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PARTICLE PENETRATION OF THE SKIN AS A ROUTE OF SENSITIZATION IN OCCUPATIONAL LUNG DISEASE. Sally S Tinkle, James M Antonini, Brenda A Abrigo, Eric J Adkins, Jenny R Roberts.

Chronic Beryllium Disease (CBD) is an occupationally-acquired lung disease that begins as a cell-mediated immune response to beryllium particulates that, over time, results in development of non-caseating granulomas. During the last ten years, the beryllium industry has made major improvements in respiratory protection and engineering control technology design, however, the rate of disease has not declined. We hypothesized that dermal exposure to beryllium particulates, coupled with joint motion, as at the wrist, would provide an alternative route for sensitization to beryllium. To test this hypothesis, 400 - 600 micron thick sections of human skin (n = 8) were applied to a flexing device with surgical glue. The integrity of the stratum corneum was verified with the NOVA DPM, and 100 μ l of 0.5, 1 or 4 micron FITC-conjugated dextran beads were applied to the surface of the skin. The skin was subjected to repeated 30 degree flexure for 0, 15, 30 or 60 minutes. Control tissues were not flexed. Following treatment, tissues were fixed, cut in 20 micron thick sections, and mounted on slides in cross-section. Penetration of beads into the skin was evaluated at 1 micron intervals by laser scanning confocal microscopy. To verify that bead penetration occurred through the stratum corneum, we evaluated data between 5 and 15 microns only. We documented 0.5 and 1 micron bead penetration into the epidermis and the dermis in flexed samples, but not non-flexed tissues. Although not quantitative, only a very small percentage of beads was observed in the skin, and there was no clear time-dependence associated with penetration. Four micron beads did not penetrate the skin. These data suggest that particle penetration of the skin is a potential route of exposure in dusty work environments.