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Appendices

Appendix A

Standard calibration curve

Standard calibration curve preparation

The medium was removed from 25-cm² tissue culture flask that contained fibroblast cells adhered to the bottom of the well. Cells were exposed briefly to 1 mL of 4°C 0.05 %w/v trypsin-EDTA solution and incubated 2 to 5 min at room temperature while examining periodically under the inverted phase-contrast microscope. As soon as the fibroblasts were rounded up, 1 mL of DMEM containing 15%v/v FBS was added to inactivate trypsin and dispersed the cells. The cells were harvested by gentle pipetting. Fibroblast suspensions was collected into a 15-mL polypropylene centrifuge tube and centrifuged for 5 min at 1200 rpm. The supernatant was aspirated, the pellet was tapped to dissociate the cells, and resuspended in 100 to 200 µL of fresh DMEM containing 15%v/v FBS. Sample of cell suspension (10 to 20 µL) was mixed with an equal volume of 0.4% trypan blue/PBS. Then, the number of viable cells counted under a microscope using a hemacytometer. Cell suspension was calculated and adjusted to desired volume (Freshney, 2000).

Standard calibration curve preparation was performed by placing 0, 500, 1000, 4000, 7000, 10000, 15000 and 20000 freshly trypsinized fibroblasts, the amount of each concentration of cells was performed in triplicate, contained in 100 µL of DMEM with supplemented 15% FBS, into 96-well multi-chamber plates and incubated for 24 hr at 37 °C in 5% CO₂ atmosphere to permit adherence to the well bottoms. After 24 hr incubation, fibroblasts were used for the MTT assay together with the test samples. Results were given as the absorbance of viable cells whose amount was known in each well.

Standard calibration curve from the relationship between absorbance and cell number was then plotted. Linear regression equation was obtained from each calibration curve. The values of the cell number of the test samples were then obtained by interpolation of their absorbances from the regression equation.

Appendix B

Proliferation assay

Table B One-way analysis of variance on the number of viable cells of the fibroblast proliferation assay and Dunnett's test

Oxyresveratrol

ANOVA

	Sum of squares	df	Mean square	F	Sig
Between groups	8.96×10^7	3	2.99×10^7	280.24	0.0001
Within groups	852224	8	106528		
Total	9.04×10^7	11			

Dunnett's test

Dependent Variable: cell number

Dunnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
10.00	.00	68.6840	266.49311	.987	-698.7260	836.0940
25.00	.00	6364.4673(*)	266.49311	.000	5597.0574	7131.8773
50.00	.00	4189.5640(*)	266.49311	.000	3422.1540	4956.9740

* The mean difference is significant at the .05 level.

a Dunnett t-tests treat one group as a control, and compare all other groups against it.

Puag-Haad

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	1.03×10^8	3	3.45×10^7	240.15	0.0001
Within groups	1147824	8	143478		
Total	1.04×10^8	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
10.00	.00	-45.7873	309.27795	.998	-936.4032	844.8285
25.00	.00	6570.5127(*)	309.27795	.000	5679.8968	7461.1285
50.00	.00	4876.3733(*)	309.27795	.000	3985.7575	5766.9892

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

EGCG

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	8.20×10^7	3	2.73×10^7	527.02	0.0001
Within groups	415088	8	51886		
Total	8.25×10^7	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
10.00	.00	160.2573	185.98812	.730	-375.3255	695.8402
25.00	.00	4166.6673(*)	185.98812	.000	3631.0845	4702.2502
50.00	.00	6089.7407(*)	185.98812	.000	5554.1578	6625.3235

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Pine bark extract

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	9.25 x 10 ⁷	3	3.08 x 10 ⁷	344.18	0.0001
Within groups	716960	8	89620		
Total	9.33 x 10 ⁷	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
10.00	.00	549.4540	244.43817	.128	-154.4452	1253.3532
25.00	.00	6730.7707(*)	244.43817	.000	6026.8715	7434.6699
50.00	.00	4395.6040(*)	244.43817	.000	3691.7048	5099.5032

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Trolox[®]

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	7.22 x 10 ⁸	3	2.41 x 10 ⁷	161.10	0.0001
Within groups	1195008	8	149376		
Total	7.34 x 10 ⁸	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
10.00	.00	641.0253	315.56880	.175	-267.7060	1549.7567
25.00	.00	4784.7983(*)	315.56880	.000	3876.0670	5693.5297
50.00	.00	5563.1867(*)	315.56880	.000	4654.4553	6471.9180

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

L-ascorbic acid

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	2.37 x 10 ⁷	3	7902232	335.05	0.0001
Within groups	188684	8	23585.5		
Total	2.39 x 10 ⁷	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
10.00	.00	114.4707	125.39402	.698	-246.6217	475.5630
25.00	.00	2632.7873(*)	125.39402	.000	2271.6950	2993.8797
50.00	.00	3067.7640(*)	125.39402	.000	2706.6717	3428.8563

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Appendix C

Cytotoxic Assay

Table C One-way analysis of variance on the number of viable cells of the fibroblast proliferation assay and Dunnett's test

Oxyresveratrol

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	4.22 x 10 ⁸	3	1.41 x 10 ⁸	169.66	0.0001
Within groups	6626304	8	828288		
Total	4.28 x 10 ⁸	11			

Dunnett's test

Dependent Variable: cell number

Dunnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	9583.7333(*)	743.08587	.000	7443.8975	11723.5692
100.00	.00	4791.8667(*)	743.08587	.001	2652.0308	6931.7025
250.00	.00	-6439.0333(*)	743.08587	.000	-8578.8692	-4299.1975

* The mean difference is significant at the .05 level.

a Dunnett t-tests treat one group as a control, and compare all other groups against it.

Puag-Haad

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	2.83 x 10 ⁸	3	9.44 x 10 ⁷	95.51	0.0001
Within groups	7904384	8	988048		
Total	2.91 x 10 ⁸	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	8760.1000(*)	811.60067	.000	6422.9647	11097.2353
100.00	.00	2395.9667(*)	811.60067	.045	58.8314	4733.1019
250.00	.00	4716.9333(*)	811.60067	.001	-7054.0686	-2379.7981

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

EGCG

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	4.73 x 10 ⁸	3	1.58 x 10 ⁸	145.85	0.0001
Within groups	8644224	8	1080528		
Total	4.81 x 10 ⁸	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	12204.3000(*)	848.74808	.000	9760.1927	14648.4073
100.00	.00	7786.8000(*)	848.74808	.000	5342.6927	10230.9073
250.00	.00	3743.6333(*)	848.74808	.006	-6187.7406	-1299.5261

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Pine bark extract

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	9.08 x 10 ⁷	3	3.02 x 10 ⁷	40.69	0.0001
Within groups	5953408	8	744176		
Total	9.68 x 10 ⁷	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	6364.2000(*)	704.36686	.000	4335.8618	8392.5382
100.00	.00	4866.7333(*)	704.36686	.000	2838.3952	6895.0715
250.00	.00	449.2667	704.36686	.860	-1579.0715	2477.6048

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Trolox[®]

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	1.17 x 10 ⁷	3	3905920	6.73	0.0144
Within groups	4641728	8	580216		
Total	1.64 x 10 ⁷	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	2021.6000(*)	621.93138	.029	230.6481	3812.5519
100.00	.00	898.5000	621.93138	.389	-892.4519	2689.4519
250.00	.00	-598.9667	621.93138	.667	-2389.9186	1191.9852

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

L-ascorbic acid

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	1.15 x 10 ⁸	3	3.82 x 10 ⁷	79.68	0.0001
Within groups	3834432	8	479304		
Total	1.18 x 10 ⁸	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	1796.9667(*)	565.27950	.032	169.1530	3424.7803
100.00	.00	-149.7000	565.27950	.986	-1777.5137	1478.1137
250.00	.00	6364.1667(*)	565.27950	.000	-7991.9803	-4736.3530

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Appendix D

Hydrogen peroxide (H₂O₂) – induced cell damages

Table D One-way analysis of variance on the number of viable cells of the fibroblast proliferation assay and Dunnett's test

Oxyresveratrol

ANOVA

	Sum of squares	df	Mean square	F	Sig
Between groups	3.20×10^7	3	1.07×10^7	154.50	0.0001
Within groups	551776	8	68972		
Total	3.25×10^7	11			

Dunnett's test

Dependent Variable: cell number

Dunnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	3684.7333(*)	214.43053	.000	3067.2460	4302.2207
50.00	.00	2763.5333(*)	214.43053	.000	2146.0460	3381.0207
100.00	.00	4247.7000(*)	214.43053	.000	3630.2126	4865.1874

* The mean difference is significant at the .05 level.

a Dunnett t-tests treat one group as a control, and compare all other groups against it.

Puag-Haad

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	2.60 x 10 ⁷	3	8671253	192.88	0.0001
Within groups	359648	8	44956		
Total	2.64 x 10 ⁷	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	3241.1667(*)	173.13467	.000	2742.5974	3739.7359
50.00	.00	3087.6667(*)	173.13467	.000	2589.0974	3586.2359
100.00	.00	3735.9333(*)	173.13467	.000	3237.3641	4234.5026

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

EGCG

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	4.97 x 10 ⁷	3	1.65 x 10 ⁷	407.66	0.0001
Within groups	324800	8	40600		
Total	5.00 x 10 ⁷	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	4469.4667(*)	164.51585	.000	3995.7167	4943.2166
50.00	.00	4452.4000(*)	164.51585	.000	3978.6500	4926.1500
100.00	.00	5066.5333(*)	164.51585	.000	4592.7834	5540.2833

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Pine bark extract

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	5.34 x 10 ⁷	3	1.78 x 10 ⁷	271.97	0.0001
Within groups	523712	8	65464		
Total	5.39 x 10 ⁷	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	3718.8333(*)	208.93943	.000	3117.1585	4320.5082
50.00	.00	4452.4000(*)	208.93943	.000	3850.7251	5054.0749
100.00	.00	5646.5333(*)	208.93943	.000	5044.8585	6248.2082

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Trolox[®]

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	2.37 x 10 ⁷	3	7897152	211.63	0.0001
Within groups	298528	8	37316		
Total	2.40 x 10 ⁷	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	3497.1000(*)	157.75222	.000	3042.8270	3951.3730
50.00	.00	3155.9000(*)	157.75222	.000	2701.6270	3610.1730
100.00	.00	3002.3667(*)	157.75222	.000	2548.0937	3456.6397

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

L-ascorbic acid

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	4.60 x 10 ⁷	3	1.53 x 10 ⁷	200.30	0.0001
Within groups	612880	8	76610		
Total	4.66 x 10 ⁷	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	2917.1000(*)	225.99432	.000	2266.3128	3567.8872
50.00	.00	-818.8333(*)	225.99432	.017	-1469.6205	-168.0462
100.00	.00	2490.6333(*)	225.99432	.000	-3141.4205	-1839.8462

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Appendix E

MTT assay of ultraviolet –induced cell damages

Table E One-way analysis of variance on the number of viable cells of the fibroblast proliferation assay and Dunnett's test

Oxyresveratrol

ANOVA

	Sum of squares	df	Mean square	F	Sig
Between groups	1.55×10^8	3	5.16×10^7	76.84	0.0001
Within groups	5371392	8	671424		
Total	1.60×10^8	11			

Dunnett's test

Dependent Variable: cell number

Dunnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	-	669.03718	.001	-5805.7340	-1952.5327
50.00	.00	3879.1333(*)	669.03718	.002	1659.3327	5512.5340
100.00	.00	5525.5000(*)	669.03718	.000	3598.8993	7452.1007

* The mean difference is significant at the .05 level.

a Dunnett t-tests treat one group as a control, and compare all other groups against it.

Puag-Haad

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	1.86×10^8	3	6.19×10^7	34.33	0.0003
Within groups	1.44×10^7	8	1801728		
Total	2.00×10^8	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	-5705.9333(*)	1095.97470	.002	-8861.9696	-2549.8971
50.00	.00	-1894.5000	1095.97470	.268	-5050.5362	1261.5362
100.00	.00	5209.7333(*)	1095.97470	.004	2053.6971	8365.7696

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

EGCG

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	1.17×10^8	3	3.89×10^7	19.80	0.0009
Within groups	1.57×10^7	8	1964992		
Total	1.32×10^8	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	-3924.2333(*)	1144.55330	.022	-7220.1595	-628.3072
50.00	.00	-2029.7667	1144.55330	.252	-5325.6928	1266.1595
100.00	.00	4465.4667(*)	1144.55330	.011	1169.5405	7761.3928

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Pine bark extract

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	2.03 x 10 ⁸	3	6.78 x 10 ⁷	104.74	0.0001
Within groups	5179008	8	647376		
Total	2.09 x 10 ⁸	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	-5638.2333(*)	656.95961	.000	-7530.0547	-3746.4120
50.00	.00	1443.4000	656.95961	.137	-448.4213	3335.2213
100.00	.00	5886.3333(*)	656.95961	.000	3994.5120	7778.1547

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Trolox[®]

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	3.65 x 10 ⁸	3	1.22 x 10 ⁸	141.43	0.0001
Within groups	6881792	8	860224		
Total	3.72 x 10 ⁸	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	-6179.5667(*)	757.31227	.000	-8360.3697	-3998.7636
50.00	.00	-563.8333	757.31227	.801	-2744.6364	1616.9697
100.00	.00	9201.6000(*)	757.31227	.000	7020.7970	11382.4030

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

L-ascorbic acid

ANOVA

	Sum of squares	df	Mean square	F	Sig.
Between groups	7.28 x 10 ⁸	3	2.43 x 10 ⁸	339.52	0.0001
Within groups	5719552	8	714944		
Total	7.34 x 10 ⁸	11			

Dunnnett's test

Dependent Variable: cell number

Dunnnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	7104.1667(*)	690.36242	.000	5116.1565	9092.1768
50.00	.00	15944.9667(*)	690.36242	.000	13956.9565	17932.9768
100.00	.00	20072.1333(*)	690.36242	.000	18084.1232	22060.1435

* The mean difference is significant at the .05 level.

a Dunnnett t-tests treat one group as a control, and compare all other groups against it.

Appendix F

Effect of antioxidants on UV-A induced LDH leakage

Table F1 The raw data for the absorbance and LDH release percentage of Puag-Haad, oxyresveratrol and other anti-oxidants (n = 3)

Sample	Final conc. (µg/mL)	n	Abs	% individual release	Mean	SD
		1	0.093	18.31		
Puag-Haad	0	2	0.099	19.84	19.70	1.33
		3	0.105	20.96		
		1	0.196	38.58		
	25	2	0.183	36.67	37.73	0.97
		3	0.190	37.92		
		1	0.227	44.69		
	50	2	0.206	41.28	45.16	4.13
		3	0.248	49.50		
		1	0.300	59.06		
	100	2	0.285	57.11	57.69	1.19
		3	0.285	56.89		
		1	0.093	18.31		
oxyresveratrol	0.00	2	0.099	19.84	19.70	1.33
		3	0.105	20.96		
		1	0.304	59.84		
	25.00	2	0.291	58.32	58.75	0.96
		3	0.291	58.08		
		1	0.309	60.83		
	50.00	2	0.306	61.32	61.41	0.63
		3	0.311	62.08		
		1	0.338	66.54		
	100.00	2	0.311	62.33	61.92	4.84
		3	0.285	56.89		

sample	Final conc. ($\mu\text{g/mL}$)	n	Abs	% individual release	Mean	SD
		1	0.093	18.31		
EGCG	0.00	2	0.099	19.84	19.70	1.33
		3	0.105	20.96		
		1	0.322	63.39		
	25.00	2	0.317	63.53	63.80	0.59
		3	0.323	64.47		
		1	0.332	65.35		
	50.00	2	0.320	64.13	66.38	2.91
		3	0.349	69.66		
		1	0.382	75.20		
	100.00	2	0.346	69.34	71.60	3.15
		3	0.352	70.26		
		1	0.093	18.31		
Pine bark	0.00	2	0.099	19.84	19.70	1.33
		3	0.105	20.96		
		1	0.181	35.63		
	25.00	2	0.188	37.68	36.74	1.04
		3	0.185	36.93		
		1	0.249	49.02		
	50.00	2	0.263	52.71	50.94	1.85
		3	0.256	51.10		
		1	0.302	59.45		
	100.00	2	0.290	58.12	61.01	3.92
		3	0.328	65.47		

sample	Final conc. ($\mu\text{g/mL}$)	n	Abs	% individual release	mean	SD
		1	0.093	18.31		
L-ascorbic acid	0.00	2	0.099	19.84	19.70	1.33
		3	0.105	20.96		
		1	0.285	56.10		
	25.00	2	0.290	58.12	56.64	1.30
		3	0.279	55.69		
		1	0.339	66.73		
	50.00	2	0.334	66.93	66.11	1.25
		3	0.324	64.67		
		1	0.373	73.43		
	100.00	2	0.404	80.96	77.34	3.78
		3	0.389	77.65		
		1	0.093	18.31		
Trolox®	0.00	2	0.099	19.84	19.70	1.33
		3	0.105	20.96		
		1	0.166	32.67		
	25.00	2	0.168	33.67	33.69	1.03
		3	0.174	34.73		
		1	0.245	48.23		
	50.00	2	0.236	47.30	48.67	1.65
		3	0.253	50.50		
		1	0.306	60.24		
	100.00	2	0.296	59.32	60.14	0.78
		3	0.305	60.88		

Appendix G

Flow cytometry

Table G1 One-way analysis of variance on the % fibroblasts

Sub G₀/G₁

Puag-Haad

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	323.881	2	161.941	1.234	.356
Within Groups	787.226	6	131.204		
Total	1111.107	8			

Oxyresveratrol

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	371.350	2	185.675	1.655	.268
Within Groups	673.312	6	112.219		
Total	1044.662	8			

Table G2 One-way analysis of variance on the % fibroblasts and Dunnett's test

G₀/G₁

Puag-Haad

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	356.976	2	178.488	3.519	.097
Within Groups	304.370	6	50.728		
Total	661.346	8			

Oxyresveratrol

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	489.001	2	244.500	7.785	.022
Within Groups	188.451	6	31.409		
Total	677.452	8			

Dunnett's test

Dependent Variable: % fibroblasts

Dunnett t (2-sided)

(I) CONC	(J) CONC	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
25.00	.00	14.4200(*)	4.57592	.035	1.3203	27.5197
50.00	.00	16.6200(*)	4.57592	.019	3.5203	29.7197

* The mean difference is significant at the .05 level.

a Dunnett t-tests treat one group as a control, and compare all other groups against it.

Appendix H

Anti-collagenase activity

Table H One-way analysis of variance on the IC₅₀ and Tukey's test

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14.248	5	2.850	17821.545	.000
Within Groups	.002	12	.000		
Total	14.250	17			

Tukey HSD

SAMPLE	N	Subset for alpha = .05				
		1	2	3	4	5
3.00	3	.0080				
4.00	3	.0219				
1.00	3		.0588			
2.00	3			.1531		
5.00	3				1.3314	
6.00	3					2.3477
Sig.		.756	1.000	1.000	1.000	1.000

Means for groups in homogeneous subsets are displayed.

a Uses Harmonic Mean Sample Size = 3.000.

Where; 1 = Puag-Haad, 2 = oxyresveratrol, 3 = EGCG, 4 = Pine bark extract, 5 = Trolox[®] and 6 = L-ascorbic acid

VITA

Miss Woraanong Prugsakij was born on February 19, 1979 in Lopburi, Thailand. She received her Bachelor's degree in Pharmacy from the Faculty of Pharmacy, Srinakharinwirot University, Bangkok, Thailand in 2001.

Before the enrollment to the Master's degree program in Pharmacy at Chulalongkorn University, she had worked as a manufacturing supervisor in Better Pharma by Betagro group, Samutprakran, Thailand later on she was an administrator in Tepsatit hospital, Chaiyapoom for 2 years.