

UC SANTA BARBARA

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## **HUMAN BREAST CANCER LINKED TO INFECTED MICE SAYS STUDY**

Can cancer develop from a virus and can humans catch these diseases from other animals? In an article linking breast cancer to mice, these provocative questions are raised in the January 19th issue of the British Journal of Cancer.

In the article, "Breast Cancer Incidence Highest in the Range of One Species of House Mouse, *Mus Domesticus*," the authors asserted that humans acquire the mouse mammary tumor virus from mice which sometimes leads to human breast cancer, a disease which claims the lives of over 40,000 women each year in the U.S. They pointed to studies that show a similar viral sequence between human breast cancer and mouse mammary tumor virus.

"This is a hypothesis, that if true, gives insight about this major disease, and more importantly provides a rational plan for a preventive vaccine," said Richard Sage, adjunct professor of biology at the University of California, Santa Barbara, and co-author of the article. "We're not speaking of a cure, but rather prevention."

The authors found that the highest incidence of human breast cancer worldwide occurs in lands where *Mus domesticus* (a type of house mouse) is the resident native or introduced species. "Given ... the near identity between human and mouse mammary tumor virus DNA sequences, and the close association between human breast cancer incidence and mouse ranges, we propose that humans acquire mouse mammary tumor virus from mice," said the authors.

The house mouse *Mus domesticus* is native from Western Europe to Iran, and introduced into North and South America, Australia, New Zealand and Hawaii. Inbred laboratory mice have mostly *Mus domesticus* genes.

The incidence of human breast cancer varies worldwide, a fact that has been known for decades. And it is higher in the above listed areas, where the *Mus domesticus* house mouse can be found, and lower in Eastern Europe, Japan and China, where this particular mouse is absent.

The authors found that people moving from areas of lower to higher breast cancer incidence have an increased risk. Studies demonstrate that Soviet Jews moving to Israel, Japanese moving to the U.S., and South Asians moving to the United Kingdom all show increased incidence of breast cancer. The authors state that "Some other, unrecognized, environmental factors with oncogenic potential must explain the geographic differences in human breast cancer incidence."

Further support for the hypothesis that humans become infected with mouse mammary tumor virus comes from a study of lab personnel who work with infected mice. Personnel working with the mice developed a blood serum response to mouse mammary tumor virus as compared to age and gender matched controls.

Of note was one female lab employee\* who was sero-negative for 28 months and then became positive in the 32nd month. Nine months later she discovered a mass in her right breast which was soon diagnosed as cancerous. Although it is not known how the virus is transmitted, following these reports, scientists recommended more stringent guidelines for laboratory containment of mouse mammary tumor virus.

According to the authors, the "possibility of a rodent-born virus causing this major human disease and accounting for almost half of its incidence should not be surprising nor unexpected. *Mus domesticus* has lived with humans, as an intimate commensal, since the beginnings of agricultural societies in the Near East." They mention that the conclusion was drawn in another scientific paper in 1981.

And, in a disturbing comment about our food supply, the authors state, "The existence of regulatory food standards allowing up to two pellets of rodent excreta per pint of wheat confirm the presence of mice in the modern human food chain."

\*As reported in 1986 in the Journal of the National Cancer Institute, 76:611-619, Serologic Responses to Murine Mammary Tumor Virus (MuMTV) in MuMTV- exposed Laboratory Personnel, by A.S. Dion, A.J. Girardi, C.C. Williams, and A.A. Pomenti

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