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## **APPENDICES**

**APPENDIX A**

**HPLC chromatogram of antioxidants**

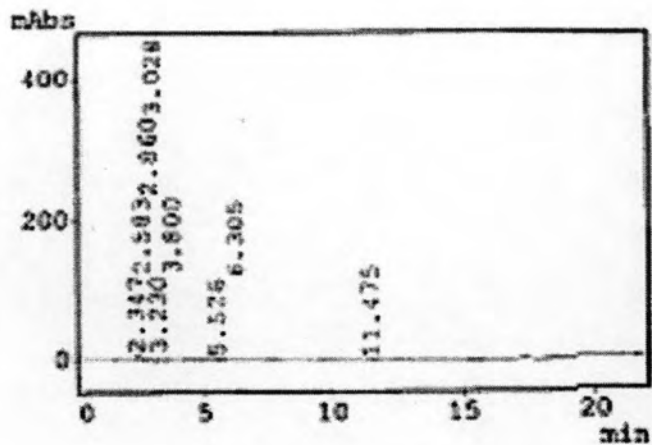


Figure A1. HPLC chromatogram of 0.10% sodium metabisulfite in 20% propylene glycol in water

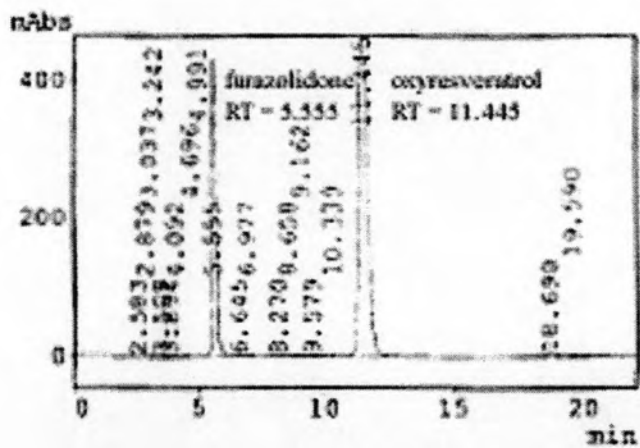


Figure A2. HPLC chromatogram of mixture of 0.10% sodium metabisulfite and 0.10% Puag-Haad with internal standard (furazolidone) in 20% propylene glycol in water



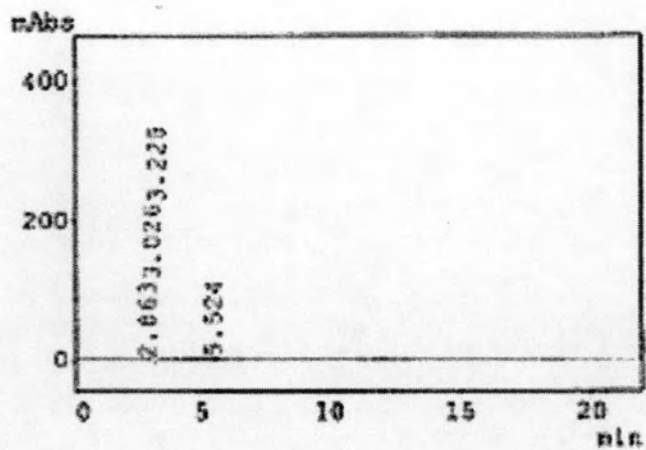


Figure A3. HPLC chromatogram of 0.02% butylated hydroxyanisole (BHA) in 20% propylene glycol in water

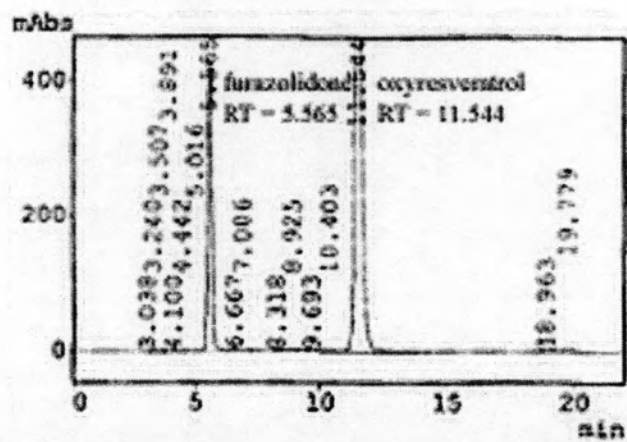


Figure A4. HPLC chromatogram of mixture of 0.02% BHA and 0.10% Puag-Haad with internal standard (furazolidone) in 20% propylene glycol in water

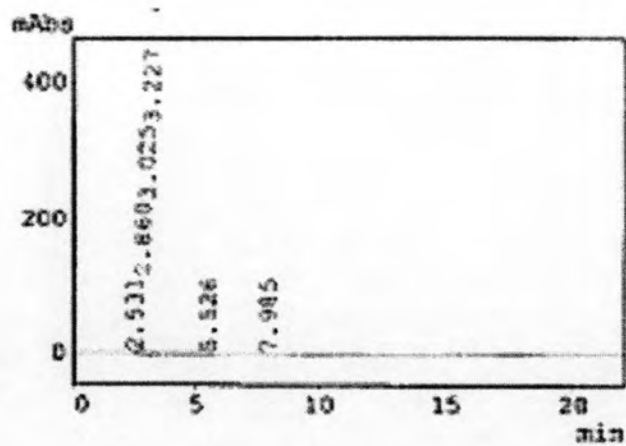


Figure A5. HPLC chromatogram of 0.10% propyl gallate in 20% propylene glycol in water

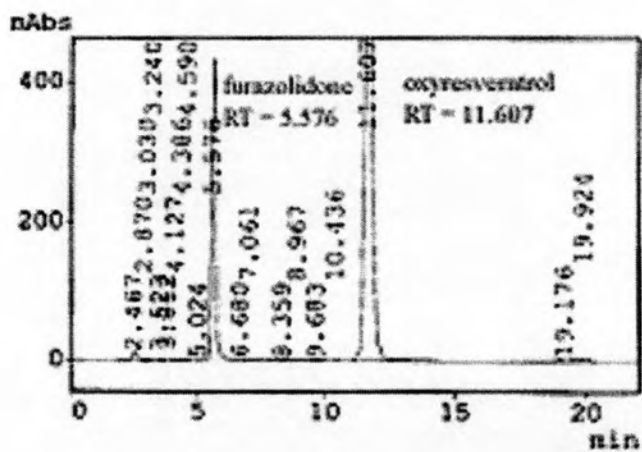


Figure A6. HPLC chromatogram of mixture of 0.10% propyl gallate and 0.10% Puag-Haad with internal standard (furazolidone) in 20% propylene glycol in water

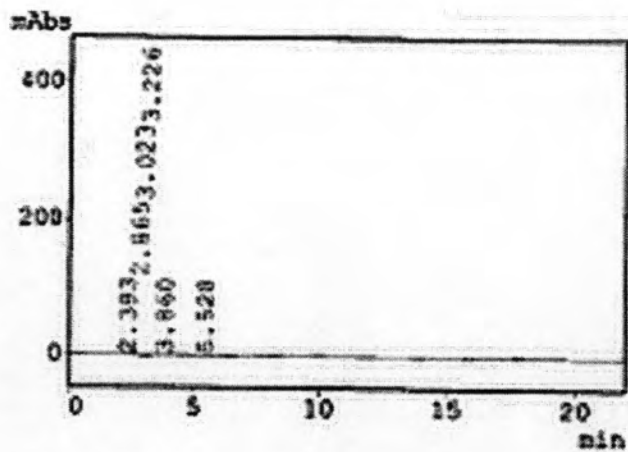


Figure A7. HPLC chromatogram of 0.05% EDTA in 20% propylene glycol in water

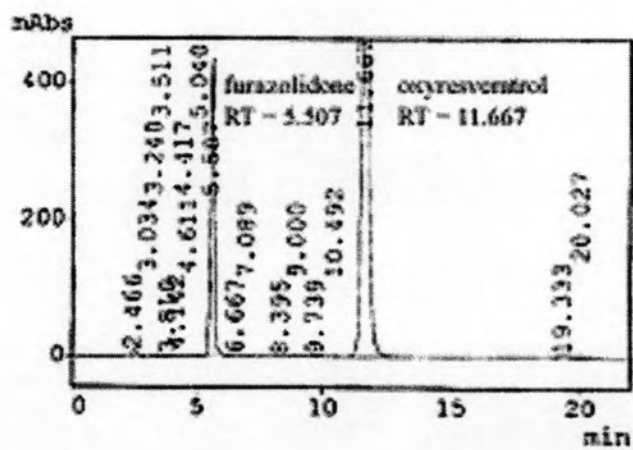


Figure A8. HPLC chromatogram of mixture of 0.05% EDTA and 0.10% Puag-Haad with internal standard (furazolidone) in 20% propylene glycol in water

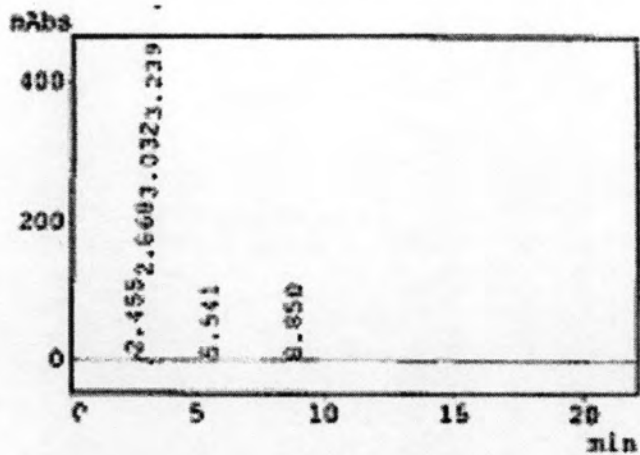


Figure A9. HPLC chromatogram of buffer medium (20% v/v propylene glycol and 80% v/v citrate buffer pH 5.5)

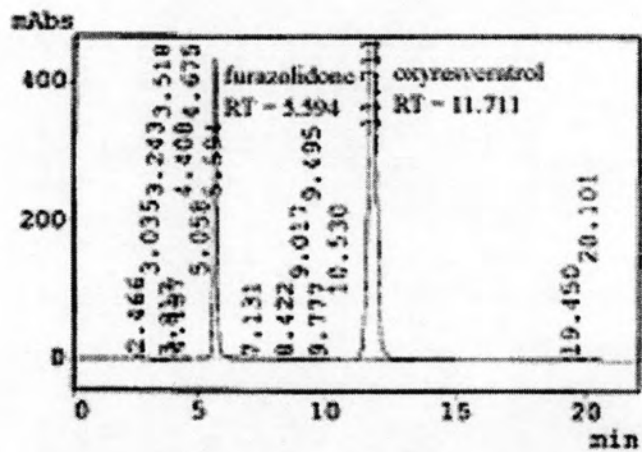


Figure A10. HPLC chromatogram of mixture 0.10% Puag-Haad and internal standard (furazolidone) in buffered medium



**APPENDIX B**

**Data for statistical analysis**

**Statistical analysis for the baseline roughness values**

Table B1. One-way analysis of variance on the baseline circular roughness values taken from the left cheek at week -4 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	294.495	3	98.165	0.861	0.465
Within Groups	9352.056	82	114.049		
Total	9646.551	85			

Table B2. One-way analysis of variance on the baseline circular roughness values taken from the left cheek at week -2 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.842	3	4.614	0.049	0.986
Within Groups	7722.590	82	94.178		
Total	7736.432	85			

Table B3. One-way analysis of variance on the baseline circular roughness values taken from the left cheek at week 0 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	37.652	3	12.551	0.110	0.954
Within Groups	9395.696	82	114.582		
Total	9433.348	85			

Table B4. One-way analysis of variance on the baseline circular roughness values taken from the right cheek at week -4 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	147.022	3	49.007	0.431	0.731
Within Groups	9321.528	82	113.677		
Total	9468.550	85			

Table B5. One-way analysis of variance on the baseline circular roughness values taken from the right cheek at week -2 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	62.757	3	20.919	0.245	0.865
Within Groups	7013.496	82	85.530		
Total	7076.253	85			

Table B6. One-way analysis of variance on the baseline circular roughness values taken from the right cheek at week 0 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	24.775	3	8.258	0.073	0.974
Within Groups	9289.428	82	113.286		
Total	9314.203	85			



Table B7. One-way analysis of variance on the baseline mean roughness values taken from the left cheek at week -4 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	237.647	3	79.216	0.761	0.519
Within Groups	8538.515	82	104.128		
Total	8776.162	85			

Table B8. One-way analysis of variance on the baseline mean roughness values taken from the left cheek at week -2 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	19.229	3	6.410	0.074	0.974
Within Groups	7112.953	82	86.743		
Total	7132.182	85			

Table B9. One-way analysis of variance on the baseline mean roughness values taken from the left cheek at week 0 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.746	3	3.915	0.037	0.990
Within Groups	8656.215	82	105.564		
Total	8667.961	85			

Table B10. One-way analysis of variance on the baseline mean roughness values taken from the right cheek at week -4 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	127.118	3	42.373	0.397	0.756
Within Groups	8758.264	82	106.808		
Total	8885.382	85			

Table B11. One-way analysis of variance on the baseline mean roughness values taken from the right cheek at week -2 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	63.867	3	21.289	0.271	0.846
Within Groups	6445.100	82	78.599		
Total	6508.967	85			

Table B12. One-way analysis of variance on the baseline mean roughness values taken from the right cheek at week 0 between the 4 groups of subjects (n = 20-23 subjects per group)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	36.884	3	12.295	0.116	0.950
Within Groups	8664.170	82	105.661		
Total	8701.054	85			

Table B13. Randomized block ANOVA on the circular roughness values taken from the left cheek of subjects group A during the baseline monitoring period (week -4, -2, 0) (n = 23)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6178.881	24	257.453	11.920	0.000
Intercept	232986.931	1	232986.931	10787.566	0.000
SUBJECT	6074.470	22	276.112	12.784	0.000
WEEK	104.410	2	52.205	2.417	0.101
Error	950.300	44	21.598		
Total	240116.112	69			
Corrected Total	7129.181	68			

Table B14. Randomized block ANOVA on the circular roughness values taken from the left cheek of subjects group B during the baseline monitoring period (week -4, -2, 0) (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4667.052	23	202.915	10.082	0.000
Intercept	225712.332	1	225712.332	11214.477	0.000
SUBJECT	4661.502	21	221.976	11.029	0.000
WEEK	5.550	2	2.775	0.138	0.872
Error	845.329	42	20.127		
Total	231224.712	66			
Corrected Total	5512.380	65			

Table B15. Randomized block ANOVA on the circular roughness values taken from the left cheek of subjects group C during the baseline monitoring period (week -4, -2, 0) (n = 21)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6940.858	22	315.494	13.741	0.000
Intercept	223134.769	1	223134.769	9718.470	0.000
SUBJECT	6865.767	20	343.288	14.952	0.000
WEEK	75.091	2	37.545	1.635	0.208
Error	918.395	40	22.960		
Total	230994.022	63			
Corrected Total	7859.253	62			

Table B16. Randomized block ANOVA on the circular roughness values taken from the left cheek of subjects group D during the baseline monitoring period (week -4, -2, 0) (n = 20)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4555.666	21	216.936	4.808	0.000
Intercept	217161.357	1	217161.357	4813.244	0.000
SUBJECT	4440.549	19	233.713	5.180	0.000
WEEK	115.117	2	57.559	1.276	0.291
Error	1714.463	38	45.117		
Total	223431.487	60			
Corrected Total	6270.130	59			

Table B17. Randomized block ANOVA on the circular roughness values taken from the right cheek of subjects group A during the baseline monitoring period (week -4, -2, 0) (n = 23)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5793.019	24	241.376	10.607	0.000
Intercept	230109.534	1	230109.534	10111.799	0.000
SUBJECT	5680.164	22	258.189	11.346	0.000
WEEK	112.855	2	56.427	2.480	0.095
Error	1001.288	44	22.757		
Total	236903.840	69			
Corrected Total	6794.307	68			

Table B18. Randomized block ANOVA on the circular roughness values taken from the right cheek of subjects group B during the baseline monitoring period (week -4, -2, 0) (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5557.526	23	241.632	6.953	0.000
Intercept	219018.358	1	219018.358	6302.652	0.000
SUBJECT	5491.991	21	261.523	7.526	0.000
WEEK	65.535	2	32.768	0.943	0.398
Error	1459.508	42	34.750		
Total	226035.392	66			
Corrected Total	7017.034	65			

Table B19. Randomized block ANOVA on the circular roughness values taken from the right cheek of subjects group C during the baseline monitoring period (week -4, -2, 0) (n = 21)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5451.803	22	247.809	8.439	0.000
Intercept	215932.948	1	215932.948	7353.903	0.000
SUBJECT	5373.581	20	268.679	9.150	0.000
WEEK	78.221	2	39.111	1.332	0.275
Error	1174.522	40	29.363		
Total	222559.272	63			
Corrected Total	6626.324	62			

Table B20. Randomized block ANOVA on the circular roughness values taken from the right cheek of subjects group D during the baseline monitoring period (week -4, -2, 0) (n = 20)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4395.587	21	209.314	9.242	0.000
Intercept	211898.260	1	211898.260	9356.055	0.000
SUBJECT	4260.009	19	224.211	9.900	0.000
WEEK	135.578	2	67.789	2.993	0.062
Error	860.633	38	22.648		
Total	217154.480	60			
Corrected Total	5256.221	59			

Table B21. Randomized block ANOVA on the mean roughness values taken from the left cheek of subjects group A during the baseline monitoring period (week -4, -2, 0) (n = 23)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5766.666	24	240.278	11.737	0.000
Intercept	219983.179	1	219983.179	10746.102	0.000
SUBJECT	5690.109	22	258.641	12.635	0.000
WEEK	76.558	2	38.279	1.870	0.166
Error	900.723	44	20.471		
Total	226650.568	69			
Corrected Total	6667.389	68			

Table B22. Randomized block ANOVA on the mean roughness values taken from the left cheek of subjects group B during the baseline monitoring period (week -4, -2, 0) (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4629.024	23	201.262	10.176	0.000
Intercept	211745.128	1	211745.128	10706.007	0.000
SUBJECT	4626.417	21	220.306	11.139	0.000
WEEK	2.607	2	1.303	0.066	0.936
Error	830.683	42	19.778		
Total	217204.835	66			
Corrected Total	5459.706	65			

Table B23. Randomized block ANOVA on the mean roughness values taken from the left cheek of subjects group C during the baseline monitoring period (week -4, -2, 0) (n = 21)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6368.021	22	289.456	14.889	0.000
Intercept	208581.579	1	208581.579	10728.879	0.000
SUBJECT	6265.602	20	313.280	16.114	0.000
WEEK	102.419	2	51.210	2.634	0.084
Error	777.645	40	19.441		
Total	215727.246	63			
Corrected Total	7145.667	62			

Table B24. Randomized block ANOVA on the mean roughness values taken from the left cheek of subjects group D during the baseline monitoring period (week -4, -2, 0) (n = 20)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3891.428	21	185.306	4.795	0.000
Intercept	201144.368	1	201144.368	5205.219	0.000
SUBJECT	3748.078	19	197.267	5.105	0.000
WEEK	143.350	2	71.675	1.855	0.170
Error	1468.427	38	38.643		
Total	206504.224	60			
Corrected Total	5359.855	59			



Table B25. Randomized block ANOVA on the mean roughness values taken from the right cheek of subjects group A during the baseline monitoring period (week -4, -2, 0) (n = 23)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5867.054	24	244.461	11.785	0.000
Intercept	214558.756	1	214558.756	10343.488	0.000
SUBJECT	5748.662	22	261.303	12.597	0.000
WEEK	118.392	2	59.196	2.854	0.068
Error	912.708	44	20.743		
Total	221338.518	69			
Corrected Total	6779.762	68			

Table B26. Randomized block ANOVA on the mean roughness values taken from the right cheek of subjects group B during the baseline monitoring period (week -4, -2, 0) (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5297.949	23	230.346	8.235	0.000
Intercept	205002.471	1	205002.471	7329.071	0.000
SUBJECT	5208.236	21	248.011	8.867	0.000
WEEK	89.712	2	44.856	1.604	0.213
Error	1174.788	42	27.971		
Total	211475.208	66			
Corrected Total	6472.737	65			

Table B27. Randomized block ANOVA on the mean roughness values taken from the right cheek of subjects group C during the baseline monitoring period (week -4, -2, 0) (n = 21)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4975.400	22	226.155	8.710	0.000
Intercept	202828.856	1	202828.856	7811.213	0.000
SUBJECT	4929.895	20	246.495	9.493	0.000
WEEK	45.505	2	22.752	0.876	0.424
Error	1038.655	40	25.966		
Total	208842.911	63			
Corrected Total	6014.055	62			

Table B28. Randomized block ANOVA on the mean roughness values taken from the right cheek of subjects group D during the baseline monitoring period (week -4, -2, 0) (n = 20)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4055.408	21	193.115	10.331	0.000
Intercept	196768.725	1	196768.725	10526.474	0.000
SUBJECT	3944.295	19	207.594	11.106	0.000
WEEK	111.112	2	55.556	2.972	0.063
Error	710.324	38	18.693		
Total	201534.457	60			
Corrected Total	4765.732	59			

**Statistical analysis of the roughness values at different application  
times in solutions**

Table B29. Paired student's t-test comparing at each week the circular roughness values between the left (control) and the right cheeks (0.25% Puag-Haad solution) of subjects group A (n = 23)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
LC-RC (-4)	-1.051	4.601	0.959	-3.040	0.939	-1.095	22	0.285
LC-RC (-2)	0.986	4.236	0.883	-0.846	2.817	1.116	22	0.277
LC-RC (0)	1.145	5.812	1.212	-1.369	3.658	0.945	22	0.355
LC-RC (2)	1.884	5.757	1.200	-0.605	4.373	1.570	22	0.131
LC-RC (4)	2.420	5.761	1.201	-0.071	4.912	2.015	22	0.056
LC-RC (6)	2.058	5.300	1.105	-0.234	4.350	1.862	22	0.076
LC-RC (8)	2.587	5.290	1.103	0.300	4.874	2.345	22	0.028*

LC = left cheek, RC = right cheek

\* Statistically significant at P-value  $\leq 0.05$

Table B30. Paired student's t-test comparing at each week the circular roughness values between the left (control) and the right cheeks (0.10% Puag-Haad solution) of subjects group B (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
LC-RC (-4)	-0.394	7.812	1.666	-3.858	3.070	-0.237	21	0.815
LC-RC (-2)	1.848	5.141	1.096	-0.431	4.128	1.686	21	0.107
LC-RC (0)	1.167	5.853	1.248	-1.428	3.762	0.935	21	0.360
LC-RC (2)	5.515	6.293	1.342	2.725	8.305	4.111	21	0.000*
LC-RC (4)	3.970	6.589	1.405	1.048	6.891	2.826	21	0.010*
LC-RC (6)	3.258	5.609	1.196	0.771	5.745	2.724	21	0.013*
LC-RC (8)	3.857	6.330	1.381	0.976	6.739	2.792	20	0.011*

LC = left cheek, RC = right cheek

\* Statistically significant at P-value  $\leq 0.05$

Table B31. Paired student's t-test comparing at each week the circular roughness values between the left (control) and the right cheeks (0.10% EGCG solution) of subjects group C (n = 21)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
LC-RC (-4)	0.873	6.957	1.518	-2.294	4.040	0.575	20	0.572
LC-RC (-2)	1.143	5.716	1.247	-1.459	3.745	0.916	20	0.370
LC-RC (0)	0.889	4.813	1.050	-1.302	3.080	0.846	20	0.407
LC-RC (2)	0.905	5.782	1.262	-1.727	3.537	0.717	20	0.482
LC-RC (4)	2.381	8.045	1.756	-1.281	6.043	1.356	20	0.190
LC-RC (6)	2.159	4.928	1.075	-0.084	4.402	2.007	20	0.058
LC-RC (8)	3.366	5.814	1.269	0.719	6.012	2.653	20	0.015*

LC = left cheek, RC = right cheek

\* Statistically significant at P-value  $\leq 0.05$

Table B32. Paired student's t-test comparing at each week the circular roughness values between the left (control) and the right cheeks (0.10% vitamin C solution) of subjects group D (n = 20)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
LC-RC (-4)	0.183	3.262	0.729	-1.343	1.710	0.251	19	0.804
LC-RC (-2)	0.350	5.122	1.145	-2.047	2.747	0.305	19	0.763
LC-RC (0)	2.617	6.261	1.400	-0.313	5.547	1.869	19	0.077
LC-RC (2)	2.583	6.005	1.343	-0.227	5.394	1.924	19	0.069
LC-RC (4)	2.500	4.037	0.903	0.611	4.389	2.769	19	0.012*
LC-RC (6)	-0.983	6.119	1.368	-3.847	1.880	-0.719	19	0.481
LC-RC (8)	3.050	6.742	1.508	-0.105	6.205	2.023	19	0.057

LC = left cheek, RC = right cheek

\* Statistically significant at P-value  $\leq 0.05$

Table B33. Paired student's t-test comparing at each week the mean roughness values between the left (control) and the right cheeks (0.25% Puag-Haad solution) of subjects group A (n = 23)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
LC-RC (-4)	-0.725	4.148	0.865	-2.518	1.069	-0.838	22	0.411
LC-RC (-2)	1.174	3.950	0.824	-0.534	2.882	1.425	22	0.168
LC-RC (0)	1.652	5.476	1.142	-0.716	4.020	1.447	22	0.162
LC-RC (2)	1.507	5.177	1.080	-0.732	3.746	1.396	22	0.177
LC-RC (4)	1.826	5.578	1.163	-0.586	4.239	1.570	22	0.131
LC-RC (6)	1.403	4.994	1.041	-0.756	3.563	1.347	22	0.192
LC-RC (8)	2.601	4.916	1.025	0.476	4.727	2.538	22	0.019*

LC = left cheek, RC = right cheek

\* Statistically significant at P-value  $\leq 0.05$

Table B34. Paired student's t-test comparing at each week the mean roughness values between the left (control) and the right cheeks (0.10% Puag-Haad solution) of subjects group B (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
LC-RC (-4)	-0.561	6.702	1.429	-3.532	2.411	-0.392	21	0.699
LC-RC (-2)	1.758	5.019	1.070	-0.468	3.983	1.643	21	0.115
LC-RC (0)	1.530	5.580	1.190	-0.944	4.005	1.286	21	0.212
LC-RC (2)	5.152	5.493	1.171	2.716	7.587	4.399	21	0.000*
LC-RC (4)	3.667	6.195	1.321	0.920	6.413	2.776	21	0.011*
LC-RC (6)	2.576	5.693	1.214	0.052	5.100	2.122	21	0.046*
LC-RC (8)	2.730	5.859	1.279	0.063	5.397	2.135	20	0.045*

LC = left cheek, RC = right cheek

\* Statistically significant at P-value  $\leq 0.05$



Table B35. Paired student's t-test comparing at each week the mean roughness values between the left (control) and the right cheeks (0.10% EGCG solution) of subjects group C (n = 21)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
LC-RC (-4)	1.206	6.509	1.420	-1.757	4.169	0.849	20	0.406
LC-RC (-2)	1.016	4.721	1.030	-1.133	3.165	0.986	20	0.336
LC-RC (0)	0.175	4.616	1.007	-1.926	2.276	0.173	20	0.864
LC-RC (2)	0.714	5.385	1.175	-1.737	3.166	0.608	20	0.550
LC-RC (4)	1.556	7.405	1.616	-1.815	4.926	0.963	20	0.347
LC-RC (6)	1.619	4.561	0.995	-0.457	3.695	1.627	20	0.119
LC-RC (8)	2.810	5.724	1.249	0.204	5.415	2.250	20	0.036*

LC = left cheek, RC = right cheek

\* Statistically significant at P-value  $\leq 0.05$

Table B36. Paired student's t-test comparing at each week the mean roughness values between the left (control) and the right cheeks (0.10% vitamin C solution) of subjects group D (n = 20)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
LC-RC (-4)	0.117	3.377	0.755	-1.464	1.697	0.155	19	0.879
LC-RC (-2)	-0.100	4.243	0.949	-2.086	1.886	-0.105	19	0.917
LC-RC (0)	1.883	5.895	1.318	-0.876	4.642	1.429	19	0.169
LC-RC (2)	1.900	5.497	1.229	-0.672	4.472	1.546	19	0.139
LC-RC (4)	1.833	4.054	0.907	-0.064	3.731	2.022	19	0.057
LC-RC (6)	-1.017	5.669	1.268	-3.670	1.636	-0.802	19	0.432
LC-RC (8)	2.217	6.187	1.384	-0.679	5.113	1.602	19	0.126

LC = left cheek, RC = right cheek

Table B37. Randomized block ANOVA on the circular roughness values taken from the left cheek of subject group A (control side) at different application times (n = 23)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8690.281	26	334.242	11.713	0.000
Intercept	377731.356	1	377731.356	13237.194	0.000
SUBJECT	8647.193	22	393.054	13.774	0.000
WEEK	43.088	4	10.772	0.377	0.824
Error	2511.133	88	28.536		
Total	388932.771	115			
Corrected Total	11201.414	114			

Table B38. Randomized block ANOVA on the circular roughness values taken from the left cheek of subject group B (control side) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8267.274	25	330.691	12.297	0.000
Intercept	385939.689	1	385939.689	14350.940	0.000
SUBJECT	8179.356	21	389.493	14.483	0.000
WEEK	86.532	4	21.633	0.804	0.526
Error	2232.118	83	26.893		
Total	397279.658	109			
Corrected Total	10499.392	108			

Table B39. Randomized block ANOVA on the circular roughness values taken from the left cheek of subject group C (control side) at different application times (n = 21)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8822.647	24	367.610	15.149	0.000
Intercept	366370.806	1	366370.806	15097.632	0.000
SUBJECT	8656.330	20	432.816	17.836	0.000
WEEK	166.317	4	41.579	1.713	0.155
Error	1941.342	80	24.267		
Total	377134.795	105			
Corrected Total	10763.989	104			

Table B40. Randomized block ANOVA on the circular roughness values taken from the left cheek of subject group D (control side) at different application times (n = 20)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6691.274	23	290.925	10.062	0.000
Intercept	344686.410	1	344686.410	11921.809	0.000
SUBJECT	6638.058	19	349.371	12.084	0.000
WEEK	53.216	4	13.304	0.460	0.765
Error	2197.332	76	28.912		
Total	353575.015	100			
Corrected Total	8888.605	99			

Table B41. Randomized block ANOVA on the circular roughness values taken from the right cheek of subject group A (treated with 0.25% Puag-Haad) at different application times (n = 23)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7666.407	26	294.862	11.488	0.000
Intercept	351588.079	1	351588.079	13697.532	0.000
SUBJECT	7629.051	22	346.775	13.510	0.000
WEEK	37.356	4	9.339	0.364	0.834
Error	2258.783	88	25.668		
Total	361513.268	115			
Corrected Total	9925.189	114			

Table B42. Randomized block ANOVA on the circular roughness values taken from the right cheek of subject group B (treated with 0.10% Puag-Haad) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8067.364	25	322.695	11.813	0.000
Intercept	341201.474	1	341201.474	12490.309	0.000
SUBJECT	7921.634	21	377.221	13.809	0.000
WEEK	143.895	4	35.974	1.317	0.270
Error	2267.336	83	27.317		
Total	352382.064	109			
Corrected Total	10334.700	108			

Table B43. Randomized block ANOVA on the circular roughness values taken from the right cheek of subject group C (treated with 0.10% EGCG) at different application times (n = 21)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7968.128	24	332.005	12.404	0.000
Intercept	339853.844	1	339853.844	12697.537	0.000
SUBJECT	7955.266	20	397.763	14.861	0.000
WEEK	12.862	4	3.216	0.120	0.975
Error	2141.227	80	26.765		
Total	349963.199	105			
Corrected Total	10109.355	104			

Table B44. Randomized block ANOVA on the circular roughness values taken from the right cheek of subject group D (treated with 0.10% vitamin C) at different application times (n = 20)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6541.439	23	284.410	12.786	0.000
Intercept	322131.959	1	322131.959	14481.869	0.000
SUBJECT	6466.528	19	340.344	15.301	0.000
WEEK	74.910	4	18.728	0.842	0.503
Error	1690.530	76	22.244		
Total	330363.927	100			
Corrected Total	8231.968	99			

Table B45. Randomized block ANOVA on the mean roughness values taken from the left cheek of subject group A (control side) at different application times (n = 23)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8164.429	26	314.017	12.230	0.000
Intercept	352492.622	1	352492.622	13728.135	0.000
SUBJECT	8113.849	22	368.811	14.364	0.000
WEEK	50.580	4	12.645	0.492	0.741
Error	2259.546	88	25.677		
Total	362916.597	115			
Corrected Total	10423.975	114			

Table B46. Randomized block ANOVA on the mean roughness values taken from the left cheek of subject group B (control side) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7486.397	25	299.456	11.161	0.000
Intercept	357532.669	1	357532.669	13325.450	0.000
SUBJECT	7420.561	21	353.360	13.170	0.000
WEEK	62.550	4	15.637	0.583	0.676
Error	2226.958	83	26.831		
Total	368046.842	109			
Corrected Total	9713.354	108			

Table B47. Randomized block ANOVA on the mean roughness values taken from the left cheek of subject group C (control side) at different application times (n = 21)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8392.055	24	349.669	16.256	0.000
Intercept	340005.839	1	340005.839	15807.035	0.000
SUBJECT	8225.754	20	411.288	19.121	0.000
WEEK	166.301	4	41.575	1.933	0.113
Error	1720.782	80	21.510		
Total	350118.676	105			
Corrected Total	10112.837	104			

Table B48. Randomized block ANOVA on the mean roughness values taken from the left cheek of subject group D (control side) at different application times (n = 20)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6352.874	23	276.212	9.117	0.000
Intercept	319978.929	1	319978.929	10561.582	0.000
SUBJECT	6278.959	19	330.472	10.908	0.000
WEEK	73.915	4	18.479	0.610	0.657
Error	2302.534	76	30.296		
Total	328634.336	100			
Corrected Total	8655.408	99			



Table B49. Randomized block ANOVA on the mean roughness values taken from the right cheek of subject group A (treated with 0.25% Puag-Haad) at different application times (n = 23)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7356.379	26	282.938	11.801	0.000
Intercept	329968.346	1	329968.346	13763.066	0.000
SUBJECT	7339.556	22	333.616	13.915	0.000
WEEK	16.824	4	4.206	0.175	0.950
Error	2109.793	88	23.975		
Total	339434.517	115			
Corrected Total	9466.172	114			

Table B50. Randomized block ANOVA on the mean roughness values taken from the right cheek of subject group B (treated with 0.10% Puag-Haad) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7416.374	25	296.655	14.918	0.000
Intercept	319474.707	1	319474.707	16065.042	0.000
SUBJECT	7322.821	21	348.706	17.535	0.000
WEEK	92.566	4	23.142	1.164	0.333
Error	1650.565	83	19.886		
Total	329291.705	109			
Corrected Total	9066.940	108			

Table B51. Randomized block ANOVA on the mean roughness values taken from the right cheek of subject group C (treated with 0.10% EGCG) at different application times (n = 21)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7610.903	24	317.121	12.685	0.000
Intercept	320601.427	1	320601.427	12824.054	0.000
SUBJECT	7602.485	20	380.124	15.205	0.000
WEEK	8.418	4	2.105	0.084	0.987
Error	2000.000	80	25.000		
Total	330212.330	105			
Corrected Total	9610.903	104			



Table B52. Randomized block ANOVA on the mean roughness values taken from the right cheek of subject group D (treated with 0.10% vitamin C) at different application times (n = 20)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6223.300	23	270.578	11.266	0.000
Intercept	304740.654	1	304740.654	12688.326	0.000
SUBJECT	6170.123	19	324.743	13.521	0.000
WEEK	53.178	4	13.294	0.554	0.697
Error	1825.323	76	24.017		
Total	312789.277	100			
Corrected Total	8048.623	99			

**Statistical analysis of the roughness, skin elasticity, melanin and skin capacitance values at different application times in lotions**

Table B53. Paired student's t-test comparing at each the circular roughness values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% Puag-Haad lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	1.015	5.778	1.232	-1.546	3.577	0.824	21	0.419
CTL-TMT (2)	2.068	8.860	1.889	-1.860	5.997	1.095	21	0.286
CTL-TMT (4)	-0.409	7.372	1.572	-3.678	2.860	-0.260	21	0.797
CTL-TMT (6)	3.379	7.045	1.502	0.255	6.503	2.250	21	0.035*
CTL-TMT (8)	4.515	9.090	1.938	0.485	8.545	2.330	21	0.030*

CTL = control side, TMT = treatment side

\* Statistically significant at P-value  $\leq 0.05$

Table B54. Paired student's t-test comparing at each the circular roughness values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% EGCG lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	-0.833	5.945	1.267	-3.469	1.802	-0.658	21	0.518
CTL-TMT (2)	0.136	8.042	1.715	-3.429	3.702	0.080	21	0.937
CTL-TMT (4)	0.409	7.576	1.615	-2.950	3.768	0.253	21	0.803
CTL-TMT (6)	-0.212	6.344	1.352	-3.025	2.601	-0.157	21	0.877
CTL-TMT (8)	3.864	8.578	1.829	0.060	7.667	2.113	21	0.047*

CTL = control side, TMT = treatment side

\* Statistically significant at P-value  $\leq 0.05$

Table B55. Paired student's t-test comparing at each the mean roughness values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% Puag-Haad lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	0.864	5.100	1.087	-1.398	3.125	0.794	21	0.436
CTL-TMT (2)	3.008	8.144	1.736	-0.603	6.618	1.732	21	0.098
CTL-TMT (4)	-0.545	6.444	1.374	-3.402	2.312	-0.397	21	0.695
CTL-TMT (6)	3.652	5.724	1.220	1.114	6.190	2.992	21	0.007*
CTL-TMT (8)	4.121	7.941	1.693	0.600	7.642	2.434	21	0.024*

CTL = control side, TMT = treatment side

\* Statistically significant at P-value  $\leq 0.05$

Table B56. Paired student's t-test comparing at each the mean roughness values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% EGCG lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	-0.667	4.873	1.039	-2.827	1.494	-0.642	21	0.528
CTL-TMT (2)	0.159	7.097	1.513	-2.988	3.306	0.105	21	0.917
CTL-TMT (4)	0.364	6.751	1.439	-2.630	3.357	0.253	21	0.803
CTL-TMT (6)	0.455	5.453	1.163	-1.963	2.872	0.391	21	0.700
CTL-TMT (8)	3.940	8.680	1.851	0.091	7.789	2.129	21	0.045*

CTL = control side, TMT = treatment side

Table B57. Randomized block ANOVA on the circular roughness values taken from the control side of subject group A at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13099.278	25	523.971	18.934	0.000
Intercept	452737.216	1	452737.216	16359.636	0.000
SUBJECT	13040.830	21	620.992	22.440	0.000
WEEK	58.448	4	14.612	0.528	0.715
Error	2324.619	84	27.674		
Total	468161.113	110			
Corrected Total	15423.897	109			

Table B58. Randomized block ANOVA on the circular roughness values taken from the control side of subject group B at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7885.282	25	315.411	11.024	0.000
Intercept	440906.414	1	440906.414	15409.826	0.000
SUBJECT	7879.958	21	375.236	13.115	0.000
WEEK	5.324	4	1.331	0.047	0.996
Error	2403.411	84	28.612		
Total	451195.107	110			
Corrected Total	10288.692	109			

Table B59. Randomized block ANOVA on the circular roughness values taken from the treatment side of subject group A (treated with 0.10% Puag-Haad lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8066.789	25	322.672	9.847	0.000
Intercept	423397.067	1	423397.067	12921.276	0.000
SUBJECT	7647.440	21	364.164	11.114	0.000
WEEK	419.349	4	104.837	3.199	0.017*
Error	2752.464	84	32.767		
Total	434216.321	110			
Corrected Total	10819.254	109			

\* Statistically significant at P-value  $\leq 0.05$

Table B60. Dunnett's test results comparing the circular roughness values of the cheek treated with 0.10% Puag-Haad lotion between initial time (week 0) and subsequent weeks (week 2, 4, 6, 8) (n = 22)

(I) WEEK	(J) WEEK	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
2	0	-0.523	1.726	0.994	-4.819	3.773
4	0	0.409	1.726	0.998	-3.887	4.705
6	0	-2.273	1.726	0.490	-6.569	2.023
8	0	-4.909	1.726	0.020*	-9.205	-0.613

\* Statistically significant at P-value  $\leq 0.05$

Table B61. Randomized block ANOVA on the circular roughness values taken from the treatment side of subject group B (treated with 0.10% EGCG lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7711.514	25	308.461	9.644	0.000
Intercept	431585.592	1	431585.592	13493.282	0.000
SUBJECT	7421.477	21	353.404	11.049	0.000
WEEK	290.037	4	72.509	2.267	0.069
Error	2686.758	84	31.985		
Total	441983.864	110			
Corrected Total	10398.272	109			



Table B62. Randomized block ANOVA on the mean roughness values taken from the control side of subject group A at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	11571.664	25	462.867	22.605	0.000
Intercept	421931.568	1	421931.568	20606.272	0.000
SUBJECT	11459.264	21	545.679	26.650	0.000
WEEK	112.399	4	28.100	1.372	0.250
Error	1719.974	84	20.476		
Total	435223.206	110			
Corrected Total	13291.638	109			

Table B63. Randomized block ANOVA on the mean roughness values taken from the control side of subject group B at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7165.598	25	286.624	10.697	0.000
Intercept	406184.980	1	406184.980	15159.698	0.000
SUBJECT	7087.552	21	337.502	12.596	0.000
WEEK	78.046	4	19.512	0.728	0.575
Error	2250.674	84	26.794		
Total	415601.252	110			
Corrected Total	9416.272	109			

Table B64. Randomized block ANOVA on the mean roughness values taken from the treatment side of subject group A (treated with 0.10% Puag-Haad lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7975.730	25	319.029	12.273	0.000
Intercept	392229.379	1	392229.379	15088.463	0.000
SUBJECT	7633.709	21	363.510	13.984	0.000
WEEK	342.021	4	85.505	3.289	0.015*
Error	2183.607	84	25.995		
Total	402388.716	110			
Corrected Total	10159.337	109			

\* Statistically significant at P-value  $\leq 0.05$

Table B65. Dunnett's test results comparing the mean roughness values of the cheek treated with 0.10% Puag-Haad lotion between initial time (week 0) and subsequent weeks (week 2, 4, 6, 8) (n = 22)

(I) WEEK	(J) WEEK	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
2	0	-1.432	1.537	0.758	-5.258	2.395
4	0	-0.091	1.537	1.000	-3.917	3.735
6	0	-2.121	1.537	0.448	-5.948	1.705
8	0	-4.833	1.537	0.008*	-8.660	-1.007

\* Statistically significant at P-value  $\leq 0.05$

Table B66. Randomized block ANOVA on the mean roughness values taken from the treatment side of subject group B (treated with 0.10% EGCG lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6944.377	25	277.775	10.380	0.000
Intercept	400914.755	1	400914.755	14982.101	0.000
SUBJECT	6690.502	21	318.595	11.906	0.000
WEEK	253.875	4	63.469	2.372	0.059
Error	2247.805	84	26.760		
Total	410106.937	110			
Corrected Total	9192.182	109			

Table B67. Paired student's t-test comparing at each the skin elasticity (R2) values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% Puag-Haad lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	0.000	0.052	0.011	-0.022	0.023	0.041	21	0.968
CTL-TMT (2)	0.001	0.023	0.005	-0.009	0.012	0.282	21	0.781
CTL-TMT (4)	0.003	0.024	0.005	-0.008	0.014	0.617	21	0.544
CTL-TMT (6)	-0.001	0.029	0.006	-0.014	0.012	-0.189	21	0.852
CTL-TMT (8)	0.007	0.050	0.011	-0.015	0.029	0.661	21	0.516

CTL = control, TMT = treatment

Table B68. Paired student's t-test comparing at each the skin elasticity (R2) values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% EGCG lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	0.007	0.049	0.010	-0.014	0.029	0.690	21	0.498
CTL-TMT (2)	-0.002	0.045	0.010	-0.022	0.018	-0.233	21	0.818
CTL-TMT (4)	-0.002	0.030	0.006	-0.015	0.012	-0.237	21	0.815
CTL-TMT (6)	0.011	0.039	0.008	-0.006	0.029	1.379	21	0.182
CTL-TMT (8)	-0.002	0.049	0.010	-0.024	0.020	-0.207	21	0.838

CTL = control, TMT = treatment

Table B69. Randomized block ANOVA on the skin elasticity (R2) values taken from the control side of subject group A at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	0.198	25	0.008	8.730	0.000
Intercept	84.989	1	84.989	93509.373	0.000
SUBJECT	0.194	21	0.009	10.189	0.000
WEEK	0.004	4	0.001	1.074	0.375
Error	0.076	84	0.001		
Total	85.263	110			
Corrected Total	0.275	109			

Table B70. Randomized block ANOVA on the skin elasticity (R2) values taken from the control side of subject group B at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	0.405	25	0.016	16.838	0.000
Intercept	80.218	1	80.218	83364.131	0.000
SUBJECT	0.401	21	0.019	19.860	0.000
WEEK	0.004	4	0.001	0.970	0.428
Error	0.081	84	0.001		
Total	80.704	110			
Corrected Total	0.486	109			

Table B71. Randomized block ANOVA on the skin elasticity (R2) values taken from the treatment side of subject group A (treated with 0.10% Puag-Haad lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	0.222	25	0.009	12.907	0.000
Intercept	84.569	1	84.569	122926.050	0.000
SUBJECT	0.220	21	0.010	15.246	0.000
WEEK	0.002	4	0.000	0.625	0.646
Error	0.058	84	0.001		
Total	84.848	110			
Corrected Total	0.280	109			

Table B72. Randomized block ANOVA on the skin elasticity (R2) values taken from the treatment side of subject group B (treated with 0.10% EGCG lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	0.523	25	0.021	21.887	0.000
Intercept	79.738	1	79.738	83460.785	0.000
SUBJECT	0.519	21	0.025	25.892	0.000
WEEK	0.003	4	0.001	0.859	0.492
Error	0.080	84	0.001		
Total	80.342	110			
Corrected Total	0.603	109			

Table B73. Paired student's t-test comparing at each the melanin values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% Puag-Haad lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	0.524	5.072	1.081	-1.725	2.772	0.484	21	0.633
CTL-TMT (4)	4.697	6.948	1.481	1.616	7.777	3.171	21	0.005*
CTL-TMT (8)	6.515	9.367	1.997	2.362	10.667	3.262	21	0.004*

CTL = control, TMT = treatment

\* Statistically significant at P-value  $\leq 0.05$

Table B74. Paired student's t-test comparing at each the melanin values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% EGCG lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	-0.970	26.921	5.740	-12.906	10.967	-0.169	21	0.867
CTL-TMT (4)	1.682	15.345	3.272	-5.121	8.486	0.514	21	0.612
CTL-TMT (8)	0.131	29.396	6.267	-12.903	13.164	0.021	21	0.984

CTL = control, TMT = treatment

Table B75. Randomized block ANOVA on the melanin values taken from the control side of subject group A at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	263019.117	23	11435.614	232.629	0.000
Intercept	4434704.655	1	4434704.655	90213.046	0.000
SUBJECT	262979.156	21	12522.817	254.746	0.000
WEEK	39.961	2	19.980	0.406	0.669
Error	2064.641	42	49.158		
Total	4699788.414	66			
Corrected Total	265083.759	65			

Table B76. Randomized block ANOVA on the melanin values taken from the control side of subject group B at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	223728.555	23	9727.328	273.928	0.000
Intercept	4349411.859	1	4349411.859	122482.381	0.000
SUBJECT	223590.822	21	10647.182	299.832	0.000
WEEK	137.733	2	68.867	1.939	0.156
Error	1491.441	42	35.511		
Total	4574631.856	66			
Corrected Total	225219.997	65			

Table B77. Randomized block ANOVA on the melanin values taken from the treatment side of subject group A (treated with 0.10% Puag-Haad lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	251423.967	23	10931.477	210.581	0.000
Intercept	4286566.806	1	4286566.806	82575.437	0.000
SUBJECT	251014.543	21	11953.073	230.261	0.000
WEEK	409.424	2	204.712	3.944	0.027*
Error	2180.259	42	51.911		
Total	4540171.032	66			
Corrected Total	253604.225	65			

\* Statistically significant at P-value  $\leq 0.05$



Table B78. Randomized block ANOVA on the melanin values taken from the treatment side of subject group B (treated with 0.10% EGCG lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	252065.179	23	10959.356	69.871	0.000
Intercept	4268384.816	1	4268384.816	27212.923	0.000
SUBJECT	251809.103	21	11990.910	76.448	0.000
WEEK	256.076	2	128.038	0.816	0.449
Error	6587.758	42	156.851		
Total	4527037.754	66			
Corrected Total	258652.938	65			

Table B79. Paired student's t-test comparing at each the skin capacitance values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% Puag-Haad lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	4.482	13.857	2.954	-1.662	10.626	1.517	21	0.144
CTL-TMT (4)	1.813	10.413	2.220	-2.804	6.429	0.817	21	0.423
CTL-TMT (8)	-0.298	8.027	1.711	-3.857	3.261	-0.174	21	0.863

CTL = control, TMT = treatment

Table B80. Paired student's t-test comparing at each the skin capacitance values between the control cheek (applied with lotion base) and the treatment cheek (applied with 0.10% EGCG lotion) (n = 22)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	SD	SEM	95% CI of the Difference				
				Lower	Upper			
CTL-TMT (0)	-2.766	10.866	2.317	-7.584	2.052	-1.194	21	0.246
CTL-TMT (4)	-1.325	10.261	2.188	-5.875	3.225	-0.606	21	0.551
CTL-TMT (8)	-1.242	10.514	2.241	-5.904	3.419	-0.554	21	0.585

CTL = control, TMT = treatment

Table B81. Randomized block ANOVA on the skin capacitance values taken from the control side of subject group A at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7023.632	23	305.375	6.777	0.000
Intercept	177293.844	1	177293.844	3934.439	0.000
SUBJECT	6518.485	21	310.404	6.888	0.000
WEEK	505.147	2	252.573	5.605	0.007*
Error	1892.606	42	45.062		
Total	186210.082	66			
Corrected Total	8916.238	65			

\* Statistically significant at P-value  $\leq 0.05$

Table B82. Randomized block ANOVA on the skin capacitance values taken from the control side of subject group B at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7945.143	23	345.441	3.750	0.000
Intercept	182853.464	1	182853.464	1984.817	0.000
SUBJECT	7276.963	21	346.522	3.761	0.000
WEEK	668.180	2	334.090	3.626	0.035*
Error	3869.296	42	92.126		
Total	194667.903	66			
Corrected Total	11814.439	65			

\* Statistically significant at P-value  $\leq 0.05$

Table B83. Randomized block ANOVA on the skin capacitance values taken from the treatment side of subject group A (treated with 0.10% Puag-Haad lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	7157.413	23	311.192	6.470	0.000
Intercept	163882.897	1	163882.897	3407.374	0.000
SUBJECT	5695.315	21	271.205	5.639	0.000
WEEK	1462.098	2	731.049	15.200	0.000*
Error	2020.054	42	48.097		
Total	173060.365	66			
Corrected Total	9177.467	65			

\* Statistically significant at P-value  $\leq 0.05$

Table B84. Randomized block ANOVA on the skin capacitance values taken from the treatment side of subject group B (treated with 0.10% EGCG lotion) at different application times (n = 22)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4828.400	23	209.930	3.763	0.000
Intercept	195413.516	1	195413.516	3503.000	0.000
SUBJECT	4419.870	21	210.470	3.773	0.000
WEEK	408.530	2	204.265	3.662	0.034*
Error	2342.954	42	55.785		
Total	202584.870	66			
Corrected Total	7171.354	65			

\* Statistically significant at P-value  $\leq 0.05$

**APPENDIX C**

**Questionnaire**

## แบบสอบถามซักประวัติอาสาสมัครก่อนเริ่มการทดลอง

ชื่อ นาง/นางสาว _____	นามสกุล _____	ชื่อเล่น _____
อายุ _____ ปี	วันเกิด _____	อาชีพ _____
ที่อยู่ _____		
เบอร์โทรศัพท์ที่ติดต่อได้สะดวก _____		

## ส่วนที่ 1

- ชนิดของผิว  แห้ง  ธรรมดา  ผสม  มัน
- ประวัติการแพ้เครื่องสำอาง  ไม่มี  มี ระบุ \_\_\_\_\_  
อาการที่เกิดจากการแพ้ \_\_\_\_\_
- ผลิตภัณฑ์ที่ใช้ทำความสะอาดผิวหนัง \_\_\_\_\_
- ผลิตภัณฑ์ที่ใช้ตอนกลางวัน \_\_\_\_\_
- ผลิตภัณฑ์ที่ใช้ตอนกลางคืน \_\_\_\_\_
- ผลิตภัณฑ์กันแดด  ไม่ใช่  ใช่ ระบุ \_\_\_\_\_
- การแต่งหน้า  ไม่แต่ง  แต่ง ระบุเครื่องสำอางที่ใช้ \_\_\_\_\_
- ขณะนี้กำลังรับประทานยา  ไม่ใช่  ใช่ ระบุ \_\_\_\_\_
- สามารถมาวัดสภาพผิวทุก 2 สัปดาห์ติดต่อกันตลอดการทดลองในวัน
 

<input type="checkbox"/> อังคาร (เช้า/บ่าย)	<input type="checkbox"/> พุธ (เช้า/บ่าย)
<input type="checkbox"/> พฤหัสบดี (เช้า/บ่าย)	<input type="checkbox"/> ศุกร์ (เช้า/บ่าย)

**APPENDIX D**

**Pictures taken from the Visioscan<sup>®</sup>**





Left cheek (control)

circular roughness = 68.33, mean roughness = 66.33



Right cheek (treatment)

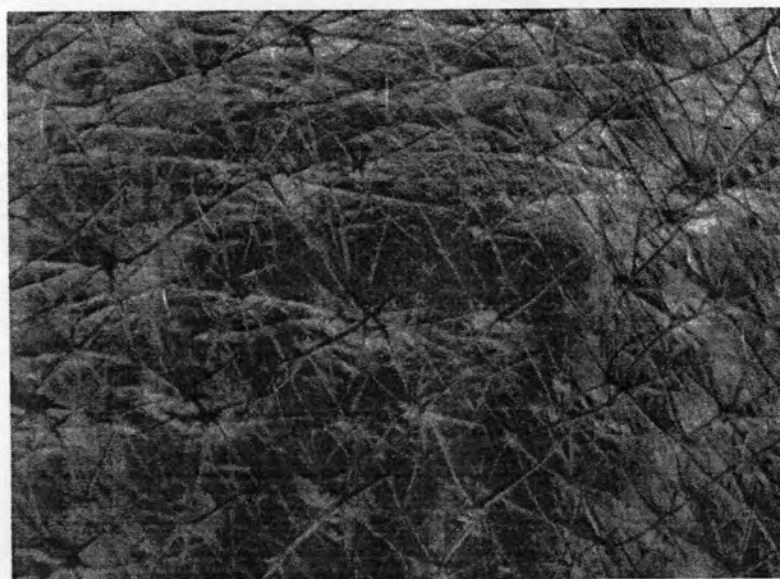
circular roughness = 56.00, mean roughness = 54.00

Figure 1D. Representative skin surface of subject No. 10 after treatment with 0.10% Puag-Haad for 8 weeks in comparison with its PG self-control taken at the same period



Left cheek (control)

circular roughness = 54.00, mean roughness = 52.00



Right cheek (treatment)

circular roughness = 47.33, mean roughness = 47.00

Figure 2D. Representative skin surface of subject No. 11 after treatment with 0.10% Puag-Haad for 8 weeks in comparison with its PG self-control taken at the same period

## VITA

Miss. Manatchaya Wanawatanakun was born on March 3, 1979 in Chiangmai, Thailand. She received her Bachelor's degree of Science in Pharmacy (2<sup>nd</sup> class Honors) from the Faculty of Pharmaceutical Sciences, Chiangmai University in 2001. Before the enrollment to the Master's degree program in Pharmacy at Chulalongkorn University in 2004, she worked as a pharmacist in Sri muang mai hospital, Ubonrachathani and Mae ai hospital, Chiangmai, Thailand from 2001-2003 and then she worked as a store manager in First drug Co., Ltd, Chiangmai from 2003-2004.

