People with allergies may have lower risk of brain tumors

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(Medical Xpress) -- New research adds to the growing body of evidence suggesting that there's a link between allergies and reduced risk of a serious type of cancer that starts in the brain. This study suggests the reduced risk is stronger among women than men, although men with certain allergy profiles also have a lower tumor risk.

The study also strengthens scientists' belief that something about having allergies or a related factor lowers the risk for this cancer. Because these tumors, called glioma, have the potential to suppress the immune system to allow them to grow, researchers have never been sure whether allergies reduce cancer risk or if, before diagnosis, these tumors interfere with the hypersensitive immune response to allergens.

Scientists conducting this study were able to analyze stored blood samples that were taken from patients decades before they were diagnosed with glioma. Men and women whose blood samples contained allergy-related antibodies had an almost 50 percent lower risk of developing glioma 20 years later compared to people without signs of allergies.

"This is our most important finding," said Judith Schwartzbaum, associate professor of epidemiology at Ohio State University and lead author of the study. "The longer before glioma diagnosis that the effect of allergies is present, the less likely it is that the tumor is suppressing allergies. Seeing this association so long before tumor diagnosis suggests that antibodies or some aspect of allergy is reducing tumor risk.

"It could be that in allergic people, higher levels of circulating antibodies may stimulate the immune system, and that could lower the risk of glioma," said Schwartzbaum, also an investigator in Ohio State's Comprehensive Cancer Center. "Absence of allergy is the strongest risk factor identified so far for this brain tumor, and there is still more to understand about how this association works."

Many previous studies of the link between allergies and brain tumor risk have been based on self-reports of allergy history from patients diagnosed with glioma. No previous studies have had access to blood samples collected longer than 20 years before tumor diagnosis.

The current study also suggested that women whose blood samples tested positive for specific allergy antibodies had at least a 50 percent lower risk for the most serious and common type of these tumors, called glioblastoma. This effect for specific antibodies was not seen in men. However, men who tested positive for both specific antibodies and antibodies of unknown function had a 20 percent lower risk of this tumor than did men who tested negative.

Glioblastomas constitute up to 60 percent of adult tumors starting in the brain in the United States, affecting an estimated 3 in 100,000 people. Patients who undergo surgery, radiation and chemotherapy survive, on average, for about one year, with fewer than a quarter of patients surviving up to two years and fewer than 10 percent surviving up to five years.

The study is published online in the *Journal of the National Cancer Institute*.

Schwartzbaum and colleagues were granted access to specimens from the Janus Serum Bank in Norway. The bank contains samples collected from citizens during their annual medical evaluations or from volunteer

blood donors for the last 40 years. Norway also has registered all new cases of cancer in the country since 1953, and personal identification numbers enable cross-referencing those cases with previously collected blood samples.

The researchers analyzed stored samples from 594 people who were diagnosed with glioma (including 374 diagnosed with glioblastoma) between 1974 and 2007. They matched these samples for date of blood collection, age and sex with 1,177 samples from people who were not diagnosed with glioma for comparison.

The researchers measured the blood samples for levels of two types of proteins called IgE, or immunoglobulin E. This is a class of antibodies produced by white blood cells that mediate immune responses to allergens. Two classes of IgE participate in the allergic response: allergen-specific IgE, which recognizes specific components of an allergen, and total IgE, which recognizes these components but also includes antibodies with unknown functions.

In each sample, the scientists determined whether the serum contained elevated levels of IgE specific to the most common allergens in Norway as well as total IgE. The specific respiratory allergens included dust mites; tree pollen and plants; cat, dog and horse dander; and mold.

The researchers then conducted a statistical analysis to estimate the association between elevated concentrations of allergen-specific IgE and total IgE and the risk of developing glioma.

Among women, testing positive for elevated levels of allergen-specific IgE was associated with a 54 percent decreased risk of glioblastoma compared to women who tested negative for allergen-specific IgE. The researchers did not see this association in men.

However, the relation between total IgE levels and glioma risk was not different for men and women, statistically speaking. For men and women combined, testing positive for elevated total IgE was linked to a 25 percent decreased risk of glioma compared with testing negative for total IgE.

The analysis for effects on glioblastoma risk alone suggested a similar decreased risk for both men and women combined whose samples tested positive for high levels of IgE, but the findings were considered borderline in terms of statistical significance, meaning the association could also be attributed to chance.

"There is definitely a difference in the effect of allergen-specific IgE between men and women. And even results for total IgE suggest there still may be a difference between the sexes. The reason for this difference is unknown," Schwartzbaum said.

What the study does provide evidence for, however, is the likelihood that the immune systems of people with respiratory allergies could have a protective effect against this type of brain cancer. The ability to investigate this association over four decades between blood sampling and tumor diagnosis gave the researchers better insight into the relationship between allergies and tumor risk, Schwartzbaum said.

For example, a positive test for elevated concentrations of total IgE was associated with a 46 percent decreased risk for developing a glioma 20 years later compared to samples testing negative for elevated IgE, according to the analysis. That decreased risk was only about 25 percent in samples that tested positive for high levels of total IgE taken two to 15 years prior to diagnosis.

"There may be a trend - the closer the samples get to the time of diagnosis, the less help the IgE is in decreasing the risk for glioma.

However, if the tumor were suppressing allergy, we would expect to see a bigger difference in risk near the time of diagnosis," Schwartzbaum said.

Schwartzbaum plans to further analyze the serum samples for concentration of cytokines, which are chemical messengers that promote or suppress inflammation as part of the immune response, to see if these proteins have a role in the relationship between elevated IgE levels and lowered tumor risk.

Provided by Ohio State University