

Beneficial effects of multi-micronutrient supplementation with collagen peptides on global wrinkles, skin elasticity and appearance in healthy female subjects

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Supplementary information

Table S1. Ingredients of the Richelet Skin Renewal beauty supplement

Ingredient	Formula for 3 tablets	Amount (% RI)
Vitamin A	600 µg RE ¹	75%
Vitamin B2 (Riboflavin)	1.4 mg	100%
Vitamin B3 (Niacin)	8.0 mg	50%
Vitamin B7 (Biotin)	450 µg	900%
Vitamin C	120 mg	150%
Vitamin D3	5.0 µg	100%
Vitamin E	18 mg α-TE ²	150%
Copper	1.0 mg	100%
Iodine	150 µg	100%
Manganese	1.0 mg	50%
Selenium (as Selenium enriched yeast)	55 µg	100%
Zinc	14 mg	140%
Collagen peptides	2500 mg	n/a
Hyaluronic acid	120 mg	n/a

¹Retinol Equivalents (RE) ²alpha-tocopherol equivalents

Inclusion criteria

- a. Subjects provided signed Consent, including Confidentiality Agreement and photography/ video (live action) model release authorisation.
- b. Healthy female subjects between 45 to 65 years of age.
- c. Subjects were able to communicate meaningfully and to complete the questionnaires used in this trial.
- d. Fitzpatrick skin types I–VI.
- e. A minimum Global Wrinkles score of 4.
- f. The subject must have had uneven skin tone, dull skin, and lax/loose skin.
- g. The subject was willing to use the test article and basic skin care products following the directions for usage provided by the Sponsor for the duration of the study.
- h. The subject was willing and able to attend all study visits.
- i. The subject was willing to give their blood for antioxidant evaluation.
- j. The subject was not a supplement rejector and had taken beauty food supplements in the past or was open to taking them.
- k. The subject was willing to stop the use of all food supplements (including daily multivitamins or single vitamin supplements) from the beginning of the ‘washout’ phase, and throughout the study, other than those provided as part of the study.

Exclusion criteria

- a. Female subjects who were pregnant, planning pregnancy or are breastfeeding.
- b. Subjects who had used a food supplement (including daily multivitamins or single vitamin supplements) in the one month before starting the use of the test article (‘active phase’ - Visit 2).
- c. Any cutaneous pathology of the studied zone (face).
- d. Subjects who had used an anti-wrinkle product (or a product for cutaneous relief) on studied zone (face) or had stopped for less than one month prior to ‘active phase’ – Visit 2.
- e. Women having had injections on the face and/or a palpebral face lift.
- f. Excessive sunlight exposure or UV-rays in the one-month before starting use of the test article (‘active phase’ – Visit 2).
- g. Known allergy to any cosmetic or derma-pharmaceutical products.
- h. Subjects known to be allergic to one of the components of the study product.
- i. Subjects with past or current cancer history, chronic diseases of cardiovascular, hepatic, pulmonary, gastrointestinal, renal, haematological, endocrinal (e.g., diabetes, thyroid) or allergic origin.
- j. Subject enrolled in another clinical study during the study period.
- k. Subjects, having changed, started, or stopped a hormonal treatment including contraceptive pill over 1.5 months prior to starting use of the test article (‘active phase’ – Visit 2).
- l. Use of topical or systemic treatment during the previous weeks liable to interfere with the assessment of the tolerance of the studied product.
- m. Subjects having had a surgery under general anaesthesia during the month before ‘washout phase’ – Visit 1.
- n. Subjects with a known allergy to any ingredients included in the test article or who do not consume pork for religious or other reasons.
- o. Subjects who did not currently use a moisturiser or equivalent as part of their beauty routine.
- p. Subjects who are vegan or vegetarian.
- q. Subjects who had a Global Wrinkles score <4 after the ‘washout’ phase.

Glogau grading scale

Group	Classification	Typical Age	Description	Skin Characteristics
I	Mild	28–35	No fine lines or wrinkles	Early Photoaging: mild pigment changes, no keratosis, minimal wrinkles, minimal or no makeup
II	Moderate	35–50	Fine lines and Wrinkles in motion	Early to Moderate Photoaging: early brown spots visible, keratosis palpable but not visible, parallel smile lines begin to appear, wears some foundation
III	Advanced	50–65	Fine lines and Wrinkles at rest	Advanced Photoaging: obvious discolorations, visible capillaries (telangiectasias), visible keratosis, wears heavier foundation always
IV	Severe	60–75	Only fine lines and wrinkles	Severe Photoaging: yellow-grey skin color, prior skin malignancies, wrinkles throughout – no normal skin, cannot wear makeup because it cakes and cracks

Table S2: Summary of skin attribute rating question asked at all time points

Question: Think about your skin now, how would you rate each of the following characteristics	Washout (N=71)	Baseline (N=71)	Month 1 (N=71)	Month 2 (N=71)	Month 3 (N=71)
Skin Tone/Even Color					
Good-Excellent	32 (47.1%)	30 (42.3%)	42 (59.2%)	61 (85.9%)	61 (85.9%)
Poor-Fair	36 (52.9%)	41 (57.7%)	29 (40.8%)	10 (14.1%)	10 (14.1%)
Skin Texture					
Good-Excellent	36 (52.9%)	33 (46.5%)	51 (71.8%)	62 (87.3%)	61 (85.9%)
Poor-Fair	32 (47.1%)	38 (53.5%)	20 (28.2%)	9 (12.7%)	10 (14.1%)
Appearance of Fine Lines/Wrinkles					
Good-Excellent	28 (41.2%)	22 (31.0%)	39 (54.9%)	47 (66.2%)	56 (78.9%)
Poor-Fair	40 (58.8%)	49 (69.0%)	32 (45.1%)	24 (33.8%)	15 (21.1%)
Skin Looking Bright					
Good-Excellent	21 (30.4%)	19 (26.8%)	45 (63.4%)	56 (78.9%)	59 (83.1%)
Poor-Fair	48 (69.6%)	52 (73.2%)	26 (36.6%)	15 (21.1%)	12 (16.9%)
Skin Looking Flawless					
Good-Excellent	13 (18.8%)	13 (18.3%)	32 (45.1%)	43 (60.6%)	51 (71.8%)
Poor-Fair	56 (81.2%)	58 (81.7%)	39 (54.9%)	28 (39.4%)	20 (28.2%)
Skin Looking Dull					
Good-Excellent	18 (26.1%)	18 (25.4%)	32 (45.1%)	39 (54.9%)	42 (59.2%)
Poor-Fair	51 (73.9%)	53 (74.6%)	39 (54.9%)	32 (45.1%)	29 (40.8%)
Feeling of Skin Firmness					
Good-Excellent	22 (31.9%)	19 (26.8%)	47 (66.2%)	52 (73.2%)	54 (76.1%)
Poor-Fair	47 (68.1%)	52 (73.2%)	24 (33.8%)	19 (26.8%)	17 (23.9%)
Skin Radiance/Glow					
Good-Excellent	17 (24.6%)	17 (23.9%)	45 (63.4%)	54 (76.1%)	57 (80.3%)
Poor-Fair	52 (75.4%)	54 (76.1%)	26 (36.6%)	17 (23.9%)	14 (19.7%)
Skin Feeling Moisturized					
Good-Excellent	28 (40.6%)	33 (46.5%)	53 (74.6%)	54 (76.1%)	59 (83.1%)
Poor-Fair	41 (59.4%)	38 (53.5%)	18 (25.4%)	17 (23.9%)	12 (16.9%)
Skin Feeling Hydrated					
Good-Excellent	21 (30.0%)	30 (42.3%)	49 (69.0%)	55 (77.5%)	57 (80.3%)
Poor-Fair	49 (70.0%)	41 (57.7%)	22 (31.0%)	16 (22.5%)	14 (19.7%)
Skin Feeling Dry or Tight					
Good-Excellent	22 (31.4%)	20 (28.2%)	33 (46.5%)	37 (52.1%)	45 (63.4%)
Poor-Fair	48 (68.6%)	51 (71.8%)	38 (53.5%)	34 (47.9%)	26 (36.6%)
Skin Feeling Nourished					
Good-Excellent	21 (29.6%)	34 (47.9%)	47 (66.2%)	55 (77.5%)	58 (81.7%)
Poor-Fair	50 (70.4%)	37 (52.1%)	24 (33.8%)	16 (22.5%)	13 (18.3%)

Skin Feeling Smooth					
Good-Excellent	27 (38.6%)	35 (49.3%)	56 (78.9%)	61 (85.9%)	59 (83.1%)
Poor-Fair	43 (61.4%)	36 (50.7%)	15 (21.1%)	10 (14.1%)	12 (16.9%)
Skin Feeling Soft					
Good-Excellent	34 (48.6%)	39 (54.9%)	55 (77.5%)	63 (88.7%)	58 (81.7%)
Poor-Fair	36 (51.4%)	32 (45.1%)	16 (22.5%)	8 (11.3%)	13 (18.3%)
Overall Skin Appearance/Condition					
Good-Excellent	22 (31.4%)	25 (35.2%)	48 (67.6%)	61 (85.9%)	59 (83.1%)
Poor-Fair	48 (68.6%)	46 (64.8%)	23 (32.4%)	10 (14.1%)	12 (16.9%)

Rating scale: Excellent, Very Good, Good, Fair and Poor.

Table S3: Analysis of change from baseline for skin attribute rating question asked at baseline and Months 1, 2 and 3

Question: Think about your skin now, how would you rate each of the following characteristics	Statistic	CFB Month 1 (N=71)	CFB Month 2 (N=71)	CFB Month 3 (N=71)
Skin Tone/Even Color ²				
	Mean (SD)	6.7 (19.80)	20.1 (20.10)	25.7 (24.26)
	Median	0	25	25
	Min-Max	-50.0-50.0	-25.0-75.0	-25.0-100.0
	p-value	0.0059	<.0001	<.0001
Skin Texture ²				
	Mean (SD)	11.3 (21.46)	22.5 (22.82)	28.2 (24.97)
	Median	0	25	25
	Min-Max	-50.0-50.0	-25.0-75.0	-25.0-75.0
	p-value	<.0001	<.0001	<.0001
Appearance of Fine Lines/Wrinkles ²				
	Mean (SD)	9.2 (21.65)	18.7 (27.29)	26.4 (28.94)
	Median	0	25	25
	Min-Max	-50.0-50.0	-50.0-75.0	-25.0-75.0
	p-value	0.0005	<.0001	<.0001
Skin Looking Bright ²				
	Mean (SD)	16.2 (26.08)	29.2 (26.39)	33.8 (28.69)
	Median	25	25	25
	Min-Max	-50.0-75.0	-25.0-100.0	-25.0-100.0
	p-value	<.0001	<.0001	<.0001
Skin Looking Flawless ²				
	Mean (SD)	13.0 (21.90)	22.9 (27.30)	28.9 (28.55)
	Median	25	25	25
	Min-Max	-50.0-50.0	-50.0-100.0	-50.0-100.0
	p-value	<.0001	<.0001	<.0001
Skin Looking Dull ²				
	Mean (SD)	7.0 (27.12)	9.5 (32.01)	14.8 (34.48)
	Median	0	25	25

	Min-Max	-75.0-50.0	-75.0-75.0	-75.0-75.0
	p-value	0.0327	0.009	0.0003
Feeling of Skin Firmness ²				
	Mean (SD)	16.9 (23.44)	28.2 (27.03)	28.2 (28.64)
	Median	25	25	25
	Min-Max	-25.0-75.0	-25.0-100.0	-25.0-100.0
	p-value	<.0001	<.0001	<.0001
Skin Radiance/Glow ²				
	Mean (SD)	19.4 (23.60)	30.3 (26.36)	35.6 (29.48)
	Median	25	25	25
	Min-Max	-25.0-75.0	-25.0-100.0	-25.0-100.0
	p-value	<.0001	<.0001	<.0001
Skin Feeling Moisturized ²				
	Mean (SD)	17.6 (23.68)	20.1 (24.86)	28.2 (26.70)
	Median	25	25	25
	Min-Max	-50.0-75.0	-25.0-100.0	-25.0-100.0
	p-value	<.0001	<.0001	<.0001
Skin Feeling Hydrated ²				
	Mean (SD)	17.6 (24.05)	22.5 (26.78)	31.0 (26.88)
	Median	25	25	25
	Min-Max	-25.0-75.0	-50.0-100.0	-25.0-100.0
	p-value	<.0001	<.0001	<.0001
Skin Feeling Dry or Tight ²				
	Mean (SD)	7.0 (23.60)	10.9 (26.64)	18.3 (27.37)
	Median	0	0	25
	Min-Max	-75.0-50.0	-50.0-75.0	-50.0-75.0
	p-value	0.0107	0.0011	<.0001
Skin Feeling Nourished ²				
	Mean (SD)	13.4 (22.69)	22.5 (29.02)	27.1 (28.27)
	Median	25	25	25
	Min-Max	-25.0-75.0	-25.0-100.0	-25.0-100.0
	p-value	<.0001	<.0001	<.0001
Skin Feeling Smooth ²				
	Mean (SD)	14.4 (22.62)	22.9 (25.96)	26.4 (27.67)
	Median	25	25	25
	Min-Max	-25.0-75.0	-25.0-100.0	-25.0-100.0
	p-value	<.0001	<.0001	<.0001
Skin Feeling Soft ²				
	Mean (SD)	14.8 (22.98)	23.2 (23.27)	25.0 (26.39)
	Median	25	25	25
	Min-Max	-25.0-50.0	-25.0-75.0	-25.0-75.0
	p-value	<.0001	<.0001	<.0001
Overall Skin Appearance/Condition ²				
	Mean (SD)	15.1 (23.33)	27.8 (25.20)	31.0 (28.49)

	Median	25	25	25
	Min-Max	-50.0-50.0	-25.0-100.0	-25.0-100.0
	p-value	<.0001	<.0001	<.0001

* P-value is from Wilcoxon signed rank test. ²Scored 100, 75, 50, 25, 0 (change positive better)

Table S4: Analysis of skin agreement questions asked at Months 1, 2 and 3

Question: Thinking about the Richelet Skin Renewal supplement you just used, please indicate how much you agree or disagree with the following statements	Month 1 (N=71)	Month 2 (N=71)	Month 3 (N=71)
Smoothed Look of Fine Lines & Wrinkles	p-value=0.7218	p-value=0.0222	p-value=0.0168
Agree	34 (47.9%)	44 (63.8%)	45 (64.3%)
Neutral-Disagree	37 (52.1%)	25 (36.2%)	25 (35.7%)
Made Fine Lines Less Noticeable	p-value=0.7218	p-value=0.0750	p-value=0.0127
Agree	34 (47.9%)	43 (60.6%)	46 (64.8%)
Neutral-Disagree	37 (52.1%)	28 (39.4%)	25 (35.2%)
Softened Skin Texture	p-value=0.0314	p-value=<.0001	p-value=<.0001
Agree	44 (62.9%)	52 (73.2%)	54 (76.1%)
Neutral-Disagree	26 (37.1%)	19 (26.8%)	17 (23.9%)
Improved My Skin	p-value=0.1917	p-value=<.0001	p-value=<.0001
Agree	41 (57.7%)	54 (76.1%)	54 (77.1%)
Neutral-Disagree	30 (42.3%)	17 (23.9%)	16 (22.9%)
Smoothed My Skin	p-value=0.2855	p-value=0.0014	p-value=<.0001
Agree	40 (56.3%)	49 (69.0%)	54 (76.1%)
Neutral-Disagree	31 (43.7%)	22 (31.0%)	17 (23.9%)
Improved the Texture of My Skin	p-value=0.0943	p-value=<.0001	p-value=0.0001
Agree	42 (60.0%)	53 (74.6%)	51 (72.9%)
Neutral-Disagree	28 (40.0%)	18 (25.4%)	19 (27.1%)
Left My Skin Feeling Stronger	p-value=0.1515	p-value=0.0943	p-value=0.0168
Agree	29 (41.4%)	42 (60.0%)	45 (64.3%)
Neutral-Disagree	41 (58.6%)	28 (40.0%)	25 (35.7%)
Left Skin Complexion More Even	p-value=0.1917	p-value=0.0436	p-value=0.0002
Agree	30 (42.3%)	44 (62.0%)	51 (71.8%)
Neutral-Disagree	41 (57.7%)	27 (38.0%)	20 (28.2%)
Left Skin Looking Brighter	p-value=0.5529	p-value=<.0001	p-value=<.0001
Agree	38 (53.5%)	54 (76.1%)	52 (73.2%)
Neutral-Disagree	33 (46.5%)	17 (23.9%)	19 (26.8%)
Reduced Appearance Hyperpigmentation/Discoloration	p-value=<.0001 ¹	p-value=0.2855	p-value=0.5529
Agree	15 (21.1%)	31 (43.7%)	38 (53.5%)
Neutral-Disagree	56 (78.9%)	40 (56.3%)	33 (46.5%)
Left My Skin With Dewy Glow	p-value=0.0436 ¹	p-value=0.1917	p-value=0.0750
Agree	27 (38.0%)	41 (57.7%)	43 (60.6%)
Neutral-Disagree	44 (62.0%)	30 (42.3%)	28 (39.4%)
Worked With My Skin Tone	p-value=0.0558	p-value=0.1229	p-value=<.0001
Agree	27 (38.6%)	42 (59.2%)	52 (73.2%)

Neutral-Disagree	43 (61.4%)	29 (40.8%)	19 (26.8%)
Was Suitable for My Skin Type	p-value=0.0127	p-value=0.0014	p-value=<.0001
Agree	46 (64.8%)	49 (69.0%)	57 (80.3%)
Neutral-Disagree	25 (35.2%)	22 (31.0%)	14 (19.7%)
Left My Skin Feeling Firmer	p-value=0.5529	p-value=0.0030	p-value=<.0001
Agree	38 (53.5%)	48 (67.6%)	53 (74.6%)
Neutral-Disagree	33 (46.5%)	23 (32.4%)	18 (25.4%)
Left My Skin Feeling Hydrated	p-value=0.0750	p-value=0.0030	p-value=0.0002
Agree	43 (60.6%)	48 (67.6%)	51 (71.8%)
Neutral-Disagree	28 (39.4%)	23 (32.4%)	20 (28.2%)
Left My Skin Feeling Moisturized	p-value=0.0558	p-value=0.0014	p-value=<.0001
Agree	43 (61.4%)	49 (69.0%)	56 (78.9%)
Neutral-Disagree	27 (38.6%)	22 (31.0%)	15 (21.1%)
Left My Skin Feeling Nourished	p-value=0.3390	p-value=0.0006	p-value=0.0003
Agree	39 (55.7%)	50 (70.4%)	50 (71.4%)
Neutral-Disagree	31 (44.3%)	21 (29.6%)	20 (28.6%)
Wrinkles Appear Reduced Around Eyes	p-value=0.0436 ¹	p-value=0.2320	p-value=0.0030
Agree	27 (38.0%)	40 (57.1%)	48 (67.6%)
Neutral-Disagree	44 (62.0%)	30 (42.9%)	23 (32.4%)
Wrinkles Appear Reduced On Neck	p-value=0.0030 ¹	p-value=0.7218	p-value=0.8111
Agree	23 (32.4%)	34 (47.9%)	36 (51.4%)
Neutral-Disagree	48 (67.6%)	37 (52.1%)	34 (48.6%)

Rating Scale: Very Strongly Agree, Strongly Agree, Agree, Neither Agree or Disagree, Disagree, Strongly Disagree and Very Strongly Disagree

* P-value is from a binomial test testing if differs from 0.5. ¹P-value in wrong direction (against Richelet).

Table S5: Analysis of change in skin questions asked at Months 1, 2 and 3

Question: Did Richelet Skin Renewal supplement change the...	Month 1 (N=71)	Month 2 (N=71)	Month 3 (N=71)
Appearance of Fine Lines/Wrinkles	p-value=0.9055	p-value=0.0153	p-value=0.0002
Better	36 (50.7%)	44 (64.7%)	51 (71.8%)
No Change-Worse	35 (49.3%)	24 (35.3%)	20 (28.2%)
Visible Texture of Skin	p-value=0.0558	p-value=0.0002	p-value=<.0001
Better	43 (61.4%)	51 (71.8%)	57 (80.3%)
No Change-Worse	27 (38.6%)	20 (28.2%)	14 (19.7%)
Brightness of Skin	p-value=0.4061	p-value=<.0001	p-value=<.0001
Better	39 (54.9%)	54 (76.1%)	54 (76.1%)
No Change-Worse	32 (45.1%)	17 (23.9%)	17 (23.9%)
Evenness of Your Skin Tone	p-value=0.2320	p-value=0.0750	p-value=0.0019
Better	30 (42.9%)	43 (60.6%)	48 (68.6%)
No Change-Worse	40 (57.1%)	28 (39.4%)	22 (31.4%)
Firmness of Skin	p-value=0.7218	p-value=0.0030	p-value=<.0001
Better	37 (52.1%)	48 (67.6%)	53 (74.6%)
No Change-Worse	34 (47.9%)	23 (32.4%)	18 (25.4%)
Visible Appearance of Acne Marks	p-value=<.0001 ¹	p-value=0.0002 ¹	p-value=0.0436 ¹
Better	19 (26.8%)	20 (28.2%)	27 (38.0%)

No Change-Worse	52 (73.2%)	51 (71.8%)	44 (62.0%)
Skin Glow	p-value=0.5529	p-value=0.0127	p-value=0.0008
Better	38 (53.5%)	46 (64.8%)	49 (70.0%)
No Change-Worse	33 (46.5%)	25 (35.2%)	21 (30.0%)
Softness of the Skin	p-value=0.0041	p-value=<.0001	p-value=<.0001
Better	47 (67.1%)	55 (77.5%)	55 (77.5%)
No Change-Worse	23 (32.9%)	16 (22.5%)	16 (22.5%)
Smoothness of the Skin	p-value=0.0063	p-value=<.0001	p-value=<.0001
Better	47 (66.2%)	54 (76.1%)	54 (76.1%)
No Change-Worse	24 (33.8%)	17 (23.9%)	17 (23.9%)
Feeling Hydrated	p-value=0.1229	p-value=0.0063	p-value=<.0001
Better	42 (59.2%)	47 (66.2%)	52 (73.2%)
No Change-Worse	29 (40.8%)	24 (33.8%)	19 (26.8%)
Feeling Moisturized	p-value=0.0063	p-value=<.0001	p-value=<.0001
Better	47 (66.2%)	52 (74.3%)	56 (78.9%)
No Change-Worse	24 (33.8%)	18 (25.7%)	15 (21.1%)
Overall Skin Complexion	p-value=0.0558	p-value=<.0001	p-value=<.0001
Better	43 (61.4%)	54 (76.1%)	53 (74.6%)
No Change-Worse	27 (38.6%)	17 (23.9%)	18 (25.4%)
Overall Skin Appearance	p-value=0.0241	p-value=<.0001	p-value=<.0001
Better	45 (63.4%)	55 (77.5%)	54 (76.1%)
No Change-Worse	26 (36.6%)	16 (22.5%)	17 (23.9%)
Feeling Nourished	p-value=0.0436	p-value=0.0006	p-value=<.0001
Better	44 (62.0%)	50 (70.4%)	55 (77.5%)
No Change-Worse	27 (38.0%)	21 (29.6%)	16 (22.5%)

Rating scale: I know it is better, I think it is better, no change, I think it is worse. And I know it is worse.

* P-value is from a binomial test testing if differs from 0.5. ¹P-value in wrong direction (against Richelet).

Table S6: Analysis of change in skin questions asked at Months 1, 2 and 3

Question: Thinking about the Richelet Skin Renewal supplement you just used, please indicate how much you agree or disagree with the following statements	Month 3 (N=71)
Product is Effective	p-value=<.0001
Agree	55 (77.5%)
Neutral-Disagree	16 (22.5%)
Great Addition to Skin Routine	p-value=0.0014
Agree	49 (69.0%)
Neutral-Disagree	22 (31.0%)

Rating Scale: Very Strongly Agree, Strongly Agree, Agree, Neither Agree or Disagree, Disagree, Strongly Disagree and Very Strongly Disagree. * P-value is from a binomial test testing if differs from 0.5.