Medical Xpress

Mystery unraveled: How asbestos causes cancer

June 29 2010

More than 20 million people in the U.S., and many more worldwide, who have been exposed to asbestos are at risk of developing mesothelioma, a malignant cancer of the membranes that cover the lungs and abdomen that is resistant to current therapies. Moreover, asbestos exposure increases the risk of lung cancer among smokers. For the past 40 years researchers have tried to understand why asbestos causes cancer.

The answer appears in a study published in the current issue of the Proceedings of the National Academy of Sciences, U.S.A., Drs. Haining Yang and Michele Carbone at the University of Hawai'i Cancer Research Center led a research team that included collaborators at New York University, University of Chicago, University of Pittsburgh, San Raffaele University of Milano, and the Imperial College in London.

These researchers addressed the paradox of how asbestos fibers that kill cells could cause cancer, since a dead cell should not be able to grow and form a tumor. They found that when asbestos kills cells, it does so by inducing a process called "programmed cell necrosis" that leads to the release of a molecule called high-mobility group box 1 protein (HMGB1). HMGB1 starts a particular type of inflammatory reaction that causes the release of mutagens and factors that promote tumor growth. The researchers found that patients exposed to asbestos have elevated levels of HMGB1 in their serum. Therefore, they state that it may be possible to target HMGB1 to prevent or treat mesothelioma and identify asbestos-exposed cohorts by simple HMGB1 serological testing.

In the article, the researchers propose that by interfering with the inflammatory reaction caused by asbestos and HMGB1, it may be possible to decrease cancer incidence among cohorts exposed to asbestos and decrease the rate of tumor growth among those already affected by mesothelioma. Drs. Yang and Carbone, the lead authors, state that to test this hypothesis, they are now planning a clinical trial in a remote area in Cappadocia, Turkey, where over 50% of the population dies of malignant mesothelioma. If the results are positive, the approach will be extended to cohorts of asbestos-exposed individuals in the U.S.

This research emphasizes the role of inflammation in causing different types of cancers and provides novel clinical tools to identify exposed individuals and prevent or decrease tumor growth. The researchers question if it will be possible to prevent mesothelioma, like colon cancer, simply by taking aspirin or similar drugs that stop inflammation. They are about to test this hypothesis.

More information: The article is titled "Programmed cell necrosis induced by asbestos in human mesothelial cells causes high-mobility group box 1 protein release and resultant inflammation," by Haining Yang, et al. It will be published online in the Proceedings of the National Academy of Sciences U.S.A. the week of June 28 2010, and later in print.

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