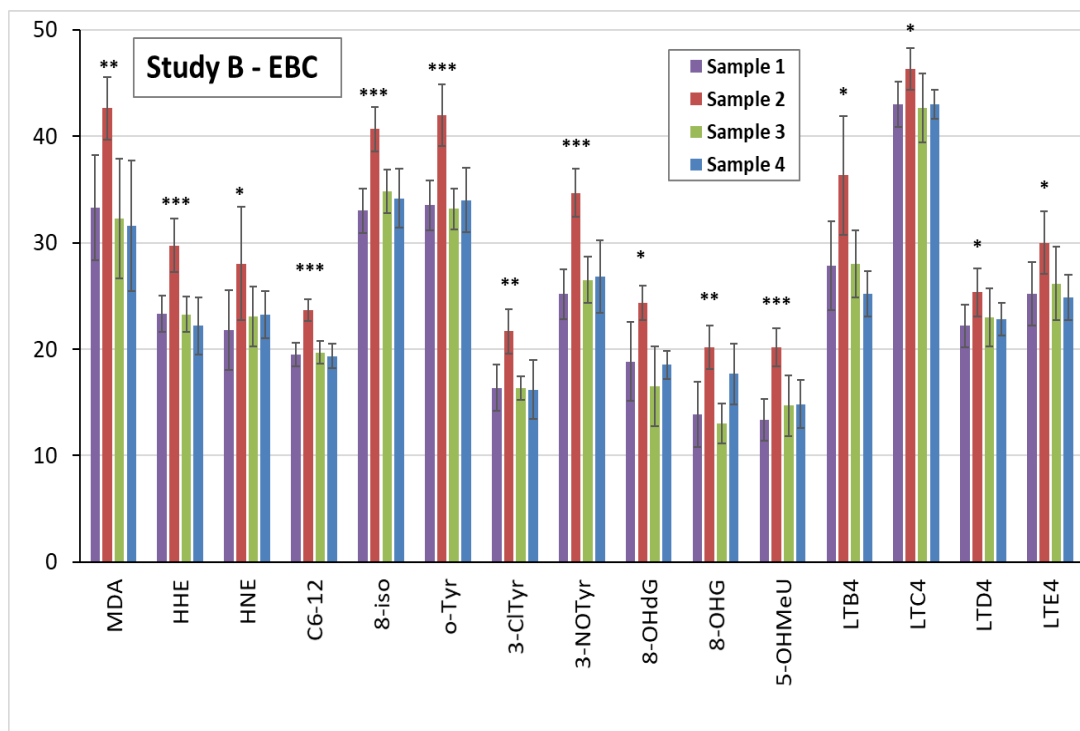
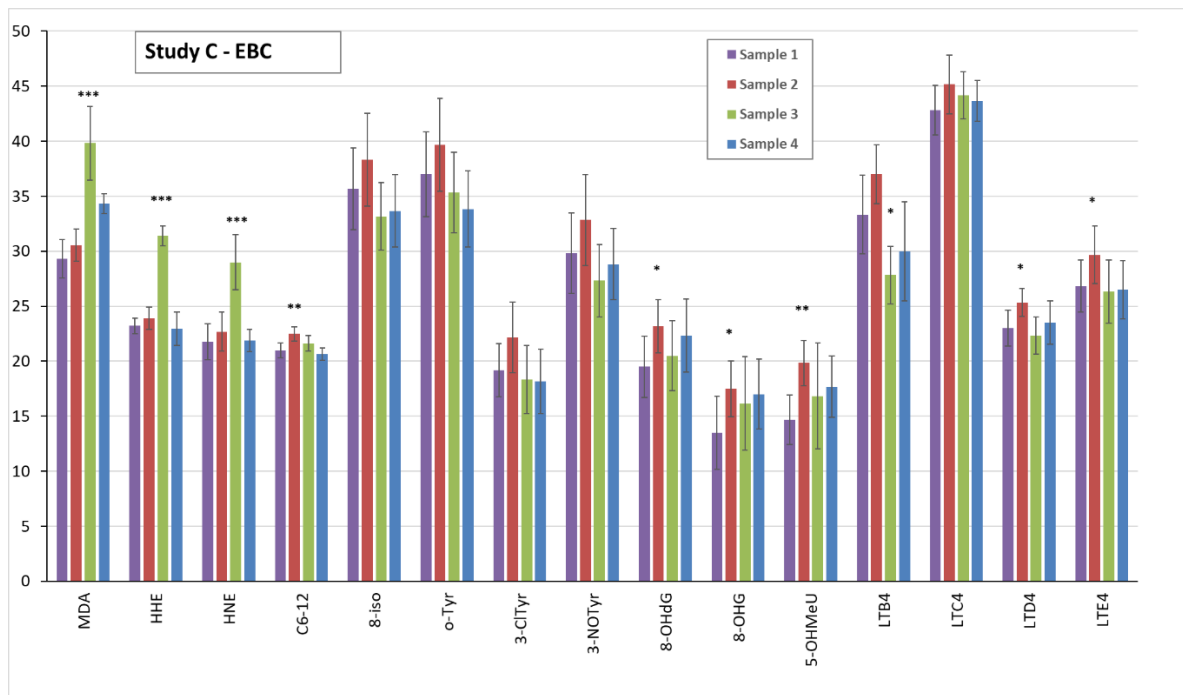


## NanoTiO<sub>2</sub> Sunscreen Does Not Prevent Systemic Oxidative Stress Caused by UV Radiation and a Minor Amount of NanoTiO<sub>2</sub> is Absorbed in Humans



**Figure S1.** Comparison of the mean levels of oxidative stress and inflammatory markers in study B exhaled breath condensate (EBC) pre-exposure (sample 1) and after UV exposure (samples 2–4). \*( $p < 0.05$ ) \*\*( $p < 0.01$ ) \*\*\*( $p < 0.001$ ).

MDA=malondialdehyde, HHE=4-hydroxy-trans-hexenal, HNE=4-hydroxy-trans-nonenal, C6-12=aldehydes C6-C12, (all ng/mL); 8-iso=8-isoProstaglandin F<sub>2</sub> $\alpha$ , o-Tyr=o-tyrosine, 3-ClTyr=3-chlorotyrosine, 3-NOTyr=3-nitrotyrosine, 8-OHdG=8-hydroxy-2-deoxyguanosine, 8-OHG=8-hydroxyguanosine, 5-OHMeU=5-hydroxymethyl uracil, and leukotrienes (LT) LTB<sub>4</sub>, LTC<sub>4</sub>, LTD<sub>4</sub>, LTE<sub>4</sub> (all pg/mL).



**Figure S2.** Comparison of the mean levels of oxidative stress and inflammatory markers in study C exhaled breath condensate (EBC) pre-exposure (sample 1) and after both sunscreen and UV exposure (samples 2-4). \*(p<0.05) \*\*(p<0.01) \*\*\* (p<0.001).

MDA=malondialdehyde, HHE=4-hydroxy-trans-hexenal, HNE=4-hydroxy-trans-nonenal, C6-12=aldehydes C6-C12, (all ng/mL); 8-iso=8-isoProstaglandin F<sub>2α</sub>, o-Tyr=o-tyrosine, 3-ClTyr=3-chlorotyrosine, 3-NOTyr=3-nitrotyrosine, 8-OHdG=8-hydroxy-2-deoxyguanosine, 8-OHG=8-hydroxyguanosine, 5-OHMeU=5-hydroxymethyl uracil, and leukotrienes (LT) LTB<sub>4</sub>, LTC<sub>4</sub>, LTD<sub>4</sub>, LTE<sub>4</sub> (all pg/mL).

**Table S1.** Individual and means levels of markers of oxidative stress and inflammation in plasma samples; and comparison of the study B (UV only) and C (sunscreen + UV). MDA=malondialdehyde, HHE=4-hydroxy-trans-hexenal, HNE=4-hydroxy-trans-nonenal, C6-12=aldehydes C6-C12, (all ng/mL); 8-iso=8-isoProstaglandin F<sub>2α</sub>, o-Tyr=o-tyrosine, 3-ClTyr=3-chlorotyrosine, 3-NOTyr=3-nitrotyrosine, 8-OHdG=8-hydroxy-2-deoxyguanosine, 8-OHG=8-hydroxyguanosine, 5-OHMeU=5-hydroxymethyl uracil, and leukotrienes (LT) LTB<sub>4</sub>, LTC<sub>4</sub>, LTD<sub>4</sub>, LTE<sub>4</sub> (all pg/mL). \*(p<0.05) \*\* (p<0.01)

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	MDA/B	MDA/C	MDA/B	MDA/C	MDA/B	MDA/C	MDA/B	MDA/C
Female	41	44	78	69	61	52	53	55
Male	53	42	68	80	46	63	43	53
Male	52	47	69	81	56	57	59	48
Male	48	57	77	79	48	51	57	48
Female	44	66	80	74	65	61	55	41
Female	53	62	75	68	48	54	41	58
Mean±SD	48.5±5.3	53±11	74.5±5.2	75.2±6	54±8.3	56.3±5.1	51.3±7.9	50.5±6.4
<i>p</i>	0.392		0.847		0.586		0.851	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	HHE/B	HHE/C	HHE/B	HHE/C	HHE/B	HHE/C	HHE/B	HHE/C
Female	14	13	23	25	17	13	11	12

Male	24	12	26	24	18	12	17	13
Male	11	15	25	34	11	17	16	14
Male	16	21	25	36	12	16	19	17
Female	16	22	26	30	14	18	13	11
Female	17	15	31	27	13	21	15	14
Mean±SD	16.3±4.5	16.3±4.4	26±2.8	29.3±5.1	14.2±2.9	16.2±3.5	15.2±3	13.5±2.2
<i>p</i>	1.000		0.211		0.326		0.316	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	HNE/B	HNE/C	HNE/B	HNE/C	HNE/B	HNE/C	HNE/B	HNE/C
Female	40	41	46	55	57	46	43	39
Male	44	40	56	62	54	46	38	44
Male	48	43	58	52	41	41	39	51
Male	42	46	60	50	45	47	44	42
Female	45	45	54	54	50	48	45	45
Female	43	52	62	61	58	34	55	37
Mean±SD	43.7±2.9	44.5±4.5	56±5.9	55.7±5.1	50.8±7.1	43.7±5.6	44±6.4	43±5.2
<i>p</i>	0.723		0.922		0.093		0.781	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	C6-12/B	C6-12/C	C6-12/B	C6-12/C	C6-12/B	C6-12/C	C6-12/B	C6-12/C
Female	74	70	92	115	81	73	90	83
Male	86	70	123	120	83	83	95	81
Male	66	68	116	127	72	80	85	87
Male	70	80	128	134	96	75	83	85
Female	71	67	114	127	85	80	89	81
Female	87	94	122	122	82	69	81	76
Mean±SD	75.9±9.1	75±11	116±13	124±7.1	83.1±8.1	76.7±5.7	87.1±5.4	82.2±4
<i>p</i>	0.880		0.223		0.167		0.117	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	8-iso/B	8-iso/C	8-iso/B	8-iso/C	8-iso/B	8-iso/C	8-iso/B	8-iso/C
Female	35	32	41	46	32	38	32	37
Male	38	33	49	49	35	40	38	33
Male	30	36	37	52	31	31	37	31
Male	38	31	45	50	35	33	26	34
Female	31	30	44	48	27	42	36	37
Female	32	34	46	48	35	36	30	35
Mean±SD	34±3.7	32.7±2.3	43.7±4.4	48.8±2.1	32.5±3.4	36.7±4.4	33.2±4.9	34.5±2.5
<i>p</i>	0.487		0.032*		0.107		0.581	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	o-Tyr/B	o-Tyr/C	o-Tyr/B	o-Tyr/C	o-Tyr/B	o-Tyr/C	o-Tyr/B	o-Tyr/C
Female	137	122	176	176	126	146	133	144
Male	164	135	157	165	162	152	125	134
Male	158	134	172	179	154	124	148	137
Male	132	141	164	184	167	133	139	158
Female	145	128	184	188	145	132	146	119
Female	165	126	174	183	130	152	138	139
Mean±SD	150±15	131±7.3	171.2±9.9	179.2±8.5	147±18	140±12	138.2±8.9	139±13
<i>p</i>	0.022*		0.181		0.432		0.962	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	3-CITyr/B	3-CITyr/C	3-CITyr/B	3-CITyr/C	3-CITyr/B	3-CITyr/C	3-CITyr/B	3-CITyr/C
Female	73	75	78	79	74	71	74	70
Male	75	78	79	83	72	67	76	72
Male	72	74	84	81	77	69	69	73
Male	78	73	76	75	74	73	73	75
Female	71	69	76	79	71	72	75	74
Female	73	65	80	81	75	72	77	73

Mean±SD	73.7±2.6	72.3±4.9	78.8±3.1	79.7±2.9	73.8±2.2	70.7±2.4	74±3	72.8±1.8
<i>p</i>	0.584		0.656		0.046*		0.449	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	3-NOTyr/B	3-NOTyr/C	3-NOTyr/B	3-NOTyr/C	3-NOTyr/B	3-NOTyr/C	3-NOTyr/B	3-NOTyr/C
Female	102	98	132	124	115	87	94	84
Male	89	94	131	130	92	92	101	85
Male	112	99	128	128	94	94	113	105
Male	106	82	120	115	98	88	93	93
Female	99	84	125	126	121	76	105	86
Female	111	87	116	122	88	91	97	102
Mean±SD	103.2±9	90.7±7.7	125.3±6.6	124.2±5.6	101±14	88±6.7	100.5±8	92.5±9.6
<i>p</i>	0.032*		0.758		0.073		0.163	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	8-OHdG/B	8-OHdG/C	8-OHdG/B	8-OHdG /C	8-OHdG/B	8-OHdG/C	8-OHdG/B	8-OHdG/C
Female	86	76	90	103	87	85	85	84
Male	75	87	106	98	81	76	92	82
Male	74	89	89	105	90	79	86	89
Male	81	77	108	92	91	74	87	93
Female	88	80	98	99	94	80	89	84
Female	83	91	99	111	76	88	84	85
Mean±SD	81.2±9	83.3±6.8	98.3±8.3	101.3±6.9	86.5±7.1	80.3±5.6	87.2±3.1	86.2±4.3
<i>p</i>	0.587		0.527		0.140		0.665	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	8-OHG/B	8-OHG/C	8-OHG/B	8-OHG /C	8-OHG/B	8-OHG/C	8-OHG/B	8-OHG/C
Female	72	77	98	102	76	80	85	76
Male	77	72	96	94	92	78	83	71
Male	88	74	88	97	90	82	83	79
Male	83	76	105	98	85	86	88	84
Female	78	74	85	93	72	74	87	76
Female	81	79	101	97	94	75	81	72
Mean±SD	79.8±5.8	75.3±2.6	95.5±8	96.8±3.3	84.8±9.4	79.2±4.7	84.5±2.8	76.3±5
<i>p</i>	0.126		0.730		0.236		0.007**	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	5-OHMeU/B	5-OHMeU/C	5-HMeU/B	5-OHMeU/C	5-OHMeU/B	5-OHMeU/C	5-HMeU/B	5-OHMeU/C
Female	52	56	65	74	54	66	54	57
Male	52	58	78	77	46	55	56	52
Male	58	63	76	78	60	56	53	53
Male	58	65	82	80	62	54	44	55
Female	55	66	69	73	56	51	51	55
Female	48	65	75	77	48	61	48	54
Mean±SD	53.8±4.1	62.6±4.4	74.2±6.5	76.5±2.7	54.3±6.7	57.2±5.7	51±4.6	54.3±1.8
<i>p</i>	0.009**		0.462		0.466		0.158	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	LTB4/B	TB4/C	LTB4/B	LTB4/C	LTB4/B	LTB4/C	LTB4/B	LTB4/C
Female	26	32	34	34	28	24	26	26
Male	31	30	38	44	31	29	25	28
Male	31	25	41	36	24	28	27	27
Male	28	23	36	34	26	22	27	29
Female	22	25	44	42	23	33	28	21
Female	19	26	30	33	28	30	18	28
Mean±SD	26.2±5.1	26.8±3.6	37.2±5.2	37.2±4.9	26.7±3.1	27.7±4.2	25.5±3.8	26.5±3
<i>p</i>	0.808		1.000		0.664		0.536	

Sample No.	Sample 1	Sample 2	Sample 3	Sample 4
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Marker/ Study	LTC4/B	LTC4/C	LTC4/B	LTC4/C	LTC4/B	LTC4/C	LTC4/B	LTC4/C
Female	59	60	79	88	66	54	67	52
Male	79	63	84	92	65	51	56	66
Male	56	57	88	94	64	55	62	61
Male	68	55	78	91	68	58	76	55
Female	65	59	83	85	61	54	80	58
Female	68	62	95	85	63	63	62	55
Mean±SD	65.8±8.5	59.3±3.2	84.5±6.6	89.2±3.9	64.5±2.5	55.8±4.4	67.2±9.6	57.8±5.3
<i>p</i>	0.136		0.185		0.002**		0.074	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	LTD4/B	LTD4/C	LTD4/B	LTD4/C	LTD4/B	LTD4/C	LTD4/B	LTD4/C
Female	25	23	32	30	30	22	24	23
Male	21	25	29	33	25	26	21	19
Male	21	20	37	35	28	20	27	25
Male	28	21	30	33	24	25	26	20
Female	22	25	35	37	26	26	28	21
Female	22	22	38	32	22	21	28	24
Mean±SD	23.2±2.9	22.7±2.2	33.5±3.9	33.3±2.5	25.8±3	23.3±2.8	25.7±2.9	22±2.5
<i>p</i>	0.754		0.935		0.183		0.047*	

Sample No.	Sample 1		Sample 2		Sample 3		Sample 4	
Marker/ Study	LTE4/B	LTE4/C	LTE4/B	LTE4/C	LTE4/B	LTE4/C	LTE4/B	LTE4/C
Female	36	43	44	56	47	33	39	38
Male	51	45	52	55	44	41	32	38
Male	40	40	50	52	38	39	46	29
Male	45	35	53	50	43	37	34	30
Female	41	38	54	48	41	40	42	33
Female	46	33	58	51	38	36	40	37
Mean±SD	43.2±5.5	39±4.8	51.8±4.9	52±3.2	41.8±3.7	37.7±3.1	38.8±5.4	34.2±4.3
<i>p</i>	0.213		0.948		0.071		0.143	