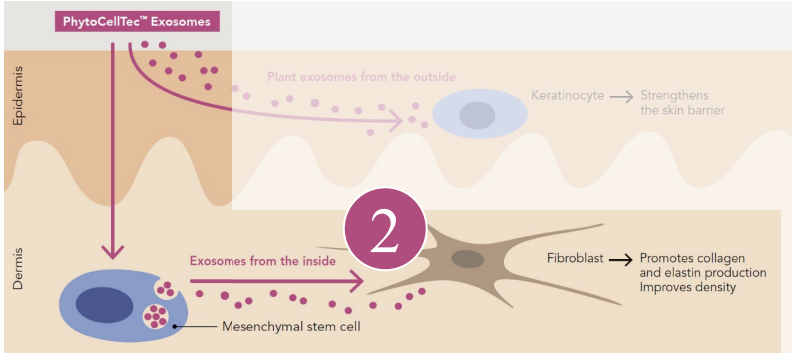
- CRCT1 = cysteine-rich C-terminal 1
- LCE2B = late cornified envelope 2B
- LOR = loricrin

Additionally, the gene expression of genes important for **regeneration** and **protection** was upregulated:

- epidermal growth factor (EGF,108 %)
- fibroblast growth factor (FGF7, 161 %)
- heat shock protein (HSPA6, 407 %)
- antioxidant gene (SOD3, 64 %)

PhytoCellTec™ Exosomes supports the formation of the stratum corneum. Thereby, it can improve the function of the skin barrier to protect the skin from water loss and external aggressors.

Activation of Aged Mesenchymal Stem Cells



To investigate the **second part of the dual action**, first, the effect of PhytoCellTec™ Exosomes on the vitality of mesenchymal stem cells (MSCs) was assessed.

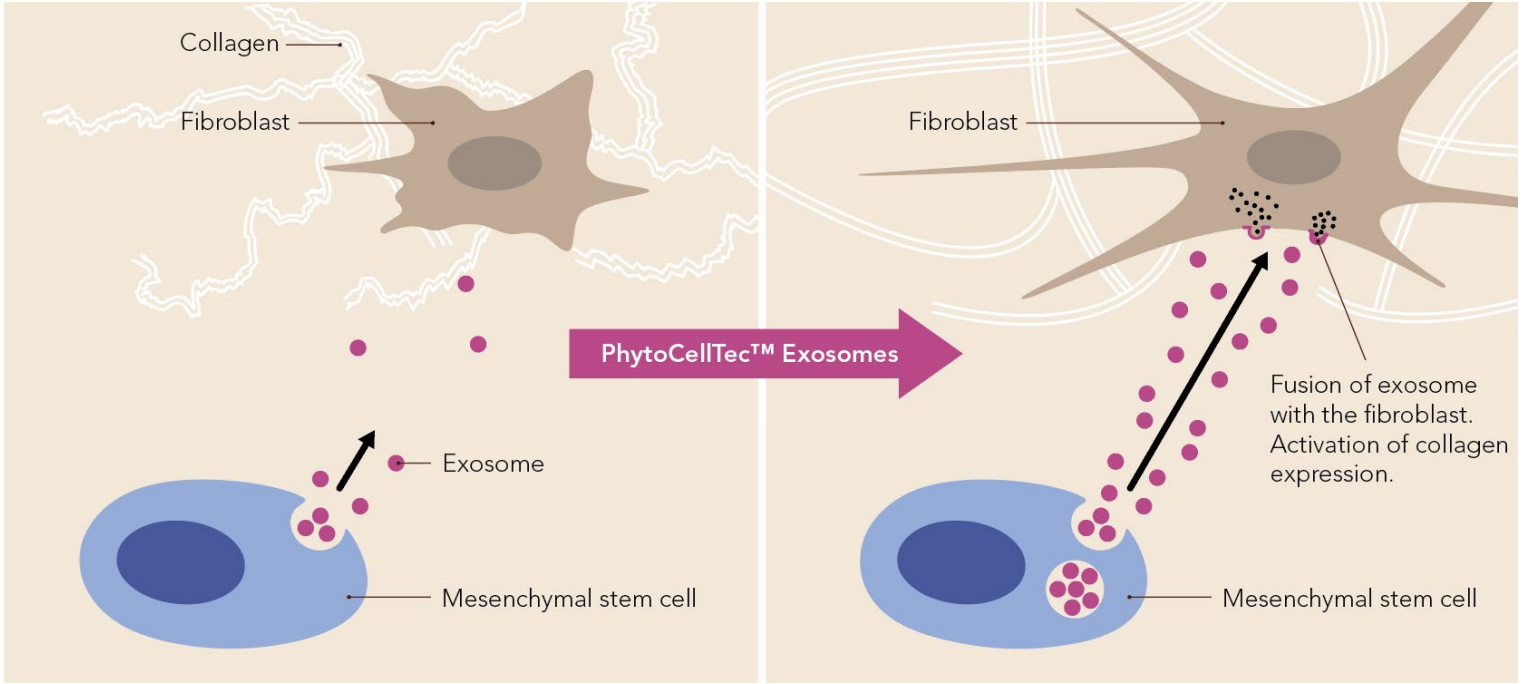
Cell type: Adipose-derived human MSCs, grown for 14 passages to mimic the aging process.

Test substance: 1 % Goji stem cell extract

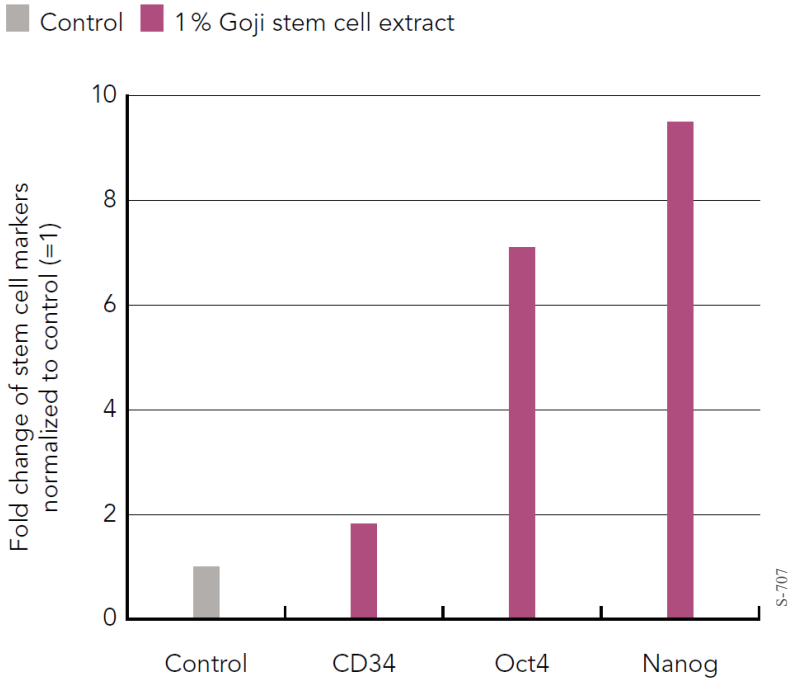
Treatment: Aged MSCs +/- 1 % Goji stem cell extract
Incubation for 72 h
Control without treatment

Parameter: Expression of stem cell markers (RT-qPCR).

Exosomes from Mesenchymal Stem Cells Rejuvenate Fibroblasts



Increase in Stem Cell Marker Expression



Increased expression of different stem cell markers in aged MSCs.

→ PhytoCellTec™ Exosomes is able to **rejuvenate** mesenchymal stem cells and help them maintain their **stemness**.

Increase in Exosome Production by Mesenchymal Stem Cells

Assessment of the effect of PhytoCellTec™ Exosomes on the exosome production capability.

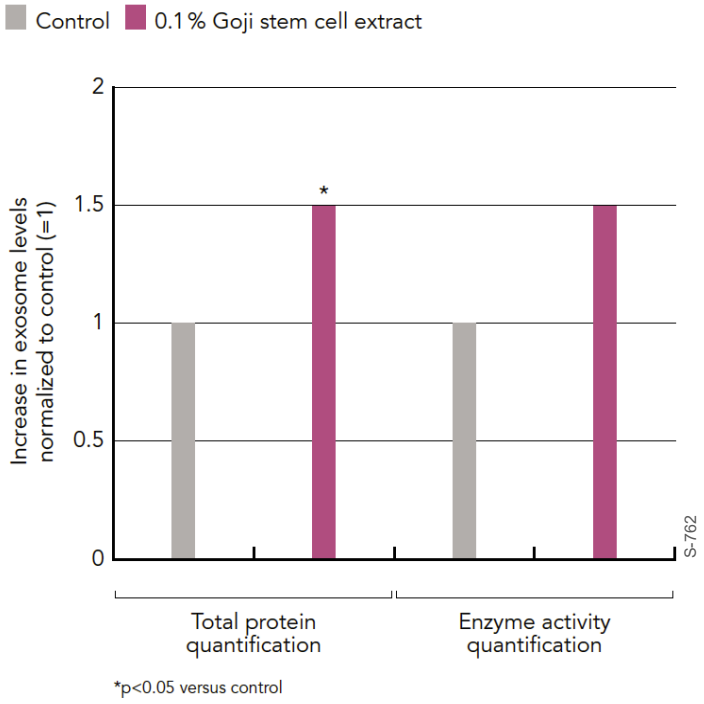
Cell type: Human mesenchymal stem cells (MSCs)

Test substance: 0.1 % Goji stem cell extract

Treatment: Incubation of MSCs +/- (control) 0.1 % Goji stem cell extract for 24 h.
Isolation of exosomes that were released from the cells (EXO-prep kit)

Parameters: Quantification of exosomes by 2 methods:
- total protein amount (BCA protein assay)
- activity of acetylcholinesterase, a known exosomal protein (FluoroCet quantitation kit)

Increase in Exosome Production by Mesenchymal Stem Cells

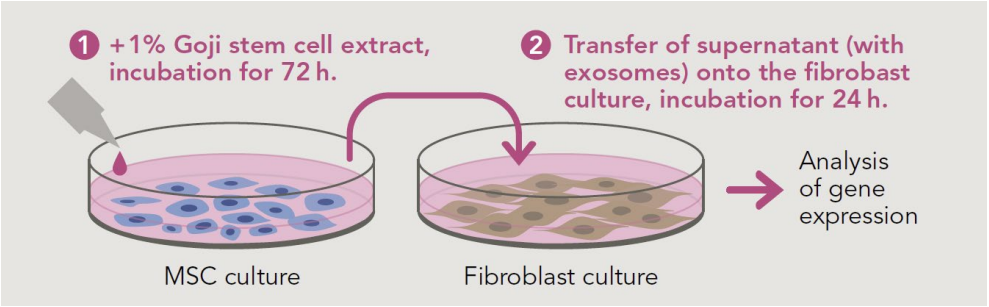


Both quantification methods revealed that treatment with Goji stem cell extract leads to an **increase in exosome production** by MSCs.

Stimulation of Extracellular Matrix Genes through Cell-Cell Communication

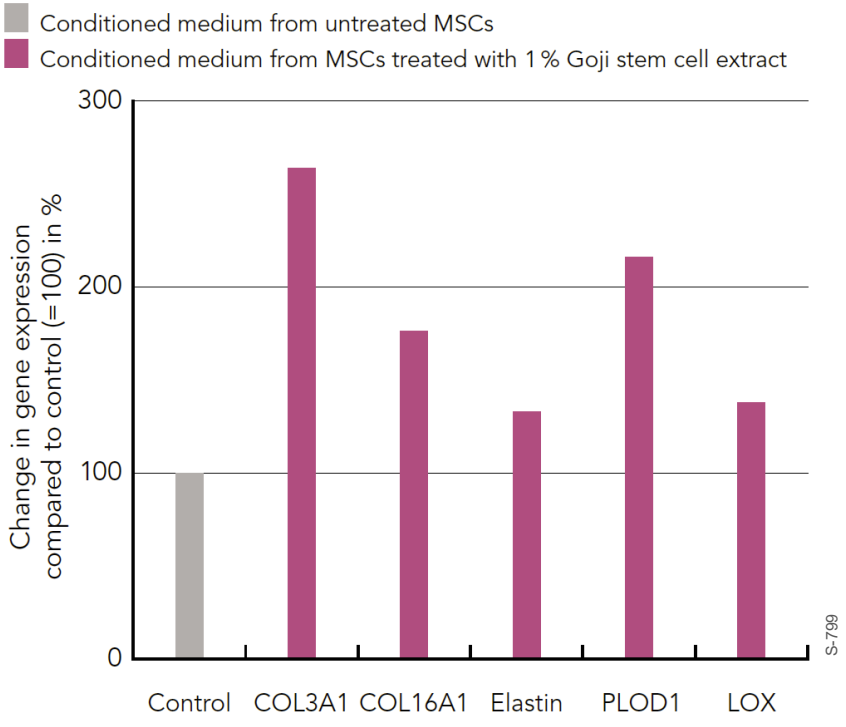
Investigation whether MSCs treated with Goji stem cell extract are able to **communicate** with **fibroblasts** to stimulate production of extracellular matrix (ECM) proteins.

Cell types: Human mesenchymal stem cells (MSCs), fibroblasts
Test substance: 1 % Goji stem cell extract
Treatment:
1. Treatment of MSC for 72 h with test substance
2. Add the supernatant (= conditioned mediumto) the fibroblasts for 24 h (control: medium from untreated MSCs).



Parameters: Gene expression of ECM proteins (RT-qPCR).

Stimulation of Extracellular Matrix Genes Through Cell-Cell Communication



Increased gene expression of

- collagen 3 and 16*
- elastin*
- PLOD1 (crucial for collagen production)*
- LOX (connects collagen and elastin → stability and elasticity ↑) *

→ PhytoCellTec™ Exosomes improves cell-cell communication between MSCs and fibroblasts.

* No effect via direct treatment of fibroblasts.

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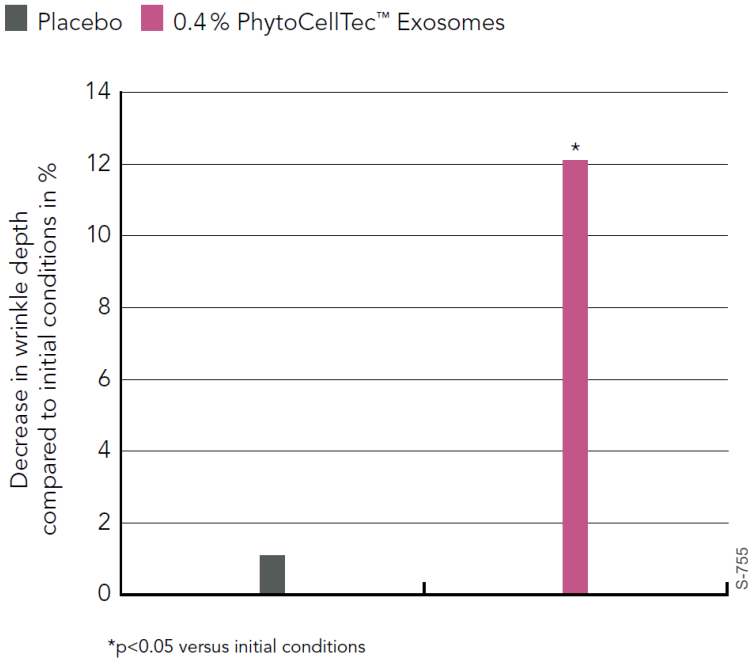
Improvement of Fine Lines and Wrinkles

Volunteers:	23 (f, Caucasian, 41 - 69 y), with signs of photo-aging
Test substance:	Cream with 0.4 % PhytoCellTec™ Exosomes, placebo cream
Application:	Twice daily on one-half of the face, the corresponding placebo on the other half of the face, for 56 days.
Parameter:	Wrinkle depth (PRIMOS lite)

Improvement of Wrinkles



*p<0.05 versus initial conditions

PhytoCellTec™ Exosomes significantly improved wrinkle depth after 2 months.

Before

After 56 days

Fine wrinkles appear smoother.

Before

After 56 days

Deeper lines are visibly reduced.

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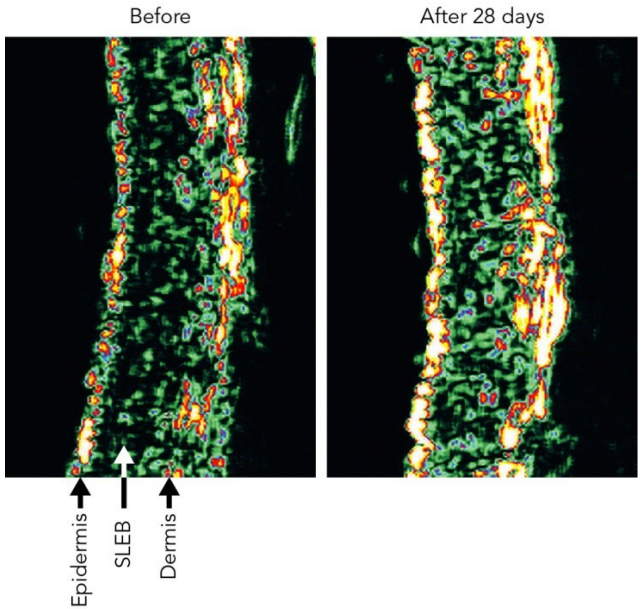
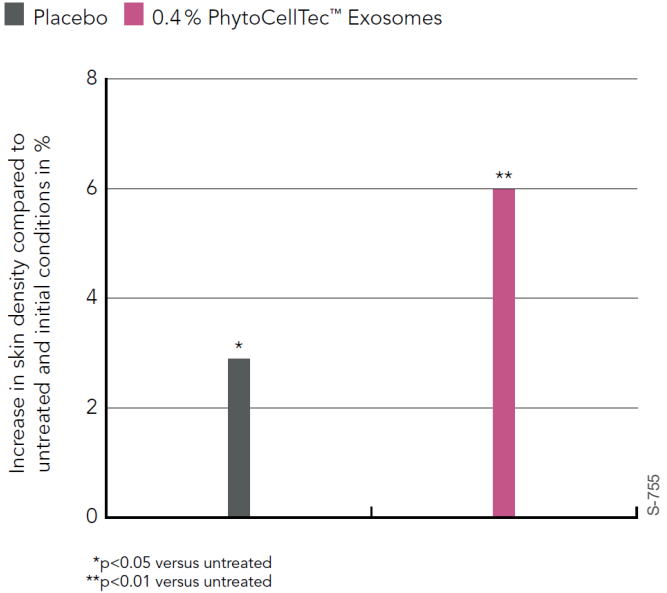
Improvement of Skin Density in Photo-Aged Skin

In an intact, youthful dermis, the collagen and elastic fiber structure is dense and yields colorful reflections in ultrasonographic pictures. In photo-aged skin, **disruption of this collagen structure** leads to dark patches (= subepidermal low-echogenic bands, **SLEB**).

Volunteers:	23 (f, Caucasian, 41 - 69 y), with signs of photo-aging
Test substance:	Cream with 0.4 % PhytoCellTec™ Exosomes, placebo cream
Application:	Twice daily on the inner side of one forearm (placebo cream on the inner side of the other forearm) for a period of 28 days
Parameter:	Density (epidermis + dermis) by ultrasonic measurements

Improvement of Skin Density





PhytoCellTec™ Exosomes significantly improved **skin density** and visibly **reduced the SLEB** in photo-aged skin after 1 month.

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Improvement of Oval Face Shape

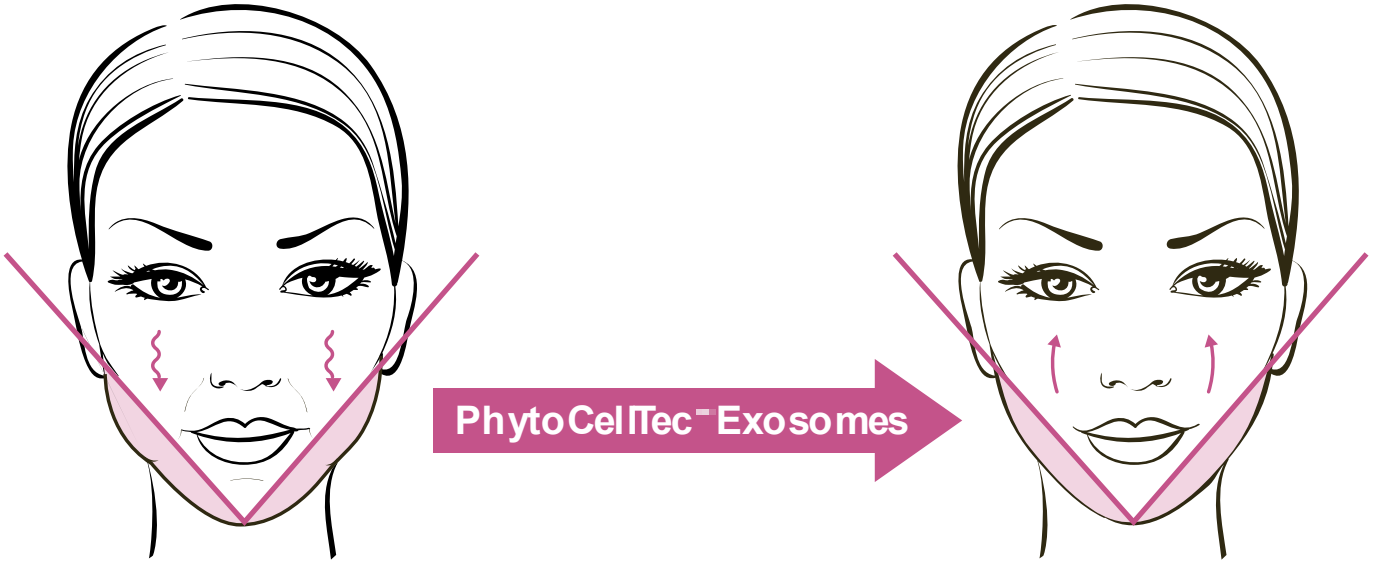
Volunteers: 67 (f, Caucasian, 39 - 70 y) with sagging facial skin,
- ✓ split into two groups:
- ✓ Group 1 applied a cream with 0.4 % PhytoCellTec™ Exosomes
- ✓ Group 2 applied the corresponding placebo cream

Test substance: Cream with 0.4 % PhytoCellTec™ Exosomes, placebo cream

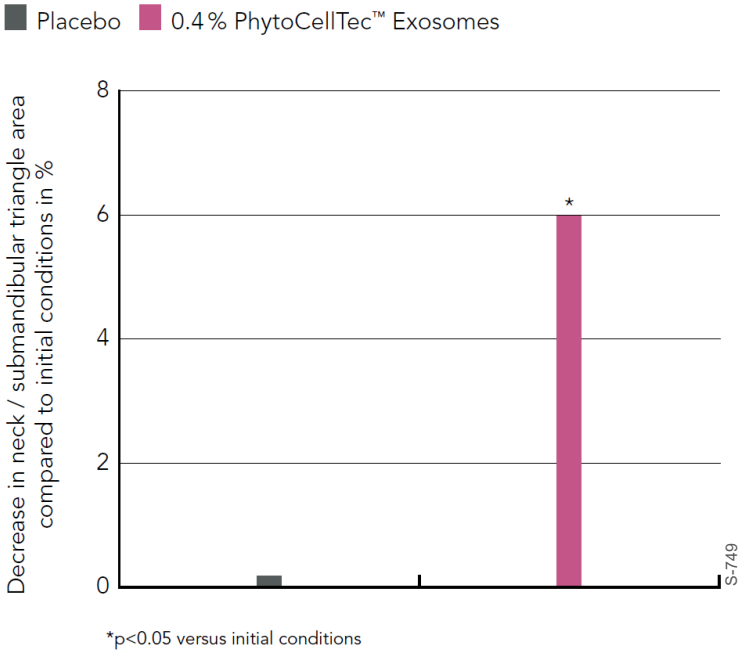
Application: Face and neck, twice daily for 28 days

Parameter: Oval face shape = neck / submandibular triangle size (Visioface)

Oval Face Shape Measurement



Improvement of Oval Face Shape



*p<0.05 versus initial conditions

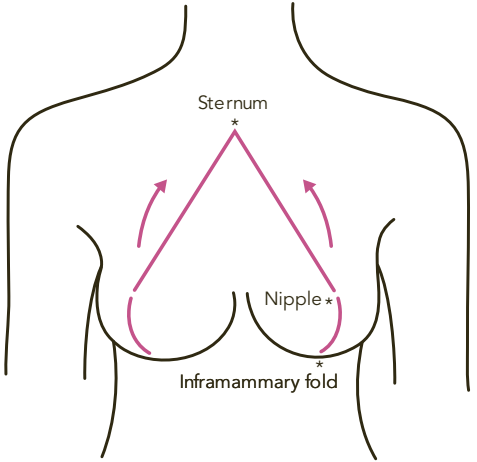
PhytoCellTec™ Exosomes significantly improved oval face shape.

Improvement of Oval Face Shape

S-749 / © Mibelle Biochemistry

Breast Lifting Effect

Aging leads to reduced extracellular matrix production,
less elastic and sagging skin
→ lowering of the breast
→ loss of fullness of the breast



Volunteers:	44 (f, 18 - 44 y), split into two groups
Test substance:	Cream with 0.4 % PhytoCellTec™ Exosomes, placebo cream
Application:	Twice daily for 56 days on the breast area
Parameter:	Bust distances (VECTRA-XT)
	Skin elasticity (Cutometer dual MPA 580)
	Breast condition (Regnault ptosis classification)

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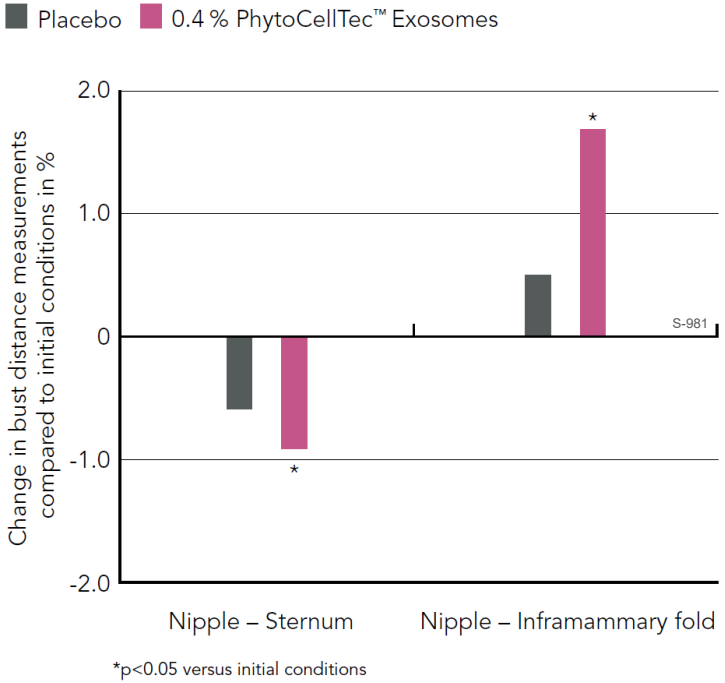
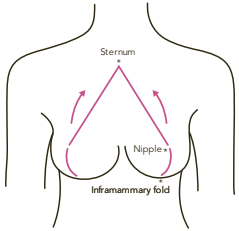
Improvement of Breast Lifting after 2 Months



*p<0.05 versus initial conditions



Measurement of the bust distances between

- the nipple and the sternum
- the nipple and the inframammary fold

Lifting = reduced nipple-sternum distance + increased nipple-inframammary fold distance

PhytoCellTec™ Exosomes significantly improved breast lifting.

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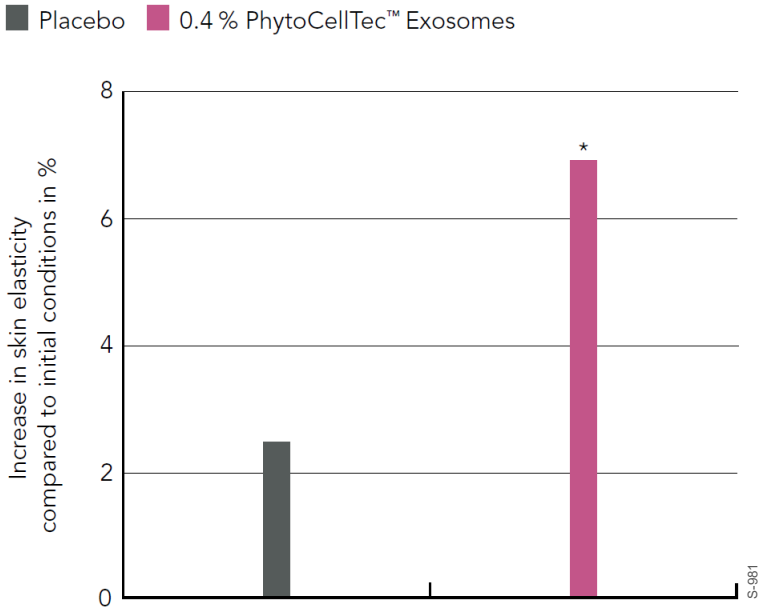
Improvement of Skin Elasticity after 2 Months



*p<0.05 versus placebo and *p<0.001 versus initial conditions

PhytoCellTec™ Exosomes significantly improved skin elasticity in the breast area.

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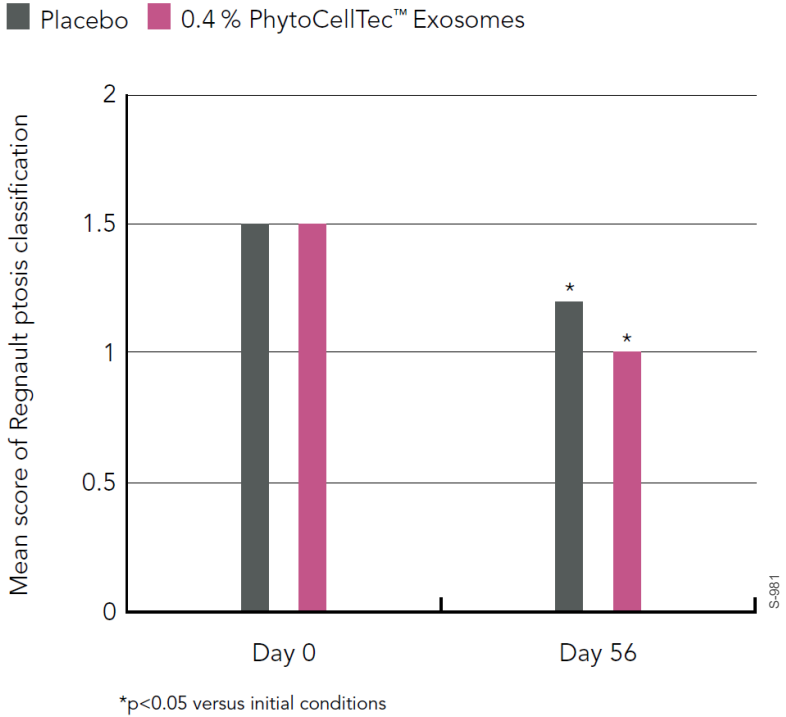
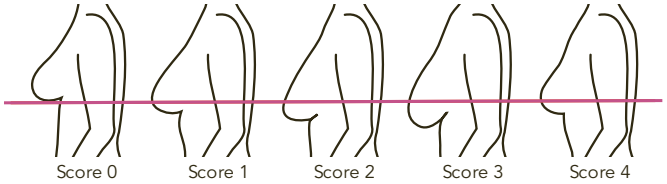
Anti-Sagging Breast Effect after 2 Months



*p<0.05 versus initial conditions

Regnault ptosis classification



Scheme of the Regnault ptosis classification:
(Score 0) normal, (Score 1) mild sagging, (Score 2) moderate sagging,
(Score 3) severe sagging, (Score 4) pseudoptosis.

PhytoCellTec™ Exosomes significantly improved breast lifting in 54.5% of the volunteers.

PhytoCellTec™ Exosomes

- Doubles the exosomal power
- Increases collagen and elastin expression
- Improves skin density
- Minimizes fine wrinkles and deeper lines
- Tightens facial contours
- Breast lifting effect

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PhytoCellTec™ Exosomes Applications

- Exosome cosmetics
- Tightening and contouring serums for the face and neck
- Collagen boosting formulations
- Contouring masks
- Lifting and firming anti-aging formulas
- Breast lifting treatments

PhytoCellTec™ Exosomes Marketing Benefits

- Dual exosome activity
- Advanced stem cell cosmetics
- Plant stem cells from a superfruit
- Application of exosome signaling
- Proven efficacy on mesenchymal stem cells
- Sustainable production of raw material
- BSB Silver Award - Category Cosmetics – Raw Materials / Actives
- Innovation Zone Best Ingredient Bronze Award Category Actives
- Product movie
- www.phytocelltec.ch

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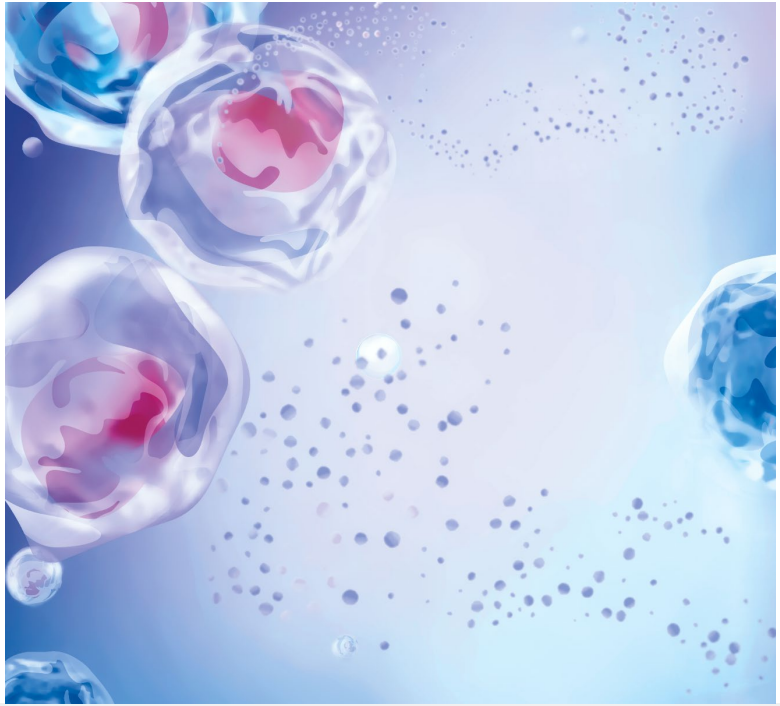
PhytoCellTec™ Exosomes Marketing Tools



Prototype Formulation

PhytoCellTec™ Exosomes Rejuvenating Sheet Mask

→ PDF available, samples available, blog

Website

Blog post

Product description

Movies

Product movie

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Address

Mibelle Biochemistry
Mibelle AG
Bolimattstrasse 1
5033 Buchs
Switzerland

Phone number:	+41 62 836 17 31
Website:	www.mibellebiochemistry.com
Mail:	info@mibellebiochemistry.com

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May / 2025

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