

Global List of Validated Bioanalytical Tobacco Assays (BTA)



Tobacco Specific Assays with LC-MS/MS Detection

Nicotine pK Assays

Assay	Exposure Component	Measured Analyte	Method of Analysis	LLOQ	Matrix
Trace Nicotine	Nicotine	Nicotine	LC-MS/MS	0.200 ng/mL	Plasma (K ₂ EDTA)
	Nicotine	Cotinine	LC-MS/MS	1.00 ng/mL	Plasma (K ₂ EDTA)
	Nicotine	<i>trans</i> -3'-hydroxycotinine	LC-MS/MS	1.00 ng/mL	Plasma (K ₂ EDTA)
Trace Nicotine	Nicotine	Nicotine	LC-MS/MS	0.200 ng/mL	Plasma (Heparin)
	Nicotine	Cotinine	LC-MS/MS	1.00 ng/mL	Plasma (Heparin)
	Nicotine	<i>trans</i> -3'-hydroxycotinine	LC-MS/MS	1.00 ng/mL	Plasma (Heparin)
Nicotine	Nicotine	Nicotine	LC-MS/MS	0.500 ng/mL	Serum
	Nicotine	Cotinine	LC-MS/MS	1.00 ng/mL	Serum

Compliance Marker Assays

Assay	Exposure Component	Measured Analyte	Method of Analysis	LLOQ	Matrix	Comment
Cyanoethylvaline Adducts	Acrylonitrile	Derivatized adduct from terminal valine	LC-MS/MS		Whole blood	Validated
Total NNAL	NNK	NNAL	LC-MS/MS	5.00 pg/mL	Urine	
2-cyanoethyl mercapturic acid	Acrylonitrile	CEMA	LC-MS/MS	0.200 ng/mL	Urine	

Exposure Marker Assays

Assay	Exposure Component	Measured Analyte	Method of Analysis	LLOQ	Matrix
Total 1-OHP	Pyrene	1-Hydroxypyrene	LC-MS/MS	10.0 pg/mL	Urine
Total 3-OH BaP	Benzo[a]pyrene	3-Hydroxybenzo[a]pyrene	LC-MS/MS	25.0 fg/mL	Urine
Mercapturic Acids	Acrolein	3-Hydroxypropylmercapturic Acid (3-HPMA)	LC-MS/MS	10.0 ng/mL	Urine
	Acrolein	2-Hydroxypropylmercapturic Acid (2-HPMA)	LC-MS/MS	2.50 ng/mL	Urine
	Crotonaldehyde	3-Hydroxy-1-methylpropylmercapturic Acid (HMPMA)	LC-MS/MS	10.0 ng/mL	Urine
	Acrylonitrile	2-cyanoethyl-mercaptopuric acid (CEMA)	LC-MS/MS	0.250 ng/mL	Urine
MHBMA	1,3-Butadiene	Monohydroxybutenylmercapturic Acid	LC-MS/MS	100 pg/mL	Urine
Nicotine Equivalents	Nicotine	Nicotine	LC-MS/MS	10.0 ng/mL	Urine
	Nicotine	Cotinine	LC-MS/MS	10.0 ng/mL	Urine
	Nicotine	<i>trans</i> -3'-hydroxycotinine	LC-MS/MS	10.0 ng/mL	Urine
	Nicotine	Nicotine- <i>N</i> -glucuronide	LC-MS/MS	10.0 ng/mL	Urine
	Nicotine	Cotinine- <i>N</i> -glucuronide	LC-MS/MS	20.0 ng/mL	Urine
	Nicotine	<i>trans</i> -3'-hydroxycotinine-O-glucuronide	LC-MS/MS	50.0 ng/mL	Urine
Nicotine Equivalents	Nicotine	Nicotine	LC-MS/MS	50.0 ng/mL	Urine
	Nicotine	Cotinine	LC-MS/MS	50.0 ng/mL	Urine
	Nicotine	<i>trans</i> -3'-hydroxycotinine	LC-MS/MS	50.0 ng/mL	Urine
	Nicotine	Nicotine- <i>N</i> -glucuronide	LC-MS/MS	50.0 ng/mL	Urine
	Nicotine	Cotinine- <i>N</i> -glucuronide	LC-MS/MS	200 ng/mL	Urine
	Nicotine	<i>trans</i> -3'-hydroxycotinine-O-glucuronide	LC-MS/MS	200 ng/mL	Urine
Total NNAL	Tobacco specific nitrosamines	4-(Methylnitrosamino)-1-(3-pyridyl)-1-butanol	LC-MS/MS	5.00 pg/mL	Urine
Total NNN	Tobacco specific nitrosamines	<i>N</i> -Nitrosonoronicotine	LC-MS/MS	0.200 pg/mL	Urine
Total NAT/NAB	Tobacco specific nitrosamines	<i>N</i> -Nitrosanabasine	LC-MS/MS	2.00 pg/mL	Urine
	Tobacco specific nitrosamines	<i>N</i> -Nitrosanatabine	LC-MS/MS	5.00 pg/mL	Urine
S-PMA	Benzene	S-Phenyl mercapuric acid	LC-MS/MS	25.0 pg/mL	Urine
HEMA	Ethylene dioxide	Hydroxyethyl mercapturic acid	LC-MS/MS	0.1 ng/mL	Urine
o-Toluidine	o-Toluidine	o-Toluidine	LC-MS/MS	20 pg/mL	Urine
Aromatic Amines	Aromatic Amines	1-Aminonaphthalene (1-NA)	LC-MS/MS	2.0 pg/mL	Urine
	Aromatic Amines	2-Aminonaphthalene (2-NA)	LC-MS/MS	2.0 pg/mL	Urine
	Aromatic Amines	3-Aminobiphenyl (3-ABP)	LC-MS/MS	0.500 pg/mL	Urine
	Aromatic Amines	4-Aminobiphenyl (4-ABP)	LC-MS/MS	1.0 pg/mL	Urine
Propylene Glycol	Propylene Glycol	Propylene Glycol	LC-MS/MS	250 ng/mL	Urine
COHb (Carboxyhemoglobin)	Carbon monoxide	COHb	Spectrophotometric	0.5%	Whole Blood
N-(2-Cyanoethyl) Valine		CeVal	LC-MS/MS	750 pm	Red Blood Cells

Biomarker Assays

Assay	Indication	Measured Analyte	Method of Analysis	LLOQ	Matrix	Comment
11-dTXB2	Platelet activation	11-dehydro Thromboxane B ₂	LC-MS/MS	25.00 pg/mL	Urine	
iPF2a-III	Oxidative stress	Isoprostaglandin F _{2α} (type III)	LC-MS/MS	25.0 pg/mL	Urine	
iPF2a-VI	Oxidative stress	Isoprostaglandin F _{2α} (type VI)	LC-MS/MS	25.0 pg/mL	Urine	
Creatinine	Kidney function	Creatinine	LC-MS/MS	50.0 µg/mL	Urine	
2,3 dinor Thromboxane-B2 (TXB2)	Platelet activation	2,3 dinor Thromboxane-B2 (TXB ₂)	LC-MS/MS	25.0 pg/mL	Urine	
sICAM	Systemic inflammatory response	sICAM	ELISA	12.5 ng/mL	Plasma	
Malondialdehyde	Lipid peroxidation	Malondialdehyde	EIA	20.0 ng/mL	K ₂ EDTA	
IL-6	Cytokine, inflammatory marker	IL-6	ELISA	3.12 pg/mL	Serum	
TNFα	Inflammatory response	Tumor necrosis factor alpha	EIA	1.00 pg/mL	Li Hep Plasma	
high sensitivity C-reactive protein	Atherosclerotic cardiovascular disease	hsCRP	Clinical Laboratory	0.25 mg/L	Serum	CAP/CLIA approved assay
Fibrinogen	Chronic COPD	Fibrinogen	Clinical Laboratory	63 mg/dL	Na Citrate Plasma	CAP/CLIA approved assay
IL-6, IL-8, TNFα	Panel assay of inflammation biomarkers	IL-6, IL-8, TNFα	MSD Panel		Li Hep Plasma	In-development
Matrix Metalloproteinase-9	Tumor formation	Metalloproteinase-9	ELISA		Serum	In-development
Surfactant Protein D	COPD development	Surfactant Protein D	ELISA		Serum	In-development
MCP-1	Cytokine, inflammatory marker	Monocyte chemoattractant protein-1	ELISA	40.0 pg/mL	Serum	

For further information on our Bioanalytical Tobacco Assays (BTAs), please contact leslie.poli@celerion.com.