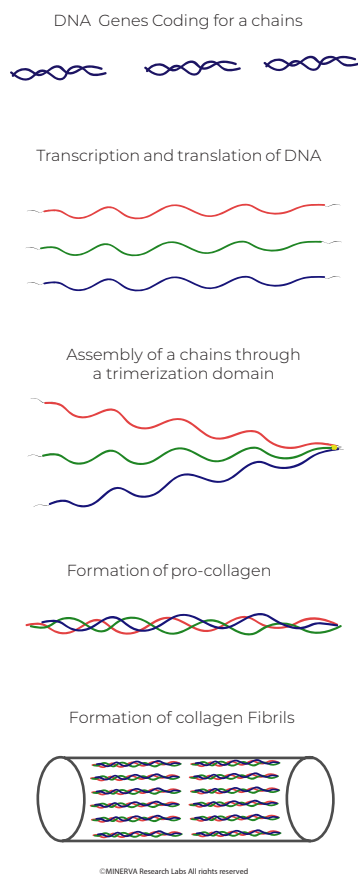




SCIENTIFIC AND CLINICAL EVIDENCE GENERATED AND PUBLISHED BY MINERVA RESEARCH LABS

Key insights into anti-ageing, beauty, joint support and health benefits of GOLD COLLAGEN® and ARTRON COLLAGEN® Products

Mechanism of Collagen Formation



Publication number	Product(s)	Experimental design	Number of tests / volunteers Key measures	Duration	Key findings
1	Pure/ Forte	Double Blind, Randomized Placebo Controlled clinical	180 Ageing & Pigmentation	16 wk	▲skin condition ▼skin hyperpigmentation
2	Pure/ Forte	Varied	Authoritative review on the health benefits of collagen	n/a	skin health and beauty skin changes with PMS
3	Active/ Forte	Fibroblast culture model	16 test cells 8 biomarkers	n/a	▲production of matrix ▲production of collagen
4	Active	Double Blind, Randomized Placebo Controlled clinical	120 volunteers Elasticity and mobility	12 wk	▲elasticity ▲joint mobility
5	Forte	Double Blind, Randomized Placebo Controlled clinical	120 volunteers Elasticity and histology	12 wk	▲elasticity ▲Improvement in histology
6	Hydrogel Mask	Open label bilateral trial	92 volunteers Hydration	4 wk	▲skin hydration and skin tone ▼fine lines and wrinkles
7	Forte / Active	Pilot study clinical	80 volunteers Elasticity and ultrasound	14 wk	▲elasticity ▲collagen density
8	Multiple	Varied	Authoritative review on the health benefits of collagen	n/a	▼wrinkle length ▲hydration; elasticity
9	Pure	Double Blind, Randomized Placebo Controlled clinical	18 volunteers Profilometry and elasticity	12 wk	▼wrinkle length ▲elasticity
10	Pure	Open label Multicentre clinical	294 volunteers Elasticity and ultrasound Skin hydration	12 wk	▲collagen density ▲elasticity ▲hydration
11	Pure	Double Blind, Randomized Placebo Controlled clinical	108 volunteers Profilometry	12 wk	▼wrinkle length
12	Pure	Varied	Authoritative review supplements for skin health	n/a	skin beauty anti ageing interventions
Ongoing	Artron	Double Blind, Randomized Placebo Controlled clinical	80 volunteers Bone and Joint health	16 wk	musculoskeletal function, mobility bone mineral density
Ongoing	Forte / Artron	Double Blind, Randomized Placebo Controlled clinical	150 volunteers Cardiovascular health	24 wk	skin blood flow cardiovascular health
Ongoing	Hairlift	Double Blind, Randomized Placebo Controlled clinical	40 volunteers Hair growth	20 wk	hair growth Trichogram and hair density

European Patent (No. EP 2532252) : Food supplement to ameliorate skin condition.

European Patent (No. EP 2979684) ; USA PATENT (No. US 9668953) : Anti-aging antioxidant nutritional supplement for the improvement of the integumentary system.

European Patent (No. EP 2695610) : Food supplement for improving connective tissue health.

Working with leading academic institutions, Dermatologists, experts in nutrition, skincare science, joint and mobility, clinical trials specialists and key opinion leaders, MINERVA Research Labs and our collaborators in several countries have tested:

+ 6 skincare and joint support products*

+ in 10 clinical trials*

+ testing on > 1300 subjects

+ published in 12 peer-reviewed papers or book chapters

+ 3 European patents and 1 US patent granted

+ 4 awards for recognition of excellence in science from the Royal Society of Medicine; Dubai Derma; 5-Continent Congress; Monte Carlo Aesthetics (Euromedicom)

+ 16 awards for recognition of excellence in business

*Products developed for antiaging; beauty, skin, hair, nails, joint, musculoskeletal, cardiovascular, wellbeing, and topical moisturization. ~ 3 of the clinical studies are still in progress: 1. Forte + Artron impact on vascular function (UCL study on 150 subjects) 2. Hairlift impact on hair growth & vitality (CTC study on 60 subjects) 3. Artron impact on joint function (LJMU study on 80 subjects).

Our Academic and Clinical Partners:



University of Modena and Reggio Emilia, Italy



Second University of Napoli, Italy



University of Camerino

University of Camerino, Italy



University College London, UK



University of Portsmouth, UK



Liverpool John Moores University, UK



Centro de Tecnologia Capilar, Spain

Centro de Tecnologia Capilar

Summary report on the studies related to GOLD COLLAGEN® products

The following data has been published in peer review journals

01.

Insights from a study on the beneficial effects of collagen-based supplement drinks for systemic treatment of skin ageing and pigmentation characteristics as measured by reflectance confocal microscopy.

Under Review

AUTHORS: Sara Sibilla, Caterina Longo, Giovanni Pellacani and Giuseppe Argenziano from the University of Modena and Reggio Emilia, Modena and the 2nd University of Naples, Italy.

SUMMARY OF THE STUDY

Changes in skin and scalp due to intrinsic aging and photoaging have been well characterised and extensively published. However, the ability of a dietary, liquid supplement drink to ameliorate the skin damage associated with aging is still debated, in part due to a lack of sensitive and relevant measurement techniques available to validate the success of such treatment regimes. Improvements in the depth and resolution with which in vivo optical microscopy methods can visualise and quantify skin topographical characteristics have allowed us previously to characterise healthy versus photodamaged skin phenotypes. Now we report on the ability of 2 supplement drinks, PURE GOLD COLLAGEN® and GOLD COLLAGEN® FORTE taken by 180 women as systemic treatment over 4 months, to improve skin and pigmentary characteristics.

Using the RCM (Reflectance Confocal Microscopy)

to measure skin topographical features, after 4 months of supplementation with a collagen-based nutritional drink, we observed a reduction of irregular age-related keratinocyte structures / morphology, specifically in patients who had started the trial with substantial facial photodamage. This reduction in irregular honeycombed pattern was statistically significant for both PURE (reduction in 56% of subjects, $p < 0.01$) and FORTE products (reduction in 76% of subjects, $p < 0.05$). We also observed a reduction of skin mottled pigmentation, specifically in patients who had started the trial with substantial facial hyperpigmentation. This decrease in pigmentation scores was statistically significant for both PURE (decrease for 71% of subjects, $p < 0.01$) and FORTE products (decrease for 77% of subjects, $p < 0.01$).

The measured RCM scores for skin features are indicative of a normalization of the proliferation, differentiation and photodamage process in the epidermis, leading to development of an intact and healthy skin phenotype.

02.

Skin Collagen through the Lifestages. Importance for Skin Health and Beauty.

published in Journal Plastic and Aesthetic Research 2021

AUTHORS: David M. Reilly and Jennifer Lozano.

SUMMARY OF THE STUDY

Collagen-based supplements have become a keystone in the management of the ageing process, with proven ability to repair skin damage, bestowing a youthful and healthy appearance sought in the pursuit of beauty. Collagen is an essential scaffold protein that gives smoothness and elasticity to skin, but its production declines with age. Finding ways to tackle this problem is now strongly promoted as an effective way to transform skin and hair, repairing age-related deterioration. A growing number of scientific studies show exciting evidence that it is possible to rejuvenate ageing or damaged skin, improve function of worn joints and support personal wellbeing and vitality.

In recent times, research on the mechanisms which impact the production of collagen in skin and the ideal organization into functional fibres which give skin its characteristic elasticity and firmness has provided new insights into how this bio-scaffold can support cells, tissues and organs. The factors which influence collagen production over a lifetime (e.g. puberty, pregnancy, menopause, andropause), intrinsic (e.g. genetics, age, ethnicity) and extrinsic factors (e.g. UV-radiation, pollution, smoking) and the potential for new technologies, ingredients and devices to restore collagen and matrix components to their optimal condition are improving the ability to deliver anti-ageing strategies with unprecedented results. This paper will review skin collagen production, structure and function throughout the lifestages, emphasizing its relationship with health, appearance and beauty.

03.

“Effects of collagen-derived bioactive peptides and natural antioxidant compounds on proliferation and matrix protein synthesis by cultured normal human dermal fibroblasts”

published in Scientific Reports (Nature Group – June 2018)

AUTHORS: Suzanne Edgar, Blake Hopley, Licia Genovese, Sara Sibilla, David Laight, Janis Shute from the Institute of Biomedical and Biomolecular Sciences, University of Portsmouth.

SUMMARY OF THE STUDY

This is an in-vitro study in which we investigated the interactions between collagen peptides (0.3-8 kDa) and other constituents present in the liquid collagen-based nutraceuticals GOLD COLLAGEN® ACTIVE and GOLD COLLAGEN® FORTE) on normal primary dermal fibroblast (skin cell) function.

The effects of the addition of collagen peptides alone and in combination with all the other bioactive and antioxidant constituents present within the two nutritional supplements, ACTIVE and FORTE, were tested and compared to the effect of media alone (control).

Highlights

- Interactions of collagen peptides with dermal fibroblast function were investigated
- Collagen peptides and other bioactives increase fibroblast elastin synthesis
- Collagen peptides and other bioactives inhibit the release of MMP-1 and MMP-3
- Inhibition of MMP-1 and MMP-3 release correlates with the antioxidant activity of bioactives
- Proliferation was enhanced in the presence of collagen peptides and antioxidants

RESULTS

Collagen peptides significantly:

- increased fibroblasts elastin synthesis
- while significantly inhibiting release of two fibroblast collagenases; MMP-1 (metalloproteinase-1) and MMP-3 (metalloproteinase-3) responsible for matrix breakdown and elastin degradation.
- The positive effects of the collagen peptides on these responses and on fibroblast proliferation were enhanced in the presence of the antioxidant constituents of the products.
- Active ingredients of FORTE have an additive effect on inhibition of MMPs expression (when compared to ingredients present in ACTIVE)
- Each of the constituent antioxidants found in FORTE appeared to have an additive effect on total soluble elastin synthesis
- Moreover, addition to dermal fibroblast cultures of the whole ACTIVE and FORTE products (including acidity regulators, stabilizers, natural sweeteners, flavorings and vitamins) at 1:50 dilution, to match the tested concentrations of individual components, significantly increased soluble elastin to $173 \pm 27.9\%$ and $187 \pm 40\%$, respectively, of the media control value [both collagen-based nutraceuticals significantly ($p < 0.05$) increased soluble elastin by almost two-fold].

These data provide a scientific, cell-based, rationale for the positive effects of these collagen-based nutraceutical supplements on skin properties, suggesting that enhanced formation of stable dermal fibroblast-derived extracellular matrices may follow their oral consumption. Moreover, the antioxidants present in FORTE have an additional beneficial effect on elastin synthesis and inhibition of degradation of components of the extracellular matrix.

04.

“Daily oral supplementation with collagen peptides combined with vitamins and other bioactive compounds improves skin elasticity and has a beneficial effect on joint and general wellbeing”

published in Nutrition Research – June 2018

AUTHORS: Anna Czajka, Ewa M. Kania, Licia Genovese, Andrea Corbo, Giovanni Merone, Cecilia Luci and Sara Sibilla.
From MedicalSpa Education, Roma Medica s.r.l., Via Cassia 1840, Roma, 00123, Italy.

SUMMARY OF THE STUDY

A double-blind, randomized, placebo-controlled clinical trial was conducted on 120 subjects who consumed either the test product or placebo on a daily basis for 90 days.

- 61 subjects taking the Test product (GOLD COLLAGEN® ACTIVE).
- 59 subjects taking placebo.

	Test product (n=61)	Placebo (n=59)
Age, years	43 ± 13.1	43 ± 12.3
Sex, n (%)		
Female	50 (82)	41 (70)
Male	11 (18)	18 (30)
Ethnicity - Mixed		

RESULTS

- After 90 days, subjects consuming the test product had an overall statistically significant increase in skin elasticity when compared to placebo (+40%; P < 0.0001) and when compared to the baseline (+24%, P<0.001).
- Histological analysis of skin biopsies taken revealed positive changes in the skin architecture, with a reduction in solar elastosis and improvement in collagen fiber organization in the test product group.
- As reported in the self-perception questionnaires, these results were confirmed by the subjects' own perceptions, in fact the participants agreed their skin was more hydrated and more elastic and the nails and hair were healthier:
 - 96% of the subjects agreed their skin was more hydrated,
 - 80% agreed their skin was more elastic,
 - 75% agreed their skin was smoother
 - 85% agreed that their skin was more radiant
 - 70% of subjects observed their nails looked stronger and healthier
 - 61% and 77% reported their hair to be stronger and glossier respectively
 - 83% of subjects claimed to have more energy
- In addition, the consumption of the test product significantly (P<0.05) reduced joint pain by -43% and improved joint mobility by +39%.
- In the self-perception questionnaires results:
 - 78% of subjects in the test product group reported less joint discomfort
 - 67% agreed their joints' health improved by increasing joints' flexibility

05.

“An insight into the changes in skin texture and properties following dietary intervention with a nutricosmeceutical containing a blend of collagen bioactive peptides and antioxidants”

published in Skin Pharmacology and Physiology – May 2017

AUTHORS: Licia Genovese, Andrea Corbo, Sara Sibilla

SUMMARY OF THE STUDY

GOLD COLLAGEN® FORTE

A double-blind, randomized, placebo-controlled clinical trial was conducted by an independent aesthetic clinic in Italy to investigate the photo-protective effects of GOLD COLLAGEN® FORTE.

- Subjects were divided into 2 groups: 60 subjects (57 females and 3 males) consumed GOLD COLLAGEN® FORTE daily and the other 60 subjects (54 females and 6 males) consumed placebo.
- Subjects drank one bottle (50 ml) of the test product or placebo daily over a period of 90 days.
- Skin elasticity (expressed as Young's Elasticity Modulus) was assessed with Skin Lab USB Elasticity Module. Young's elasticity was measured in the inner part of the ventral forearm, at 10 cm from the wrist of each subject recruited in the trial at the beginning of the trial (day 0) and the end of the trial (day 90).
- Skin biopsies (Punch 4.0 mm) and histological examinations were performed to assess the skin structures and, in particular, collagen and elastin fibres at the beginning of the trial (day 0) and the end of the trial (day 90) in four subjects who took GOLD COLLAGEN® FORTE.
- A self-assessment questionnaire including questions related to skin, hair, nails, joints, mood, and photo-ageing conditions as well as questions regarding the subjects' opinion about the product was filled by each subject at the beginning of the trial (day 0) and the end of the trial (day 90).
- The photographic assessment was done at the beginning of the trial (day 0) and the end of the trial (day 90).

FORTE

Subjects (N)	120 (60 test product, 60 placebo)
Average Age (years)	47-50
Sex	M & F
Ethnicity	Mixed

RESULTS

- Statistically significant increase of +7.5% ($p \leq 0.001$, t test) in skin elasticity in subjects consuming GOLD COLLAGEN® FORTE for 90 days. A significant decrease -5% ($p \leq 0.001$, t test) in skin elasticity in the placebo group at day 90, when compared to day 0.
- In subjects consuming GOLD COLLAGEN® FORTE for 90 days a statistically significant increase in skin elasticity was seen both in the subgroup with a cosmetic treatment +9.1% ($p \leq 0.001$, t test) and in the one without +5.4% ($p \leq 0.01$, t test). In the placebo group at day 90 skin elasticity was significantly reduced by -3.7% ($p \leq 0.001$, t test) for the subjects with cosmetic treatment and by -6.5% ($p \leq 0.01$, t test) for the ones without.
- Histological skin biopsies from 4 female subjects before treatment with GOLD COLLAGEN® FORTE showed the following skin characteristics: orthokeratotic hyperkeratosis, irregular acanthosis, vascular ectasia, and dermal elastosis. After 90 days of treatment, there was an improvement in the structure and stratification of the epidermal layers and an improvement in the collagen fibre's structural architecture within the dermis.
- More than 90% of subjects agreed that the overall skin, hair, nail, and joint conditions were dramatically improved after 90 days of supplementation with GOLD COLLAGEN® FORTE.

06.

“Thermosensitive hydrogel mask significantly improves skin moisture and skin tone; bilateral clinical trial”

published in Cosmetics – June 2017

AUTHORS: Anna Quattrone, Anna Czajka, Sara Sibilla

SUMMARY OF THE STUDY

GOLD COLLAGEN® HYDROGEL MASK

An open label clinical trial was conducted by an independent contract research organisation in England to evaluate the effects of the GOLD COLLAGEN® HYDROGEL MASK on skin hydration, skin tone and skin ageing.

- The study was conducted on 30 healthy female subjects, aged 40 years+, with ageing skin (dehydrated or hyper pigmented skin).
- This was a bilateral (half-face), left vs. right (treated vs. untreated) clinical study. Subjects applied the GOLD COLLAGEN® HYDROGEL MASK on one side of their face. The GOLD COLLAGEN® HYDROGEL MASK was applied weekly for 4 weeks.
- At baseline subjects underwent Corneometer® assessments for moisturisation, Chromameter assessments for skin tone/luminosity, expert visual assessment of facial skin ageing and facial photography. All assessments and photography were performed again 20 min after removal of the GOLD COLLAGEN® HYDROGEL MASK (after first application) and at the end of the study (after four applications).
- All assessments and Self-Perception Questionnaires (SPQ) were performed at baseline, after the first application of the hydrogel mask and after four applications.

HYDROGEL MASK

Subjects (N)	30
Average Age (years)	54.4
Sex	F

RESULTS

- A single treatment of the GOLD COLLAGEN® HYDROGEL MASK resulted in: statistically significant improvement in skin tone/luminosity by 8.91% ($p \leq 0.05$), significant improvement in moisturisation/hydration by 74.03% ($p \leq 0.0001$) and visual grading showed a -24.74% ($p \leq 0.001$) significant reduction of the signs of ageing.
- After four applications of the GOLD COLLAGEN® HYDROGEL MASK skin tone/luminosity was significantly improved by 18.39%, ($p \leq 0.0001$), moisturisation/hydration was significantly improved by 79.24% ($p \leq 0.0001$) and visual grading showed a -32.89% ($p \leq 0.0001$) significant reduction of the signs of ageing.
- Results from the self-assessment questionnaires showed that the subjects' perception of skin properties and reduction of the signs of ageing was dramatically improved after four applications with the GOLD COLLAGEN® HYDROGEL MASK.

07.

“Innovative Nutraceutical Approaches to Counteract the Signs of Aging”

published as a chapter in the
Textbook of Aging Skin – 2016

AUTHORS: Licia Genovese, Sara Sibilla

SUMMARY OF THE STUDY

ACTIVE GOLD COLLAGEN®

A pilot clinical study has been carried out at a single site to evaluate the effect of the systemic treatment with ACTIVE GOLD COLLAGEN® on collagen density, skin elasticity and body composition in healthy and active volunteer subjects.

- The study was conducted in 20 male healthy volunteer subjects aged 20–60 years.
- Each subject was administered one bottle of test product daily for a maximum of 14 weeks.
- DermaLab SkinLab USB elasticity module was used to measure skin elasticity on each subject forearm at baseline (day 0) and after 7 and 14 weeks of treatment.
- High resolution ultrasound skin imaging (DermaLab SkinLab USB) was used to measure dermal collagen density. Collagen density was measured in the left ventral forearm at weeks 0, 4, 8, 12 and 14.
- Bodyfat, muscle mass, bone density and hydration were measured using Ozeri Touch II Digital Scale, a multifunction scale that provides profile-driven measurements for these parameters.

ACTIVE

Subjects (N)	20
Average Age (years)	30.45
Sex	M
Ethnicity	Mixed
Average height (cm)	175.8
Average weight (kg)	77.065
Average BMI	25

RESULTS

- An increase in skin elasticity was observed at 7 and 14 weeks in the subjects who were taking ACTIVE GOLD COLLAGEN® with a statistically significant improvement detected at week 14 (65% increase; $p \leq 0.05$).
- The same subjects were also measured for collagen density in the ventral forearm. In 55% of the subjects, a constant statistically significant increase was observed in the collagen density over 14 weeks. This increase was statistically significant at 8 (26% increase; $p \leq 0.05$), 12 (31% increase; $p \leq 0.05$) and 14 weeks (40% increase; $p \leq 0.05$).
- Improvement in body composition and fitness level. A decrease in weight and body fat was detected over the 14-week treatment with ACTIVE GOLD COLLAGEN®, together with an improvement in hydration, muscle mass and bone density.
- In 55 % of the subjects, a 9% reduction in resting heart rate (from 71 to 64 on average), moving subjects from 'average' to 'good' fitness level, was noticed after 5 weeks.

GOLD COLLAGEN® FORTE

An independent pilot double-blind, randomised, placebo-controlled clinical trial was performed to investigate the effects of GOLD COLLAGEN® FORTE on skin elasticity in subjects who underwent a cosmetic treatment (fillers and Botox in the face) and subjects who did not while using this nutraceutical supplement.

- Subjects participating in the trial were divided into two groups: 30 volunteer subjects (28 females and 2 males, between 40 and 60 years old) who consumed GOLD COLLAGEN® FORTE daily and other 30 volunteer subjects (27 females and 3 males, between 40 and 60 years old) who consumed placebo.

- Subjects drank one bottle (50 ml) of test product or placebo daily over a period of 90 days.

- DermaLab SkinLab USB elasticity module was used to measure skin elasticity on each subject forearm at baseline (day 0) and at the end of the treatment at day 90.

- A self-assessment questionnaire including questions related to skin, hair, nails, joints, mood, and photo-ageing conditions and questions regarding the subjects' opinion about the product was filled by each subject.

- To evaluate the efficacy of the product on skin, histological examination was performed, before and after the treatment, in two subjects who took GOLD COLLAGEN® FORTE for 90 consecutive days.

RESULTS

- Statistically significant increase in skin elasticity after 90 days of treatment (from 8.42 to 9.17 mm; $p < 0.05$, T-test). Moreover, no significant change in skin elasticity was observed in the placebo group.

- Reduction in solar elastosis and in hyperkeratosis. Histological sections of healthy skin (stained with hematoxylin-eosin) relative to two female subjects before and after 90 days of treatment with GOLD COLLAGEN® FORTE revealed a reduction in solar elastosis and in hyperkeratosis.

- Results from the self-assessment questionnaires showed that the perception of the overall skin, hair, nails, and joints condition was dramatically improved after 90 days of treatment with GOLD COLLAGEN® FORTE. Importantly, these improvements were not observed in the subjects taking placebo.

FORTE

Subjects	30 (Test Product), 30 (placebo)
Age	40-60
Sex	Mixed (mainly F)
Ethnicity	Mixed

08.

“An Overview of the Beneficial Effects of Hydrolysed Collagen as a Nutraceutical on Skin Properties: Scientific Background and Clinical Studies”

published in The Open Journal of Nutraceuticals - 2015

AUTHORS: Sara Sibilla, Martin Godfrey, Sarah Brewer, Anil Budh-Raja and Licia Genovese

SUMMARY OF THE STUDY

This review article examines the available data with regard to the use of hydrolysed collagen as a nutraceutical in skin ageing. We bring together a thorough review of the basic physiology of collagen formation and its degradation during the skin ageing process and the beneficial effects of oral ingestion of hydrolysed collagen on skin properties such as hydration, elasticity and reduction of wrinkles.

- Skin aging is a complex biological process which results in a loss of type I collagen, reduction in dermal elastin density and lower levels of hyaluronic acid (HA)
- This causes a decrease in skin moisture, suppleness, elasticity and increase in sagging and wrinkles
- Several in vitro and in vivo studies have proven the efficacy of collagen peptides in:
 - Targeting fibroblasts
 - Increasing collagen density in the dermis
 - Increasing HA production
 - Protecting against skin-damaging UVA radiation

09.

“Effects of a nutritional supplement containing collagen peptides on skin elasticity, hydration and wrinkles”

published in Journal of Medical Nutrition and Nutraceuticals - 2015

AUTHORS: Maryam Borumand, Sara Sibilla

SUMMARY OF THE STUDY

The aim of this study was to determine whether PURE GOLD COLLAGEN®, containing hydrolysed collagen and other specific ingredients reported to have anti-ageing properties, could improve certain specific skin properties in post-menopausal women such as: depth of facial wrinkles, skin elasticity and hydration.

- A double-blind, randomised, placebo-controlled study was conducted by an independent Clinical Research Organization (Wales, UK) between April and July 2012.
- Eligible subjects were Caucasian, healthy, non-smoking volunteers aged 45-64 years, who were not using other nutritional supplements. 18 healthy volunteers were enrolled into this study.
- Subjects consumed one dose of their allocated drink per day before breakfast for 12 weeks.
- Skin assessments were carried out at weeks 0, 3, 6, 9 and 12 using Visioline® VL 650, Cutometer® dual MPA 580 and Corneometer® CM 825. The Two non-parametric tests (Wilcoxon signed rank test for study data and Mann-Whitney U-test for P-values) were used as the sample size was small and we could not assume that our population was normally distributed.

	Placebo	PURE
Subjects (N)	9	9
Average Age (years)	51.7	55.4
Sex	F	F
Ethnicity	Caucasian	Caucasian

RESULTS

- Statistically significant reduction in the depth of facial wrinkles within 9 weeks (8% decrease, $p \leq 0.05\%$).
- Statistically significant increase in skin elasticity (after 6 weeks; 10% increase, $p \leq 0.5$) and skin hydration (after 6 weeks; 14% increase, $p \leq 0.5$).

10.

“Daily consumption of the collagen supplement PURE GOLD COLLAGEN® reduces visible signs of aging”

published in Clinical Interventions in Aging - 2014

AUTHORS: Maryam Borumand, Sara Sibilla

SUMMARY OF THE STUDY

An open-label multicentre study was conducted to investigate the effect of PURE GOLD COLLAGEN® on skin appearance and skin physiological properties. There were three arms in this study.

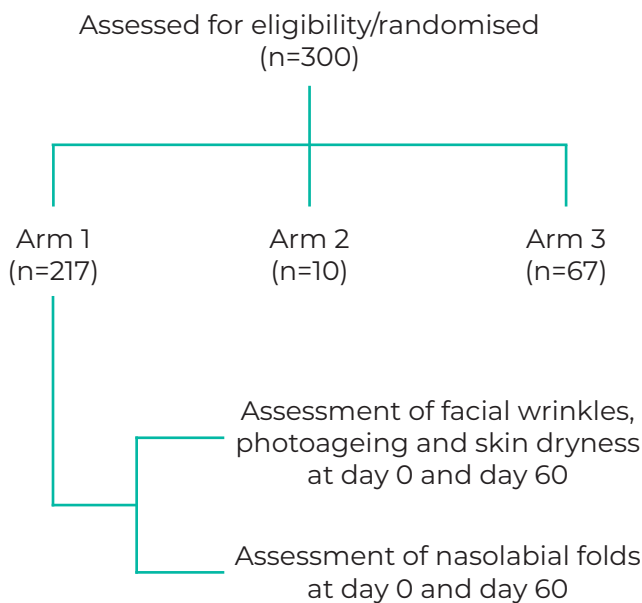


Table 1 Baseline characteristics of the study subjects

	ARM 1	ARM 2	ARM 3
Subjects (N)	217	10	67
Age (years)	23-69	18-65	18-74
Sex	M and F	M and F	Female
Ethnicity	Caucasian	Mixed	Mixed

ARM 1

- The study was conducted by 40 independent dermatologists across 5 different Countries namely United Kingdom, USA, UAE, Greece and the Czech Republic. The dermatologists worked independently on the basis of a protocol developed by the scientists at MINERVA Research Labs Ltd.
- The study involved 217 healthy volunteer subjects taking orally one bottle (50ml) of PURE GOLD COLLAGEN® or placebo daily for 60 days.
- Subjects had a skin assessment conducted by the dermatologists, before the 60 day treatment. The dermatologists evaluated the benefits and the effects of PURE GOLD COLLAGEN® again at the end of the 60 day treatment.

PURE

Subjects (N)	217
Average Age (years)	47.6
Sex	M and F
M	10
F	207
Ethnicity	Caucasian

RESULTS

- 69% of subjects taking PURE GOLD COLLAGEN® had either a visible or significant improvement in their facial lines at the end of the study.
- 82% of the subjects had either a visible or significant improvement in skin hydration at the end of the study.
- 43% of the subjects had either a visible or significant improvement in the level of photoageing.
- Statistically significant reduction in nasolabial folds in subjects who did not undergo any other cosmetic treatment (32% reduction; p<0.05).

ARM 2

- In this study 10 healthy volunteer subjects were recruited at a single site.
- Each subject consumed one bottle (50 ml) of PURE GOLD COLLAGEN® or placebo daily for 12 weeks.
- High resolution ultrasound skin imaging (DermaLab SkinLab USB) was used to assess the effect of PURE GOLD COLLAGEN® on dermal collagen density. Collagen density was measured in the left ventral forearm and in the zygomatic area around the left eye at weeks 0, 4, 8, and 12.

RESULTS

- A statistically significant improvement ($p \leq 0.05$) in collagen density was detected at 12 weeks, both in the crow's feet area (19% increase) and in the left ventral forearm (12% increase).

ARM 3

- In this study 67 healthy volunteers were recruited at a single site.
- Each subject consumed one bottle (50ml) of PURE GOLD COLLAGEN® or placebo daily for 130 days.
- The DermaLab SkinLab USB elasticity module was used to assess the effect of PURE GOLD COLLAGEN® on skin firmness. Measurements were carried out on the ventral left forearm after 50, 80, and 130 days of treatment.

RESULTS

- Increase in skin firmness was observed at 80 and 130 days. The improvement was statistically significant at 80 days (83%; $p \leq 0.05$) and at 130 days (94%; $p \leq 0.01$).

DERMATOLOGISTS QUOTES:

“Skin elasticity is improved and the skin glows more”

“More youthful appearance, more hydrated skin”

“The skin is hydrated, smoother, more radiant, with less fine wrinkles”

“Skin is brighter and has a healthy look”

11.

“A study to assess the effect on wrinkles of a nutritional supplement containing high dosage of hydrolysed collagen”

published in Cosmeceuticals - 2014

AUTHORS: Maryam Borumand, Sara Sibilla

SUMMARY OF THE STUDY

The aim of this study was to assess the efficacy of PURE GOLD COLLAGEN® on skin condition.

- A double-blind, randomised, placebo-controlled study was conducted by an independent Clinical Research Organization (Wales, UK) between April and July 2012.
- 108 healthy volunteers were recruited in the study and consumed the product daily for 12 weeks. The anti-wrinkle effect of the supplement was further investigated in a sub-group of 17 subjects, aged 45 to 64 years.
- Skin assessments were performed at week 0, 3, 6, 9 and 12 using Visioline® VL 650 (Courage and Khazaka, GmbH). The following parameters were analyzed: total surface area of wrinkles (in μm^2), total length and mean length of wrinkles (in μm). The results were compared with those obtained on day 0 for each group and between groups, using Wilcoxon test and Mann-Whitney U-test, respectively.
- The subjects' appreciation of the oral supplement was compared before and after treatment through analysis of information obtained from self-evaluation questionnaires.

	Placebo	PURE
Subjects (N)	54	54
Average Age (years)	41.2	40.6
Sex	M and F	M and F
M	45	41
F	9	13

RESULTS

- A significant improvement in wrinkles was achieved, primarily in the surface area and the mean length of wrinkles after 9 weeks (19% reduction compared to placebo; $p \leq 0.05$). The total length of wrinkles was significantly reduced by 10% after 9 weeks when compared to placebo ($p \leq 0.05$).
- Most subjects agreed PURE GOLD COLLAGEN® improved the condition of their skin, hair, nails and joints.

Percentage of people taking PURE GOLD COLLAGEN®, compared to placebo, who agreed with the benefits stated in the questionnaire:

66%

agree skin is more elastic

121%

agree stretch marks are reduced

113%

agree hair is thicker

52%

agree hair is less brittle

35%

agree nails are less brittle

64%

agree joint pain is reduced

12.

Current understanding of the effects of diet on skin health: Food supplements rich in vitamins and nutrients as a valuable ally to maintain skin, hair and nails health and function while dieting.

published as a chapter in Losing Weight Simply and Effectively, 2014. Officina Editoriale Oltrarno (Ed. Roberto Maugeri)

AUTHORS: Sara Sibilla and Maryam Boramund

SUMMARY OF THE REVIEW

Exercise and healthy eating choices play an important role in maintaining skin health. Research shows that a well-balanced and healthy diet is able to maintain integrity and function at a cellular level in many different tissues and organs. It helps the body to protect against the aggressive effects of the external environment, pathogens and dangerous free radicals. Diet in human health is no longer simple nutrition; in light of recent research, especially nutrigenomics, diet is linked via evolution and genetics to our cell health status reflecting their capability to modulate apoptosis, detoxification and appropriate gene responses.

13.

Study on the anti-hair loss and hair regeneration effect of a liquid supplement.

published in Journal Plastic and Aesthetic Research 2021

AUTHORS: Encarnacion Gomez and Alfonso Fernandez.

SUMMARY OF THE STUDY

The aim of this study was to evaluate the effect of GOLD COLLAGEN® HAIRLIFT on reducing hair loss as well as promoting hair regeneration.

- A double-blind, randomised, placebo-controlled study was conducted by Centro de Tecnologia Capilar, S.L. between February and July 2021
- 40 healthy volunteers (aged 40-65) with hair loss were recruited and consumed one bottle of test product per day for 150 days.
- The key tests carried out on day 0 and day 150 included:
 - Cosmetic trichogram (to identify the phase of hair growth cycle)
 - Hair density
 - Wash and comb tests

RESULTS:

After 150 days of product use, volunteers taking GOLD COLLAGEN® HAIRLIFT saw:

Increase in hair density by an average of

4170

new hairs

An average of

44%

reduction in hair loss in 83% of volunteers

Increased number of growth phase hairs in

83%

of volunteers

MINERVA Research Labs based in London, was established in 2009 and is a leading innovator in the field of beauty and nutraceutical products, designed to deliver beneficial support to skin, hair and nails. We have recently expanded our product portfolio with an innovative product supporting joints. MINERVA is a Research and Development facility employing nearly 100 people across R&D, marketing, sales and operation functions. We operate globally with offices in Japan, Middle East, Europe and the USA. We develop and manufacture healthy nutritional supplements which provide consumers with bioactives, vitamins, minerals, and plant extracts in a form that is highly efficacious, pleasant tasting, and enjoyable, thus ensuring continued use of the products for visible results. We complement our nutritional supplements with innovative cosmeceutical products.

MINERVA has 3 European Patents and 1 US patent all granted, originally filed between 2011 and 2014. All our liquid products are protected by one or more of such patents. Promising research results regarding our collagen supplements have already been published in peer-reviewed journals and have ignited widespread interest. MINERVA has a long-term investment programme with an academic network in several universities. The studies are being funded by the booming sales of MINERVA's sophisticated collagen products. GOLD COLLAGEN® is available in 45 markets across the world from Japan, China, to the Middle East, Europe, the USA and Canada.

Understanding the growing interest for healthy nutrition, Tony Sanguinetti, Founder & CEO launched the 1st collagen-based liquid beauty supplement in the UK, GOLD COLLAGEN PURE, expanding the range and the markets over the years and launching then a new brand in 2021 with COLLAGEN SUPERDOSE to answer to a change of behaviour in consumers' mind towards a more practical and affordable supplement. In 2021 also consolidated NUTRIJUVINATE CLINIC and its community of experts available to offer services and share knowledge around nutrition, skincare and wellbeing. Dedicated to producing only high-quality effective products, MINERVA collaborate with renowned universities, gold standard testing facilities, suppliers and manufacturers to deliver clinically tested and scientifically developed products all made with three fundamental attributes: research, high quality and efficacy.

GOLD COLLAGEN® is a multi award winning brand. Beside numerous recognition in the scientific field, over the last 4 years we have received 16 awards, including: a recent award from The Telegraph in 2018 for the Best British SME International Brand; Men's Health, Women's Health 2018 Excellence Award; They Sunday Times "Fasttrack 100" Fastest Growing British Company 24 and 26 respectively in 2017 and 2018.

Official supplier of Beauty Supplement to LONDON FASHION WEEK.

PURE GOLD COLLAGEN® is our best-selling liquid food supplement with over 50 million bottles sold and a Customer Retention Rate of over 50% over a 3 year time period.

MINERVA has developed a network that enables us to bridge 3 distinct industries, and thus be successful market leaders in the area of nutritional supplement drinks for skin, hair, nails and joint:

1. NUTRACEUTICAL: MINERVA is specialized in using high-tech manufacturing to produce nutraceutical food supplements, mainly for oral intake, in liquid form based on natural ingredients which have a pleasant taste and are enjoyable. Free form sugar, preservatives and artificial colouring, our products are also halal compliant.
2. PHARMACEUTICAL: MINERVA's product range leverages nutritional ingredients based on rigorous scientific background and advanced research, with ingredients and products validated for use by rigorous clinical trials and supported by peer-reviewed publications. Our SKIN & JOINT RESEARCH focus on anti-ageing, skin, hair, nails as well as joint mobility and pain / discomfort.
3. BEAUTY: MINERVA's products address the anti-ageing and beauty aspirations of women with a top of the range, compelling look and "prestige" positioning.

Our network of expert collaborators includes approximately 50 Dermatologists, experts in nutrition, skincare science, joint and mobility, clinical trials specialists and key opinion leaders. We are actively collaborating and publishing research papers with several leading academic institutions.