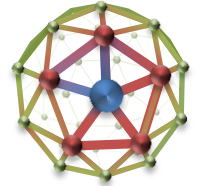




The Benefit of Palm Tocotrienols in Personal Care Products
Sime Darby Research Sdn Bhd, Malaysia
Zahariah Ismail



Contents



Composition of CPO

1

What are Tocotrienols

2

Health Benefits of Tocotrienols

3

Clinical Trials (In-vitro) on Skin Regeneration and
Melanin Synthesis

4

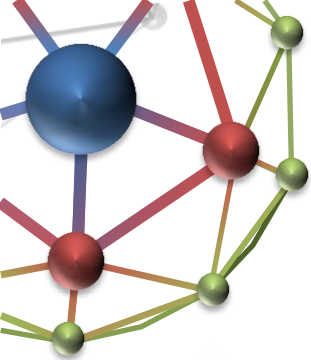
Efficacy Studies (in-vivo)

5

Overall Conclusions

6





Composition of Crude Palm Oil

01
Triglycerides
(TAG) > 90%

02
Diglycerides
(DAG) ≈ 2-7%

Co-enzyme Q10
& Polyphenols

Tocopherols
&
Tocotrienols

Carotenoid
s

05
Phytonutrients
≈ 1%

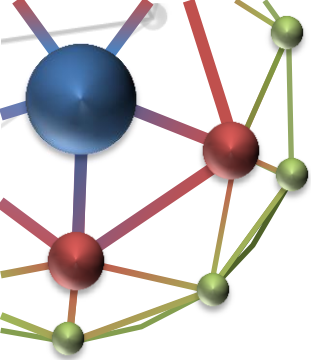
Lecithin

Phytostrols

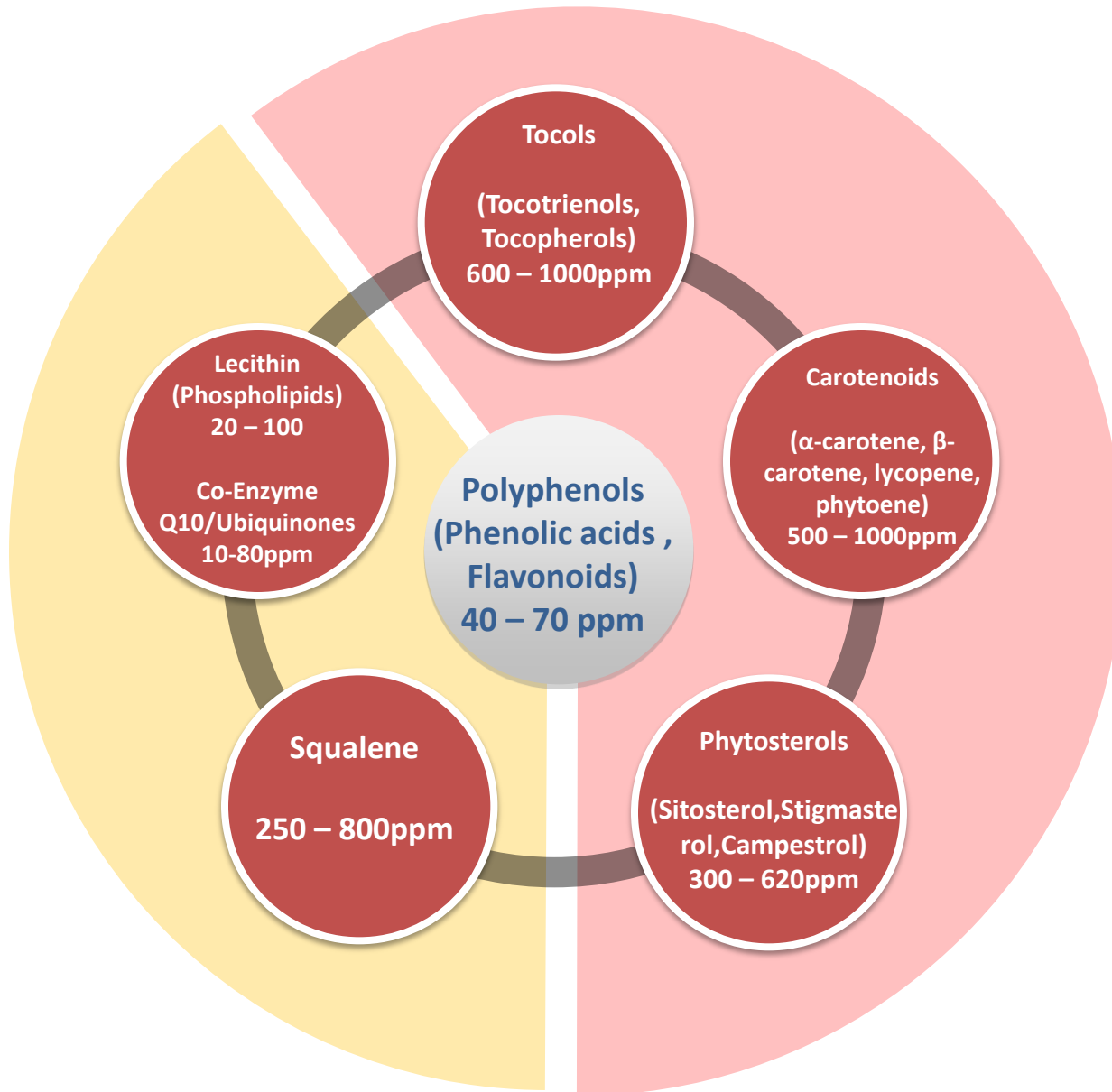
Squalene

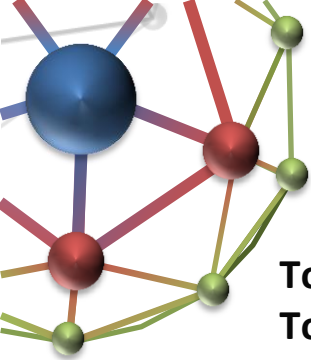
04
**Free Fatty
Acid**
(FFA) ≈ 3-5%

03
Monoglycerides
(MAG) ≈ <1%



Composition of Phytonutrients





What Are Tocotrienols

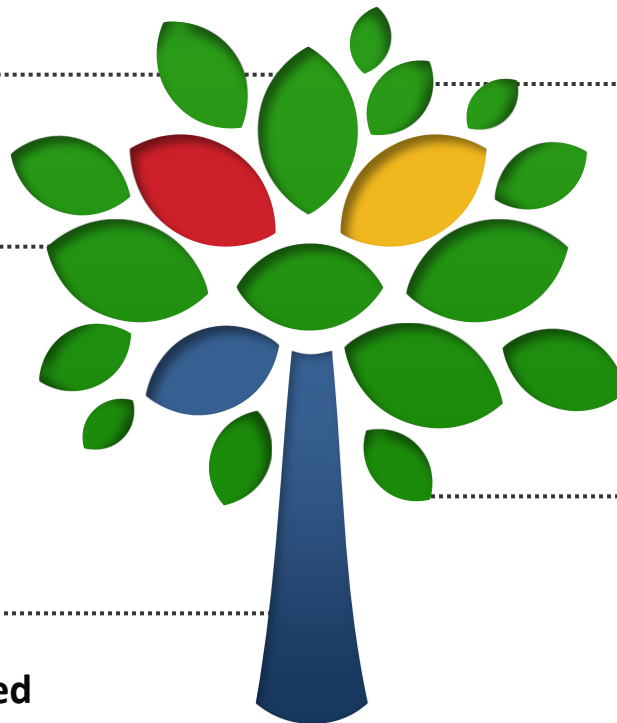
Tocotrienols and Tocopherols are members of the vitamin E family

Palm Bioactives: :

Tocotrienols – rich fraction (TRF)

- 75%- tocotrienols
- 25% - tocopherols

supplementation and therapeutic use and it is safe to be used

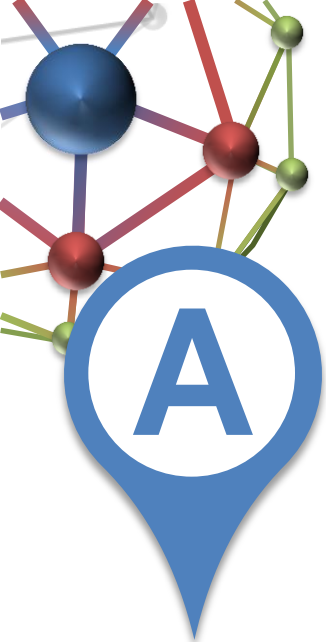


Naturally found in palm oil, barley, wheat germ, oats, grains and rice bran

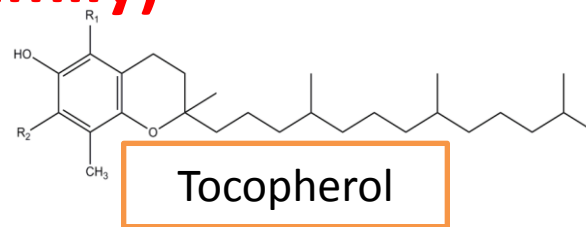


Normally not found in the body.

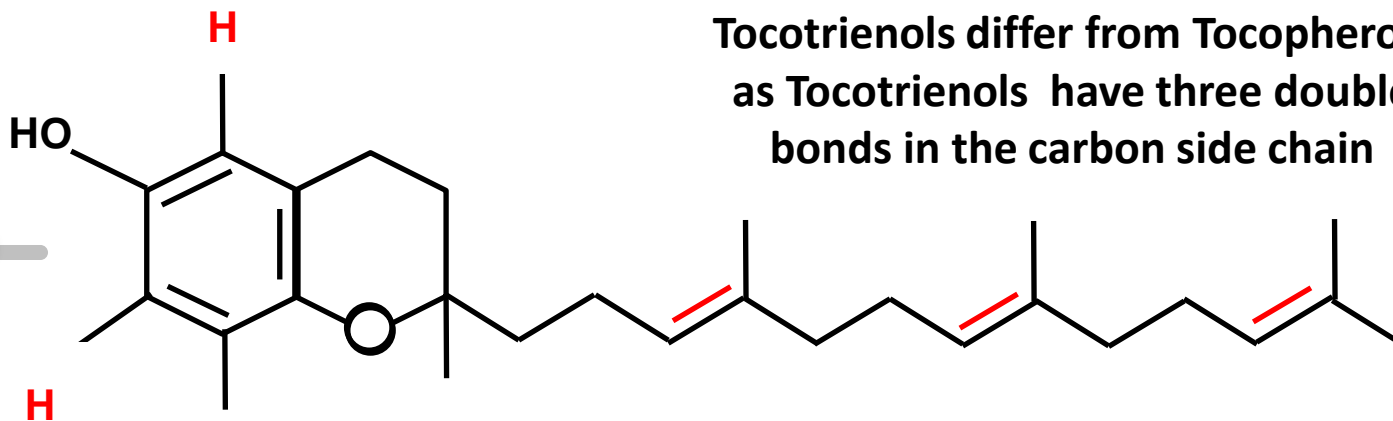
Molecular Structure of Tocopherol vs Tocotrienols (Vitamin E Family)



The Vitamin E family consists of four Tocopherols and four Tocotrienols isomers (alpha, beta, gamma and delta isomers)

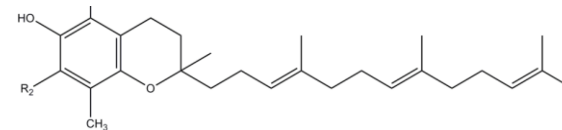


Both have the same structure but Tocotrienols differ from Tocopherols as Tocotrienols have three double bonds in the carbon side chain

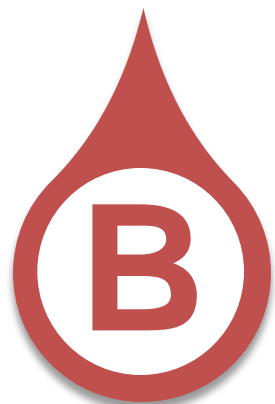


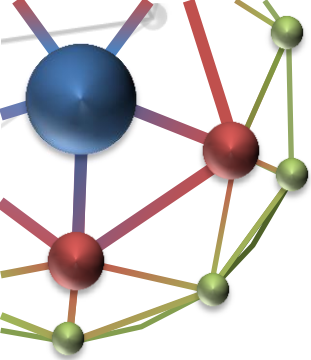
 **delta-Tocotrienol molecule**

This unique structure confers upon the tocotrienols, impressive health effects which have really excited the scientific community



Tocotrienols





Mechanism of Tocotrienols as Antioxidant

• ROS/free radical/singlet oxygen

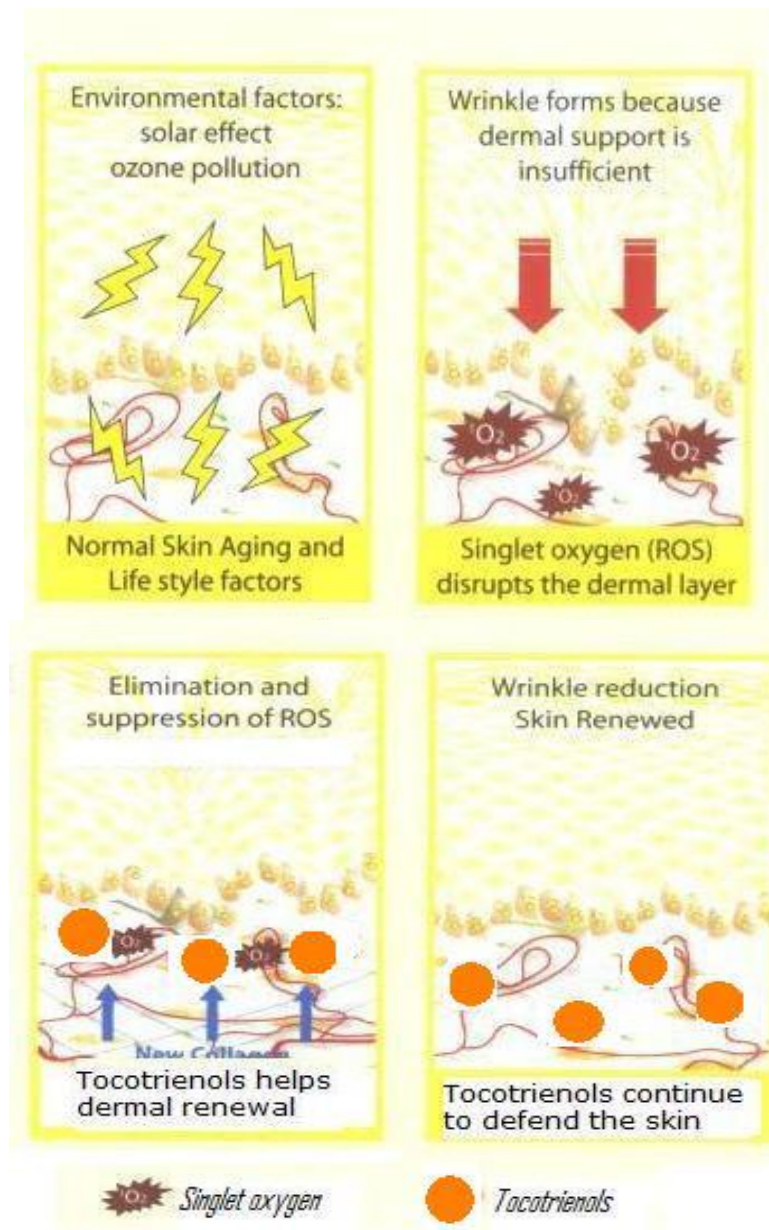
Reactive oxygen species (ROS) caused by UV rays (strong oxidation agent). The ROS is unstable. They attempt to;

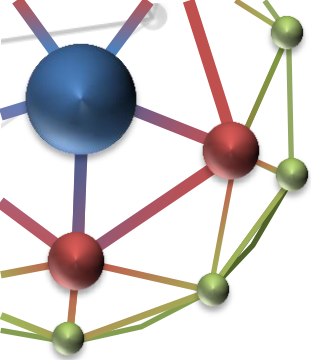
- steal electrons from neighboring molecules (DNA, phospholipids enzymes and protein for stabilisation)

• Tocotrienols

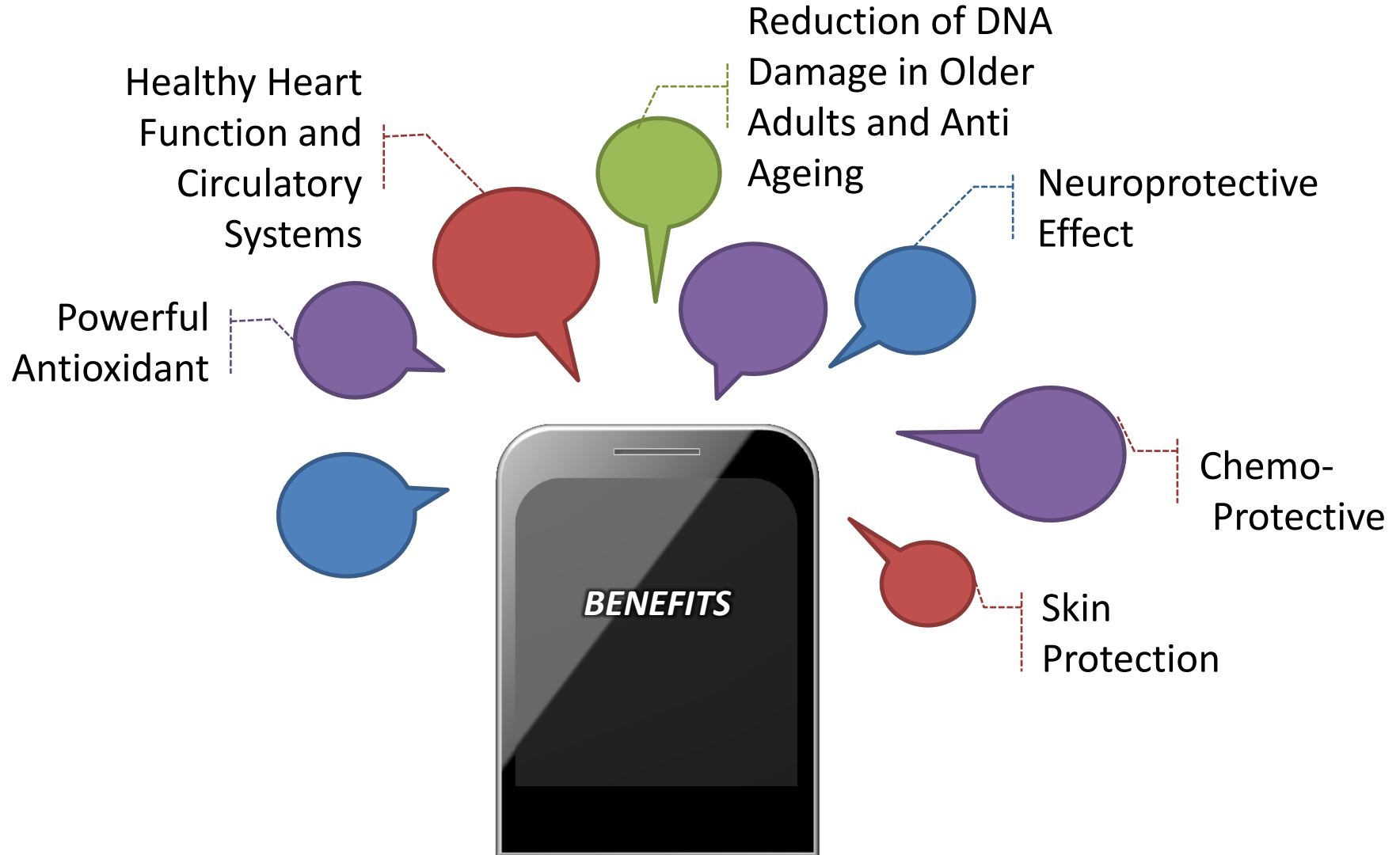
A very strong antioxidant,

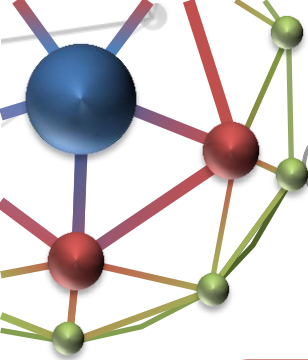
- able to quench singlet O_2
- suppress lipid peroxidation
- controls ROS formation



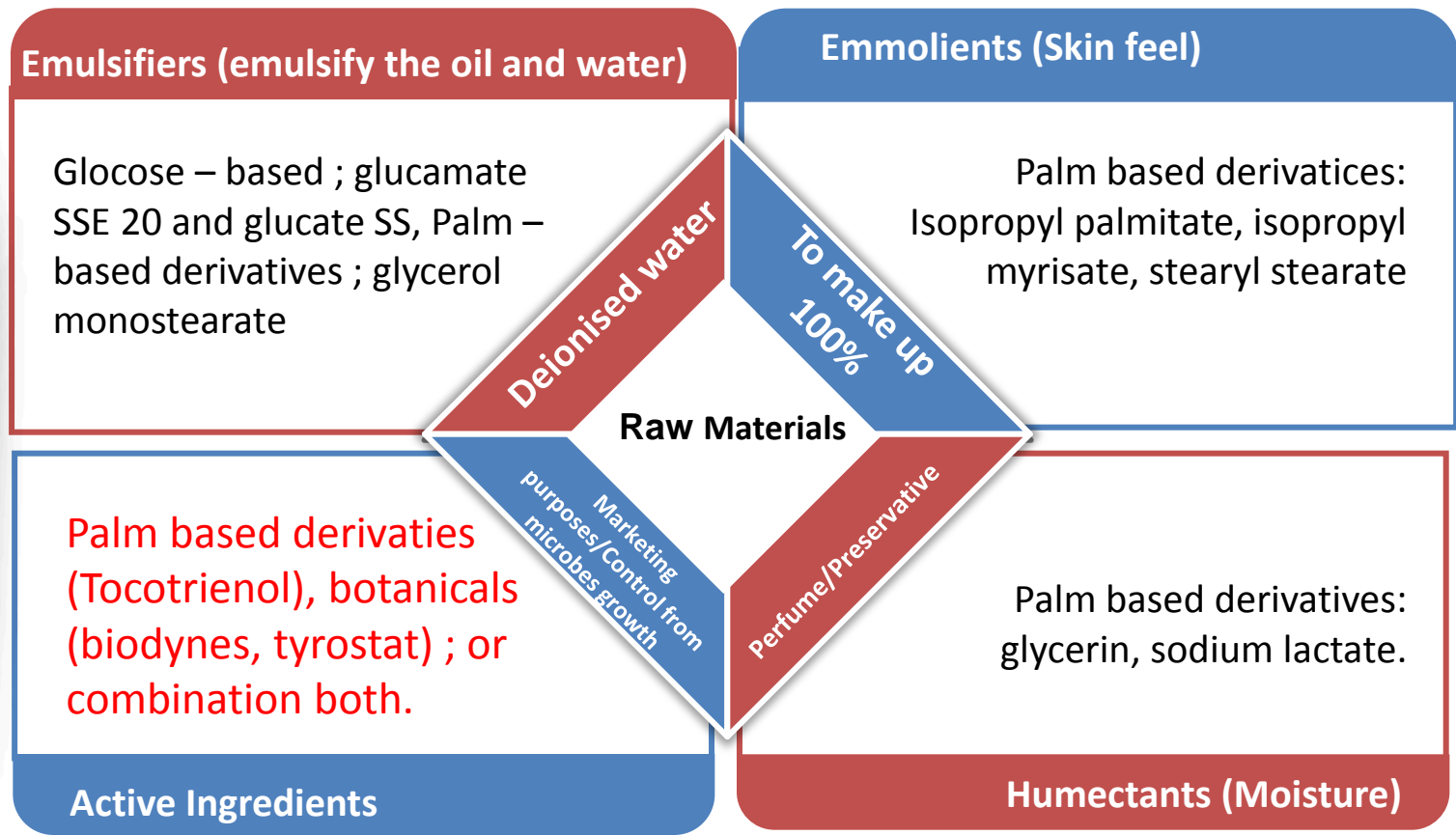


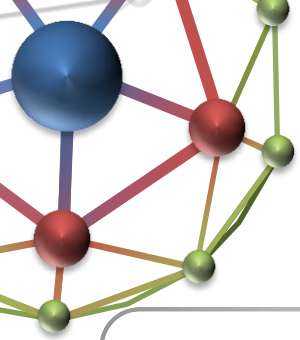
Health Benefits of Tocotrienols





Raw Materials Use in Product Development





Clinical Trials (In-Vitro)

Skin Regeneration in Human Fibroblasts Cell(HFC)

● Effect of Biodynes, Tocotrienols, Tocopherol on Collagen Synthesis in HFC

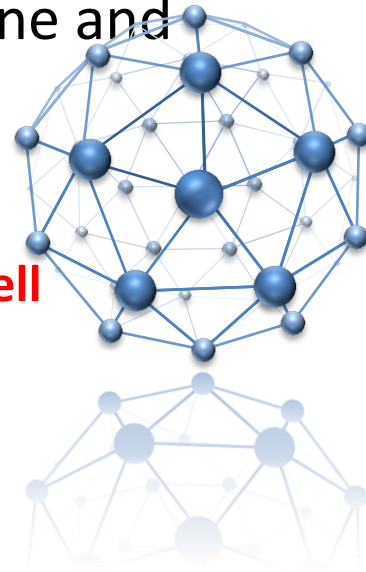
Objectives

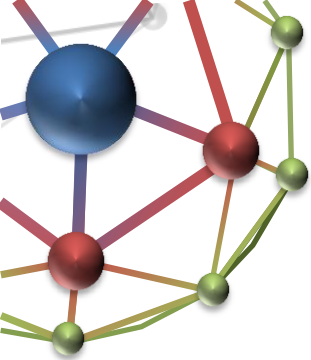
- 1.To elucidate the molecular mechanism of Biodynes, Tocotrienols, Tocopherol in preventing skin ageing
- 2.To determine the expression of collage and MMPs gene and protein levels

● Hypothesis

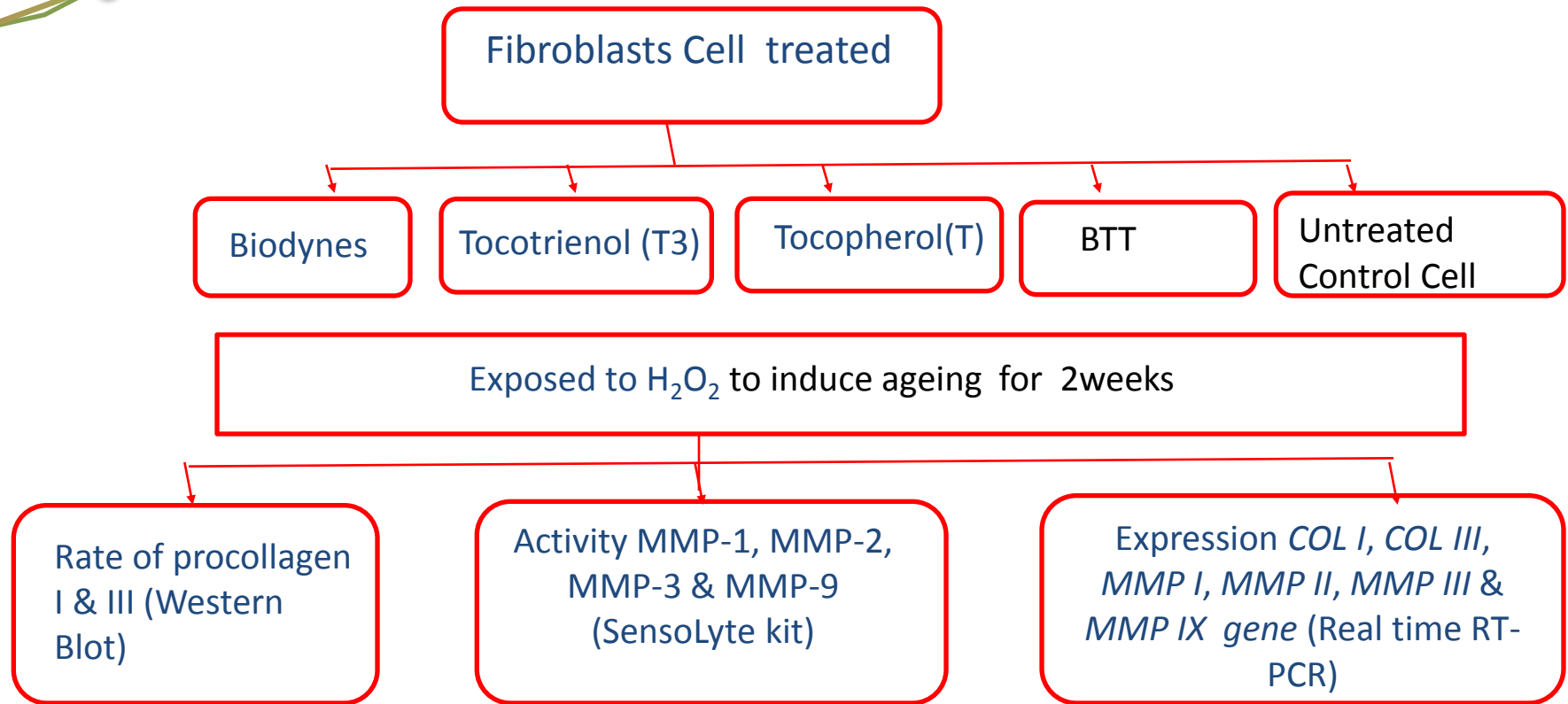
Tocotrienols promotes skin regeneration in human fibroblasts cell by:-

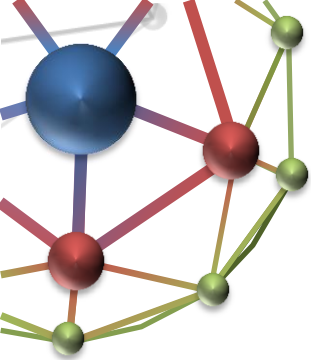
1. Upregulating the expression of COLI and COLIII genes
2. Increasing procollagen Type 1 and Type III synthesis
3. Downregulating the expression of MMPI, MMPII, MMPIII and MMPIX genes
4. Decreasing the activity of MMP1, MMP2, MMP3 and MMP9





Experimental Design for Skin Regeneration

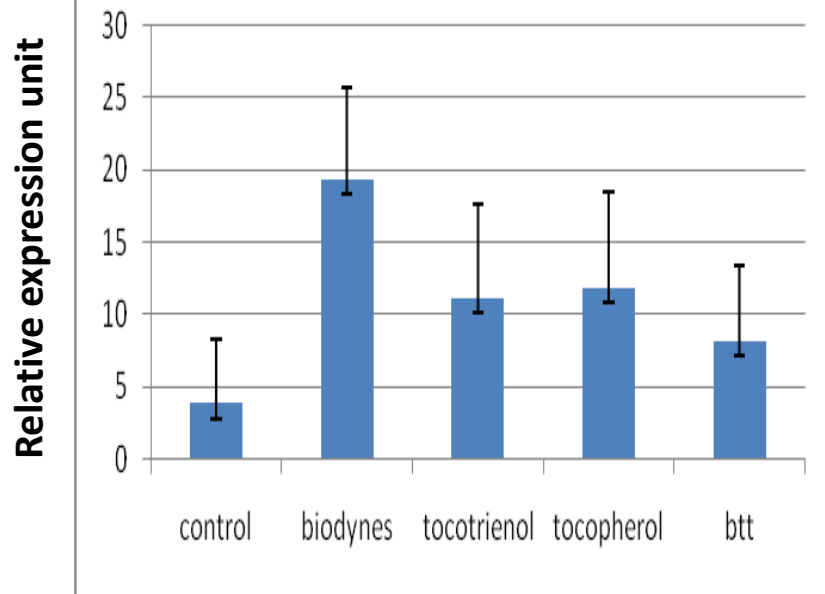




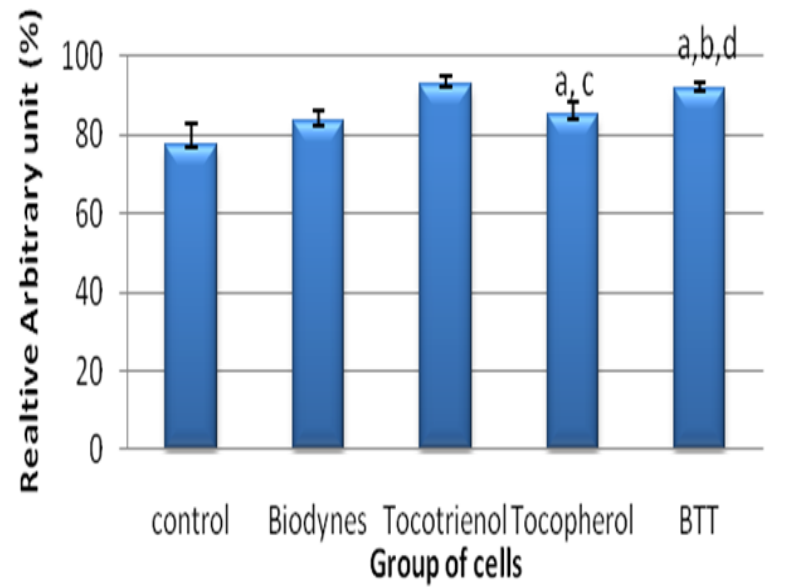
Effect of Biodyne , T3 and T on Collagen Synthesis

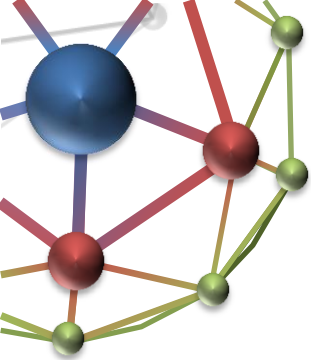
• Expression of COL 1 & Procollagen 1

COL1



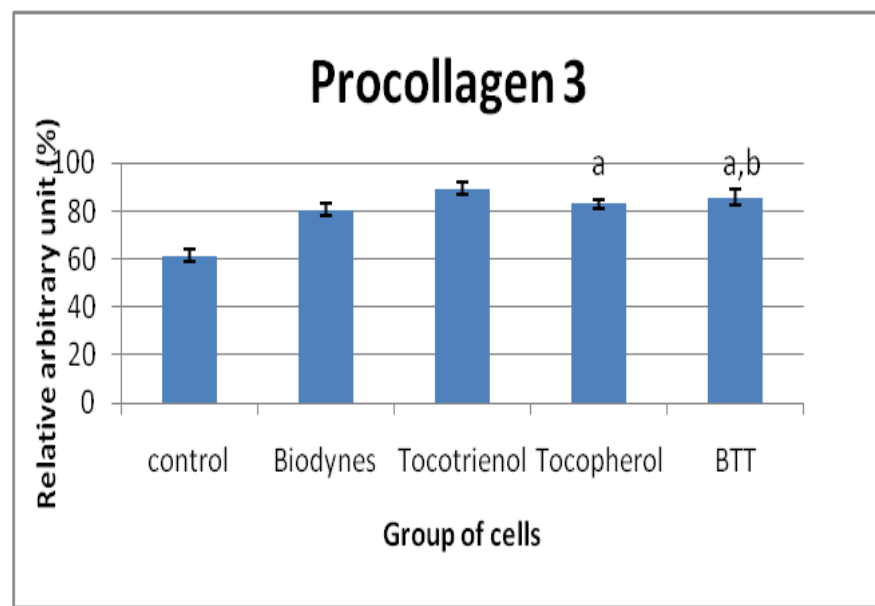
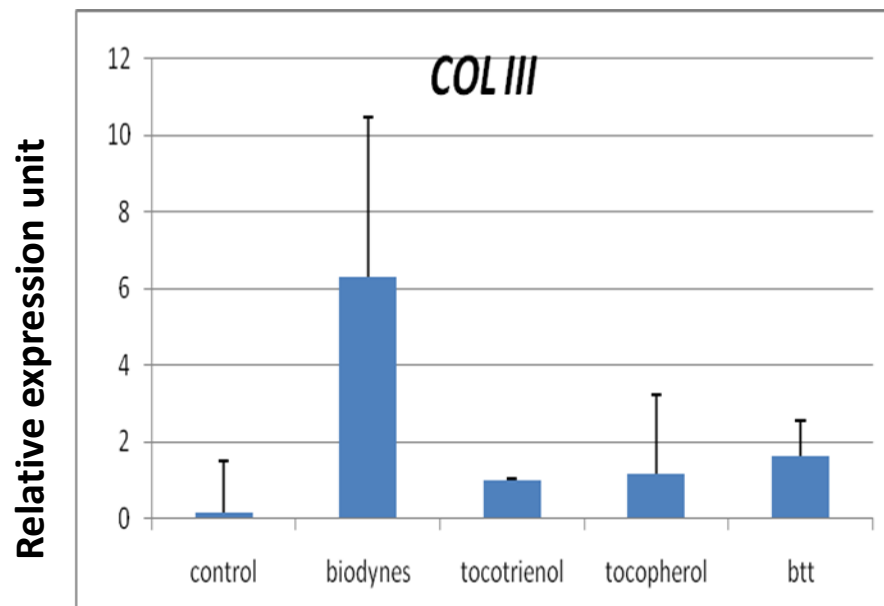
Procollagen 1





Effect of Biodyne , T3 and T on Collagen Synthesis

• Expression of COL III & Procollagen 3



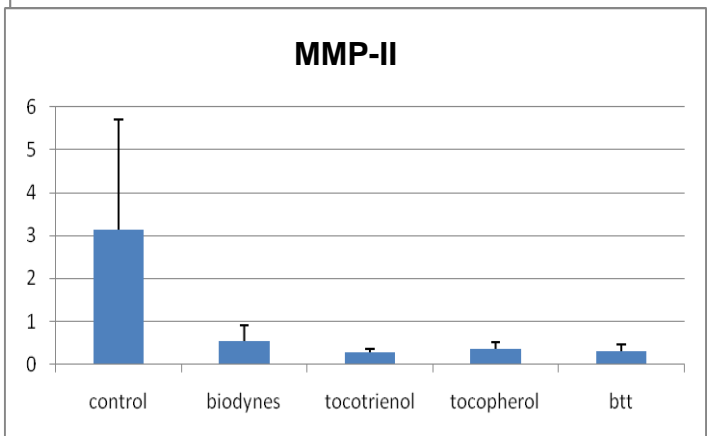
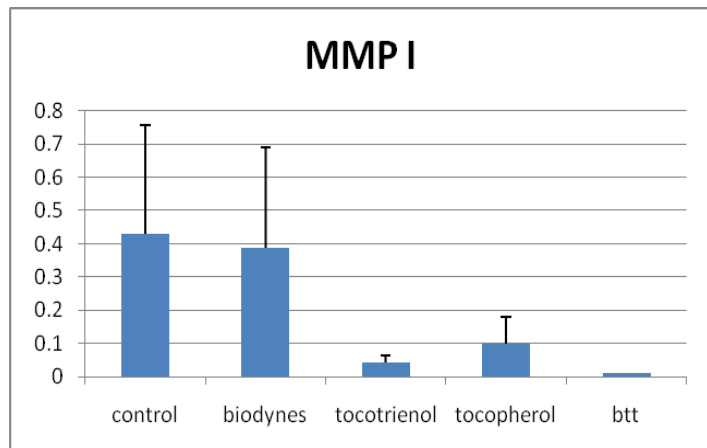


Effect of Biodyne, T3 and T on Collagen Degradation

Expression of MMP I, MMP II Genes

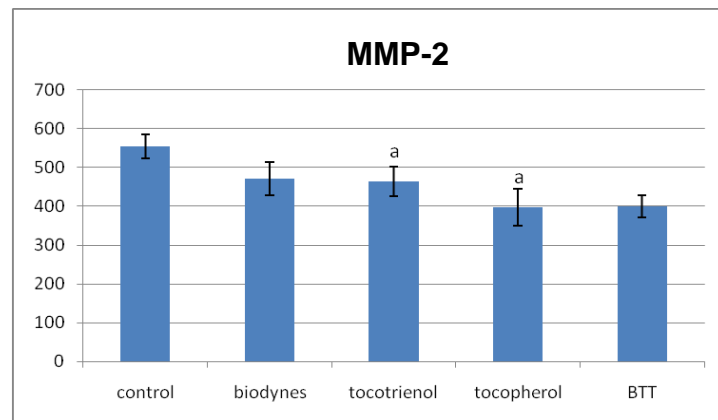
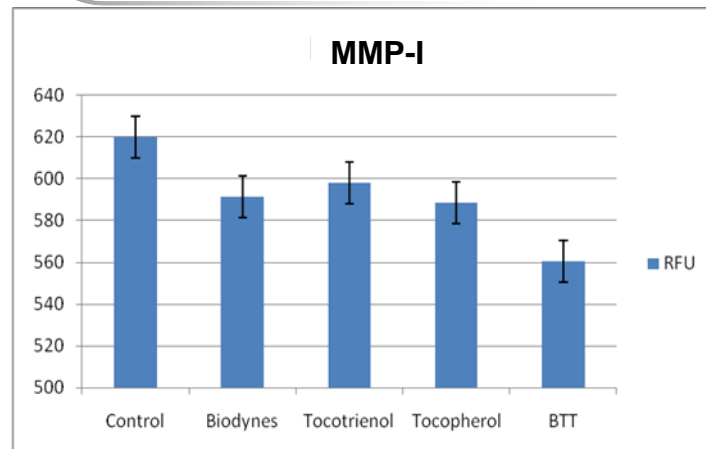
Expression of MMP 1, MMP 2 Activity Assay

Relative expression unit

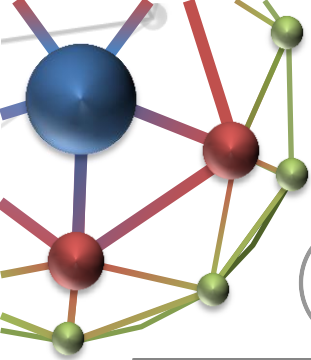


Group of Cells

Relative fluorescence unit

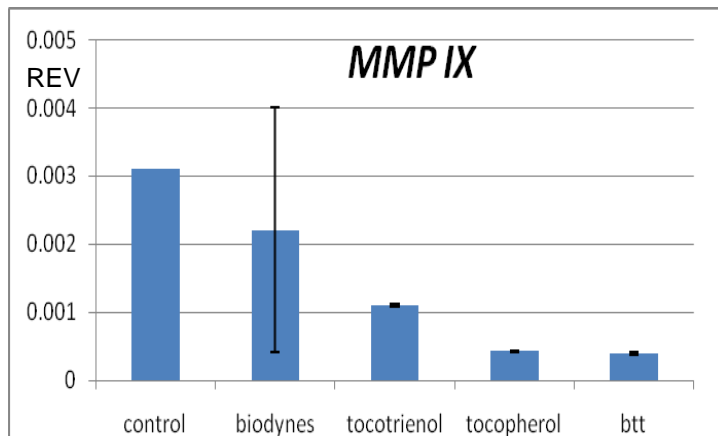
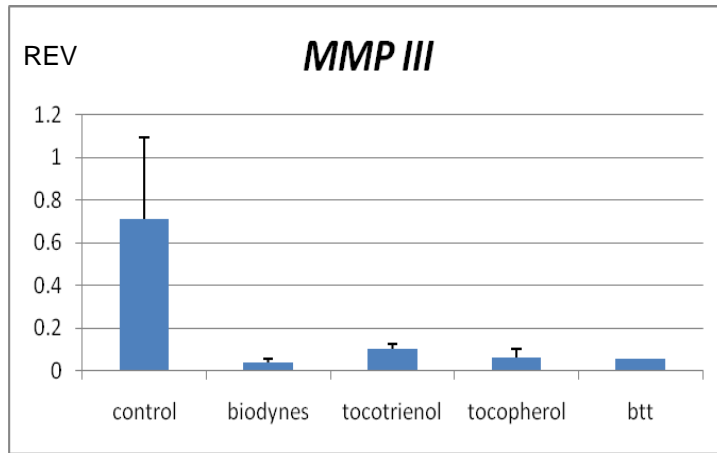


Group of Cells



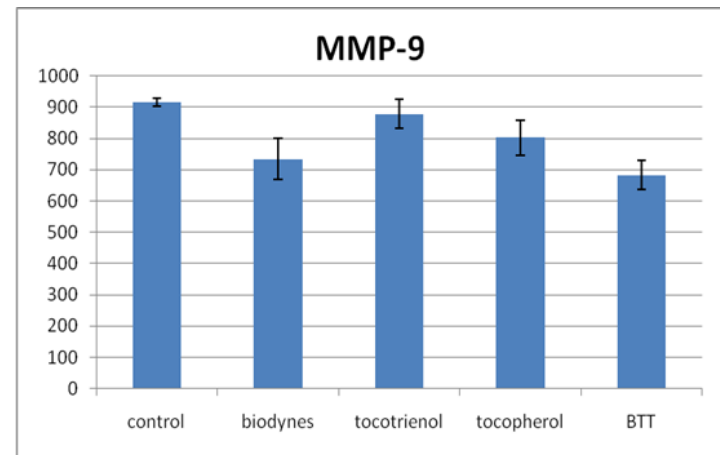
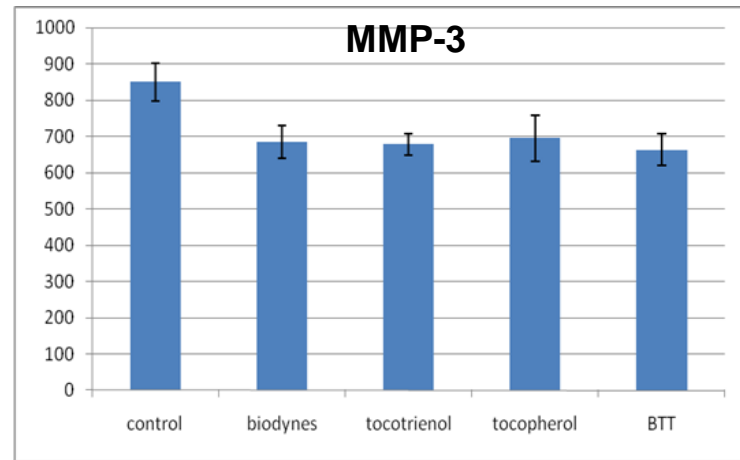
Effect of Biodyne , T3 and T on Collagen Degradation

• Expression of MMP III, MMP IX Genes



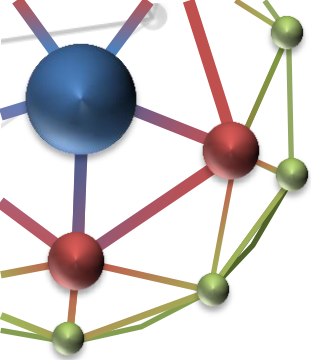
Group of Cells

• Expression of MMP3, MMP 9 Activity Assay



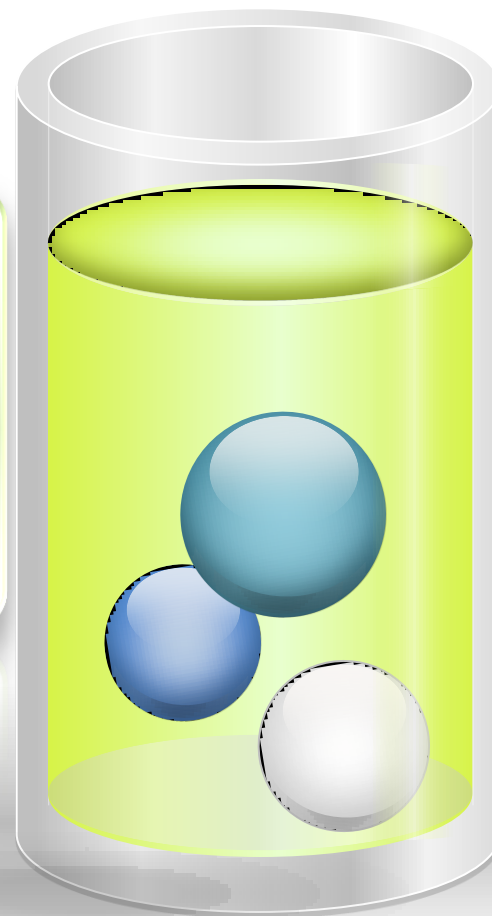
Group of Cells

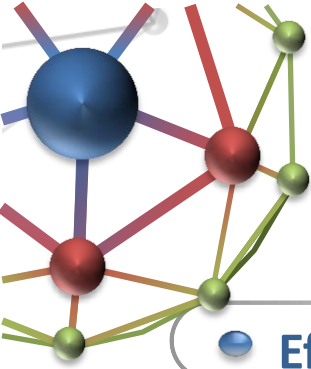
Relative fluorescence unit



Conclusion

These findings showed that each active compounds has the potential to activate skin regeneration





Clinical Trials (In-Vitro)

Melanin Synthesis in Human Fibroblasts Cell (HFC)

● Effect of Tocotrienols on Melanin Synthesis in the HFC

Objective

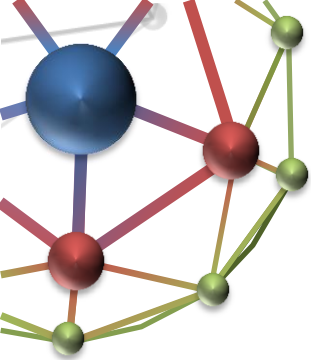
To elucidate the molecular mechanism of tyrostat, tocotrienols, tocopherol inhibiting melanogenesis (skin pigmentation) in human skin melanocytes

● Hypothesis

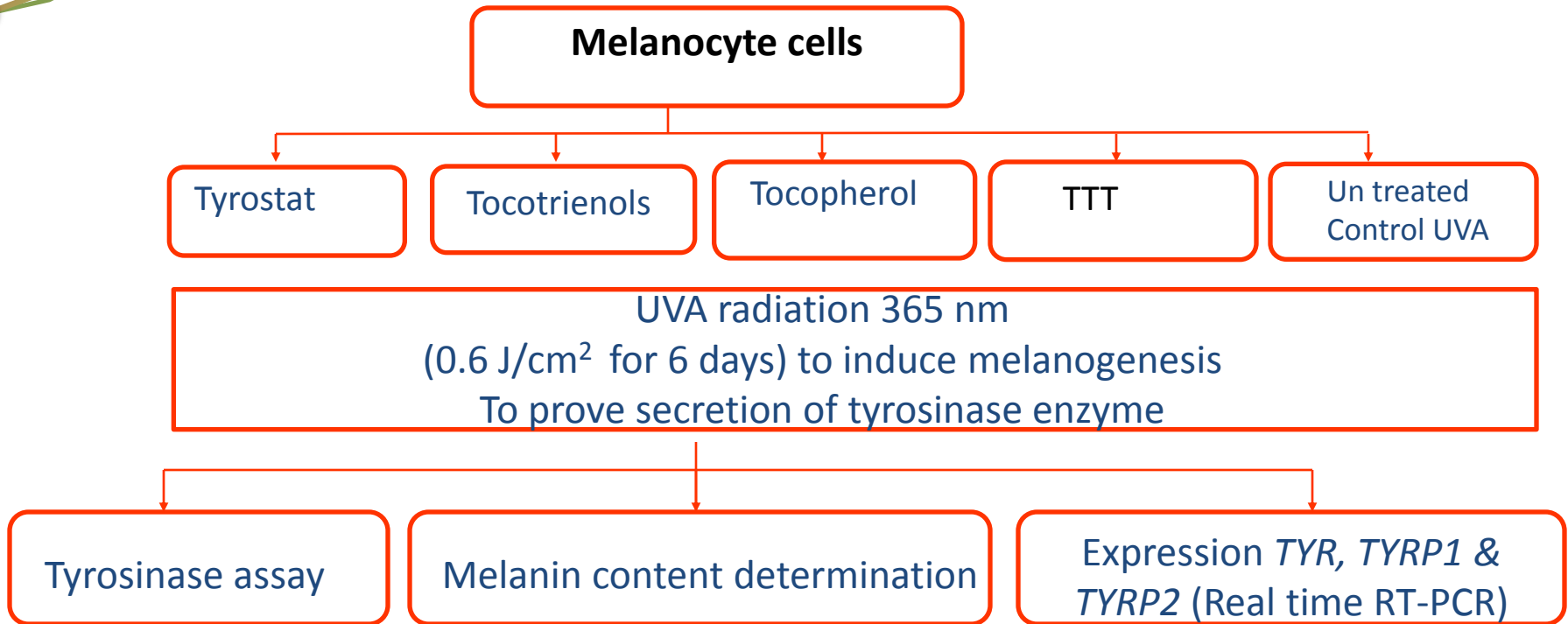
Tocotrienols inhibits pigmentation process in human melanocytes cells by:

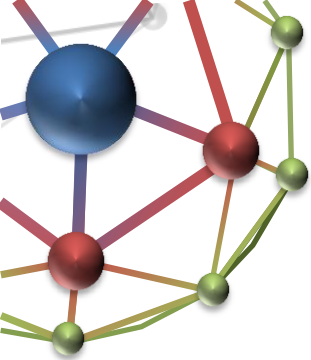
1. Down regulating the expression of TYR, TYRP1 and TYRP2 genes
2. Decreasing tyrosinase enzyme activity





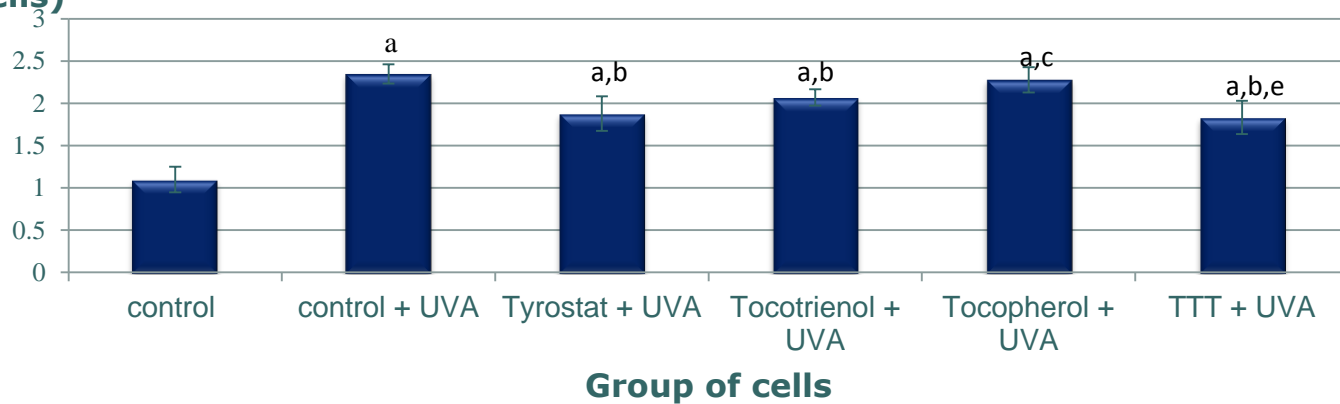
• Experimental Design on Whitening Effect

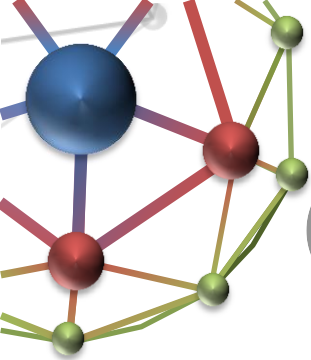




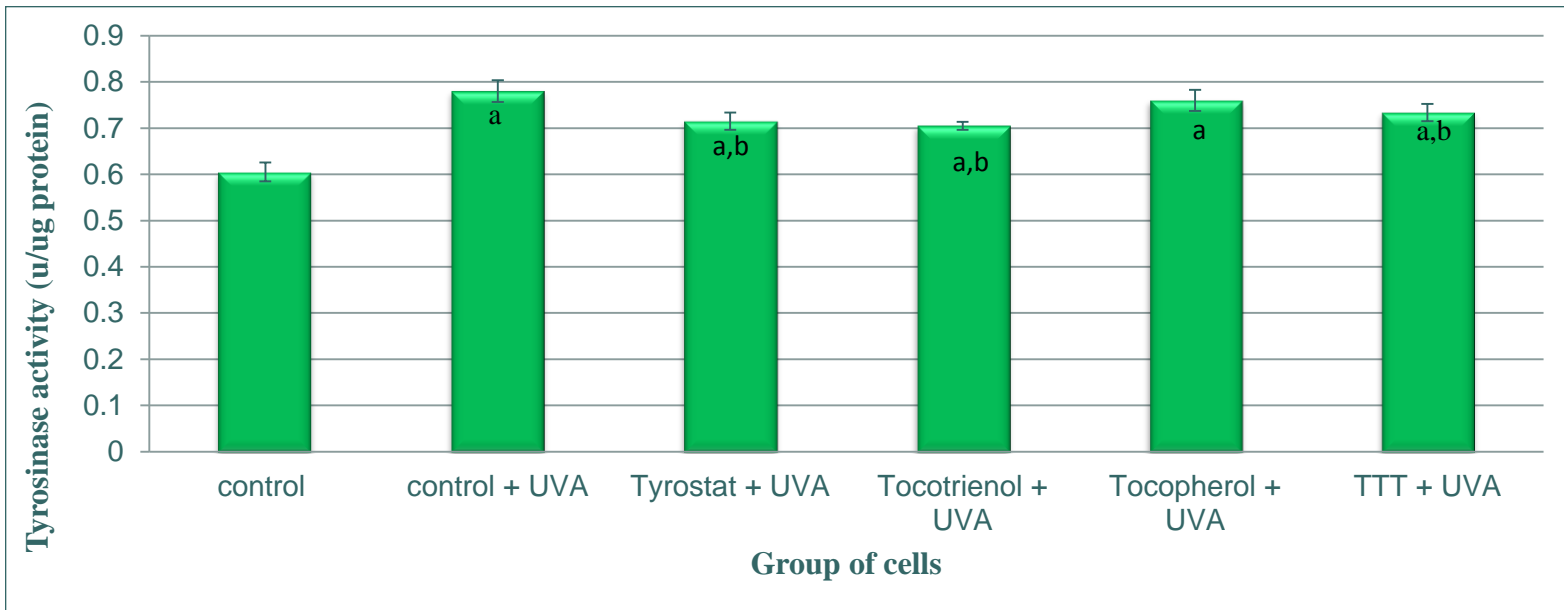
Effect of UVA Irradiation on Melanin Synthesis Genes

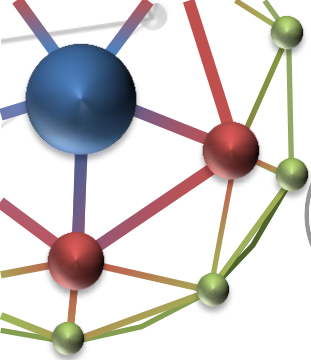
Melanin content
(pg/cells)





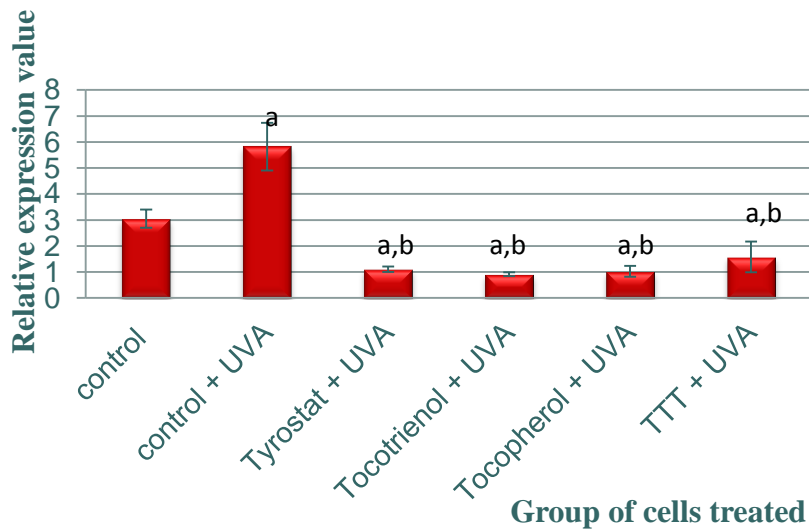
● Effect of Tyrostat, T3 and T on Tyrosinase Activity Genes



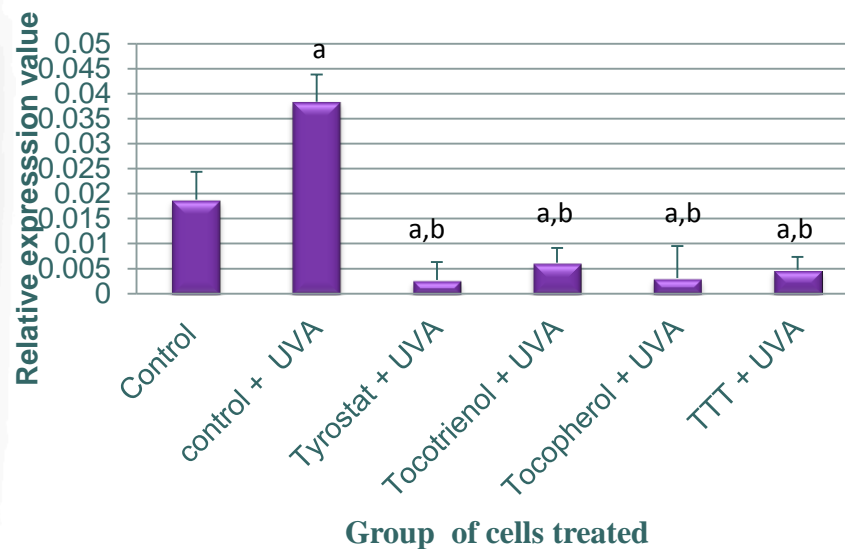


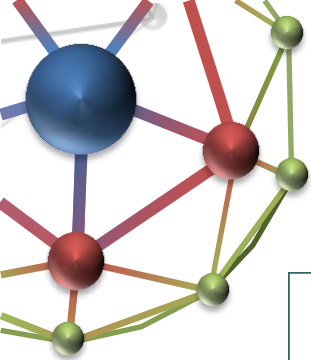
Effect of Tyrostat, T3 and T on the Expression of TYR, TYRP 1 Genes

TYR

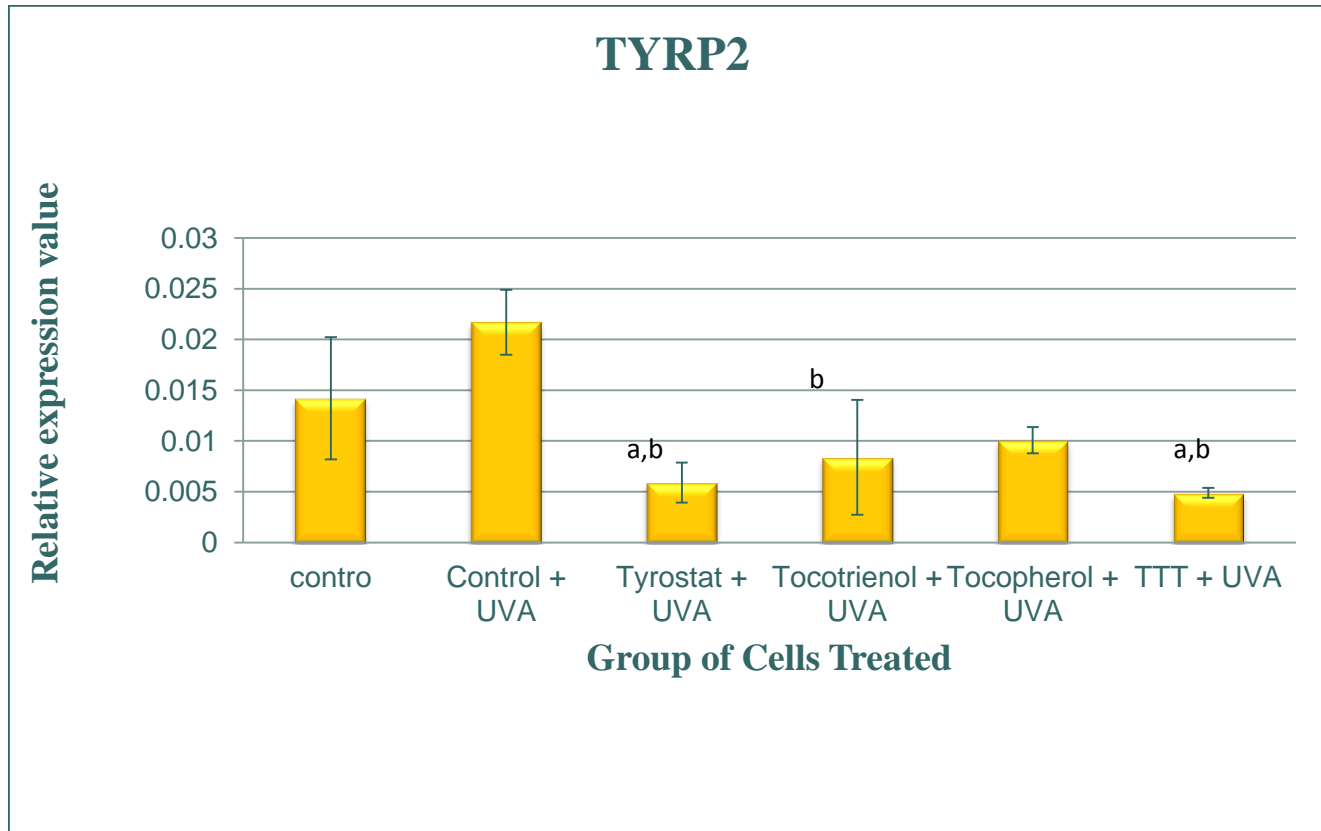


TYRP1





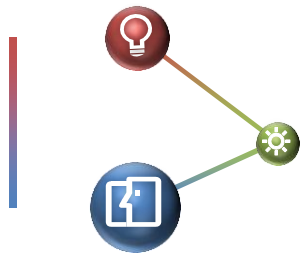
• Effect of Tyrostat, T3 and T on the Expression of TYRP2 Gene



Conclusion

- Tyrostat, Tocotrienols, Tocopherol possessed anti-melanogenic properties and might be useful in improving skin pigmentation caused by UV exposure





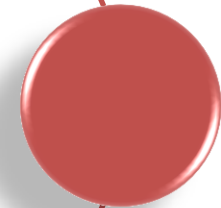
Efficacy Study (In-Vivo)

Nano Anti-Wrinkle Lotion

Skin Whitening Lotion

Foot Care Cream

Slimming Lotion





Nano Anti- Wrinkle Lotion



INGREDIENTS:

Palm-based derivatives (PEG-8 Caprylic/Capric Triglyceride, Isostearyl Isostearate), Solubiliser gamma, Preservatives, Deionised water, **Tocotrienols**, **Biodyne**, Carbopol Ultrez-20, Perfume.

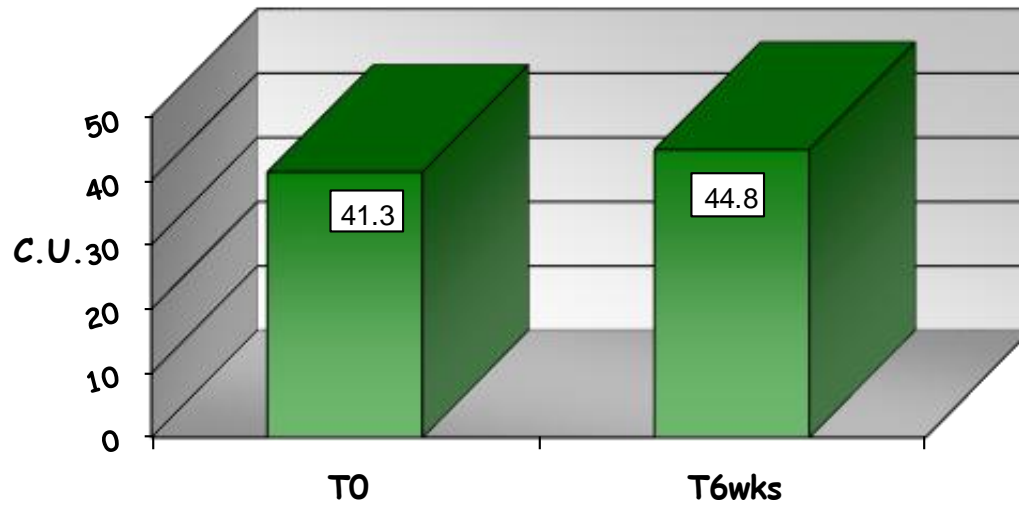
Objective

To evaluate the anti-aging effect of the tocotrienols based product on:

- Skin hydration (increase in corneometric values)
- Skin elasticity (decrease of R0 and R6 parameters, increase of R2 parameter)
- Skin roughness (decrease of Ra and Rz parameters)



Skin Hydration

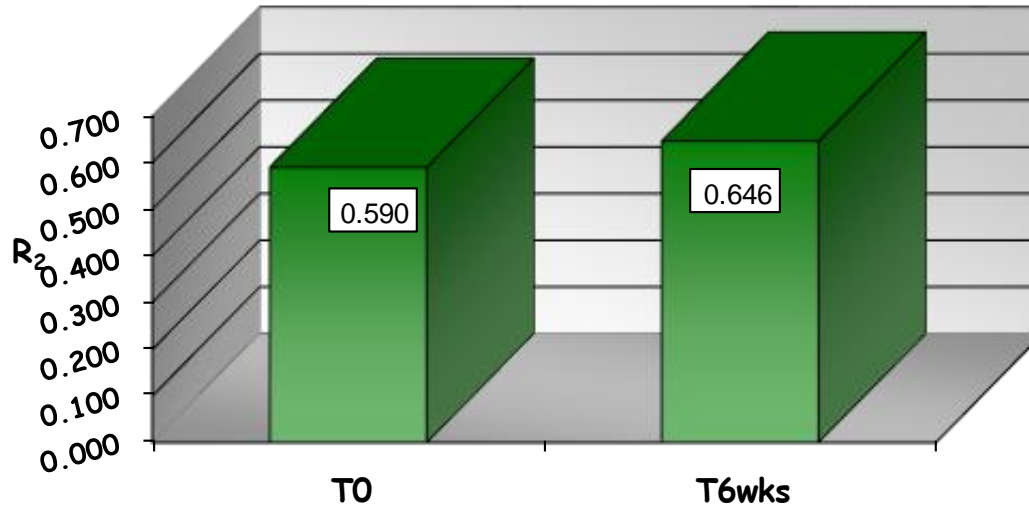


T ₀	T _{6wks}	Variation T _{6wks} -T ₀	% Variation	P-level
Mean 41.3	Mean 44.8	+3.5	+8.5	P<0.01

significant increase in skin hydration values, +8.5%;



Overall Elasticity

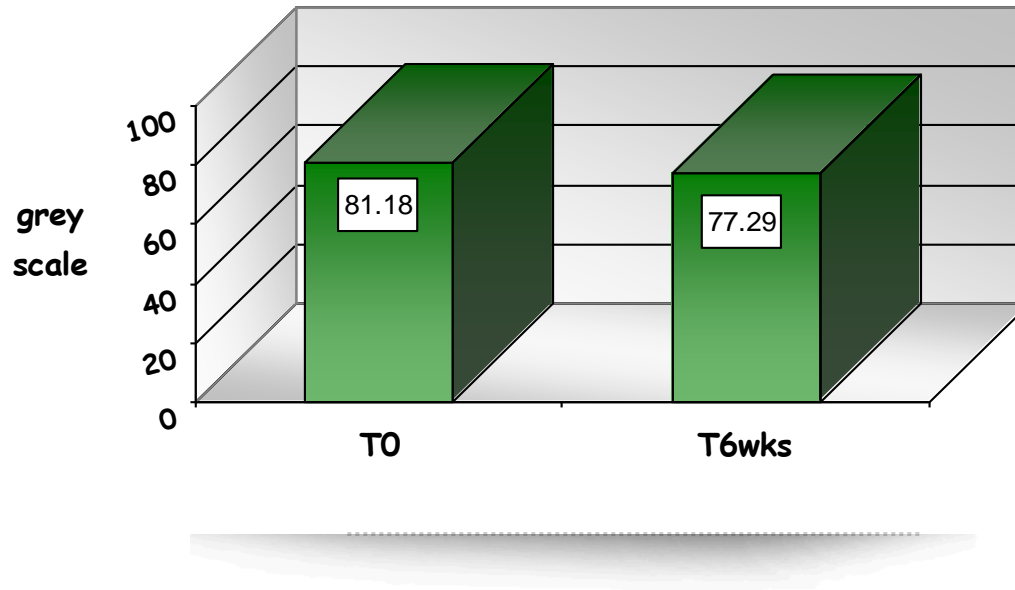


T ₀	T _{6wks}	Variation T _{6wks} -T ₀	% Variation	P-level
Mean 0.590	Mean 0.646	+0.0565	+9.5	P<0.05

significant increase in overall elasticity values (R²), +9.5%;

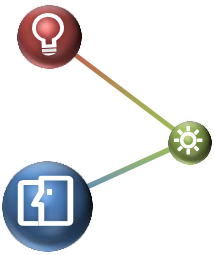


Average Maximum Roughness



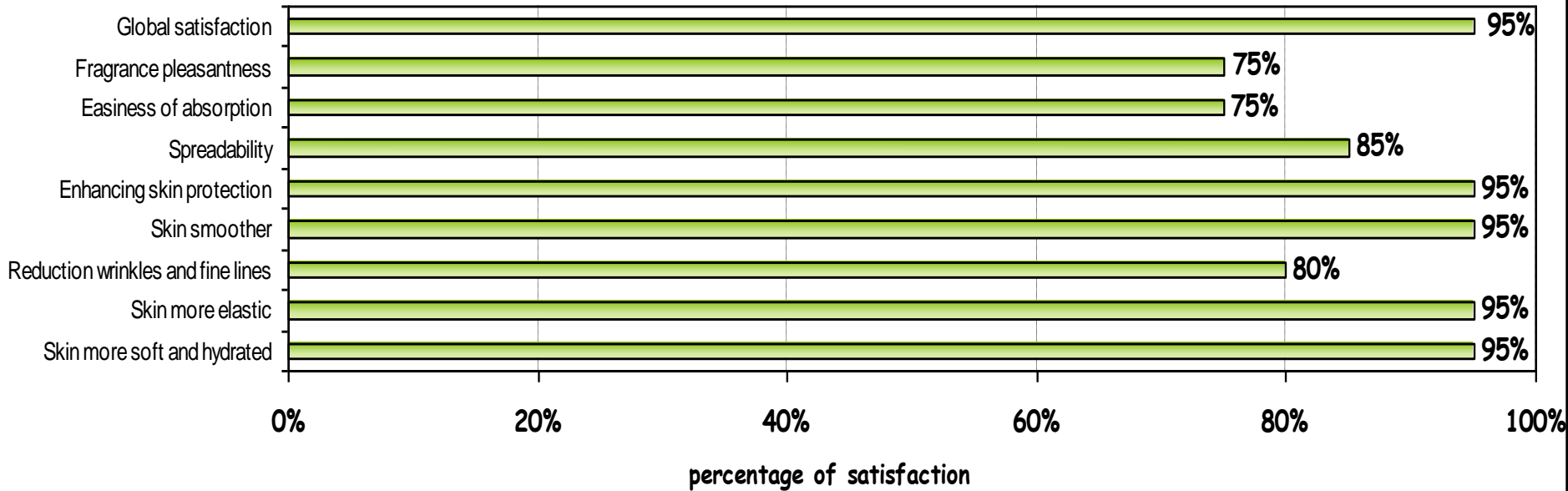
T ₀	T _{6wks}	Variation T _{6wks} -T ₀	% Variation	P-level
Mean 81.18	Mean 77.29	-3.89	-4.8	P<0.01

Significant decrease in average maximum roughness values , , - 4.8%;



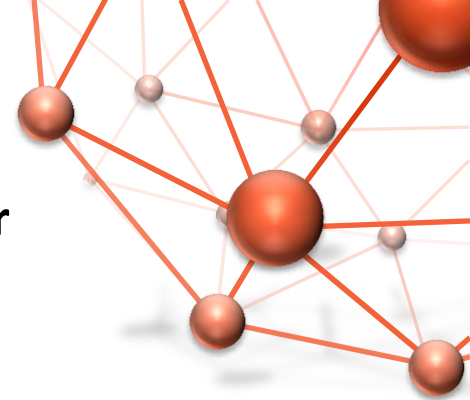
Evaluation by Panel after 6 Weeks

NANO ANTI-WRINKLE ENRICHED WITH GOLD TRI-E™ TOCOTRIENOLS





**Evaluated by Old Japanese Lady @ 75 yr Old for
6 Months**

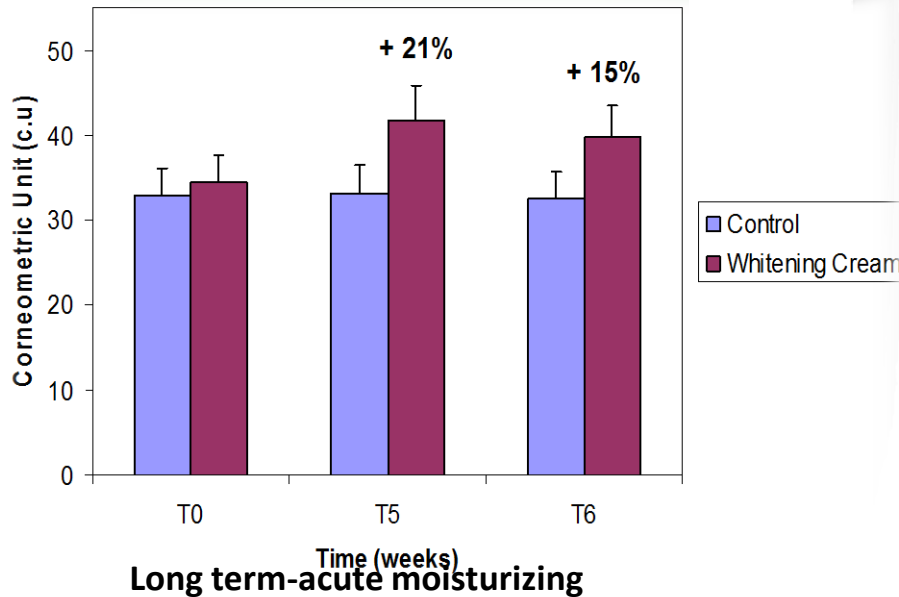


Using Nano Anti-wrinkle



Using Regular Cream

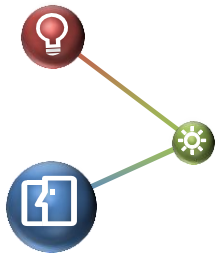
Skin Whitening Lotion Enriched with T3



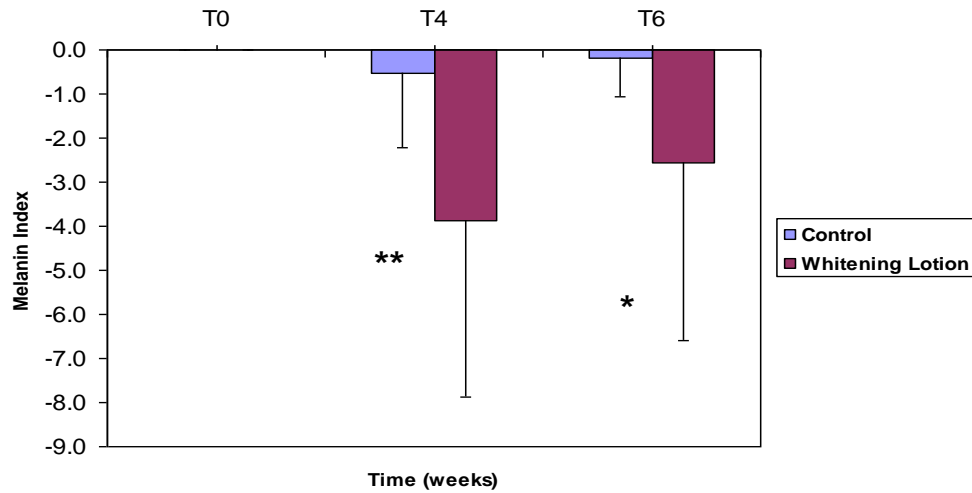
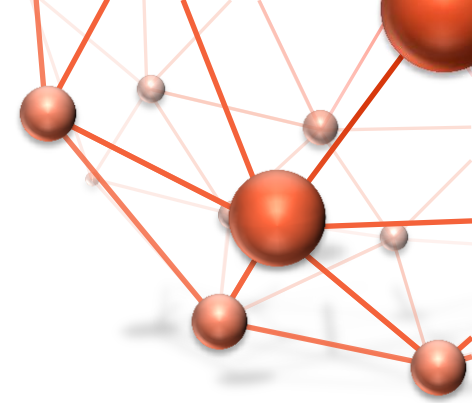
Long term acute moisturizing test indicates at 21% for 5 weeks and 15% for 6 weeks

Objective

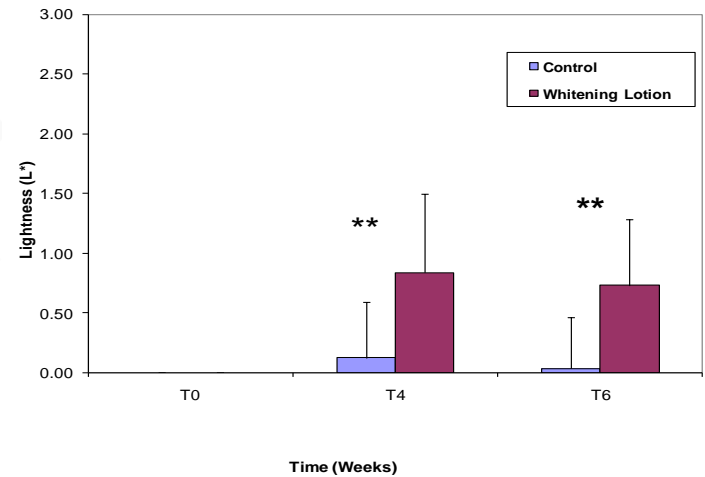
- To evaluate the whitening efficacy of designated area
- 20 subject of each products, with skin type III and IV
- Apply for 6 weeks
- Using skin colorimetric
- taken at the beginning, after 4 and 6 weeks
- For the **long term moisturizing effect** was monitored for 6 weeks of product applications



Melanin Content



Reduction in melanin content



Increase in lightening



Skin Whitening Lotion - Testimonial



The Results





Foot Care Cream Enriched with T3

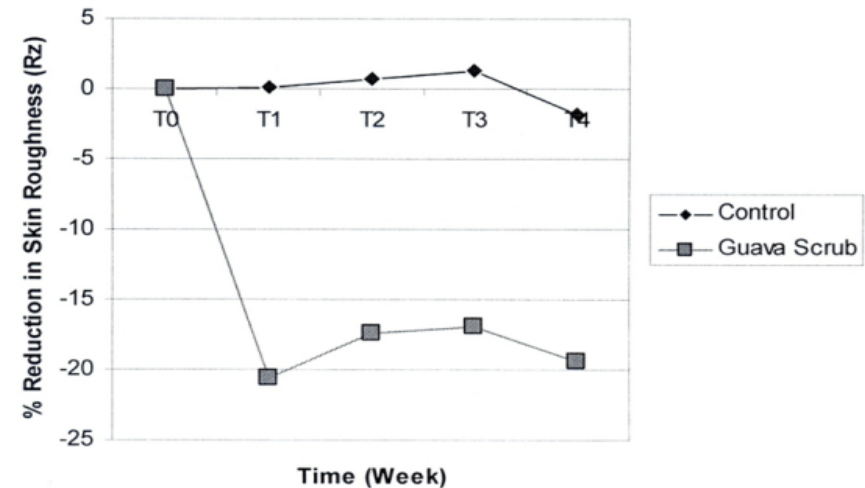


- Creamy product has pH 5.5,
- Stable for 3 years
- 0.5 % Tocotrienols

Objective

To study the effect of foot care cream enriched with tocotrienols for crack heels on 20 subjects

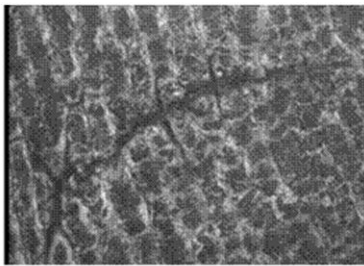
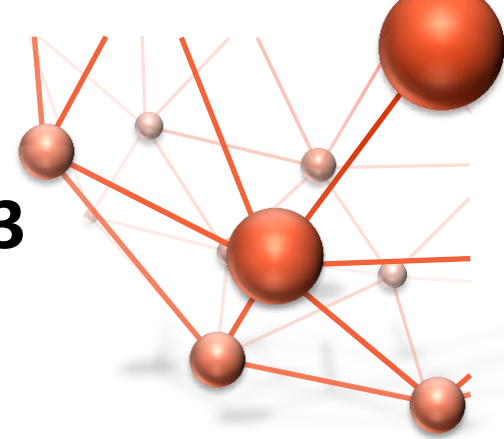
The Results



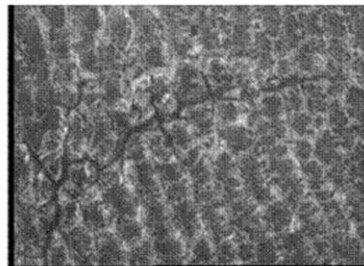
Percentage of Skin Roughness vs Time : Reduction in skin roughness in 4 wks compared to control



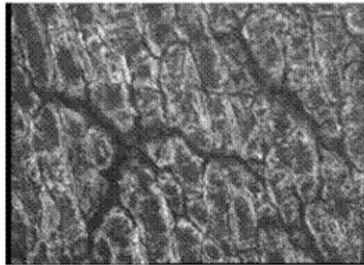
Foot Care Cream Enriched with T3



Control (Untreated)



T4 (after 4 weeks)



Control (Treated)



T4 (after 4 weeks)

The Results

Digital Photograph of Cracked Heel from Subject No. 3 ;
Before and After 4 weeks on
Treated Area



● Slimming Lotion Enriched with T3



○ Objectives

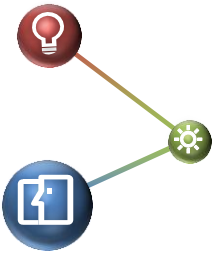
To evaluate and to compare the efficacy of three formulations in treating fat bulges:

S015 (A) – SL with Tocotrienols + Botanical Active

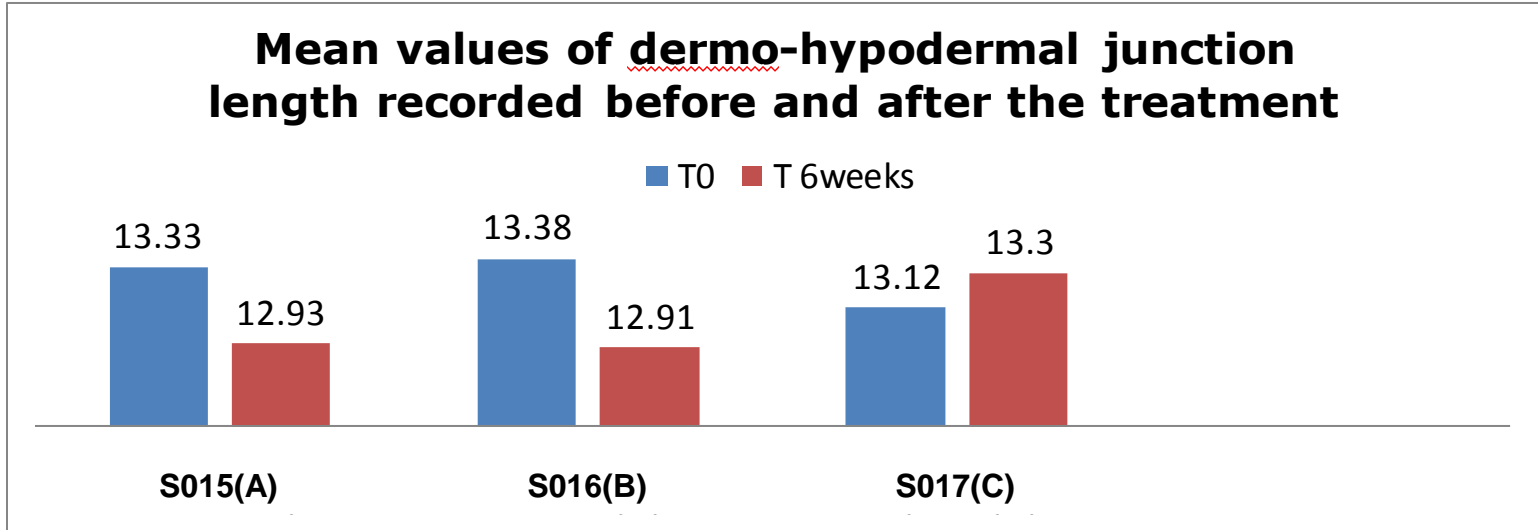
S016 (B) – SL with Tocotrienols

S017 (C) – Control



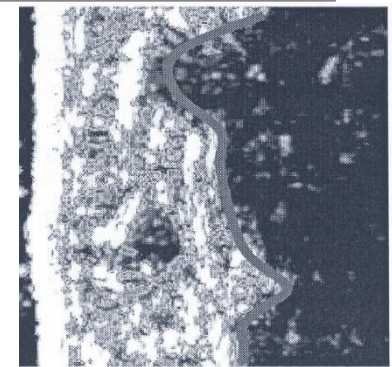


• Slimming & Reduction in Dermo – Hypodermal Junction Length

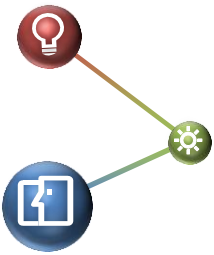


Statistically significant differences

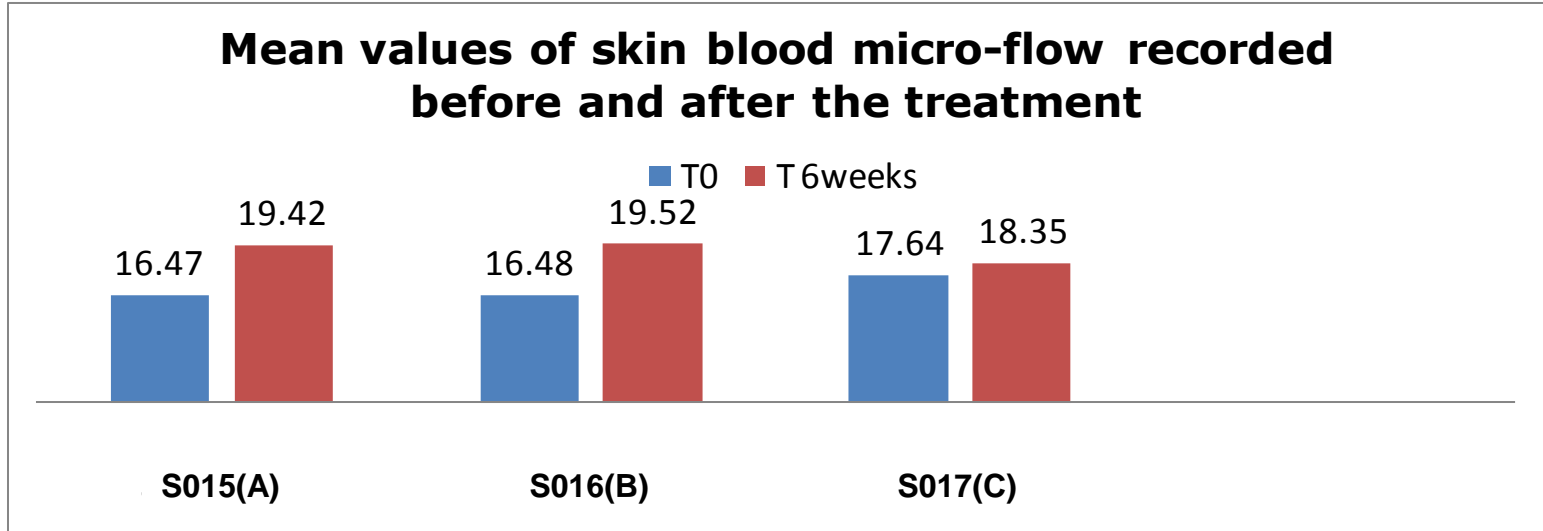
Product	p value
S015(A) vs S016(B)	p>0.05
S016(B) vs S017(C)	p<0.01
S017(C) vs S017(C)	P<0.01



Excess fat –bulges into dermis (darker grey)



Skin Blood Micro - Flow

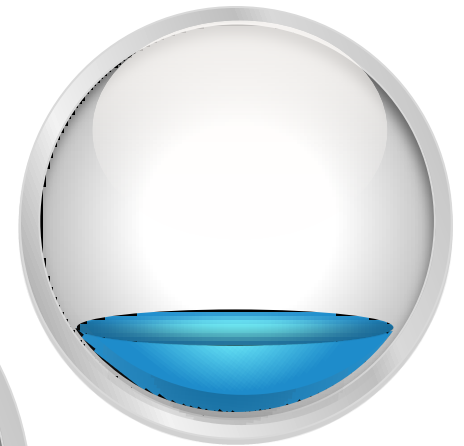
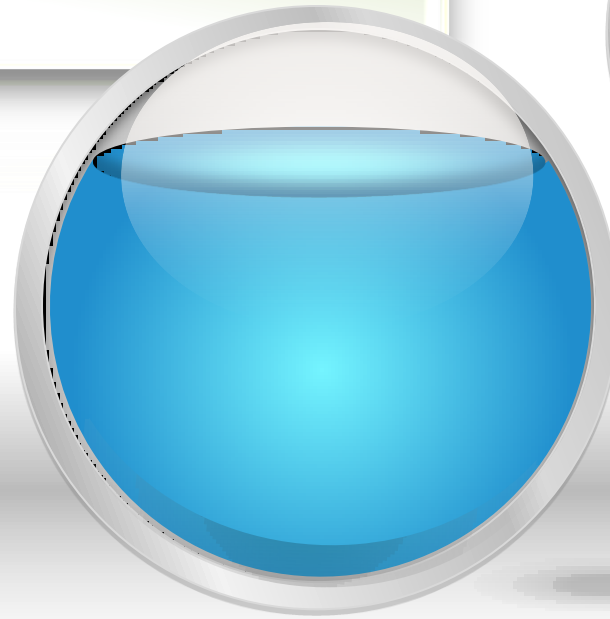


Statically significant differences

Product	p value
S015(A) vs S016(B)	p>0.05
S016(B) vs S017(C)	p<0.01
S017(C) vs S017(C)	P<0.01

Conclusion

- Increased in skin blood micro – flow resulting in fat reduction at hyperdermal junction



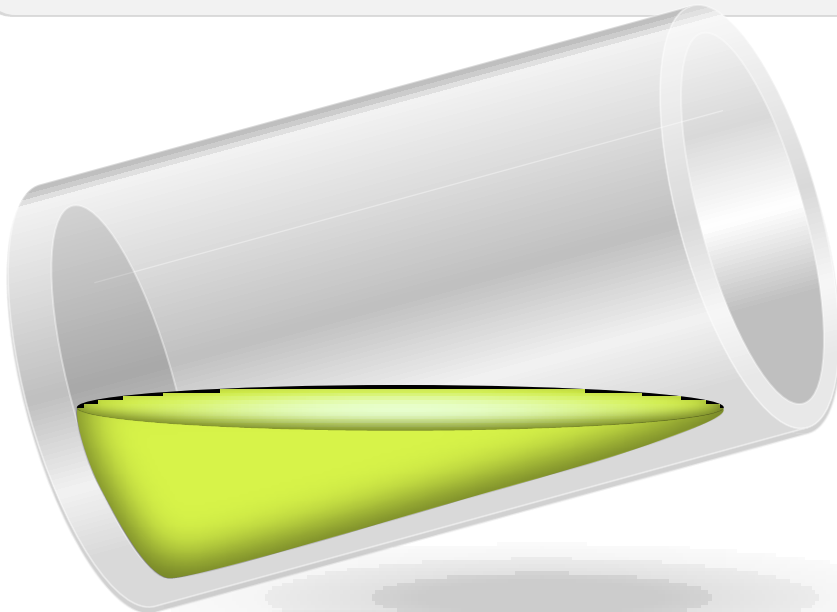


• Overall Conclusions



OUTCOME 1

- Prevent skin ageing, improve skin elasticity by stimulating collagen synthesis.
- Promote skin whitening by reducing tyrosinase activity & decreased melanin content



OUTCOME 2

Improved cracked heels

OUTCOME 3

Tocotrienols has ability to penetrate at micro – blood circulation resulting in fat reduction

OUTCOME 4

Synergistically has greater impact with other actives

Thank You

www.gold-trie.com

References

1. Sen CK, Khanna S, Roy S, Lester Packer: Molecular basis of Vitamin E action. The Journal of Biological Chemistry. 2000, Vol 275, No. 17 Issue of April 28, pp. 13049-13055.
2. Serbinova E, Kagen V, Han D, packer I. Free radical recycling and intramembrane mobility in the antioxidant properties of alpha-tocopherol and alpha-tocotrienol. Free Rad Biol Med, 1991, 10:263
3. Qureshi AA, qureshi N, Wright JJK, Shen Z, Kramer G, Gapor A, Chong YH, DeWitt G, Ong ASH, Peterson DM, Bradlow BA Lowering of serum cholesterol in hypercholesterolemic humans by tocotrienols (Palmvitee). Am J Clin Nutr, 1991, 53: 1021S-6S
4. Qureshi AA, Bradlow BA, Brace L, Manganello J, Peterson DM, Pearce BC, Wright JJ, Gapor A, Elson CE. Response of hypercholesterolemic subjects to administration of tocotrienols. Lipids 1995, 30: 1171
5. Theriault A, Chao JT, Gapor A. Tocotrienols is the most effective Vitamin E for reducing endothelial expression of adhesion molecules and adhesion to monocytes. Artherosclerosis 2002 160 (1): 21-30
6. Das S, Powell SR, Ang P, Divald A, Nesaretnam, Tosaki A, Cordis GA Maulik N, Das DK. Cardio protection with palm tocotrienol: antioxidant activity of tocotrienol is linked with its ability to stabilize proteosomes. Am J Physiol Heart Physiology 2005 Jul; 289 (1): H361-7
7. Kooyenga DK, et al. m oil antioxidant effects in patient with hyperlipidemia and carotid stenosis-2 years experience Asia Pacific J Cli. Nut 1997 6(1): 1-10
8. Tomeo AC, et al. Antioxidant effects of Tocotrienol in patients with hyperlipidemia and carotid stenosis, Lipids 1995 30: 1179-83
9. Siok-Fong Chin, Wan Zurinah Wan Ngah Ph.D, et al. Reduction of DNA damage in older healthy adults by Tri.E Tocotrienol supplementation, Nutrition 24 (2008): 1-10
10. Osakada F, Hashino A, Kume T, Katsuki H, Kaneko S, Akaike A, Alpha-Tocotrienol provides the most neuroprotection among Vitamin E analogs on cultured striatal neurons, Neuropharmacology, 2004 Nov; 47(6): 904-15

References-cont

- 11.Sen CK, Khanna S, Roy S, Tocotrienol: the natural vitamin E to defend the nervous system ? Ann NY Academy Sciences 2004 Dec; 1031: 127-42
- 12.Khanna S, Roy S, Slivka A, Craft TK, Parinandi NL, Sen CK. Neuroprotective properties of the natural Vitamin E alpha-tocotrienol, Stroke 2005 Oct; 36 (10); 2258-64
- 13.Traber MG, et al. Diet-derived and topically applied tocotrienols accumulate in skin and protect the tissues against UV induced oxidative stress, Asia Pacific J. Clinical Nutrition: 1997, 63-67
- 14.Traber MG, Packer L, Ozones depletes Tocopherol and Tocotrienol topically applied to murine skin. Feb. Letters 401, 1997
- 15.Nesaretnam K, Ambra R, Selvaduray KR, Radhakrishnan A, Reiman K, Razak G, Canali R, Virgili F, Tocotrienol-rich fraction from palm affects gene expression in tumors resulting from MCF-7 cell inoculation in athymic mice. Lipids 2004 May; 39 (5): 459-57
16. Nesaretnam K, Ambra R, Selvaduray KR, Radhakrishnan A, Canali R, Virgili F, Tocotrienol-rich fraction from palm oil and gene expression in human breast cancer cells. Ann NY Academy Sciences 2004 Dec; 1031: 143-57
- 17.Sylvester PW, Shah SJ, Tocotrienol induced cytotoxicity is unrelated to mitochondrial stress apoptic signaling in neoplastic mammary epithelial cells. Biochem Cell Biology, 2005 Feb 83 (1): 86-95
- 18.Stephanie J. Weinstein, et al. Serum and dietary Vitamin E in relation to prostate cancer risk. Cancer epidemiol biomarkers prev 2007; 16(6) June 2007: 1253-1259
- 19.KR Sree Kumar ad, Mythill Raghavan, et al. Preferential radiation sensitization of prostate cancer in nude mice by nutraceutical antioxidant g-tocotrienol. Life Sciences 78 (2006): 2099-2104