

## POTENTIAL BIOMARKERS FOR THE TOTAL EXPOSURE PROJECT

Biomarker	Associated Smoke Constituent	R value	T <sub>1/2</sub>	Biofluid Matrix
2,5-dimethylfuran	VOC (hexane)	Highly specific		blood
2,5-dimethylfuran	alkanes, i.e., hexane			exhalate
3-hydroxypropylmercapturic acid	acrolein			urine
7-(2-hydroxyethylguanine)	ethylene oxide	Probably unspecific		
acetonitrile	acetonitrile	~12 <sup>a</sup> ; 1.8 <sup>b</sup>	24 hr <sup>a</sup> , 32hr <sup>b</sup>	exhalate and urine, saliva, or blood
aldehyde metabolites				
alkanes (i.e., pentane)	alkanes			exhalate
benzene	benzene	~2.5 -- ~17	10 min	exhalate
Cadmium	Cadmium	~4 -- 8 <sup>d</sup>	10 -- 30 yr (body burden)	
CO	CO	~6	~3.5 -- 7 hr	exhalate
COHb	CO	~2	5.5 hr	blood
DNA adduct of malondialdehyde metabolite	malondialdehyde	Probably unspecific	0.5 -- 12.5 d	
Hb adduct of 3-aminobiphenyl	3-aminobiphenyl	11 -- 12		blood
Hb adduct of 4-aminobiphenyl	4-aminobiphenyl	3 -- 5	~7 -- 9 weeks	blood
Hb adduct of malondialdehyde metabolite	malondialdehyde	Probably unspecific	~6 d	blood
nicotine + 8 metabolites	nicotine	~1000 <sup>c</sup>	2 h (nic); ~18 hr (cot)	urine
NNAL + NNAL-Gluc	NNK	~120 <sup>c</sup>		urine
N-terminal cyanoethylvaline Hb adducts	acrylonitrile -- associated with cpd	≥8		blood
N-terminal hydroxyethylvaline Hb adducts	nonspecific but associated with cpd OR ethylene oxide	~6.5	~30 d	blood

Biomarker	Associated Smoke Constituent	R value	T <sub>1/2</sub>	Biofluid Matrix
S-phenylmercapturic acid	benzene	~2	≤6 hr	urine
thiocyanate	hydrogen cyanide	~3	~6 – 14 d	urine, saliva, or blood
thioethers		~1.5		urine, saliva, or blood
trans,transmuconic acid	benzene	~2	≤6 hr	urine

<sup>a</sup> Exhalate; note that there exists an unresolved discrepancy between breath and blood values for R for acetonitrile

<sup>b</sup> Blood; see note above

<sup>c</sup> R<sub>μ-cotinine</sub>

<sup>d</sup> no significant in body burden between female smokers and nonsmokers

<sup>e</sup> R ~120 times higher in smokers than in nonsmokers exposed to sidestream smoke