



Glow from within

Unlocking the skin health
benefits of collagen peptides

Dr Tim Crowe

BSc(Hons), MNutrDiet, PhD



Do collagen supplements really help your muscles grow and skin glow?

ABC Everyday / By Clare Watson

National Latest Coronavirus World Videos Live Today Show A

News / National

Collagen is the new needle-free beauty trend - but does it work?

By Sharon Labi | 5:07pm Oct 4, 2021

Tweet

Facebook

Mail

It's the latest beauty fad in the quest for youth and there's not a needle in sight.

Protein dream: can eating collagen improve your skin?

Collagen supplements are booming, but there is mixed advice on whether eating the protein offers anything more than a healthy, balanced diet

Product reviews Topics Campaigns About us

Media CHOICE Community

Health and body / Beauty and personal care / Skin care and cosmetics /

Do collagen supplements work?

Can you really improve your skin, hair, nails and joints simply by popping a pill or eating collagen-enriched foods?

WEBMD HEALTH NEWS

Collagen: 'Fountain of Youth' or Edible Hoax?

By Lisa Marshall

Medically Reviewed by Brunilda Nazario, MD on December 12, 2019



The New York Times

SCAM OR NOT

Are There Benefits to Collagen Supplements?

Maybe! But get ready for a long-term relationship.

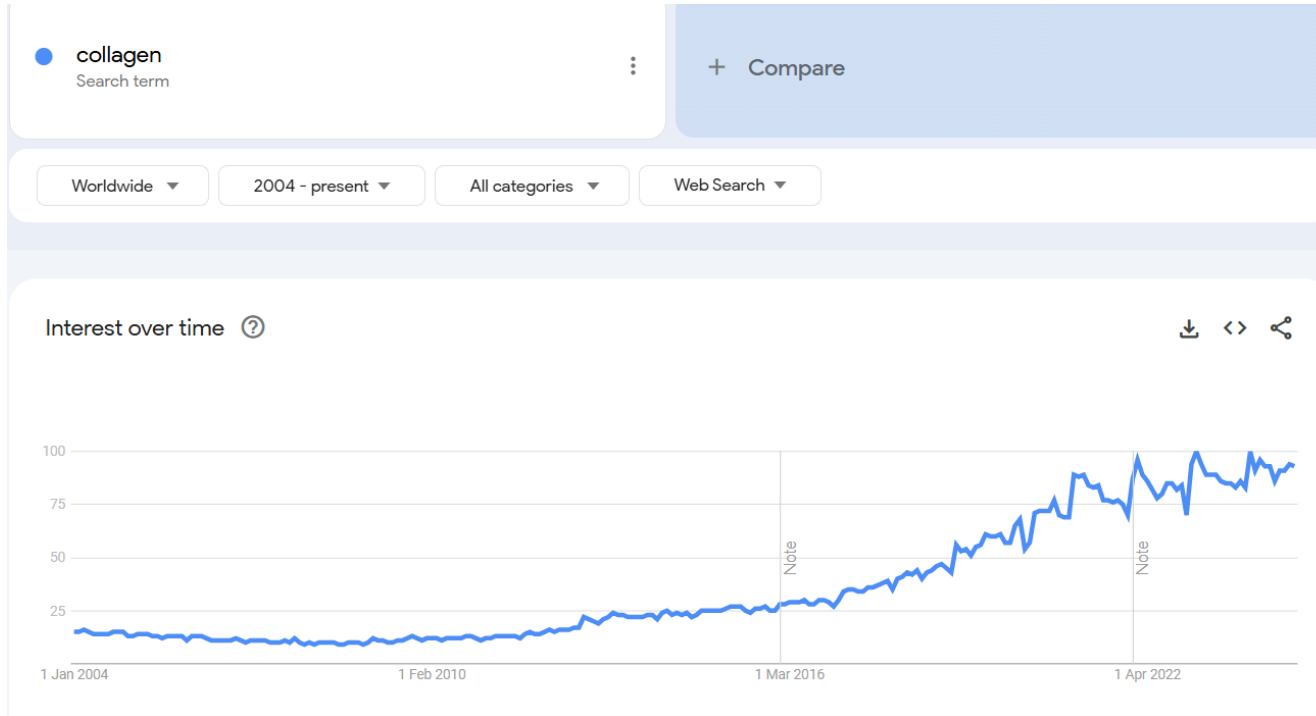
Can collagen supplements REALLY reduce the appearance of wrinkles? Reviewers share impressive before and after photos using Proto-col collagen drink sachets - and you can get 30% off with our discount

- The [Proto-col Complete Collagen Drink Sachets](#), which cost £31.95 for a box of 14, are unlike other collagen-boosting collagen drinks on the market
- They are the first to combine two different collagen peptides in one product
- MailOnline readers can get 30 per cent off Complete Collagen sachets from Proto-col by applying discount code MAIL30 at checkout

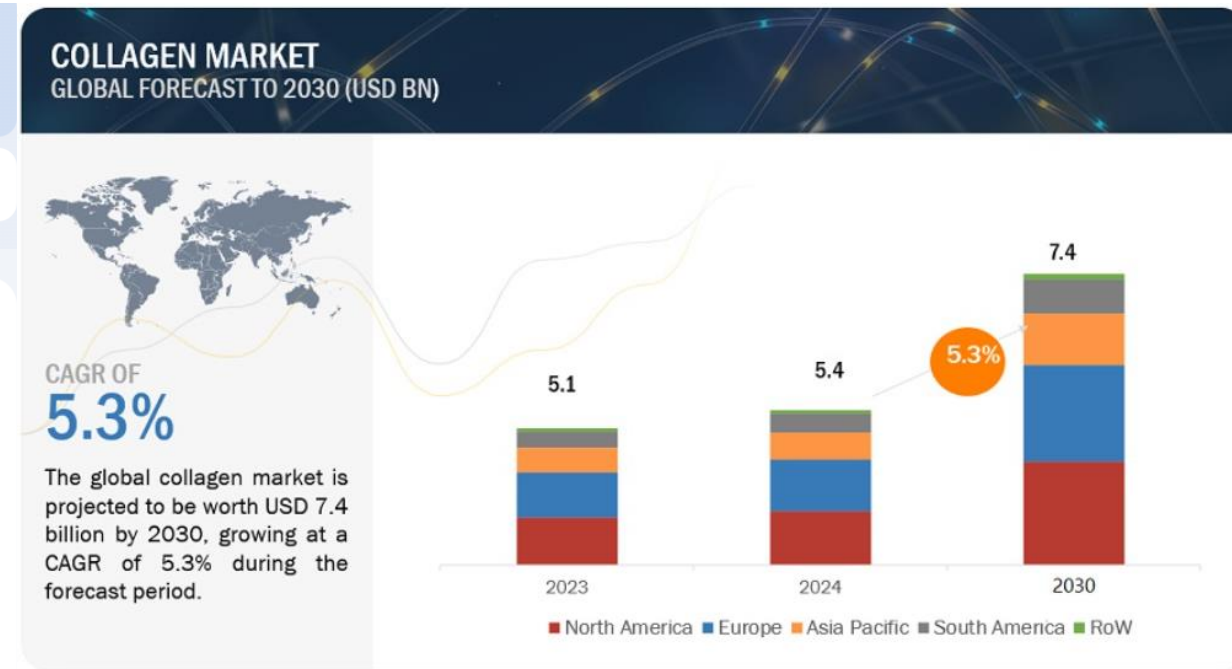
By EMILY KNOTT FOR MAILONLINE

PUBLISHED: 23:06 AEDT, 22 October 2021 | UPDATED: 01:33 AEDT, 23 October 2021

Collagen is on trend



Source: Google Trends

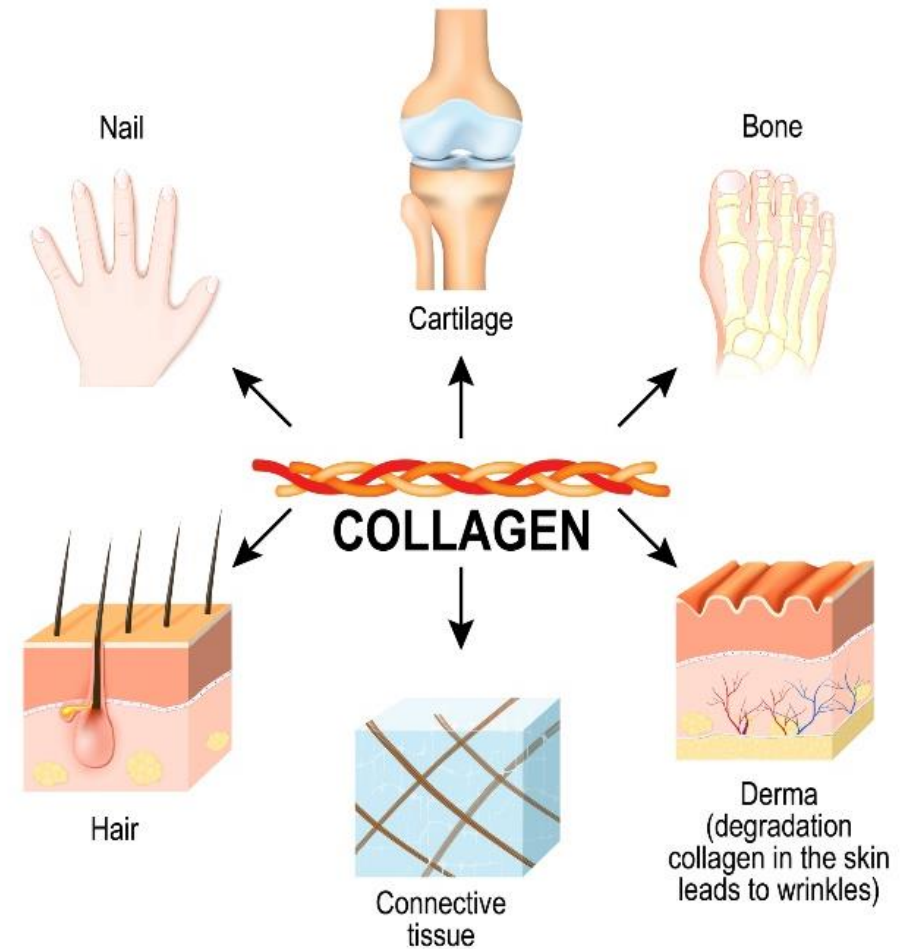


Source: Markets and Markets > Collagen Market
www.marketsandmarkets.com/Market-Reports/collagen-market-220005202.html

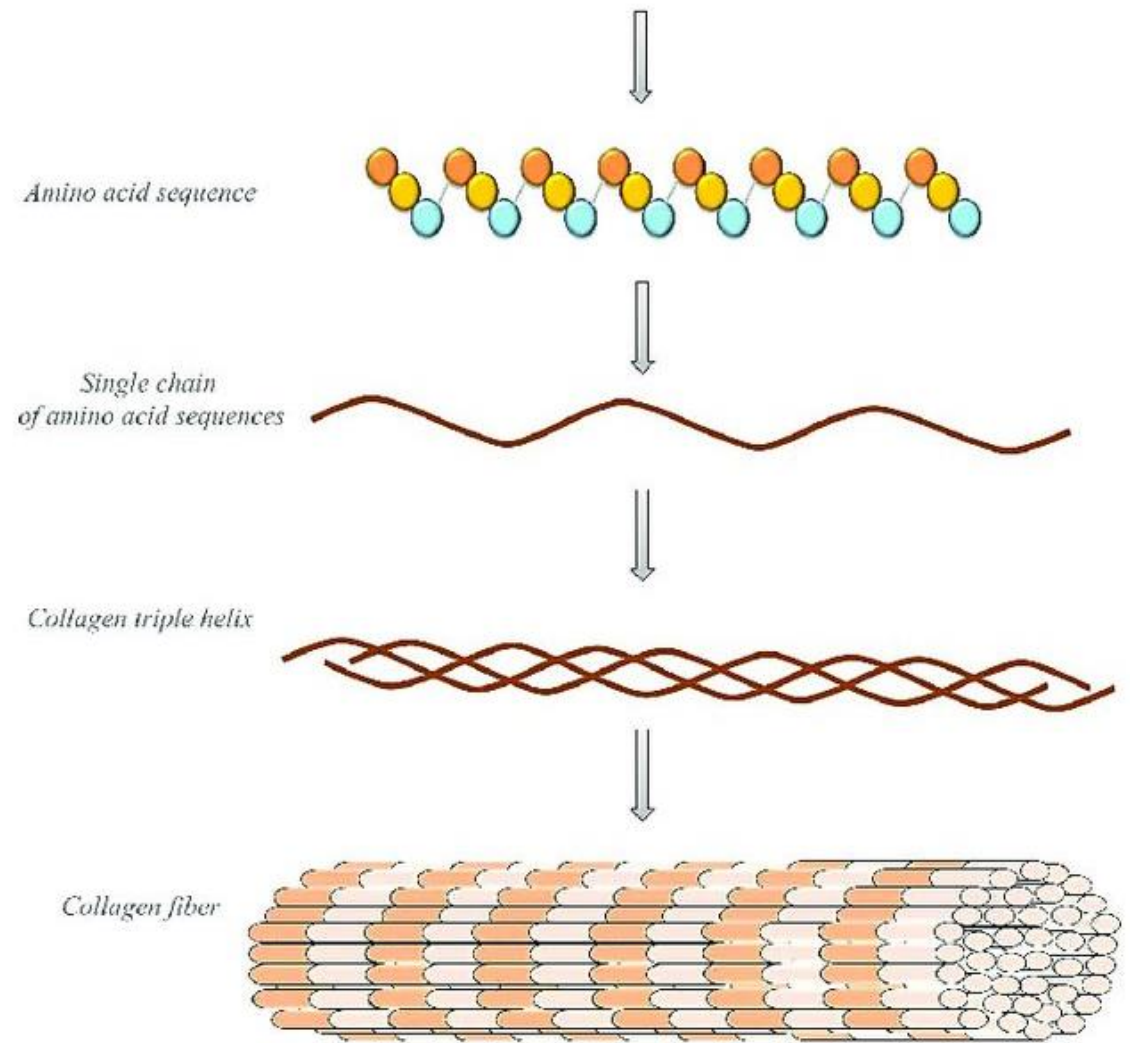
Collagen is the most abundant protein in our body

30 percent of body protein is collagen

Is the main structural component of connective tissue



Collagen is composed of repeating tripeptide units mostly made up of **glycine** (every third residue), **proline** and **hydroxyproline** which make up the bulk of the structure formed into a triple helix chain



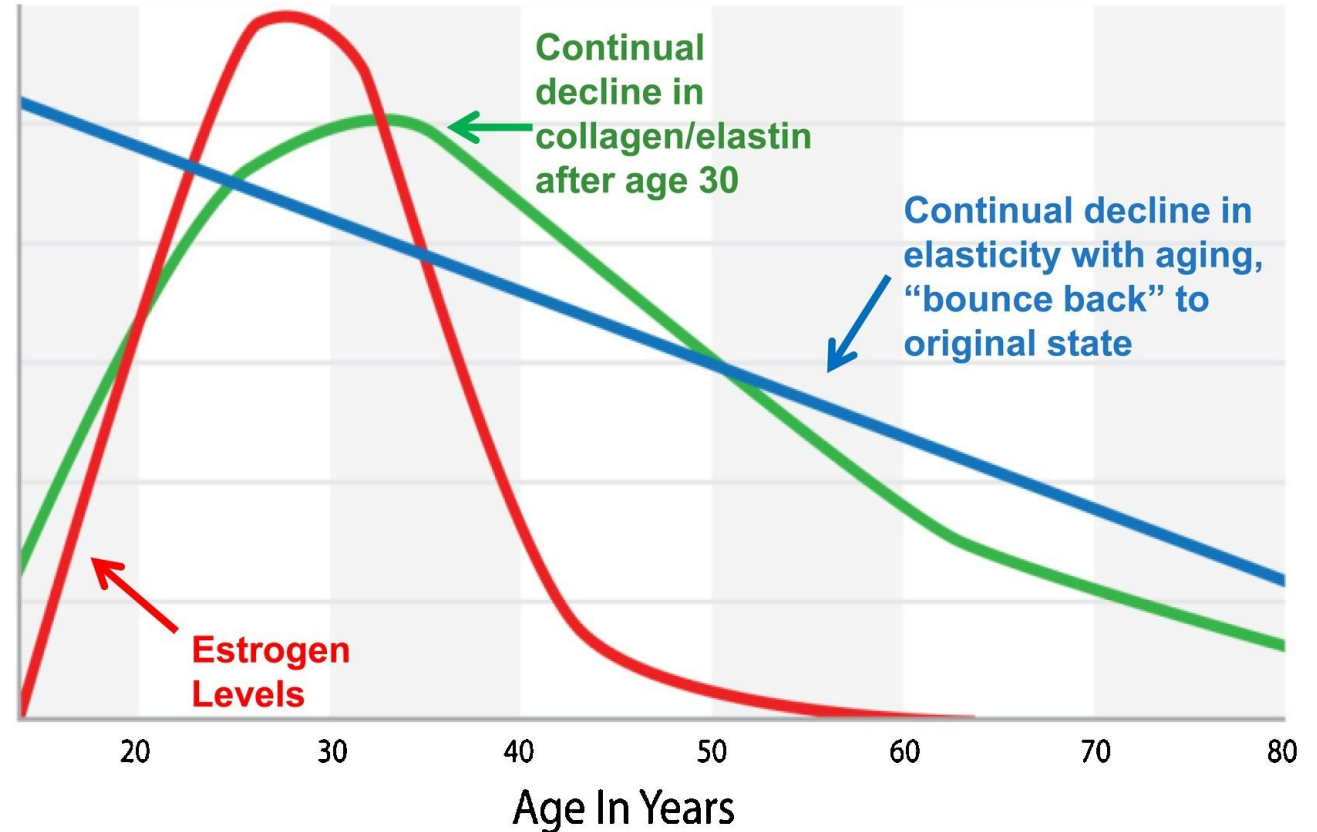
Collagen and elastin with age

Collagen degradation starts in our 20s

Similar falls in elastin and hyaluronic acid

Sunlight, smoking, environmental pollution, alcohol abuse and nutrient deficiencies can all accelerate this loss

All this leads to ↓ volume, ↓ elasticity, ↓ epidermal thickness, ↑ wrinkles and ↓ capacity to retain moisture



Types of collagen

29 distinct types of collagen

Type I found in skin, dentin, corneas, blood vessels, bone and tendons

Type II primarily found in cartilage

Type III found in skin, ligaments, blood vessels and internal organs

Skin is 80% type I and 15% type III



Collagen in our diet

Meat (especially tougher cuts) and meat on the bone with more connective tissue

Organ meats

Chicken skin and chicken wings (joints in the wings provide cartilage)

Pork skin

Eggshell membranes

Fish with skin on, canned fish with bones and whole sardines

Jellyfish



What about bone broth?

Made by simmering bone and connective tissue to extract collagen (in the form of gelatin) as well as additional amino acids, minerals and bone marrow

Not a reliable source of key amino acids (glycine, lysine, proline, leucine, hydroxyproline and hydroxylysine) with a large degree of variability

Poor source of minerals (<50 mg of calcium per cup) and only a good source of micronutrients when vegetables added to it



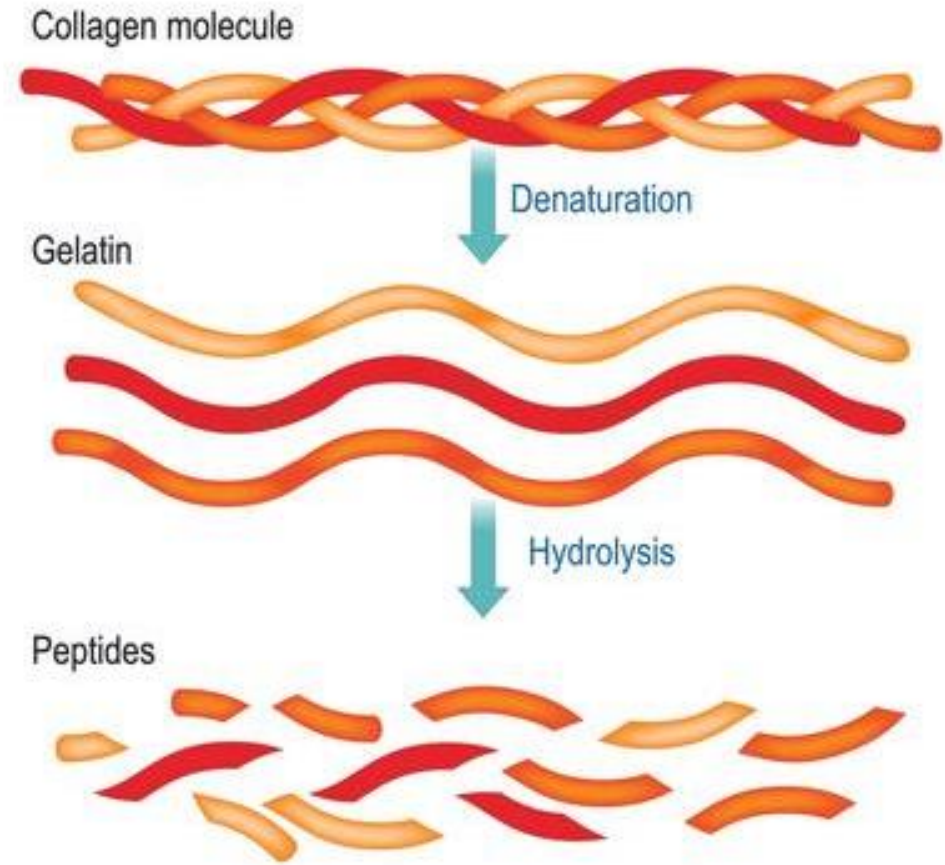
Why hydrolysed collagen?

When you heat collagen, it is denatured to gelatin

Gelatin is large and relatively insoluble

Hydrolysing gelatin breaks it into peptide chains of 30-60 amino acids in length

Hydrolysed collagen has greater water solubility and no gelation at room temperature



But surely it all just becomes single amino acids in the body which are indistinguishable from any other protein source we eat???



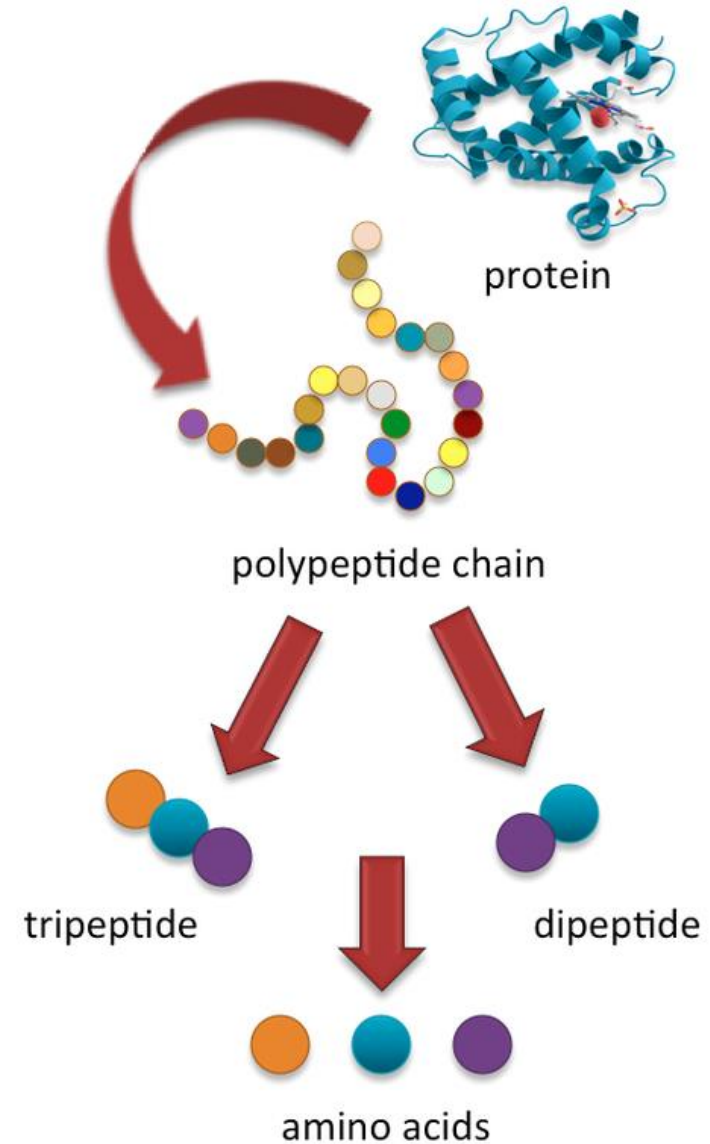
It's all about the peptides

Digested collagen is absorbed as single amino acids and unique di- and tri-peptides

The peptides are most commonly characterised by **hydroxyproline-proline** and **hydroxyproline-glycine** sequences

Hydroxyproline-proline also generated by degradation of endogenous collagen in tissue undergoing inflammation and at wound healing sites in the skin

Very few mammalian proteins apart from collagen (and elastin) contain hydroxyproline



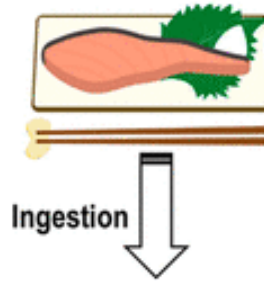
Native collagen vs collagen peptides

Collagen peptides show greater absorption and functional effects than native collagen forms such as gelatin

Native collagen in food also shows poor digestibility and absorption when compared to collagen peptides

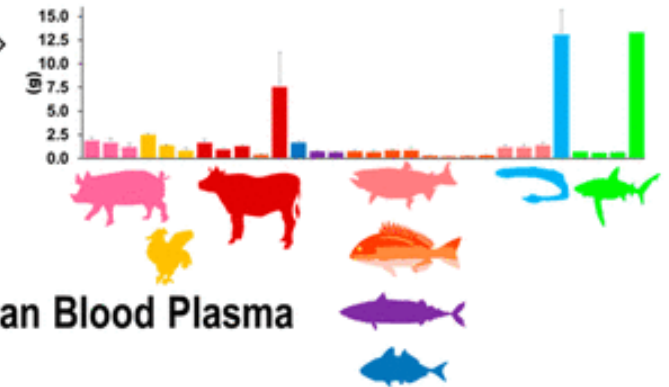
Evidence that lower molecular weight peptides have greater antioxidant and improved skin photoageing effects

Meat in one serve of Japanese dish

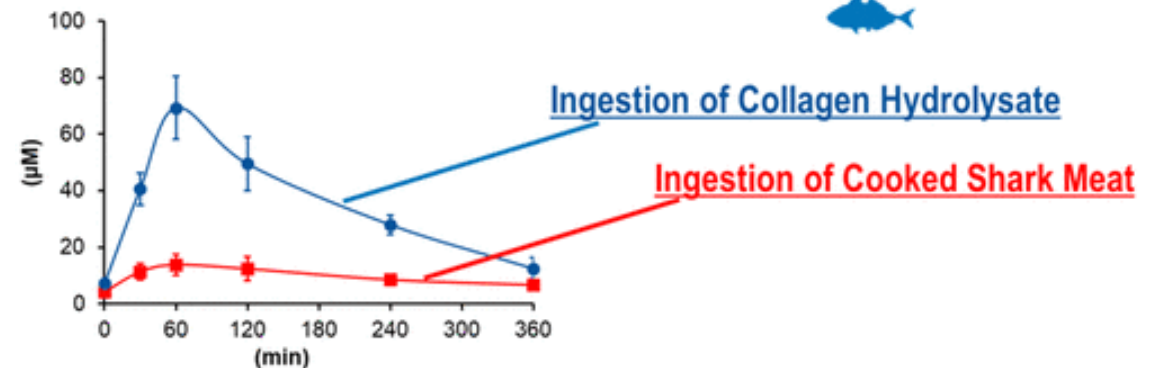


Ingestion

Collagen Amounts in Meats (g)



Peptide-form Hyp in Human Blood Plasma

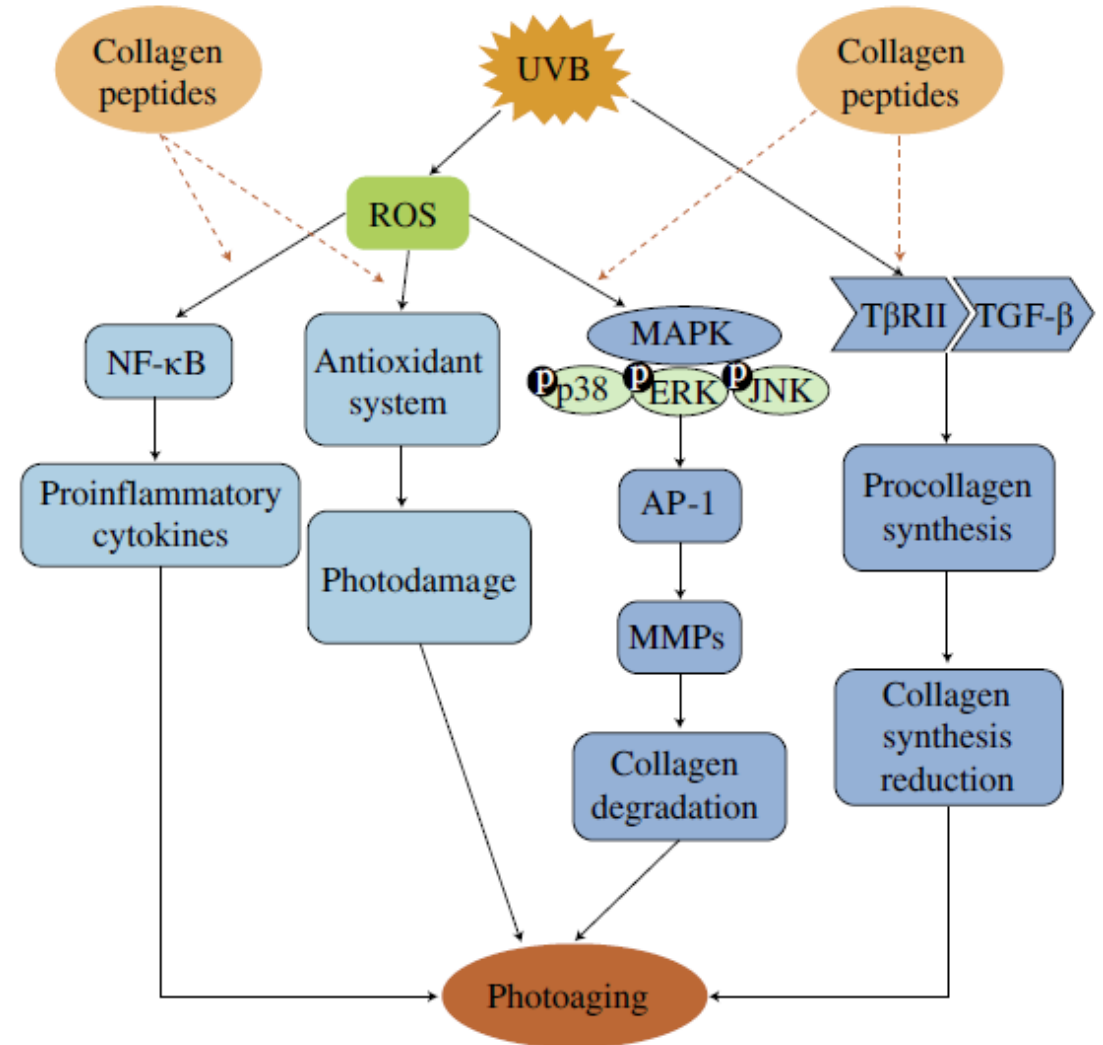


Collagen peptides in the skin

After absorption, collagen peptides are distributed in the body (especially to the skin) where they can remain in place for up to 2 weeks

Act as signalling molecules on fibroblast cell surface receptors to stimulate collagen, elastin and hyaluronic acid production as well as enhance proliferation of these cells

Also enhances the activity of antioxidant defence enzymes and inhibits inflammatory cytokines



But all those newspaper articles say that there is no evidence collagen supplements work. And what evidence there is has been funded by collagen manufacturers???



And then in March 2021, this happened



Review

Effects of hydrolyzed collagen supplementation on skin aging: a systematic review and meta-analysis

Roseane B. de Miranda MD, Patrícia Weimer MD, Rochele C. Rossi PhD ✉

First published: 20 March 2021 | <https://doi.org/10.1111/ijd.15518> | Citations: 9

Conflict of interest: None.

Funding source: None.

[Read the full text >](#)



PDF



TOOLS



SHARE



[Volume 60, Issue 12](#)

December 2021

Pages 1449-1461



Related



Information

Recommended

[Oral collagen supplementation for skin aging: A fad or the future?](#)

Nikita Jhawar BS,

What was studied?

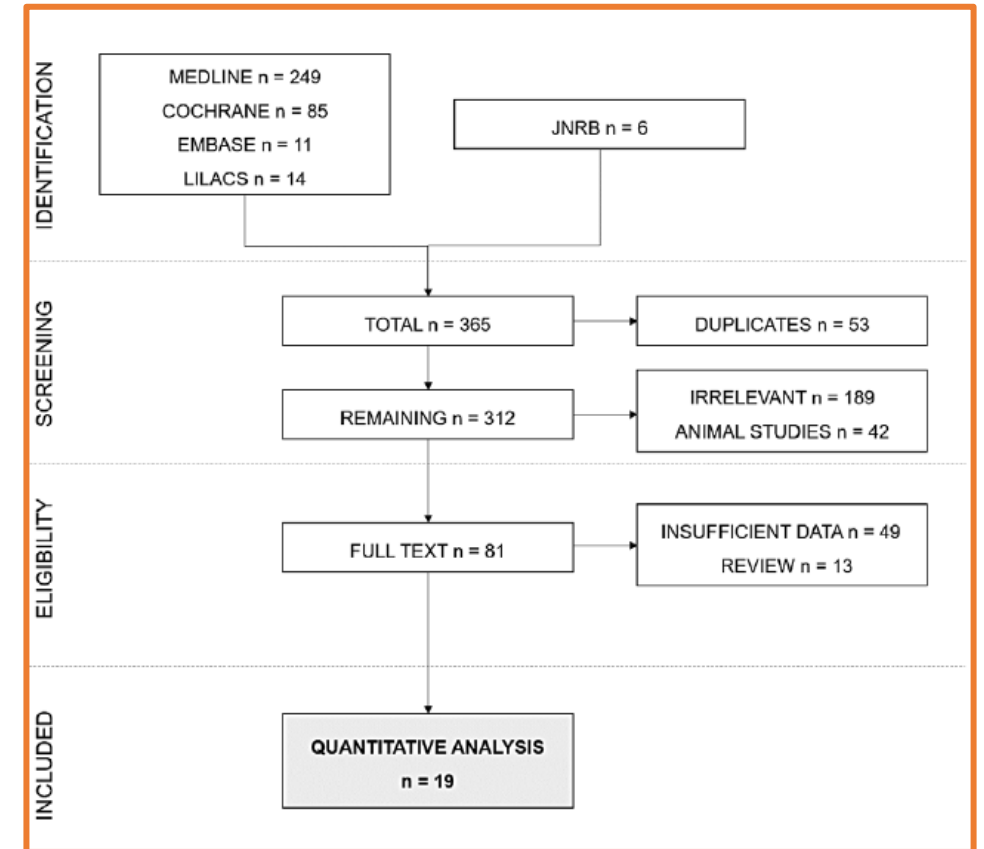
19 placebo-controlled, double-blinded randomised trials

1,125 participants aged 20-70 yrs (95% female) with mean age of 50 yrs

Doses ranged from **0.6 g/d to 12 g/d** for up to 4 months

Used a range of collagen formulations (mostly commercial) with and without additional ingredients (e.g. vitamins, minerals, antioxidants, CoQ10, hyaluronic acid, chondroitin)

Outcomes: Skin hydration, skin elasticity, skin density and wrinkles



What did they find?

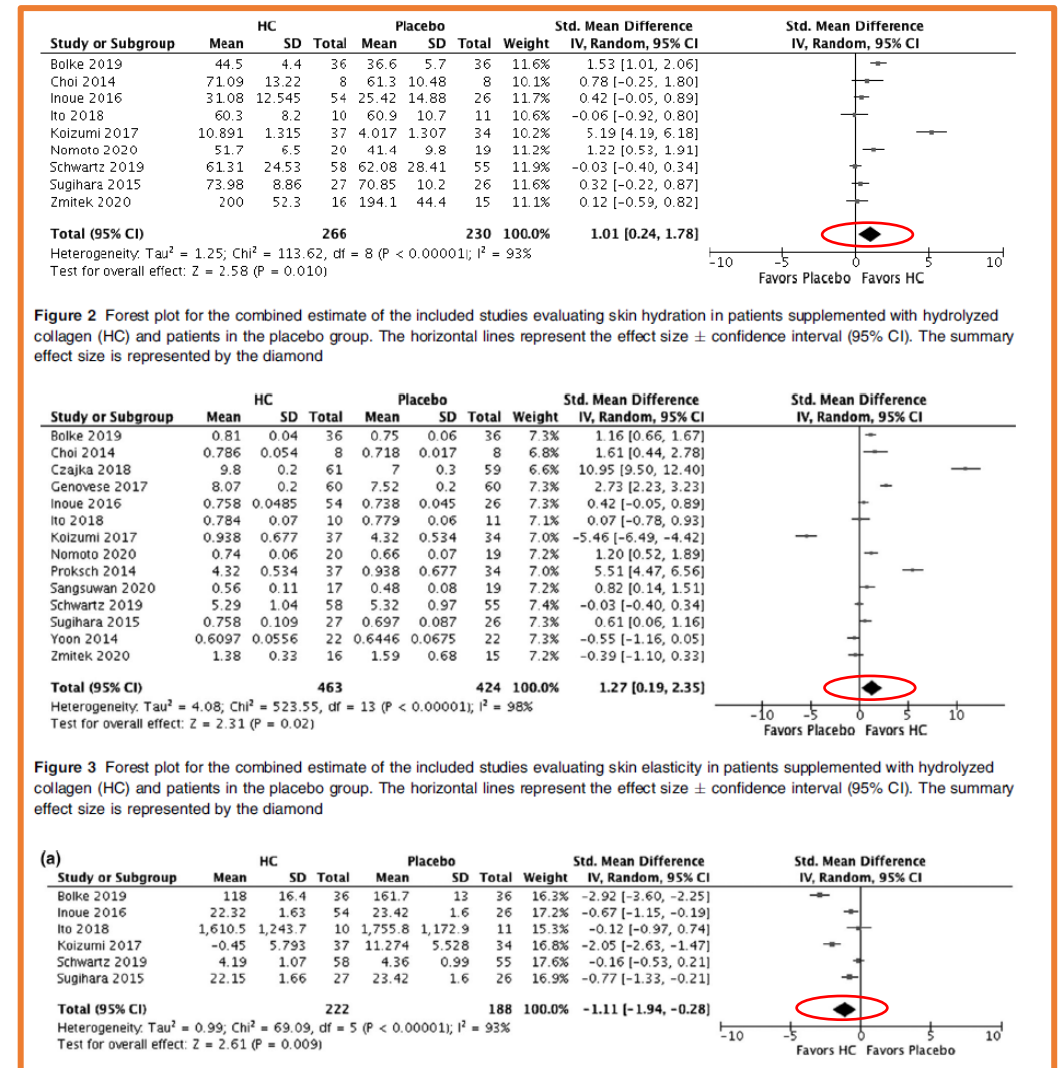
Supplementation with hydrolysed collagen saw a significant effect on **skin hydration**, **skin elasticity**, **skin density** and **wrinkles**

Benefit seen by 60 days and maintained for 30 days after end of the study

No adverse events reported in any study

7/19 studies did not involve commercial funding nor were any COI issues reported by the authors

Authors of the review reported no COI and received no funding

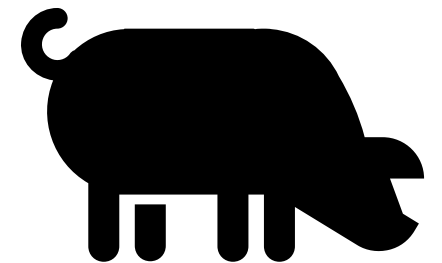
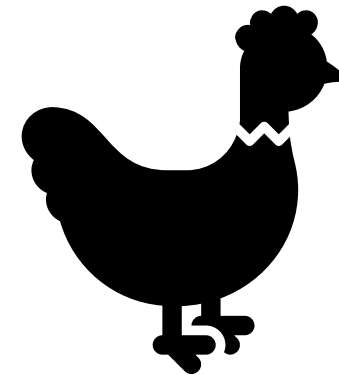
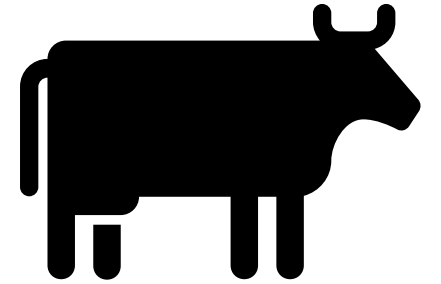
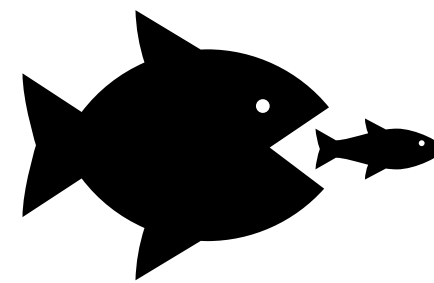


Collagen sources

Marine/fish collagen was the most common source of collagen followed by bovine, porcine and chicken

Studies using collagen alone were just as effective as those that had additional ingredients in the formulation

Studies using collagen supplements with higher concentrations of **Pro-Hyp** and **Hyp-Gly** dipeptides showed skin improvements after 4 weeks and indication of higher degree of efficacy



But wait, there's more



Updated systematic review and meta-analysis of 26 RCTs involving 1,721 people comparing hydrolysed collagen to placebo published in 2023



Supplementation duration was 2 to 12 weeks with doses of 0.6 to 12 g/d with outcomes assessed of skin elasticity and hydration



Significant improvements in skin elasticity and hydration with greatest benefits seen after 8 weeks

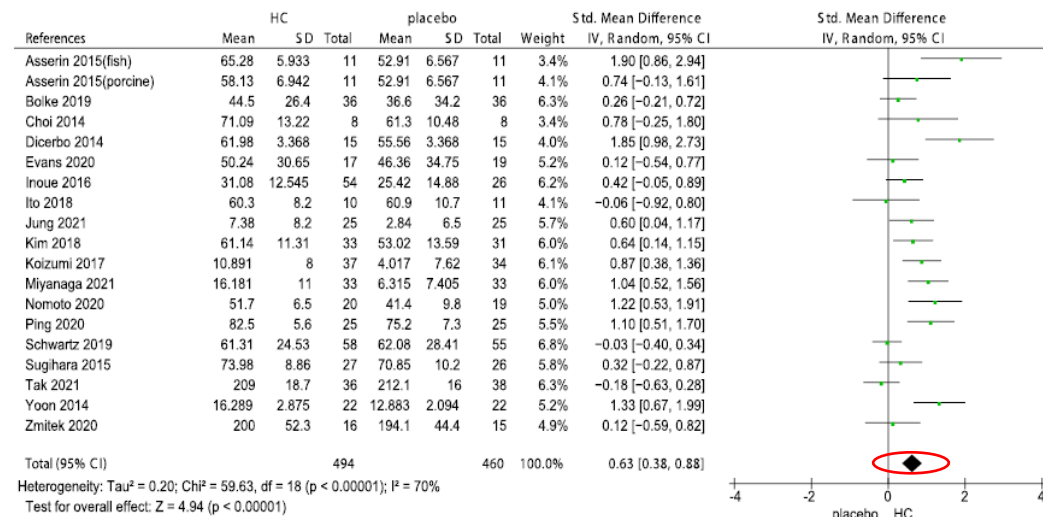


Figure 2. Forest plot of the included studies evaluating skin hydration in patients supplemented with HC and patients in the placebo group [26–28,30–35,39,40,43,44,46–50]. (HC: hydrolyzed collagen, CI: confidence intervals, SD: standard deviation, I²: heterogeneity).

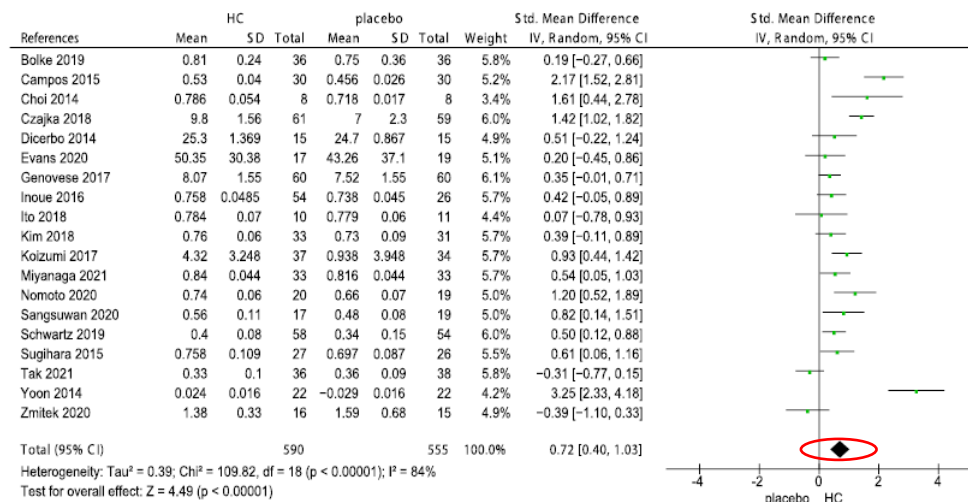


Figure 3. Forest plot of the included studies evaluating skin elasticity in patients supplemented with HC and patients in the placebo group [26–29,31–35,37,39–44,47–49]. (HC: hydrolyzed collagen, CI: confidence intervals, SD: standard deviation, I²: heterogeneity).

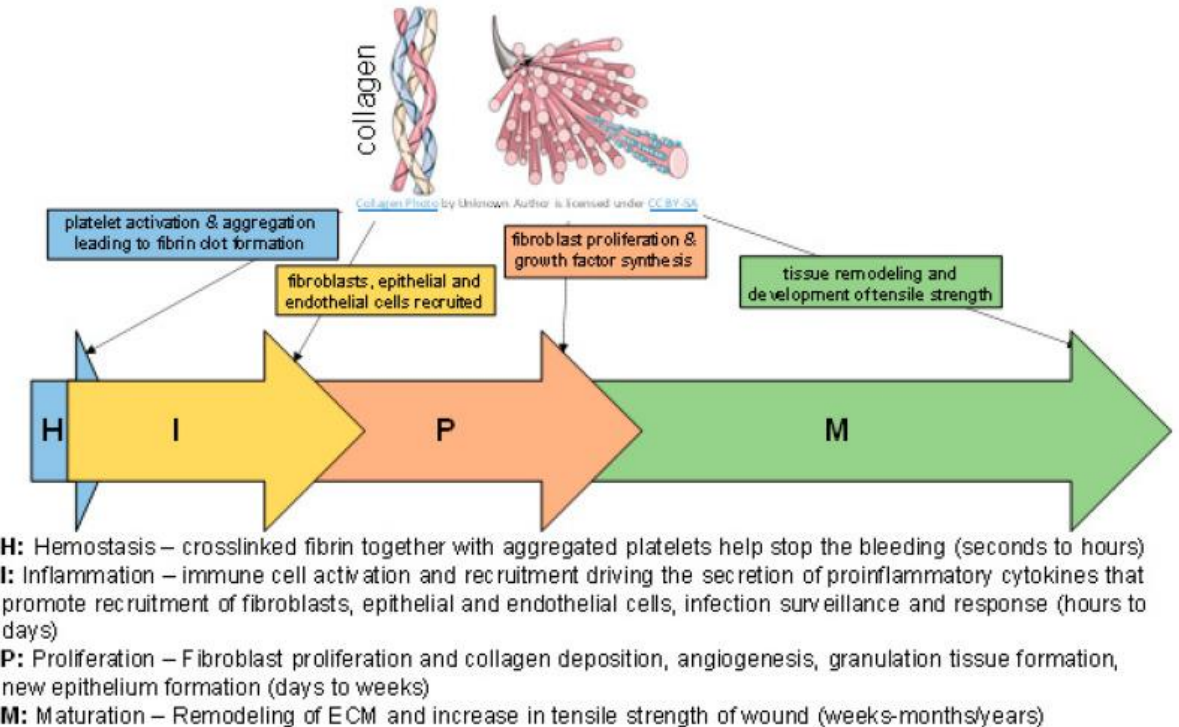
Collagen as an adjunct in wound healing

Chronic wounds are associated with high costs, lower quality of life and significant morbidity and mortality

Develops when progression through the normal phases of wound healing is impaired

Results in ↑ levels of pro-inflammatory cytokines, ↑ matrix metalloproteinases (MMPs), destruction of extracellular matrix components and ↓ activity of growth factors

Besides its function as a scaffold in skin, collagen also plays a pivotal role as a signaling molecule in the regulation of all phases of wound healing



Collagen dressings and wound healing

Systematic review of 11 RCTs involving 961 patients with chronic wounds (pressure ulcers, diabetic foot ulcers and venous leg ulcers)

Use of collagen dressing compared to SOC had a higher rate of wound healing as defined as complete healing (53% vs 34%) and a faster healing velocity

Collagen dressings are costly in the short term, but the cost can be offset by improved wound healing rate and accelerated wound healing

SYSTEMATIC REVIEW article

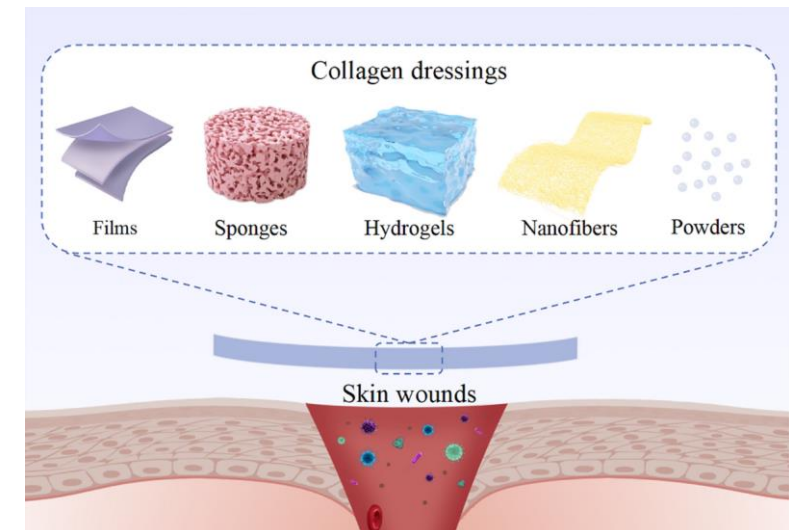
Front. Surg., 31 August 2022

Sec. Reconstructive and Plastic Surgery

Volume 9 - 2022 | <https://doi.org/10.3389/fsurg.2022.978407>

The clinical efficacy of collagen dressing on chronic wounds: A meta-analysis of 11 randomized controlled trials

Hongxin Shu^{1,2} Zhiyu Xia² Xuan Qin¹ Xiaowei Wang² Weihang Lu³
Qingyu Luo¹ Zhenxiong Zhang¹ Xiaowei Xiong^{1*}



Hydrolysed collagen and burns: RCT

34 adults with 20-30% of body surface area burns

Randomly assigned to an oral collagen-based supplement (36 g hydrolysed collagen, 1,000 kcal) or isocaloric placebo (35 g soy protein) plus usual meals (both groups) for 4 weeks

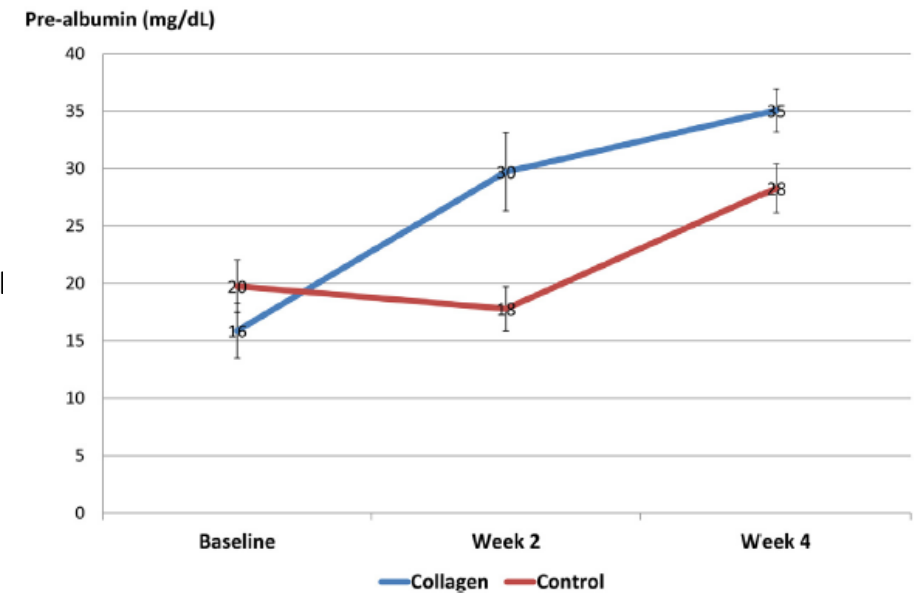
Serum pre-albumin higher at weeks 2 and 4 in collagen group

Week 2: Complete wound healing (defined as absence of a burn ulcer and the presence of a new layer of epithelium) in 8 (50%) patients in the collagen group at week 2 vs 1 (6.7%) in placebo group

Week 4: Full healing of wounds in all patients in collagen group vs 6 (40%) patients in the placebo group

Length of hospital stay in collagen group 9.4 days vs 13.5 for placebo group ($p=0.063$)

No differences in energy and protein intakes between groups



Hydrolysed collagen and pressure ulcers: RCT

122 adults with stage II or III pressure ulcers

Randomly assigned to an oral collagen supplement at low (CH-a) and high (CH-b) levels of di-peptides (Hyp-Gly and Pro-Hyp) at 10 g/day or placebo for 16 weeks

PU healing assessed by PUSH and PSST scores (assessor blinded)

PUSH, PSST and wound area of high collagen di-peptide group (CH-b) significantly lower than placebo group at week 16

PUSH score of low collagen di-peptide group (CH-a) significantly lower than placebo group at week 16

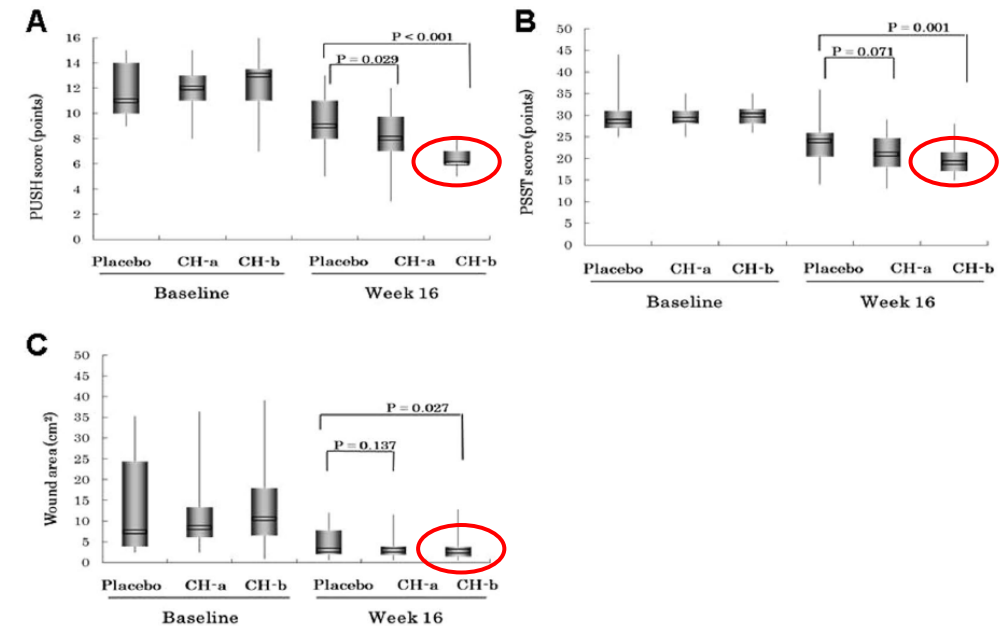


Figure 2. Comparisons of the primary treatment efficacy parameters (the Pressure Ulcer Scale for Healing (PUSH) score (A), Pressure Sore Status Tool (PSST) score (B), and wound area (C)) between the baseline and week 16. Data are expressed as mean values ($N = 38, 35$, and 39 for the CH-a, CH-b and placebo groups, respectively). The PUSH and PSST scores and the pressure ulcer surface area of the CH-b group were significantly lower than those of the placebo group at week 16 (PUSH score, $P < 0.01$; PSST score, $P = 0.01$; wound area, $P = 0.027$). The PUSH score of the CH-a group was significantly lower than that of the placebo group at week 16 ($P = 0.029$).



Most of the criticisms made about collagen in the popular press are way off the mark and not reflective of the scientific evidence



Digested collagen acts in the body via specific peptides which can accumulate in skin, improving its condition by $\uparrow$ synthesis of collagen, elastin and hyaluronic acid while alleviating oxidative stress, inhibiting inflammatory reactions and regulating cell behavior



There is very good evidence that a range of hydrolysed collagen forms can improve various aspects of skin health including skin hydration, skin elasticity and wrinkles



Greatest benefits of collagen supplementation for skin health can be seen by 8 weeks and with doses ranging from a few grams up to 12 grams per day



www.thinkingnutrition.com.au



Thinking Nutrition



@doctimcrowe



@doctimcrowe



Thinking Nutrition



@CroweTim