

# TEGO® Arjuna S

## Versatile skin vitalizer

### Intended use

Active for hair and skin care

### Benefits at a glance

- Enhances skin nutrition by increased skin blood microcirculation
- Improves skin resiliency & dermal density
- Provides specific efficacy in restoring natural sebum levels of postmenopausal skin
- Reinforces skin barrier performance
- Reduces skin scaliness leading to smoother skin
- Usage concentration: 1 – 4%

### INCI (PCPC name)

Terminalia Arjuna Extract, Pentylene Glycol

### Chemical and physical properties (not part of specifications)

Form	slightly yellow to light brown solution
Active matter	Approx. 7% triterpenes

TEGO® Arjuna S is a self preserving solution of standardized plant extract of pentacyclic triterpenes from the Arjun tree. It contains approx. 7% triterpenes of which at least 65% are arjunolic acid and 25% are asiatic acid.

### Introduction

In the context of aging skin triterpenes are valuable ingredients to counteract the signs of skin aging. With age the skin's natural functions are slowing down due to naturally occurring intrinsic aging of the skin. This is starting in the 20s and will be more pronounced over time.

Women in their late 40s or early 50s experience a very radical change. They are in menopause, a major reduction in female hormone production by the ovaries that tends to occur over a period of years and is a natural consequence of aging. This category of aging is also referred to as 'hormonal aging'. It occurs as levels of estrogen decline. While many tissues are affected by this process, women having overcome the menopause transition (postmenopausal phase) experience major changes especially concerning the skin. There is a change in skin structure and composition. Low estrogen levels result in weakening of collagen and elastin fibers. With decreased skin elasticity, the skin loses its property to extend and bounce back to the initial state. The skin is thinner and becomes more fragile. Due to reduced sebum production and a weakened skin barrier, mature skin often feels and appears very dry. Decreasing estrogen levels also result in a weakening of blood vessels and a decreased blood distribution in the skin (microcirculation). This further results in a shortage of nutrients and oxygen, and a diminished removal of metabolic waste products in the different skin layers. This contributes to slower cell turnover.

Figure 1 summarizes the effects which are influenced by hormonal aging.

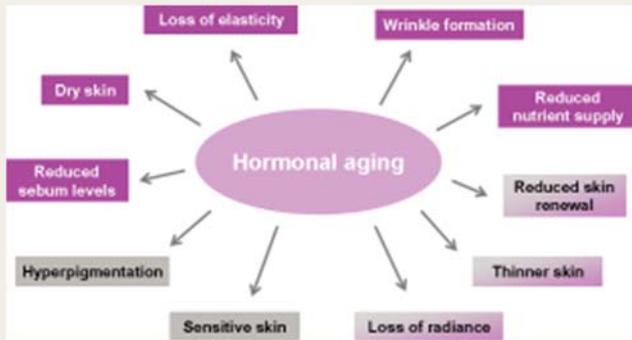


Figure 1: The consequences of hormonal aging in mature skin. Effects in purple are addressed by TEGO® Arjuna S

TEGO® Arjuna S has a very broad activity. It strengthens the extracellular matrix leading to improved skin density and resiliency. By strengthening the skin barrier and inducing skin sebum production TEGO® Arjuna S reduces the signs of dry skin and protects the skin from external challenges. TEGO® Arjuna S also contributes to an improved microvascular network leading to better skin nutrient supply and promotion of cellular turnover. Relating these activities to mature and postmenopausal skin, TEGO® Arjuna S is a perfect ingredient to combat the signs and effects of hormonal aging.

**In vivo study overview conducted for claim support:**

Commonly the *in vivo* tests were carried out under standardized conditions in a climatic room (room temperature, 55% relative humidity).

Test	No. of panelists	Test concentration [%]	Measurement	Results
Moisturization & elasticity study	30	0.25% Terminalia Arjuna Extract (equals ~3% TEGO® Arjuna S)	Transepidermal water loss (Tewameter)	<ul style="list-style-type: none"> <li>Reinforcement of skin barrier performance</li> <li>Reduction of skin scaliness</li> <li>Improvement of skin resiliency</li> </ul>
			Skin hydration (Corneometer)	
			Skin scaliness (Visioscan)	
			Skin elasticity (Cutometer)	
Study on postmenopausal skin	60	0.2% Terminalia Arjuna Extract (equals ~2.5% TEGO® Arjuna S)	Skin blood microflow (Flowmeter)	<ul style="list-style-type: none"> <li>Enhancement of skin nutrition</li> <li>Improvement of skin density</li> <li>Increase of sebum production</li> <li>Reduction of skin sagging</li> <li>Diminishment of nasolabial fold</li> </ul>
			Skin echogenicity (Ultrasound scanner)	
			Sebum content on the skin (Sebumeter)	
			Skin sagging (Expert grading)	
			Clinical evaluation (Digital images)	

Table 1: Summary of *in vivo* studies

**Improvement of skin moisturization & elasticity – *In vivo* efficacy study**

This study over a time of eight weeks was performed in order to investigate the effects of Terminalia Arjuna Extract on skin moisturization (measurement after four weeks) and elasticity (measurement after eight weeks). The measured values are listed in table 1 and the results are shown in figures 2 to 5.

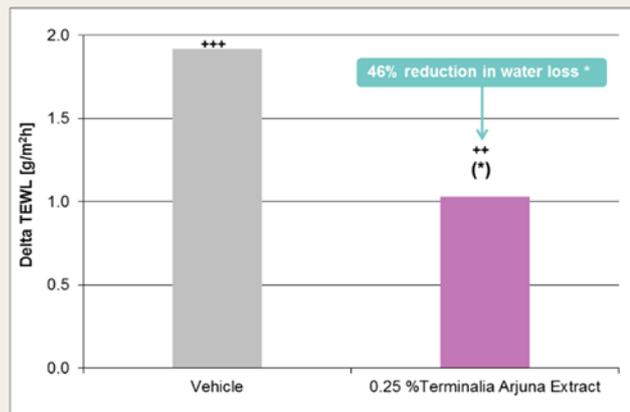


Figure 2: Transepidermal water loss (TEWL) after 4 weeks of application of Terminalia Arjuna Extract (Statistics: Student's t-test +++ p<0.001, ++ p<0.01 vs. start; (\*) p<0.1 vs. vehicle); \*compared to vehicle

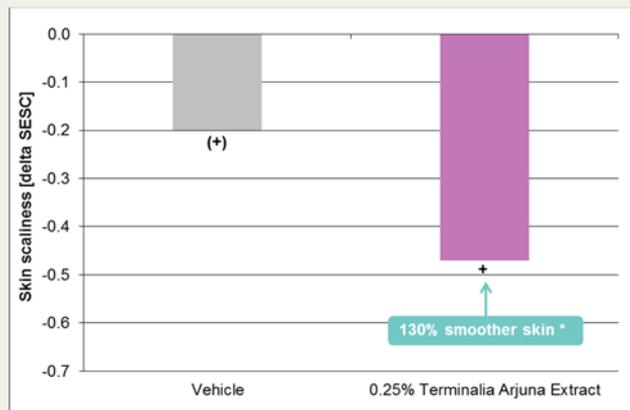
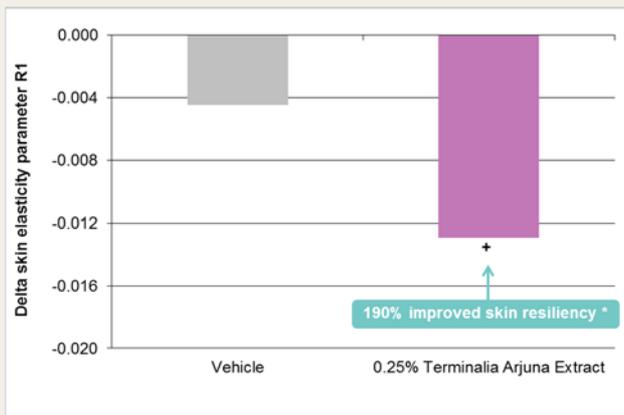


Figure 3: Skin scaliness after 4 weeks of application of Terminalia Arjuna Extract (Statistics: Student's t-test (+) p<0.1, + p<0.05 vs. start); \*compared to vehicle

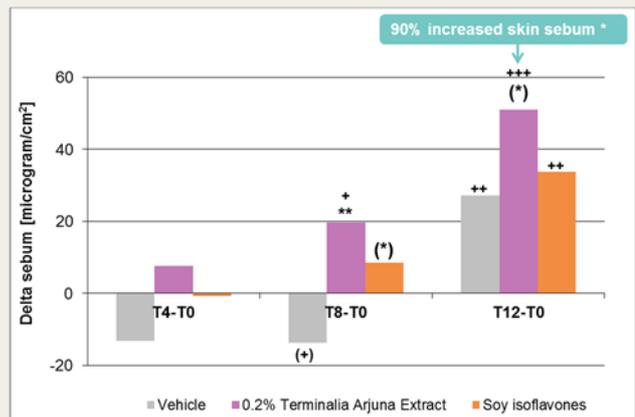


**Figure 4: Skin elasticity after 8 weeks of application of Terminalia Arjuna Extract; top: elasticity parameter R1, bottom: elasticity parameter R5; (Statistics: Student's t-test +  $p < 0.05$  vs. start); \* compared to vehicle**

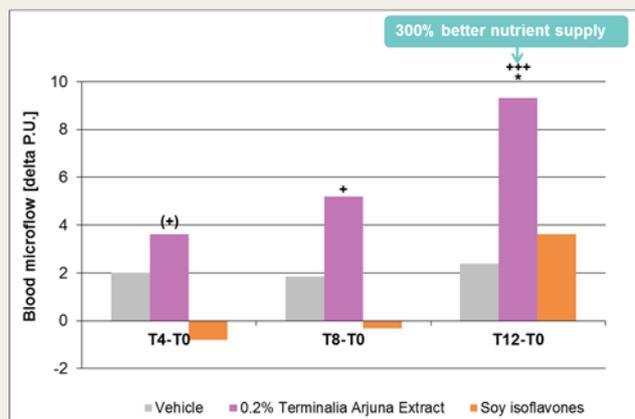
The figures clearly demonstrate that Terminalia Arjuna Extract decreases the transepidermal water loss (TEWL) compared to vehicle. TEGO® Arjuna S thereby significantly reinforces the skin barrier performance. This results in an improved moisture content of the skin leading to reduced skin scaliness already after 4 weeks of application. The skin looks much smoother after application of TEGO® Arjuna S. Improved skin moisture comes along with improved skin elasticity which was observed after 8 weeks of application. Therefore, TEGO® Arjuna S is an ideal ingredient for improvement of the overall skin appearance.

### Reducing symptoms of postmenopausal skin - *In vivo* efficacy study

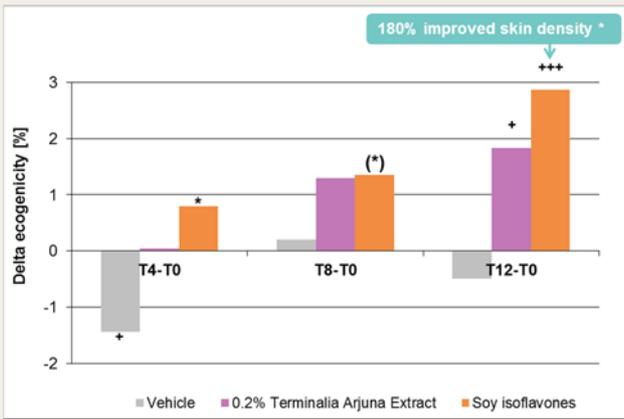
The aim of this study was to evaluate the efficacy of TEGO® Arjuna S in improving the symptoms of postmenopausal skin, like reduced sebum reduction, reduced microcirculation and thinner, more fragile skin. The evaluation was done by measuring the sebum content, the blood microcirculation as well as the dermal density. Beside this digital pictures have been taken. The results for the different parameters are shown in figures 5 to 9.



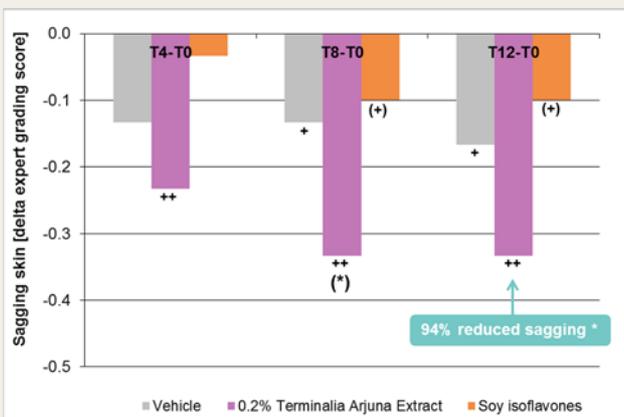
**Figure 5: Amount of sebum on the skin relative to the beginning after 4, 8, and 12 weeks of application of Terminalia Arjuna Extract. (Statistics: Student's t-test +++  $p < 0.001$ , ++  $p < 0.01$ , +  $p < 0.05$ , (+)  $p < 0.1$  vs. start; \*\*  $p < 0.01$ , (\*)  $p < 0.1$  vs. vehicle); \* compared to vehicle**



**Figure 6: Skin blood microflow relative to the beginning after 4, 8, and 12 weeks of application of Terminalia Arjuna Extract. (Statistics: Student's t-test +++  $p < 0.001$ , +  $p < 0.05$ , (+)  $p < 0.1$  vs. start; \*  $p < 0.05$  vs. vehicle); \* compared to vehicle**



**Figure 7: Skin echogenicity/dermal density relative to the beginning after 4, 8, and 12 weeks of application of Terminalia Arjuna Extract. (Statistics: Student's t-test ++ p<0.01, + p<0.05 vs. start; \* p<0.05, \*\* p<0.01 vs. vehicle); \* compared to vehicle**



**Figure 8: Sagging skin degree relative to the beginning after 4, 8, and 12 weeks of application of Terminalia Arjuna Extract graded by experts. (Statistics: Student's t-test ++ p<0.01, + p<0.05 vs. start; \* p<0.05 vs. vehicle); \* compared to vehicle**

The visible reduction of sagging skin on the jowls can also be seen in the pictures in figure 9. It can be seen that sagging skin regions have been improved and the overall skin structure was reshaped. This goes along with a reduction in depth of the nasolabial fold.



**Figure 9: Digital images of a representative volunteer. (a) before, (b) after 12 weeks of application of Terminalia Arjuna Extract.**

The results of this study demonstrate a strong effect of TEGO® Arjuna S on postmenopausal or mature skin. TEGO® Arjuna S reduced skin dryness by enhancing the amount of skin sebum. This effect could not be observed in the studies on normal skin which implies that the working mechanism of sebum production stimulation by TEGO® Arjuna S is especially applicable on postmenopausal skin. Furthermore, the supply with nutrients and oxygen inside the skin is improved by treatment with TEGO® Arjuna S demonstrated by an increased skin blood microcirculation. Finally, the fragility of the skin has been reduced by an increase of dermal density. Taken together, the skin appears reshaped and less mature. TEGO® Arjuna S shows an improved activity compared to the benchmark but without estrogen-receptor activity (hormonal activity) which is reported for phytohormones like soy isoflavones. TEGO® Arjuna S has a comparable activity without influencing hormone metabolism.

The distinct improvement of blood microcirculation by TEGO® Arjuna S also implies the use of this product in scalp care applications and as an ingredient for the reduction of dark circles under the eye.

A detailed test summary report (technical dossier) is available on request.

### Claim Summary

- Enhances skin nutrition by increased skin blood microcirculation
- Improves skin resiliency & dermal density
- Provides specific efficacy in restoring natural sebum levels of postmenopausal skin
- Reinforces skin barrier performance
- Reduces skin scaliness leading to smoother skin

### Formulation hints

#### Preparation of an O/W emulsion (cream or lotion):

TEGO® Arjuna S is added to the emulsion during the cooling process at temperatures below 40 °C. Depending on the concentration of TEGO® Arjuna S it might lower the viscosity of O/W-emulsions. In this case, the emulsion viscosity can be readjusted by increasing the concentration of cosmetic waxes like fatty alcohols (TEGO® Alkanol types), glyceryl stearate (TEGIN® M Pellets) or stearic acid or by a increasing the concentration of hydrocolloids like carbomer (TEGO® Carbomer types) or xanthan gum.

#### Preparation of a W/O emulsion (cream or lotion):

TEGO® Arjuna S is added after oil and water phase are combined and prior to the homogenization step.

### Recommended usage concentration

1 – 4%, clinically tested at different concentrations

### Possible applications

- Products for mature & postmenopausal skin
- Treatment of dry skin
- Anti-cellulite applications
- Products for treatment of dark circles
- Scalp care applications

### Packaging

5 kg

### Hazardous goods classification

#### Information concerning

- classification and labelling according to regulations for transport and for dangerous substances
- protective measures for storage and handling
- measures in case of accidents and fires
- toxicity and ecological effects

is given in our material safety data sheets.

## Guideline formulations

<b>Facial Cream for Women 50+ MAC 694/3/3</b>	
<b>Phase A</b>	
TEGO® Care PSC 3 (Polyglyceryl-3 Dicitrate/Stearate)	3.5%
TEGIN® M Pellets (Glyceryl Stearate)	1.5%
TEGO® Alkanol 18 (Stearyl Alcohol)	1.0%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	10.0%
TEGOSOFT® OP (Ethylhexyl Palmitate)	7.5%
TEGOSOFT® TIS (Triisostearin)	2.0%
<b>Phase B</b>	
HyaCare® 50 (Hydrolyzed Hyaluronic Acid)	0.1%
Glycerin	3.0%
Water	68.9%
<b>Phase C</b>	
TEGO® Carbomer 134 (Carbomer)	0.2%
TEGOSOFT® OS (Ethylhexyl Stearate)	0.8%
<b>Phase D</b>	
Sodium Hydroxide (10%)	q.s.
<b>Phase E</b>	
TEGO® Arjuna S	2.0%
Preservative, Perfume	q.s.

### Preparation:

1. Heat phase A and B to approx. 80 °C.
2. Add phase A to B with stirring<sup>1)</sup>.
3. Homogenize.
4. Cool with stirring to approx. 60 °C and add phase C.
5. Homogenize again for a short time.
6. Cool with gentle stirring and add phase D and E below 40 °C.

<sup>1)</sup> Important: If phase A has to be charged into the vessel first, phase B has to be added without stirring.

<b>Stimulating Body Lotion</b> MAC 694/6/2	
<b>Phase A</b>	
TEGO® Care LTP (Sorbitan Laurate; Polyglyceryl-4 Laurate; Dilauryl Citrate)	2.0%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	6.5%
TEGOSOFT® TN (C12-15 Alkyl Benzoate)	7.3%
TEGO® Carbomer 141 (Carbomer)	0.1%
TEGO® Carbomer 341 ER (Acrylates/C10-30 Alkyl Acrylate Crosspolymer)	0.1%
<b>Phase B</b>	
Glycerin	3.0%
Water	80.0%
<b>Phase C</b>	
Sodium Hydroxide (10%)	q.s.
<b>Phase D</b>	
TEGO® Arjuna S	1.0%
<b>Phase Z</b>	
Preservative, Perfume	q.s.
<b>Preparation:</b>	
<ol style="list-style-type: none"> <li>Mix ingredients of phase A and B separately.</li> <li>Combine phase A and B without stirring.</li> <li>Homogenize.</li> <li>Add phase C, D and Z and stir well.</li> </ol>	

<b>Rejuvenating Facial Serum</b> CD 963	
<b>Phase A</b>	
TEGO® Care PSC 3 (Polyglyceryl-3 Dicitrate/Stearate)	3.00%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	2.00%
TEGOSOFT® OER (Oleyl Erucate)	2.00%
Avocado (Persea Gratissima) Oil	1.00%
Phytosphingosine SLC (Salicyloyl Phytosphingosine)	0.05%
<b>Phase B</b>	
Glycerin	5.00%
SKINMIMICS® (Ceteareth-25; Glycerin; Cetyl Alcohol; Behenic Acid; Cholesterol; Ceramide NP; Ceramide NS; Ceramide EOS ; Ceramide EOP; Ceramide AP; Caprooyl Phytosphingosine; Caprooyl Sphingosine)	1.00%
Water	84.45%
<b>Phase C</b>	
Xanthan Gum (Keltrol CG-SFT, Kelco)	0.50%
<b>Phase D</b>	
TEGO® Arjuna S	1.00%
Preservative, Perfume	q.s.
<b>Preparation:</b>	
<ol style="list-style-type: none"> <li>Heat phase A and B separately to approx. 70 – 75 °C.</li> <li>Add phase A to phase B with stirring<sup>1)</sup>.</li> <li>Homogenize.</li> <li>Cool with gentle stirring.</li> <li>Add phase C at 40 °C.</li> <li>Homogenize for a short time.</li> <li>Add phase D.</li> </ol>	
<sup>1)</sup> Important: If phase A has to be charged into the vessel first, phase B has to be added without stirring.	

<b>Skin Nutrition Lotion</b>	
<b>MAC 694/2/3</b>	
<b>Phase A</b>	
ABIL® EM 90 (Cetyl PEG/PPG-10/1 Dimethicone)	2.0%
Hydrogenated Castor Oil	0.5%
Microcrystalline Wax (Paracera W 80, Paramelt B. V.)	0.5%
TEGOSOFT® CT (Caprylic/Capric Triglyceride)	10.0%
TEGOSOFT® DEC (Diethylhexyl Carbonate)	10.0%
TEGOSOFT® OP (Ethylhexyl Palmitate)	5.0%
<b>Phase B</b>	
TEGO® Cosmo C 100 (Creatine)	0.5%
Sodium Chloride	0.5%
Water	69.0%
<b>Phase C</b>	
TEGO® Arjuna S	2.0%
Preservative, Perfume	q.s
<b>Preparation:</b>	
<ol style="list-style-type: none"> <li>1. Heat phase A to approx. 80 °C.</li> <li>2. Add phase B (room temperature) while stirring.</li> <li>3. Add phase C.</li> <li>4. Homogenize for a short time.</li> <li>5. Cool with gentle stirring below 30 °C and homogenize again.</li> </ol>	

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