

Supplemental Information

Emission and Cytotoxicity of Surgical Smoke: Cholesta-3,5-Diene Released from Pyrolysis of Prostate Tissue

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Table S1. Operational conditions of GCMS-TD system.

GC (Agilent 7890A), MS (Agilent 5975C)			
Column : HP-5MS (Length : 30 m, Diameter : 0.25 mm, Film thickness : 0.25 μ m)			
1) Oven setting		2) Detector setting	
Oven temp :	65 °C (10min)	Ionization mode :	EI (70 eV)
Oven rate :	5.3 °C / min	Ion source temp :	230 °C
Max oven temp :	310 °C (5min)	MS Quad :	150 °C
Total time :	61.26 min	TIC scan range :	m/z 40 - 550
Carrier gas :	He (99.999%)		

TD (UNITY2, Markes International, Ltd., UK)			
Cold trap :	High boilers trap (U – T2HBL – 25), Electrically-cooled sorbent		
Split ratio :	Splitless	Trap low :	0 °C
Hold time :	15 min	Trap high :	360 °C
		Flow path temp. :	220 °C
Sampling			
Sample Tube :	Glass tube (3.5 inch long \times 0.25 inch)		
Desorb time :	20 min	Desorb temp	360 °C
Desorb flow :	55 mL min ⁻¹		

Table S2. Coefficient of determination (r^2) of standards, percent of duplication, and method of detection limit for the target organic compounds in particulate matter.

Compound	r^2 1)	D 2)	MDL 3)	Compound	r^2 1)	D 2)	MDL 3)
Cholestra-3,5-diene	> 0.999	103	< 5	Eicosane	> 0.999	102	8.00
Naphthalene	0.999	104	12.00	Heneicosane	> 0.999	98	< 5
Acenaphthylene	> 0.999	98	5.00	Docosane	> 0.999	99	< 5
Acenaphthene	> 0.999	98	10.00	Tricosane	> 0.999	99	< 5
Fluorene	0.999	100	6.00	Tetracosane	> 0.999	102	< 5
Phenanthrene	> 0.999	99	7.00	Pentacosane	> 0.999	102	< 5
Anthracene	> 0.999	99	8.00	Hexacosane	> 0.999	98	< 5
Fluoranthene	> 0.999	97	8.00	Heptacosane	> 0.999	98	< 5
Pyrene	> 0.999	101	8.00	Octacosane	> 0.999	98	< 5
Methylfluoranthene	> 0.999	101	7.00	iso-nonacosane	> 0.999	98	< 5
9-Methylanthracene	> 0.999	98	< 5	Nonacosane	> 0.999	100	< 5
Benzo(GHI)fluoranthene	> 0.999	102	< 5	anteiso-triacontane	> 0.999	98	< 5
Chrysene	> 0.999	102	< 5	Triacontane	> 0.999	101	< 5
Coronene	> 0.999	101	< 5	iso-hentriacontane	> 0.999	102	< 5
Dibenzo(ae)pyrene	> 0.999	101	< 5	Hentriacontane	> 0.999	101	< 5
17A(H)-21B(H)-Hopane	> 0.999	101	< 5	anteiso-dotriacontane	> 0.999	101	< 5
Tridecane	0.999	98	12.00	Dotriacontane	> 0.999	98	< 5
Tetradecane	0.999	101	8.00	Tritriacontane	> 0.999	104	< 5
Pentadecane	0.999	101	8.00	Tetratriacontane	> 0.999	103	< 5
Hexadecane	> 0.999	99	10.00	Pentatriacontane	> 0.999	101	< 5
Heptadecane	> 0.999	101	8.00	Hexatriacontane	> 0.999	102	< 5
Octadecane	> 0.999	98	7.00	Heptatriacontane	> 0.999	99	< 5
Nonadecane	> 0.999	97	7.00	Octatriacontane	> 0.999	99	< 5
				Nonatriacontane	> 0.999	98	< 5

1) Coefficient of determination (r^2) by 7 standard points

2) Percent of duplication ratio.

3) Method of detection limit; pi (i.e., 3.14) times standard deviations of seven detectable lowest standards (unit: pg/cm^2).

Table S3. Organic carbon (OC) and elemental carbon (EC) concentrations by a laboratory based thermo-optical ECOC analyzer

	OC $\mu\text{gC}/\text{m}^3$	OC uncertainty $\mu\text{gC}/\text{m}^3$	EC $\mu\text{gC}/\text{m}^3$	EC uncertainty $\mu\text{gC}/\text{m}^3$
Patient 01	1490	102	102	59
Patient 02	1855	123	123	58
Patient 03	976	79	79	50
Patient 04	585	59	59	23
Patient 05	917	76	76	52
Patient 06	613	61	61	37
Patient 07	2004	140	140	205

Table S4. Concentration of Organic Compounds normalized to PM_{2.5} mass in pyrolyzed TURP-smoke by GC/MS-TD.

Compound ¹⁾	Average	Std error ₂₎	Compound	Average	Std error ²⁾
Total Mass	-	-	Cholestra-3,5-diene	2551.1	12.1
Organic Carbon	506,720	1,721	Eicosane	31.2	18.6
Elemental Carbon	39,920	2,581	Heneicosane	38.4	9.9
Naphthalene	16.9	2.7	Docosane	38.6	8.7
Acenaphthylene	4.0	1.9	Tricosane	68.3	13.4
Acenaphthene	11.1	3.2	Tetracosane	182.8	57.7
Fluorene	1.9	1.5	Pentacosane	157.3	28.3
Phenanthrene	16.9	2.9	Hexacosane	190.7	38.1
Anthracene	18.6	4.9	Heptacosane	247.0	41.8
Fluoranthene	5.4	1.0	Octacosane	205.1	51.4
Pyrene	7.8	1.0	iso-nonacosane	83.2	13.5
Methylfluoranthene	2.3	1.3	Nonacosane	286.6	76.9
9-Methylanthracene	172.2	71.1	anteiso-triacontane	103.0	83.0
Benzo(GHI)fluoranthene	13.2	3.3	Triacontane	317.8	125.3
Chrysene	4.0	0.9	iso-hentriacontane	31.1	14.0
Coronene	21.4	4.3	Hentriacontane	610.8	240.3
Dibenzo(ac)pyrene	77.6	17.0	anteiso-dotriacontane	53.3	13.4
17A(H)-21B(H)-Hopane	9.1	4.6	Dotriacontane	640.5	363.0
Tridecane	49.8	0.7	Tritriacontane	607.1	424.5
Tetradecane	109.0	25.7	Tetratriacontane	360.5	180.7
Pentadecane	256.6	34.3	Pentatriacontane	253.8	105.5
Hexadecane	17.8	64.2	Hexatriacontane	153.9	35.6
Heptadecane	33.7	5.6	Heptatriacontane	92.4	30.3
Octadecane	28.4	7.4	Octatriacontane	101.6	23.8
Nonadecane	28.6	8.7	Nonatriacontane	52.3	26.1

1) unit : µg/mg in PM_{2.5} mass

2) standard error

Table S5. Emission Rate of PM_{2.5} mass in pyrolyzed TURP-smoke.

	age	ER (mg/sec) ₁₎	FR ²⁾	SV ³⁾	TURP initial mass (g)	TURP final mass (g)	ST ⁴⁾
Patient 01	71	29.3	92	0.195	5.17	1.36	130
Patient 02	66	37.9	92	0.18	7.63	3.08	120
Patient 03	86	20.3	92	0.18	4.21	1.77	120
Patient 04	67	27.1	92	0.18	4.99	1.74	120
Patient 05	64	14.3	92	0.18	1.83	0.11	120
Patient 06	73	31.4	92	0.18	5.18	1.41	120
Patient 07	74	14.9	92	0.18	2.37	0.58	120

1) emission rate = mass difference before and after pyrolysis / sampling time

2) Flow rate (unit: liter per minute)

3) Sampling Volume (m³)

4) Sampling Time (second)

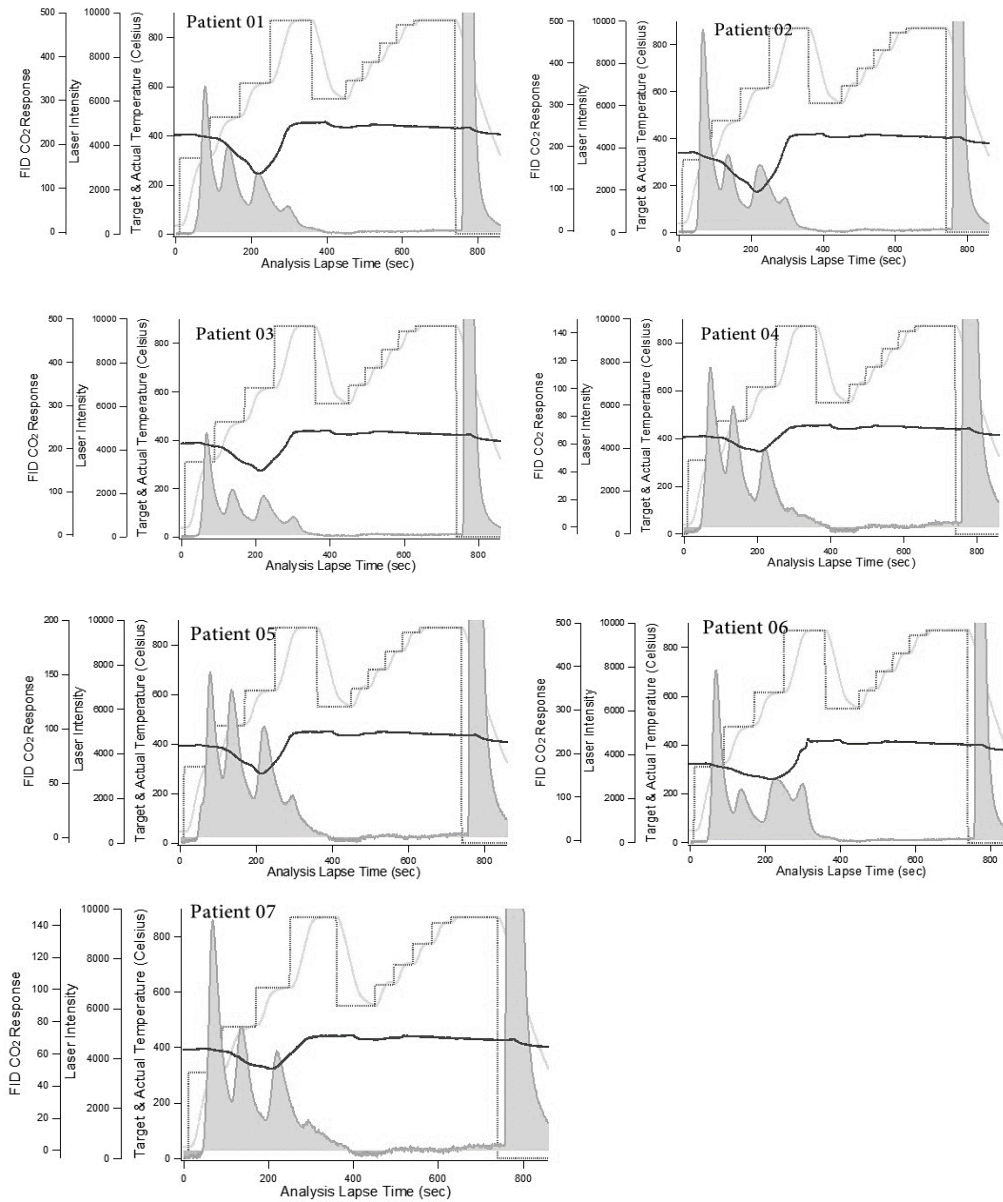
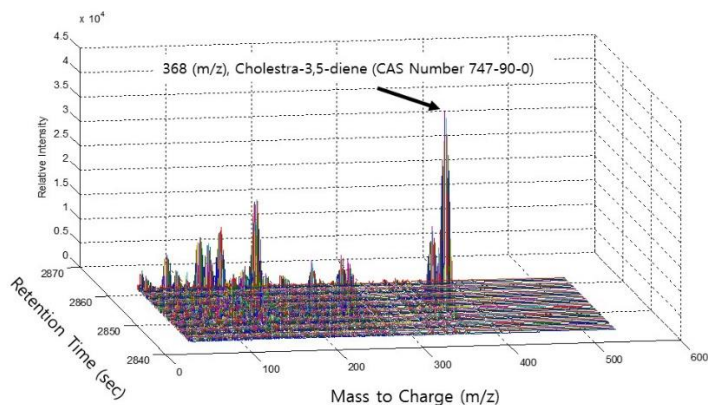
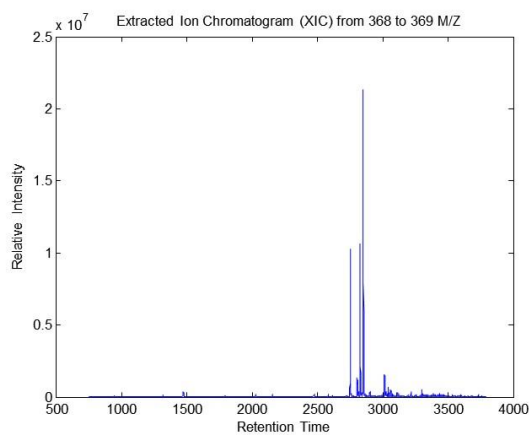


Figure S1. Carbonaceous Thermal Distributions by a laboratory based thermo-optical ECOC analyzer for the pyrolyzed prostate tissue samples.

(a)



(b)



(c)

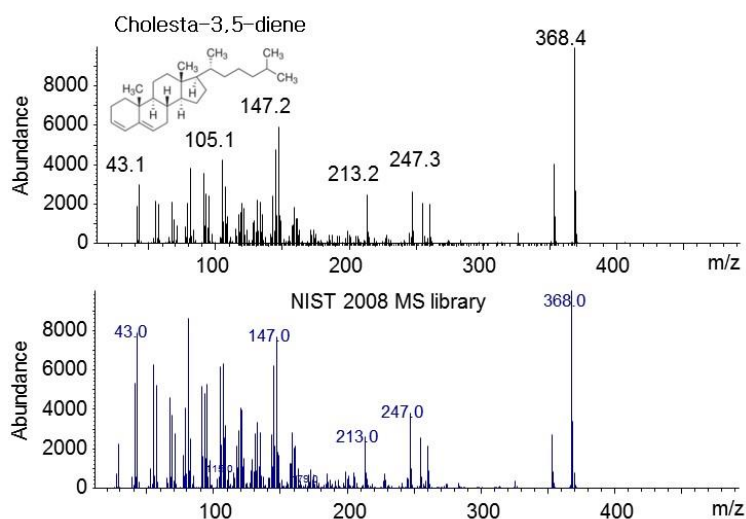


Figure S2. Mass fragments (a - b) of Cholesta-3,5-diene in smoke sample of patient 01 by GC/MS-TD and (c) NIST 2008 MS library research result.