

BIOMARKER GROUPS

Reported in CDC's National Report on Human Exposure to Environmental Chemicals | www.cdc.gov/exposurereport/

NHANES* Cycle

| Biomarker Groups | 1999-2000 | 2001-2002 | 2003-2004 | 2005-2006 | 2007-2008 | 2009-2010 | 2011-2012 | 2013-2014 | 2015-2016 | 2017-2018 |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Adducts | | | ● | ● | | | | ●,+ | ● | ● |
| Tobacco Alkaloids and Metabolites | ● | ● | ● | ● | ● | ● | ● | ●,+ | ●,+ | ● |
| Tobacco-Specific Nitrosamines (TSNAs) | | | | | ● | ● | ● | ● | | |
| Volatile N-Nitrosamines (VNAs) | | | | | | | | ●,+ | | |
| Disinfection By-Products | | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Personal Care and Consumer Product Chemicals and Metabolites | | | ● | ● | ● | ● | ● | ● | ● | |
| Flame Retardant Metabolites | | | | | | | ● | ● | ● | ● |
| Fungicides and Metabolites | | | ● | ● | ● | ● | | | | |
| Herbicides and Metabolites | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| Sulfonyl Urea Herbicides | | | ● | ● | ● | | | | | |
| Insect Repellent and Metabolites | | | | | ● | ● | ● | ● | ● | |
| Neonicotinoid Insecticides | | | | | | | | | ● | |
| Carbamate Pesticide Metabolites | ● | ● | ● | | | | | | | |
| Organophosphorus Insecticides: Specific Metabolites | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| Organophosphorus Insecticides: Dialkyl Phosphate Metabolites | ● | ● | ● | ● | ● | | ● | | ● | ● |
| Pyrethroid Metabolites | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| Organochlorine Pesticide Metabolites: Urine | | | ● | ● | ● | ● | | | | |
| Organochlorine Pesticides and Metabolites: Serum | ● | ● | ● | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | |
| Polybrominated Diphenyl Ethers and PBB 153 | | | ● | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | |
| Polychlorinated Dibenzo-p-Dioxins | ● | ● | ● | ▲ | ▲ | ▲ | ▲ | | | |

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|--------------------------------|---|----------------------------|
| ● Individual data [^] | ⊕ Individual data from a special sample of smokers and non-smokers [†] | ▲ Pooled data [§] |
|--------------------------------|---|----------------------------|



* NHANES: National Health and Nutrition Examination Survey, www.cdc.gov/nchs/nhanes/

[^] Derived from whole blood, serum, or urine.

[†] Beginning with NHANES 2011-2012, a special sample was selected for measurement of certain groups of chemicals associated with tobacco smoke exposure. The special sample consists of a nationally representative sample of adult nonsmokers and all adults who reported being current cigarette smokers.

[§] Pooled samples are used when larger sample volumes are needed to improve the sensitivity of the measurements and to reduce the number of samples being analyzed, balancing the cost of the analysis against a low frequency of detectable results.

Last updated: September 29, 2023

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| Polychlorinated Dibenzofurans | ● | ● | ● | ▲ | ▲ | ▲ | ▲ | | | |
| Polychlorinated Biphenyls: Coplanar PCBs (Dioxin-Like) | ● | ● | ● | ▲ | ▲ | ▲ | ▲ | | | |
| Polychlorinated Biphenyls: Mono- Ortho-Substituted PCBs (Dioxin-Like) | ● | ● | ● | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | |
| Polychlorinated Biphenyls: Non-Dioxin-Like | ● | ● | ● | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | |
| Metals and Metalloids | ● | ● | ● | ● | ● | ● | ●,+ | ●,+ | ●,+ | ● |
| Perchlorate and Other Anions | | ● | ● | ● | ● | ● | ●,+ | ●,+ | ●,+ | ● |
| Perfluoroalkyl and Polyfluoroalkyl Substances: Surfactants | ● | | ● | ● | ● | ● | ● | ● | ● | ● |
| Perfluoroalkyl and Polyfluoroalkyl Substances: Urine | | | | | | | | ● | | |
| Phthalate and Phthalate Alternative Metabolites | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Phytoestrogens and Metabolites | ● | ● | ● | ● | ● | ● | | | | |
| Polycyclic Aromatic Hydrocarbon Metabolites | | ● | ● | ● | ● | ● | ●,+ | ● | ● | |
| Heterocyclic Amines | | | | | | | | ●,+ | | |
| Terpenes | | | | | | | | ● | | |
| Volatile Organic Compounds (VOCs) | | ● | ● | ● | ● | ● | ● | ●,+ | ●,+ | ● |
| Volatile Organic Compound (VOC) Metabolites | | | | ● | | | ●,+ | ●,+ | ●,+ | ● |
| Aldehydes | | | | | | | | ●,+ | | |
| Aromatic Amines | | | | | | | | ●,+ | | |
| Aromatic Diamines | | | | | | | | | ● | |
| Sex Steroid Hormones | | | | | | | | ● | ● | |

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Centers for Disease Control and Prevention
National Center for Environmental Health

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