Activity Name: **ICP-MS/AAS determination of nanoparticles in biological materials**	**Category:** **D. In-vitro toxicity studies** **Institute: Slovak Medical University** **Location: Limbova 12, 833 03 Bratislava, Slovakia** **Contact Details of Experts:** **Name: Monika Ursinyova, Iveta Uhnakova, Vlasta Masanova, Jana Tulinska, Aurelia Liskova, Miroslava Kuricova** **Phone: +421 2 59369 246, 244** **E-mail:** monika.ursinyova@szu.sk, iveta.uhnakova@szu.sk, vlasta.masanova@szu.sk, jana.tulinska@szu.sk, aurelia.liskova@szu.sk, miroslava.kuricova@szu.sk

Short technology description/Overview *(approx 300 words)*:

ICP-MS (inductively coupled plasma with mass spectrometry) method offers rapid, sensitive, accurate and simultaneous determination of chemical elements with atomic mass ranged from 7 to 250 (except C, N, O, F, Cl) in biological samples and aqueous media in a single run. The limits of detection are at the level of nanograms per litre (ppt). This technique is also used to analyze relative abundance of different isotopes and in tandem with HPLC/GC to determine the element species. At concentrations above micrograms per litre (ppb), using of AAS (atomic absorption spectrometry) is advantageous compared to ICP-MS because of lower purchase price and running cost.

Experimental biological samples and aqueous media:

- Cell cultures *in vitro* pulsed with suspension of nanoparticles
- Organ tissues (liver, kidney, etc.) of animals exposed to nanoparticles

Following procedures are used in process of determination of nanoparticles in samples:

- Preparation of nanoparticle test samples suspended in tissue culture media or aqueous solutions
- Separation of cell pellets, lysates, media (*in vitro*)
- Sample preparation for analytical determination
- Quantification of nanoparticles by ICP-MS/AAS in biological materials
- The evaluation of nanoparticles in cell and/or medium fraction of *in vitro* cell culture system
- The evaluation of nanoparticle bioaccumulation in selected organs of experimental animals

Determination of nanoparticles in tissue samples can be carried out in animal *(in vivo)* experiments, following procedures are necessary to run:

- Administration of animals with test substance
- Sampling of biological tissues and blood from experimental animals – venipuncture, autopsy and extraction of animal organs/tissue

Main Features (Equipment Capabilities):

- ICP-MS (XSeries 2, fy. Thermo Fisher Scientific)
- AAS (AA280Z and AA240FS, fy. Varian)

- Microwave digestion unit (mls 1200 Mega, fy.Milestone)
- Centrifuge (Hettich)
- Incubator with CO_2 atmosphere (Jouan, Heracell)
- Light microscope (Leitz)

Typical Samples & Images:

Flame and flameless technique of AAS equipment - AA280Z and AA240FS

ICP-MS equipment (XSeries 2) obtained from the SK0020 project, funded by EEA FM and NFM

Any further Information: