NanoExplore

Exposure metrics and minimum meta-data needed to use measured data on the concentration of ENMs under national and international epidemiological studies

Non Valid

Physicochemical features

Size	
Particle Diameter (Nm) with a DMA	☐
Agglomerate particle size (nm)	☐
Size with TEM	☐
Size with SEM	☐
Size with SAXS or DLS	☐
Size with AFM for non- spherical particles	☐
Surface Area	
Surface area (µm2.cm-3) measured with OPS	☐
Surface area (µm2.cm-3) measured with NSAM (TSI)	☐
Shape	
Shape/chemical composition with XRD	☐
Shape/Chemical composition with EDX/SEM/TEM	☐
Other	
Charged surface (Z-potential)	☐
Surface reactivity	☐
Crystallinity with XRD	☐
Solubility	☐
Density	☐
Added functional groups	☐
Impurities	☐
Hydrophobicity with Dark-Field microscopy	☐

Other exposure data importants for epidemiological studies

Concentration	
Mass concentration (µg/m3)	☐
Number of nanoparticles	
Number of nanoparticles (#/cm3) measured with FMPS/SMPS	☐
Number of nanoparticles (#/cm3) measured with CPC/OPS	☐
Number of nanoparticles (#/cm3) measured with Nanoscan	☐
Number of nanoparticles (#/cm3) measured with ELPI	☐
Background (#/cm3)	☐
Near field (#/cm3)	☐
Far field (#/cm3)	☐
Instruments and methods	
Personal measure (with pump and filters) to characterize the shape and the chemical composition	☐
Describe the Instrument and methods used to measurements	☐
Date and time of measurements	☐
Size distribution	
Particle Size distribution (nm) measured with OPS	☐
Particle Size distribution (nm) measured with SMPS/FMPS	☐
Particle Size distribution (nm) measured with DiSCmini	☐
Particle Size distribution (nm) measured with Nanotracer	☐
Particle Size distribution (nm) measured with ELPI	☐
Particle Size distribution (nm) measured with NTA/DLS	☐
Exposure characteristics	
Intensity of exposure	☐
Duration of exposure	☐
Susceptibility, including preexisting health status of individuals	☐
Possible interactions with other risk factors (socioeconomic, smoking habits, etc)	☐
Number of workers exposed	☐
Control measures (techhical measures)	☐
Control measures (organizational measures)	☐
Control measures (protection measures or PPE)	☐
Description of the exposure scenarios and contributory exposure scenarios: characterize processes and identify potential emissions that could result in worker exposures	☐
Describe the workplace (geographic location, air currents….)	☐
Other tasks performed at other nearby workplaces that may influence exposure	☐
All the exposure registries of this workers	☐
Occupational health surveillance (initial, before exposure)	☐
Occupational health surveillance (regular)	☐
Other	
Ratio mean value/background value	☐

Important factors for the design of the epidemiological study			
	Instruments and methods		
		inmunological, Oxidative damage) and choose the right biomarker	☐
		Establish the most appropriate collection of biological samples within the working day: day, hour...	☐
		Establish the plan for the transport and analysis of the samples	☐
		Describe the instrument and methods used to biomonitoring	☐
		For any nanomaterial, at least, the Biomarker coul be: a) Biomarkers of oxidative stress: exhaled particles and/or elements in EBC (Exhaled breath condensate), metallic Elements analysis in biological fluids;SOD (Superoxide Dismutase) in serum; GPX (Glutathione peroxidase) in serum; FeNO in Exhaled air; b) Biomarkers of systemic inflammation and endothelial activation: reduction PEF, PEFR in serum (lung inflammation) ; VCAM, IL-6, LF, VLF in serum (vessel inflammation); c) Biomarkers for Vascular Inflammation or cardiovascular damage: VCAM, ICAM, LF in serum, High-Sensitive CReactive protein in serum and heart rate variability (HRV) in blood; d) Biomarkers of systemic inflammation and endothelial activation: reduction PEF, PEFR in serum (lung inflammation) ; VCAM, IL-6, LF, VLF in serum (vessel inflammation); PEF reduction in serum (lung inflammation); e) Biomarkers for Vascular Inflammation or cardiovascular damage:	☐
		In addition to biomarkers for any NMs (row 65), for metal NPs, the Biomarker could be: a) Biomarkers of oxidative stress: Malonaldehyde, 4-hydroxy-transhexenale, 4-hydroxy-transnoneanale, 8-isoprostaglandin F2, Aldehydes C6-C12 in EBC (Exhaled breath condensate); for TiO2: indium tin oxide Nps: 8-OHdG in uribe and 8-isoprostane in EBC; SP-D and pulmonary function (lung damage); SOD and MDA (stress oxidative), in serum; 5-hydroxymethyl uracil in urine, 8-hydroxydeoxyguanosine in urine; O-tyrosine, 3-chloro-tyrosine, 3-NO-tyrosine in urine; b) Biomarkers of systemic inflammation and endothelial activation: 8-hydroxydeoxyguanosine in urine, IL- 8, Leukotriene B4 reduction in serum; for silver: IL-6, TNF-alfa in physiological fluids; for TiO2: IL-8, IL-6, IL-1β, TNF-α, and IL-10 in serum; c) Biomarkers of DNA damage (DNA oxidation, Lipidic peroxidation): 8-hydroxydeoxyguanosine in serum, 8-isoprostane in serum; global DNA methylation (5-methyl-2-deoxycytidine extracted from WBCs); for TiO2: malondialdehyde, 4-hydroxy-trans-hexenal, 4-hydroxy-trans-nonenal, 8-isoProstaglandin F2α	☐
		In addition to biomarkers for any NMs (row 65), for based carbon NPs: a) Biomarkers of fibrosis: for CNT: LDH, (TNF)-α in Bronchoalveol ar lavage fluid (BALF); for MWCNT: IL-1β, IL6, TNF-α, KL-6 in sputum samples	☐
		In addition to biomarkers for any NMs (row 65), for tonners NPs: VEGF and CA15-3 in blood	☐
		In addition to biomarkers for any NMs (row 65), for SiO2, the Biomarker could be: a) Biomarkers of oxidative stress: 8-OHdG in uribe and 8-isoprostane in EBC; b) Biomarkers of systemic inflammation and endothelial activation : * For metal NPs, oxide metals Ns, PEPs, TiO2 Nps: 8-hydroxydeoxyguanosine in urine	☐
	Exposure characteristics		
		Temporal factors (likelihood to observe the outcome; shot-term vs. long-term effects)	☐
		Exposure duration and intensity (effectiveness)	☐
		Identify the target population/epidemiological study population	☐
	Other		
		Knowledge of toxicokinetic/toxicodynamic data of NM	☐
		Heterogeneity of nanoparticles	☐