PhytoCellTec™ Goji

Stem cell activation for a V-shaped face

BSB Innovation Award® Cosmetics 2019

3. Prize Category Most Innovative Raw Material

SWISS QUALITY PRODUCT

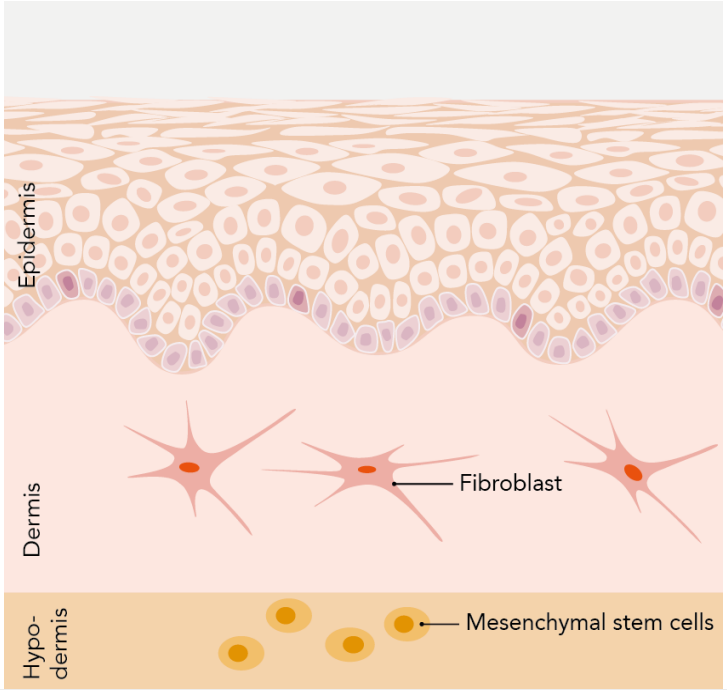
Aging and Sagging Skin

Loose, sagging skin can be caused by a number of different factors including weight loss, sun damage, environmental stress and excessive sun exposure – but getting older is undoubtedly the main cause of loss of firmness in our complexion.

Cause: the production of collagen and elastin is reduced

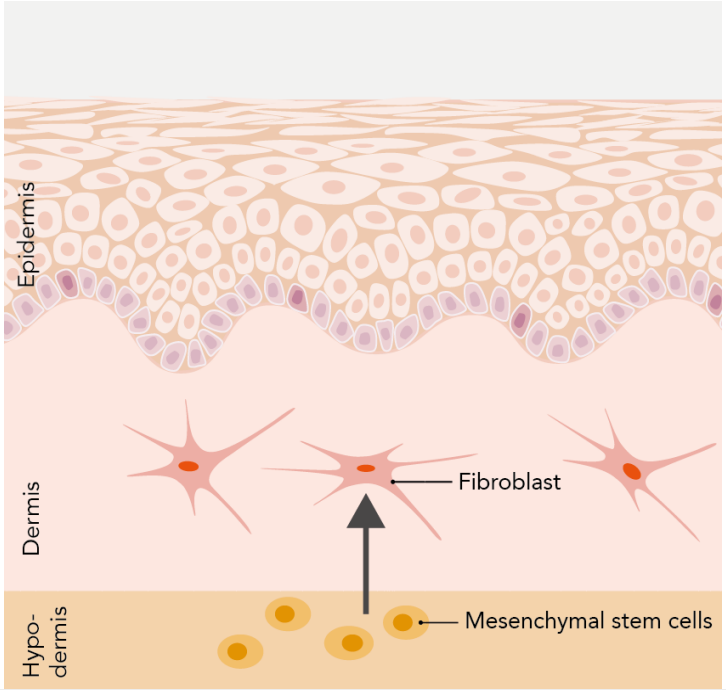
Result: Sagging skin, especially at the face contours of the jawline

Mesenchymal Stem Cells (MSCs)



- Collagen and elastin are produced by fibroblast in the dermis
- As we age, fibroblast slow down their productivity
- Activation of fibroblasts can be achieved via triggers coming from e.g. mesenchymal stem cells (MSCs)
- MSCs are located amongst other sites in the subcutaneous adipose layer of the skin

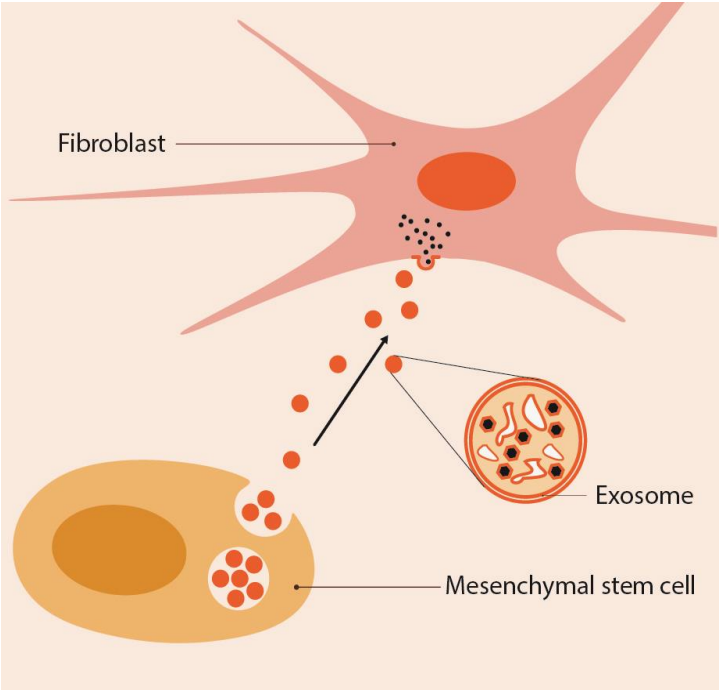
Mesenchymal Stem Cells (MSCs) and Cell-to-Cell Signaling



- MSCs were shown to improve and accelerate various regenerations processes such as wound healing
- Mechanism: Cell-to-cell signaling through vesicles called **exosomes** from MSCs to fibroblast

→ production of extracellular matrix (collagen and elastin)

Cell-to-Cell Signaling via Exosomes

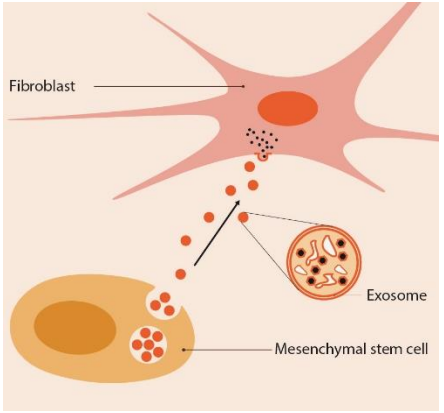


- Exosomes are transport vesicles for cell-to-cell communication
- Size: 30 -130 nm
- Aqueous core, surrounded by a double membrane
- Cargo: messenger molecules such as lipids, proteins, regulatory RNA (miRNA, mRNA, ncRNA)
- New topic in science: 2006 < 100 publications, 2018 > 9'000!
- High therapeutic and diagnostic potential

Mechanism of PhytoCellTec™ Goji

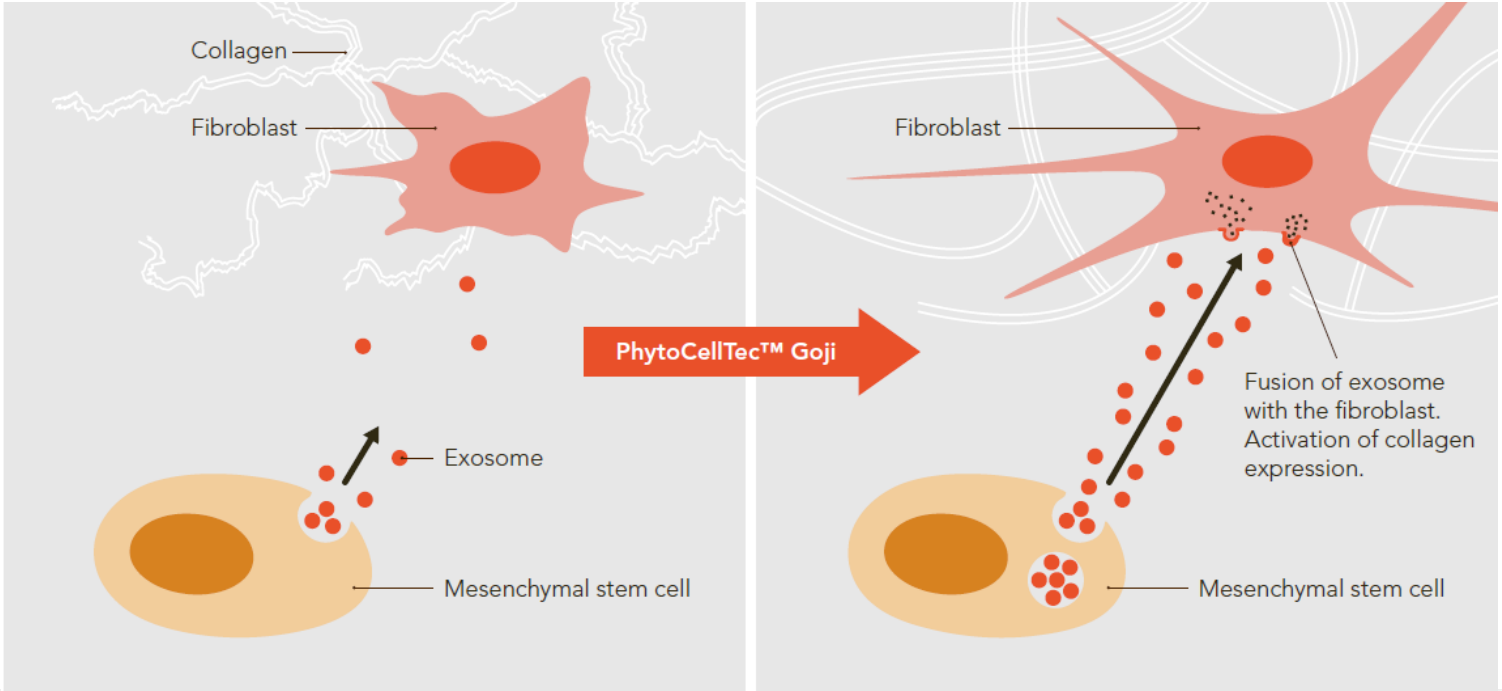
PhytoCellTec™ Goji was shown to rejuvenate MSCs

- → MSCs release more exosomes with collagen stimulating messenger molecules
- → Increased production of collagen and elastin by fibroblasts → increase of skin density
- → MSCs produce more adipocytes → filling from inside



Results in vivo
Reduction of facial sagging of the skin
Improved definition of jawline / V- shape of the face

Exosomes from Mesenchymal Stem Cells Rejuvenate Fibroblasts



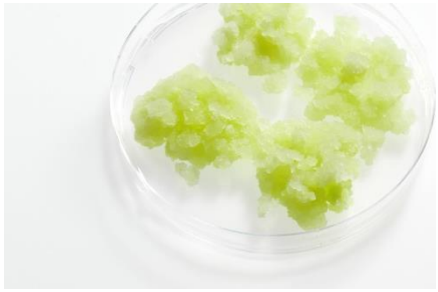
Lycium barbarum
Goji Berry - The Superfruit

- Deciduous bush native to south east Europe and Asia
- Goji berries are considered superfruits / health food
- Legend: Goji berries were first discovered by a Buddhist monk and the monks who incorporated them into their diets lived longer than those who didn't

→ **Goji stimulates stem cells**

Plant Stem Cells for Skin Stem Cells

Goji seedling



Agar plate

Stem cell culture

- Extract of Goji plant stem cells
- Epigenetic factors that have a vitalizing effect on skin stem cells
- Test on mesenchymal stem cells (stemness, exosome production)

PhytoCellTec™ Goji 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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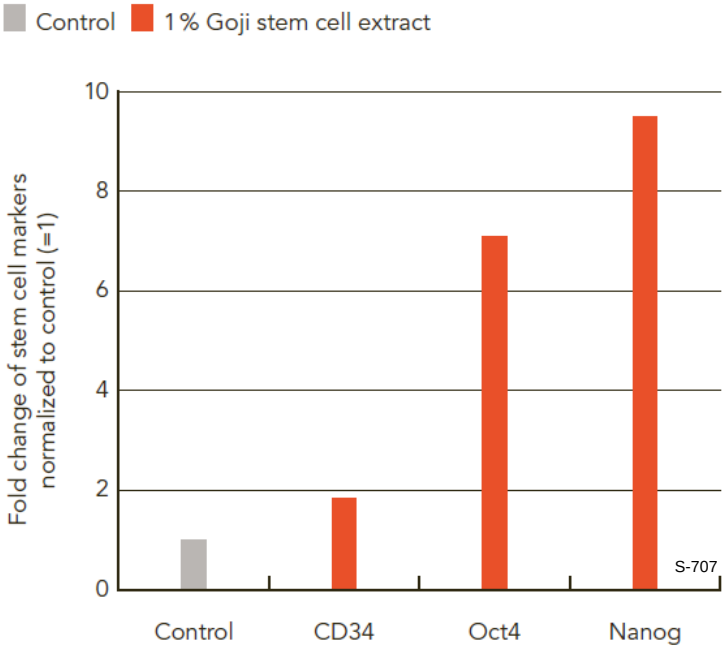
Activation of Aged Mesenchymal Stem Cells

Investigation whether PhytoCellTec™ Goji influences the vitality of mesenchymal stem cells (MSCs)

Cell culture:	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).

Increase in Stem Cell Marke Expression



Increased expression of different stem cell markers in aged MSCs.

→ PhytoCellTec™ Goji 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™ Goji on the exosome production capability.

Cell culture:	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.
Parameters:	Quantification of exosomes that were released from the cells by 2 methods: - total protein amount - activity of acetylcholinesterase, a known exosomal protein

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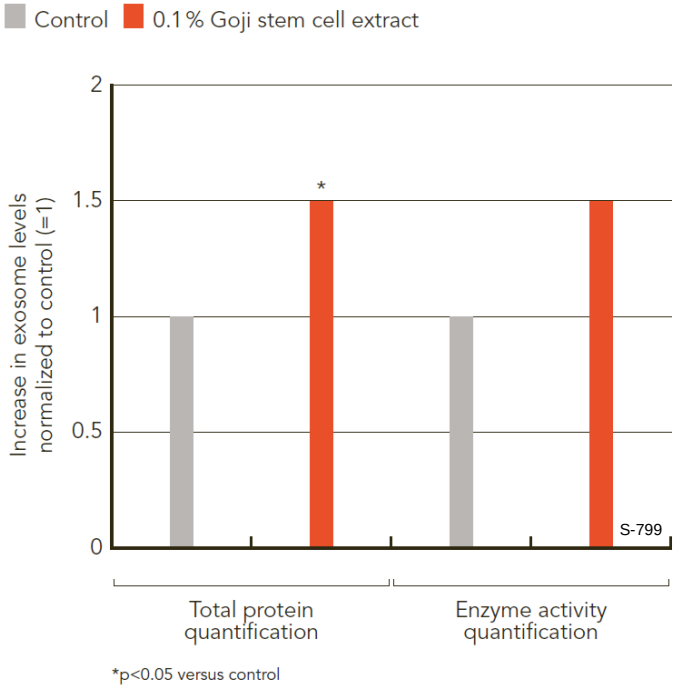
Increase in Exosome Production by Mesenchymal Stem Cells



*p<0.05 versus control

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-to-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.

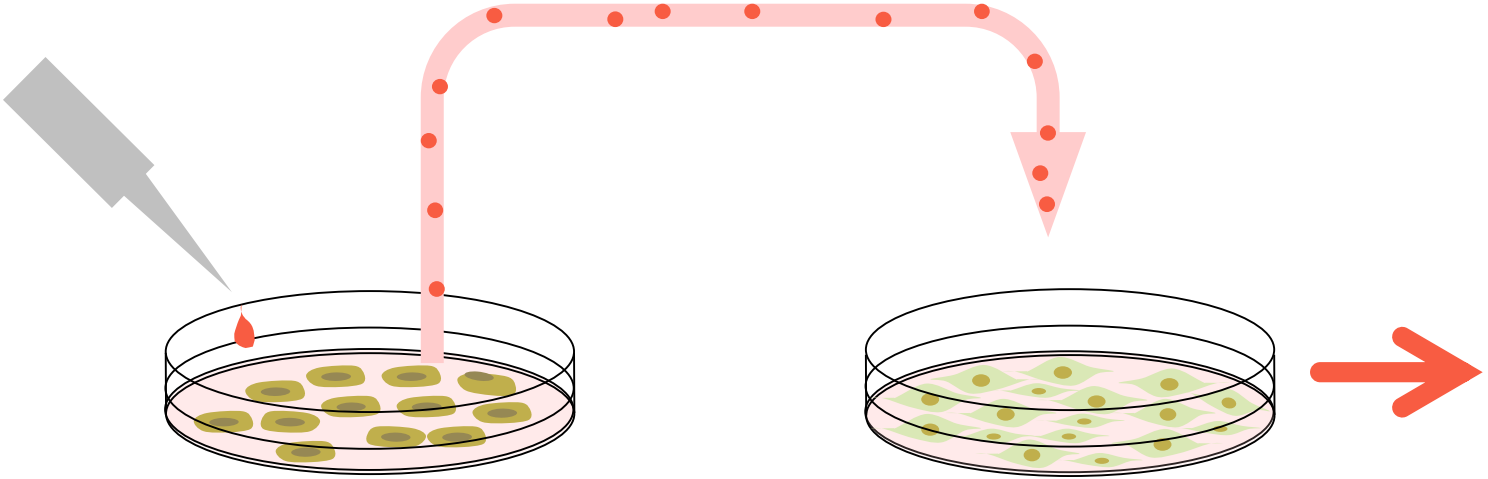
Cell cultures:	Human mesenchymal stem cells (MSCs), fibroblasts
Test substance:	1 % Goji stem cell extract
Treatment:	1. Treatment of MSC for 72 h with test substance
	2. Add the supernatant (incl. soluble factors + exosomes («conditioned medium»)) to fibroblasts for 24 h. Fibroblasts treated with medium from untreated MSCs served as control.
Parameters:	Analysis of gene expression of ECM proteins (RT-qPCR).

1

+ 1% 1 % Goji stem cell extract, incubation for 72 h

2

Transfer of supernatant (with exosomes) onto the fibrobast culture, incubation for 24 h.



MSC culture

Fibroblast culture

Analysis of gene expression of ECM proteins by RT-PCR

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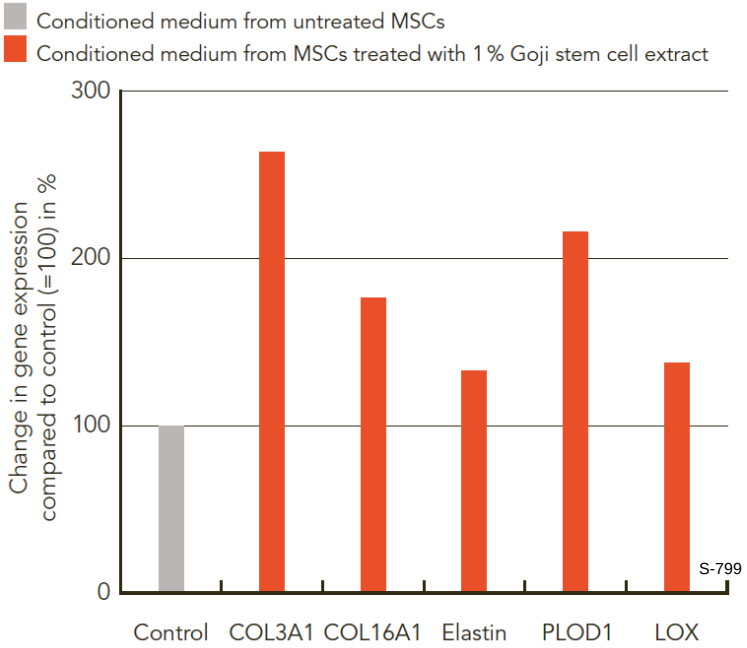
Stimulation of Extracellular Matrix Genes Through Cell-to-Cell Communication



Increased gene expression of

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

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

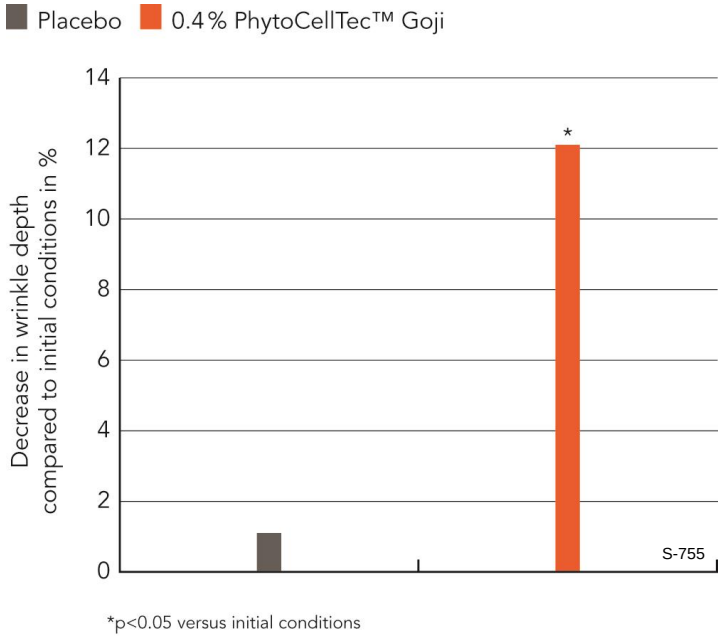
* No effect via direct treatment of fibroblasts.

SWISS QUALITY PRODUCT

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™ Goji, 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™ Goji significantly improved wrinkle depth after 2 months

Before

After 56 days

Fine wrinkles appear smoother

Before

After 56 days

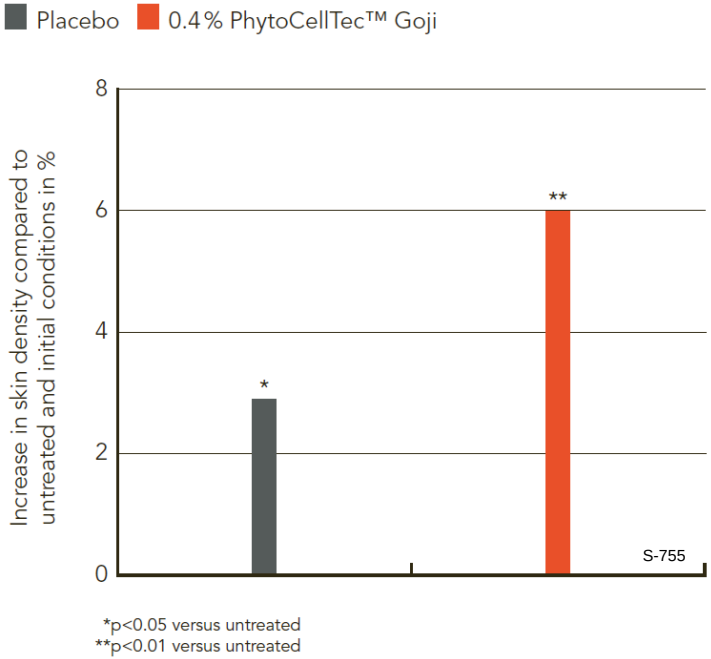
Deeper lines are visibly reduced

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™ Goji, 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

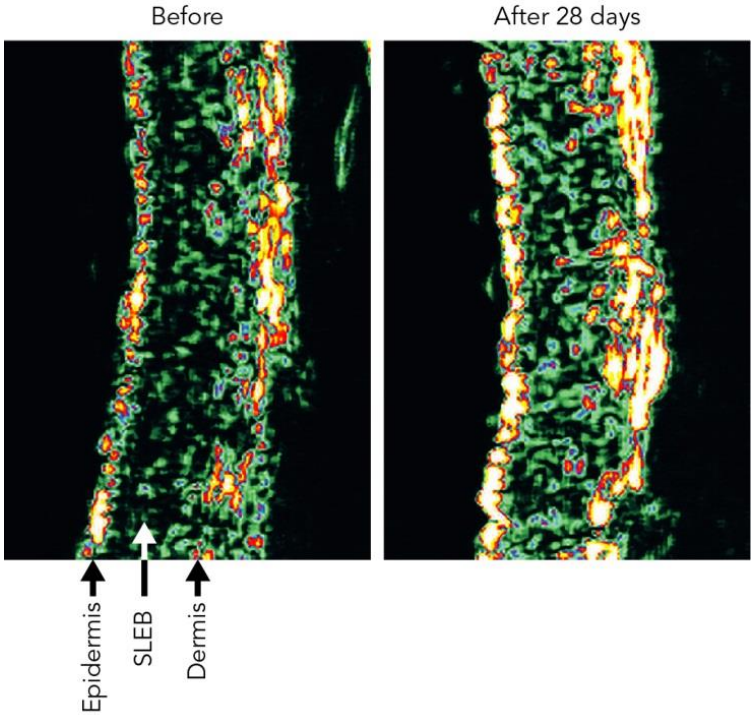
Improvement of Skin Density



*p<0.05 versus untreated
**p<0.01 versus untreated

PhytoCellTec™ Goji significantly improved skin density after 1 month

Improvement of Skin Density



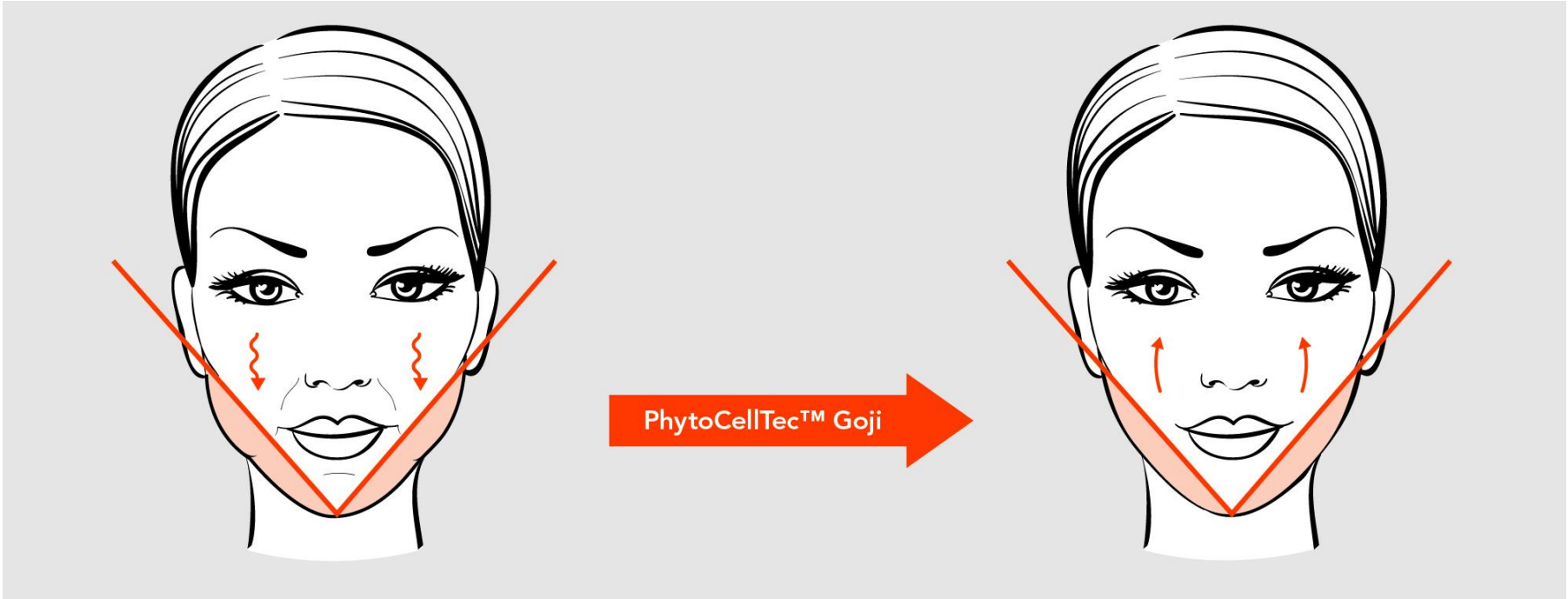
PhytoCellTec™ Goji visibly reduced the SLEB in photo-aged skin

Improvement of Oval Face Shape

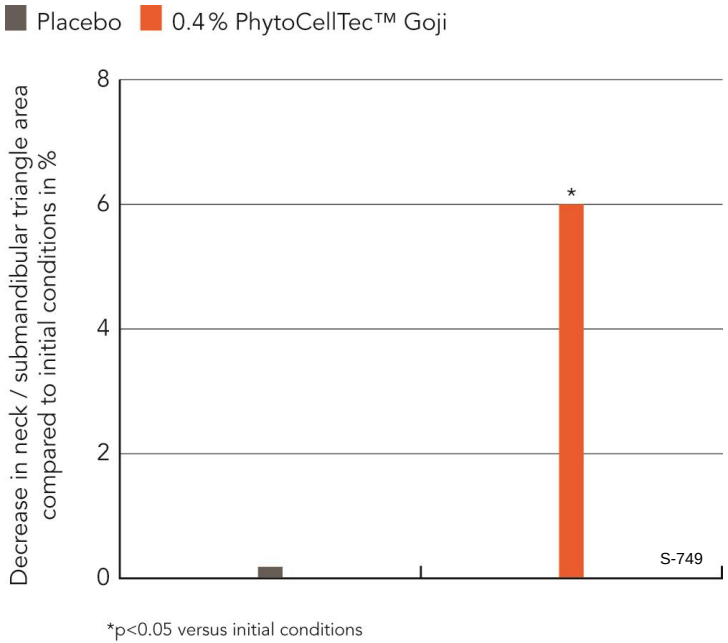
Study design

Volunteers:	67 (f, Caucasian, 39 - 70 y) with sagging facial skin, split into two groups: Group 1 applied a cream with 0.4 % PhytoCellTec™ Goji Group 2 applied the corresponding placebo cream
Test substance:	Cream with 0.4 % PhytoCellTec™ Goji, 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™ Goji significantly improved oval face shape

Improvement of Oval Face Shape

S-749 / © Mibelle Biochemistry

PhytoCellTec™ Goji

- Stimulates exosome signaling
- Increases collagen and elastin expression
- Improves skin density
- Tightens facial contours
- Minimizes fine wrinkles and deeper lines

PhytoCellTec™ Goji Applications

- Tightening and contouring serums for the face and neck
- Collagen boosting formulations
- Contouring masks
- Lifting and firming anti-aging formulas

PhytoCellTec™ Goji Marketing Benefits

- 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
- www.phytocelltec.ch
- 3. Prize at BSB Innovation Award 2019

BSB Innovation Award® Cosmetics 2019
3. Prize Category Most Innovative Raw Material

PLANT STEM CELLS
PhytoCellTec.ch™
SKIN CELL PROTECTION

SWISS QUALITY PRODUCT

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