

Synergistic Bioactive Ingredients and 24K Gold for Advanced Anti-Aging Efficacy in Aesthetic Medicine

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BACKGROUND

Gold-based formulations have long been valued in aesthetic medicine for their anti-aging properties. The facial concentrate evaluated in the following study (6914) combines 24K gold flakes, wild yam (*Dioscorea villosa*) extract, and a complex of thioproline and L-ergothioneine, offering a synergistic blend of ingredients with potent bioactive efficacy. Additionally, L-ergothioneine exhibits protective effect on mitochondrial DNA, reducing the occurrence of 'common deletions' after UVA exposure (**Fig. 1**). This study evaluates the *in vitro* activity of these ingredients and the *in vivo* efficacy of the final formulation in improving skin parameters such as firmness, elasticity, and wrinkle reduction.

METHODS

In vitro studies assessed the individual and combined effects of the active ingredients. The synergistic effect of thioproline and L-ergothioneine on KB cell proliferation was evaluated using a MTT cell viability assay and antioxidant efficacy was assessed through the DPPH assay. In both cases, synergy was calculated via Kull's equation with synergy index (SI) above 1 indicating synergy occurrence. Wild yam extract was tested for its ability to enhance proliferation in primary human dermal fibroblasts obtained from donors aged 16 and 70. *In vivo* efficacy was tested in a clinical trial with 30 female participants (aged 37–75) with combination skin, visible redness, and wrinkles. Participants applied the concentrate twice daily for three weeks. Skin firmness, elasticity, and wrinkle count and volume were evaluated using biophysical measurements and imaging analysis.

RESULTS

In vitro, thioproline and L-ergothioneine demonstrated significant synergistic effects in promoting KB cell proliferation (SI: 1.0789) and antioxidant activity (SI: 20.306; **Fig. 2**). Wild yam extract enhanced fibroblast proliferation in both young and aged donor cells, confirming its rejuvenating properties (**Fig. 2**). *In vivo*, the final formulation significantly improved skin firmness in 82% of participants (mean increase: 81%) and elasticity in 73% of participants (mean increase: 28%). Wrinkle count and volume were reduced by 20% and 29%, respectively (**Fig. 3**), demonstrating the formulation's robust anti-aging effects (**Fig. 4**).

Prevention of UVA-induced mtDNA 'common deletions' after exposure to L-ergothioneine

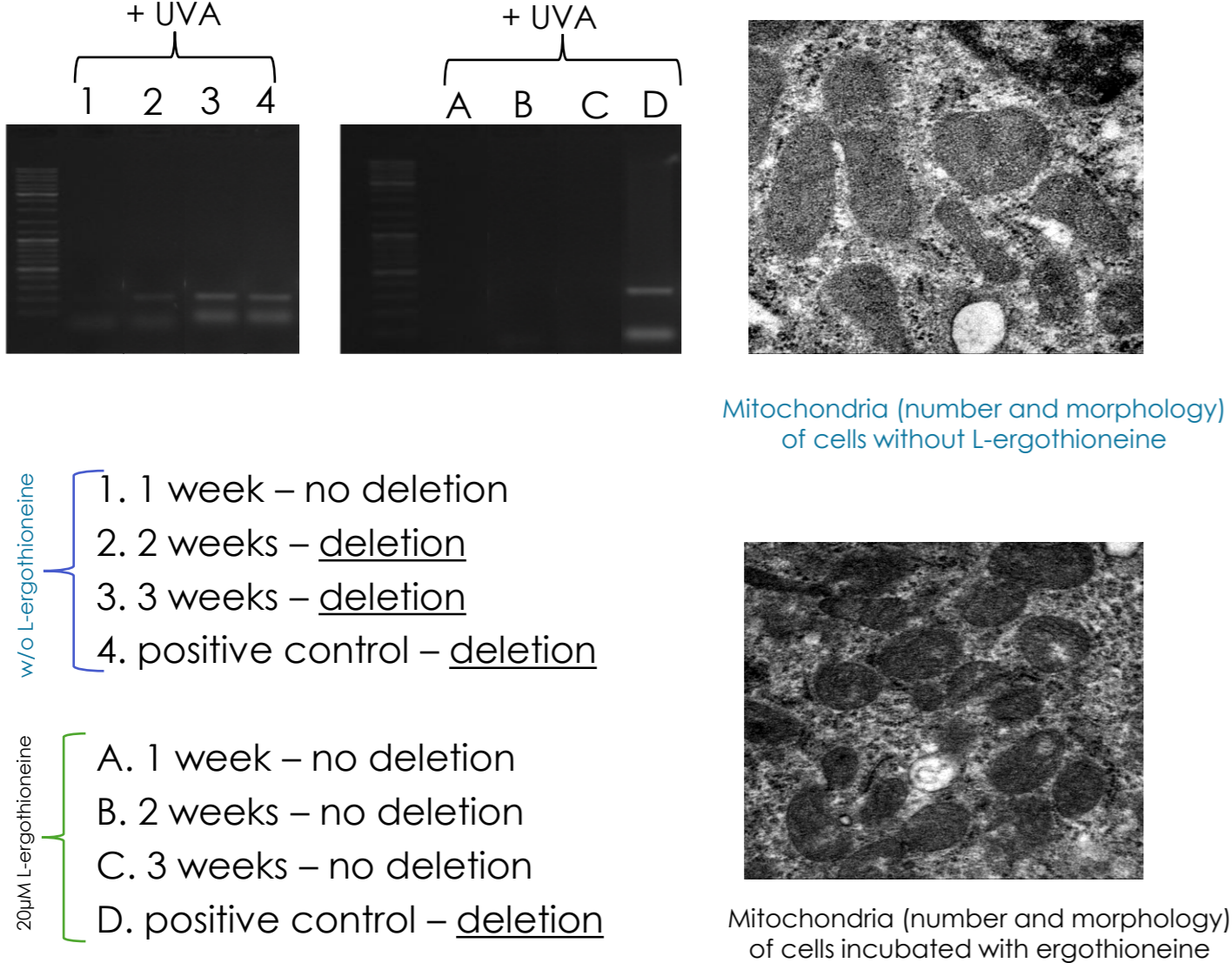


Fig. 1 Presence of 'common deletions' in mtDNA after exposure to UVA radiation. Cells incubated with ergothioneine and exposed to UVA did not express 'common deletions'. Changes in size and morphology of cell mitochondria indicate their higher activity.

Wild yam extract, thioproline and L-ergothioneine – cell proliferation and antioxidant potency

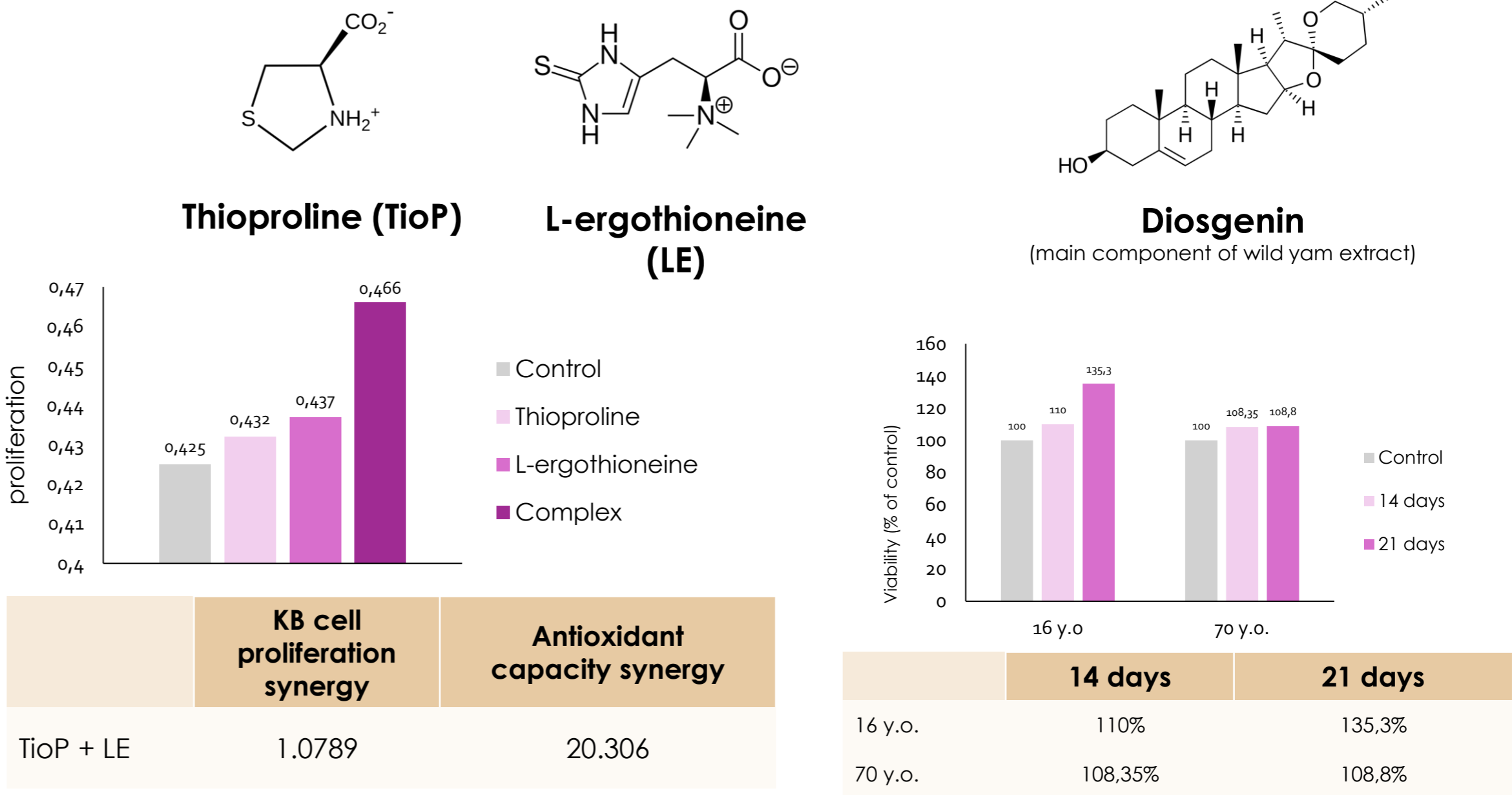
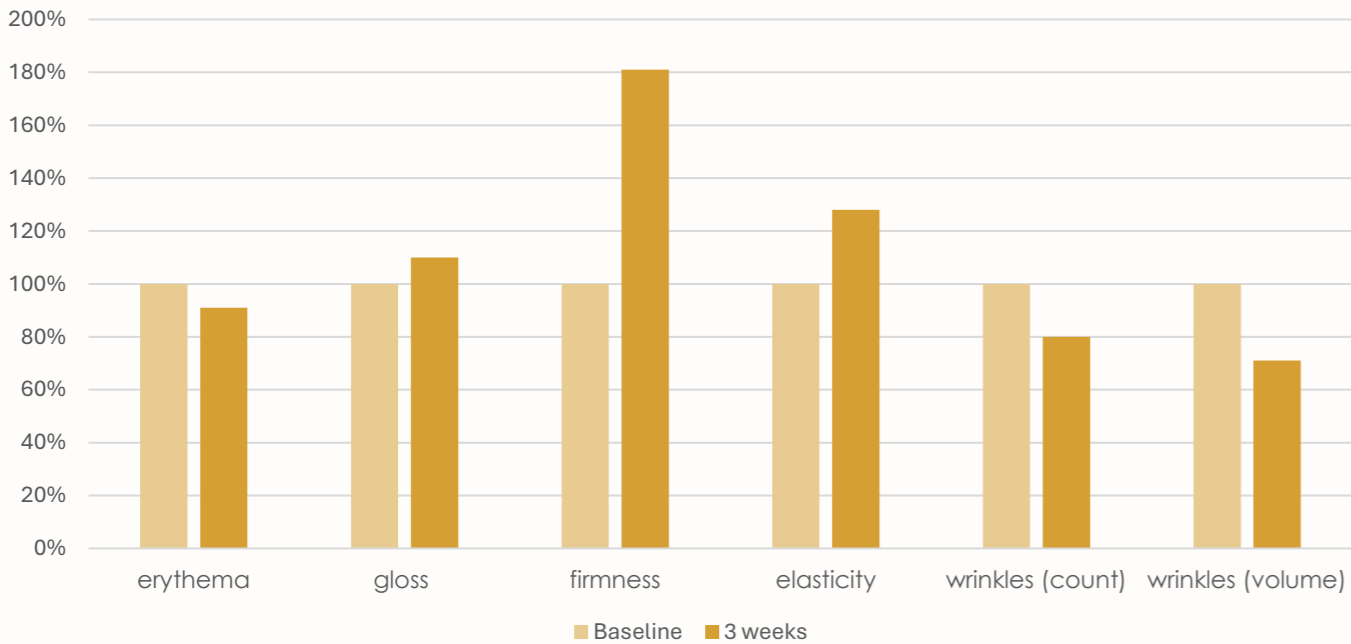


Fig. 2. Synergy of Thioproline/L-ergothioneine complex in KB cell proliferation and antioxidant capacity. In proliferation assay, concentrations of TioP and LE were 10-5% and 10-4%, respectively. For antioxidant capacity assessment – 0.6 mg/mL for TioP and 0.45 mg/mL for LE. Values >1 indicates synergy

Fig. 2. Influence of wild yam extract on viability of young and aged fibroblasts (obtained from 16 and 70 year-old subjects). Values are expressed as mean viability of control (untreated cells).

Assessment of *in vivo* efficacy of a facial concentrate 6914



Parameter	Baseline	In the whole group	In volunteers with improvement
erythema	100%	95%	91% (in 82% volunteers)
gloss	100%	no improvement	110% (in 73% volunteers)
firmness	100%	150%	181% (in 81% volunteers)
elasticity	100%	118%	128% (in 73% volunteers)
wrinkles (count)	100%	93%	80% (in 73% volunteers)
wrinkles (volume)	100%	86%	71% (in 55% volunteers)

Figure 4. Instrumental analysis of skin condition parameters (erythema, gloss, firmness, elasticity, wrinkle count and volume) after 3 weeks of using serum 6914.



Figure 3. Best results in wrinkle count (A, B) and smoothness (D, C) after 3 weeks of application of serum 6914.

CONCLUSIONS

The facial concentrate 6914 leverages the synergistic effects of thioproline and L-ergothioneine, the regenerative properties of wild yam extract, and the anti-aging benefits of 24K gold flakes to deliver remarkable improvements in skin firmness, elasticity, and wrinkle reduction. These findings underscore the potential of this innovative formulation as a powerful anti-aging treatment, warranting further investigation into its long-term efficacy and mechanisms of action.

IMPACT OF THE STUDY

The synergy between thioproline and L-ergothioneine in both antioxidant efficacy and cellular proliferation reflects a cutting-edge approach to formulating cosmetics. Such formulations may reduce oxidative stress and support dermal remodeling at the cellular level, providing a biologically substantiated basis for skin rejuvenation that aligns with the goals of aesthetic medicine. Facial concentrate 6914 exemplifies how innovative formulations leveraging synergistic can redefine anti-aging skincare in aesthetic medicine. Its demonstrated efficacy could reshape current non-invasive treatment paradigms, offering practitioners scientifically grounded, effective, and patient-friendly alternatives for addressing skin aging. This reinforces the growing role of high-efficacy cosmetics in holistic patient care plans.