Carbon nanotubes (CN) are important industrially; however, evidence of their potential toxicity is also increasing. The fibers produced by CN in lung compare to asbestos, a known mesothelioma producer (1). Early detection methods are greatly needed.

Nanoparticles are fibers or particles with one dimension less than 100 nanometers. This size gives them unusual electrical and magnetic characteristics; it also means they are too small to see, except with a very high magnification (electron) microscope. Single wall carbon nanotubes (SWCNT) can cross intact skin and cell membranes. When inhaled, they create needle-like fibers in lung that cause mechanical necrotic damage by piercing cell membranes.

Mesothelioma was rare until about 30 years ago when incidence began to rise in relation to exposure to asbestos and asbestos products. The median survival is only about 7 months (2). Most mesothelioma surveillance (on asbestos exposure groups) is done by chest x-ray and pulmonary function tests (3). The disease is highly fatal after diagnosis, but asbestos exposure may take 20 years to produce mesothelioma (4).

Clinical Application: Serum and pleural fluid are both being tested for proteins secreted by the body when malignant mesothelioma is present.
- No marker is yet available that gives a reliable diagnosis.
- The latest “soluble marker” candidates are mesothelin and osteopontin (5,6,7).

Materials and Methods

Cell lines were from the American Type Culture Collection (ATCC): Untransformed human mesothelial cells, MeT-5A which grow in KGM basal medium with additives plus 10% fetal calf serum (Lonza) and NCHI28 (CRL5820) human mesothelioma cells which grow in RPMI 1640 with 10% fetal calf serum. Purified SWCNTs (SES Research, Houston TX) were used at 500 micrograms/mL media with 25% fetal calf serum to assist suspension and added to the cell cultures at 25 micrograms/mL of media, which has been shown to produce 80% viability in cultured cells by earlier work in our group.

The positive control for these experiments, NCI-H28 human mesothelioma, responded to nanoparticles by upregulating osteopontin and mesothelin only after over night exposure.

**References**