

[S-5]

Particle Toxicity; From Coal Dust to Nanoparticle

Young Lim

*Department of Occupational & Environmental Medicine, St. Mary Hospital,
The Catholic University of Korea, Seoul, Korea*

Health effect of particles was a big concern because it had been historically closely connected to industrial activities or materials, such as coal, asbestos, man-made mineral fibers, and ambient particulate matter. Recent debate on the issue of nanoparticle exposure and possible health effect is acceptable. Differences in size, shape, surface area, chemical composition and biopersistence require that the possible environmental and health impact be assessed for each type of nanomaterial because similar compounds may induce substantially different health effects. It has been recently shown not only that inhaled ultrafine particles exert respiratory effects, but that they may also translocate from the lung into the systemic circulation and this may result in cardiovascular and other extrapulmonary effects. We evaluated the characteristics of ultrafine particles (Tab.1) including silica, titanium dioxide, DEP and metal nanoparticles and their cytotoxicity (Fig.1). The toxicity of particles is dependent on the physical and chemical activity in addition to the biological feature. Also, this experiment is just the beginning and all the particles should be comprehensively assessed for the prevention of health effect.

Table1. Analysis of transition metals.

| | Units ppm | | | | | | | | | |
|------------------|-----------|----|-----|------|-----|-----|----|---------|----|-----|
| | Co | Cr | Cu | Fe | Mn | Ni | Sc | Ti | V | Zn |
| TiO ₂ | <5 | <5 | 10 | <50 | <2 | <5 | <2 | 595,000 | 5 | <5 |
| DEP | <2 | 30 | 6 | 5600 | 22 | 14 | 1 | 10 | 5 | 12 |
| SRM2975 | <20 | 50 | 100 | 300 | <10 | <50 | <5 | 50 | 20 | 400 |
| Mini_U_silica | <2 | 4 | <2 | 250 | 5 | <2 | <1 | <100 | <5 | 2 |

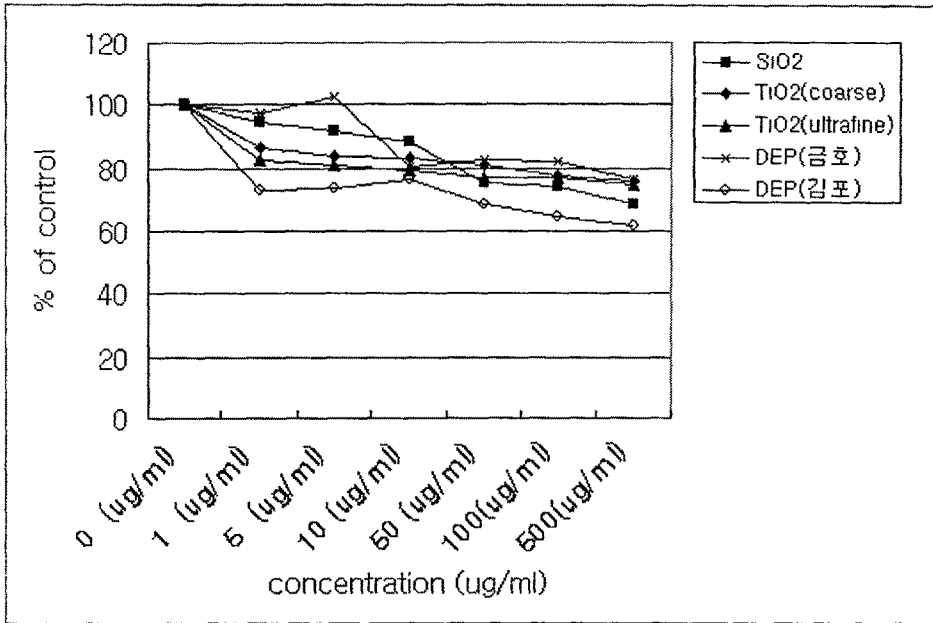


Fig 1. cytotoxicity of SiO₂, TiO₂(coarse size), TiO₂(ultrafine size), F-DEP, NF-DEP using MTS assay in A549 cells.