

# HBM stav v roku 2017

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Spoločný konzultačný deň NRC pre expozičné testy xenobiotík  
a NRC pre laboratórnu diagnostiku v oblasti ľudského biomonitoringu  
RÚVZ so sídlom v Banskej Bystrici, 6.12.2017

# Prehľad HBM vo svete

- USA
- Kanada
- Nemecko
- Európa
- Česká republika
- Slovenská republika



2017

Fourth National Report on Human Exposure to Environmental Chemicals  
*Updated Tables, January 2017, Volume One*



U.S. Department of  
Health and Human Services  
Centers for Disease  
Control and Prevention



2017

Fourth National Report on Human Exposure to Environmental  
Chemicals *Updated Tables, January 2017, Volume Two*



U.S. Department of  
Health and Human Services  
Centers for Disease  
Control and Prevention

# Biomarkery – HBM v USA , viac ako 600 zlučenin

Acrylamide - 4

Antimicrobials used in Food Production

Brominated and Chlorinated Organic Compounds used as Flame Retardants - 36

Polybrominated diphenyl ethers (PBDEs)-19

Hydroxy-PBDEs (Metabolites of PBDEs)-14

Cyclosiloxanes - 3

Diesel Exhaust

Diglycidyl Ethers of p,p'-Bisphenols - 2

Disinfection By-Products (Trihalomethanes) – 4

Environmental Phenols

p,p'-Bisphenols -6

Brominated phenols - 4

Chlorinated phenols - 6

Parabens - 6

Related chemicals 1

Metals - Sb, As (7šp), Be, Cd, Co, Pb, Mn, Mo, Hg, Th, W, U - (18) - 21

Non-Halogenated Aromatic Phosphates - 10

Perchlorate and Other Anions – 3

Perfluoroalkyl and Polyfluoroalkyl Substances (PFASs) - 55

Tobacco Smoke – Nicotine, Cotinine, NNK, NNAL

Volatile Organic Compounds

[www.cdc.org](http://www.cdc.org)

# HBM California, Priority Chemicals, October 2017



Pesticides

Carbamate Insecticides -13

Fungicides – 17

Herbicides - Substituted

Ureas – 24

Organochlorine Pesticide - 27

Organophosphate

Pesticides - 27

Pyrethroid Pesticides - 35

Other Herbicides – 20

Other Pesticides - 2

ortho-Phthalates - 37

Phthalate Alternatives - 2

Phytoestrogens - 6

Polychlorinated Biphenyls (PCBs), Dioxin-Like

Coplanar PCBs - 3

Mono-ortho-Substituted PCBs - 6

Polychlorinated Biphenyls(PCBs), Non-Dioxin-Like - 32

Polychlorinated Biphenyls (PCBs)

Hydroxy-PCBs (Metabolites of PCBs) - 14 (10)

Polychlorinated Dibenzofurans - 10

Polycyclic Aromatic Hydrocarbons (PAHs) - 24

3-Hydroxybenzo[a]pyrene, 6-Hydroxychrysene, 3-Hydroxyphenanthrene (3)

(metabolity: B(a)P, Chrysene, Phenantrene)

Synthetic Hormones used in Food Production -3

Synthetic Polycyclic Musks – 7

Tetramethyl Acetyloctahydronaphthalenes - 4

# Biomarkery – HBM v Kanade



Skupiny látok	2007-2009	2010-2011	2012-2013	2014-2016
Organochlórové zlúčeniny	x			
Polybrómované retardanty horenia	x			
Polychlórované bifenyly (PCB)	x			
Chlórfenoly	x	x		
Perfluórované alkyly	x	x		
Metabolity ftalátov	x	x		
Pesticídy	x	x		
<b>Fenoly (Bisfenol A, Triclosan)</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
<b>Stopové prvky a kovy (Pb, Cd, Hg, As, F)</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
<b>Metabolit nikotínu</b>	<b>x</b>	<b>x</b>	<b>x</b>	<b>x</b>
Metabolity PAU		x	x	x
Metabolity benzénu		x	x	x
Akrylamid			x	x
Parabény			x	x
Pesticídy: metabolity organofosforečných pesticídov			x	x
Prchavé organické látky			x	x

# “HBM Commission” of the German Federal Environment Agency



**Human-Biomonitoring (HBM) values, derived by the Human Biomonitoring Commission of the German Environment Agency, date February 2017**

Analyte and sample material	Population group	HBM-I-Value	HBM-II-Value
Lead in whole blood [1996, 2002, 2009]		suspended	suspended
Cadmium in urine [1998, 2011]	children and adolescents; adults	0.5 µg/l; 1 µg/l	2 µg/l; 4 µg/l
Mercury in urine [1999]	children and adults	7 µg/l; 5 µg/g crea.	25 µg/l; 20 µg/g Crea.
Mercury in whole blood [1999]	children and adults	5 µg/l	15 µg/l
Thallium in urine [2011]	general population	5 µg/l	/
Pentachlorophenol (PCP) in serum [1997]	general population	40 µg/l	70 µg/l
Pentachlorophenol (PCP) in urine [1997]	general population	25 µg/l; 20 µg/g crea.	40 µg/l; 30 µg/g crea.
∑ of DEHP-metabolites 5 oxo- and 5 OH-MEHP in urine [2007]	children aged 6-13 years; women of child-bearing age; men aged 14 years and older, remaining general population	500 µg/l; 300 µg/l; 750 µg/l	/
Bisphenol A in urine [2012, updated 2015]	children; adults	0.1 mg/l; 0.2 mg/l	/

# “HBM Commission” of the German Federal Environment Agency



∑ PCB (138 + 153 + 180) in serum x 2 [2012]	infants, toddlers and women of child-bearing age	3.5 µg/l	7 µg/l
Glycoether which are metabolized to 2-methoxyacetic acid (MAA), urine [2014]	general population	0.4 mg MAA/g creatinine	1.6 mg MAA/g creatinine
Glycoether which are metabolized to 2-ethoxyacetic acid (EAA), urine [2016]	adults	5 mg EAA/l	/
∑ DINCH®-metabolites OH-MINCH and cx-MINCH in urine [2014]	children; adults	3 mg/l; 4.5 mg/l	/
∑ DPHP-metabolites OH-MPHP and oxo-MPHP in urine [2015]	children; adults	1 mg/l; 1.5 mg/l	/
Hexabromocyclododecane (HBCD(D)) [2015]	general population	0.3 µg/g Fett (1.6 µg/l plasma)	/
Triclosan in urine [2015]	children; adults	2 mg/l; 3 mg/l	/
2-Mercaptobenzothiazole (2-MBT) in urine [2015]	children; adults	4.5 mg/l; 7 mg/l	/
∑ N-Methyl-2-pyrrolidone (NMP)-metabolites 5-Hydroxy-NMP and 2-Hydroxy-N-methylsuccinimide in urine [2015]	children; adults	10 mg/l; 15 mg/l	30 mg/l; 50 mg/l
∑ N-Ethyl-2-pyrrolidone (NEP)-metabolites 5-HNEP and 2-HESI in urine [2015]	children; adults	10 mg/l; 15 mg/l	25 mg/l; 40 mg/l
∑ 3-(4-Methylbenzylidene)-camphor (4-MBC)-metabolites 3-4CBHC and 3-4CBC in urine [2016]	children; adults	0.3 mg/l; 0.5 mg/l	/
PFOA in blood plasma [2016]	general population	2 µg/l	/
PFOS in blood plasma [2016]	general population	5 µg/l	/
DEHP metabolite 5cx-MEPTP in urine (publication in preparation)	children; adults	1.8 mg/l; 2.8 mg/l	

# Európska iniciatíva ľudského biomonitoringu HBM4EU



- **HBM4EU** je výsledkom spoločného úsilia 26 krajín a Európskej komisie spolufinancovaný z programu Horizont 2020
- **Hlavným cieľom tejto iniciatívy** je koordinovať a presadzovať ľudský biomonitoring v Európe, čím sa zaistí lepší dôkaz o skutočnej expozícii občanov chemickými látkami a ich zdravotných účinkov na podporu tvorby politík pre jednotlivé štáty EU

8. – 9. December 2016 – Konferencia HBM4EU, Brusel Belgicko

Prioritné skupiny látok podľa HBM4EU

<https://ipchem.jrc.ec.europa.eu>



# Stav HBM – Česká republika



## ► Systém monitorovania zdravotného stavu obyvateľstva Českej republiky vo vzťahu k životnému prostrediu

Zdroj: Súhrnná správa za rok 2016

5 lokalít: Praha, Ostrava, Liberec, Žďár nad Sázavou, Kutná Hora

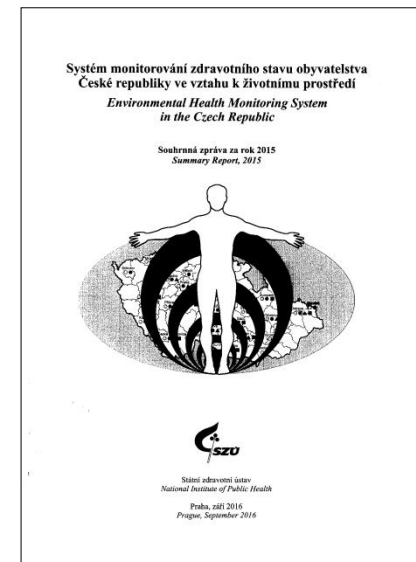
Populačná skupina:

18 – 65 r. (darcovia krvi)  
(2015)

5 – 9 r. (deti) (2016)

419 detí

Matrica	Počet vzoriek	Sledované biomarkery	Analytická metóda	Riešiteľ
<b>Plná krv</b>	<b>418</b>	Toxické kovy: Pb, Cd, Hg, Esenciálne prvky: Mn, Se	ICP-MS AMA-254	SZÚ Praha
<b>Krvné sérum</b>	<b>300</b>	Metabolit vitamínu D – 25(OH)vitamínuD		Endokrinolo- gický ústav Praha
<b>Moč</b>	<b>400</b> <b>378</b>	Toxické kovy: Cd, Hg, AS, Esenciálne prvky: I, Metabolity ftalátov : MEHP, 5-OH-MEHP, 5- oxo-MEHP, MBzP, MiBP, MnBP	ICP-MS AMA-254	SZÚ Praha



# Stav HBM – Slovenská republika



Slovensko **nemá** zavedený Národný program ľudského biomonitoringu (HBM) zameraný na všeobecnú populáciu

Projekt **DEMOCOPHES** prebiehal v rokoch 2010 – 2012. Bol zameraný na stanovení koncentrácií **kadmia, ortuti, metabolitov ftalátov a kotinínu** vo vybranej populácii (deti 6 – 11 r. / matky <45 r., mestské prostredie - vidiek) s počtom 120 dvojíc matka/dieťa

Analyt	Matrica	Analytické pracovisko
Kadmium	moč	SZÚ Praha
Kotinín	moč	SZÚ Praha
Metabolity ftalátov	moč	SZÚ Praha
Ortuť	vlasý	RÚVZ Banská Bystrica

**Budúcnosť HBM na Slovensku?**