Individuals who apply pesticides are found to have double the risk of blood disorder

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A study involving 678 individuals who apply pesticides, culled from a U.S. Agricultural Health Study of over 50,000 farmers, recently found that exposure to certain pesticides doubles one's risk of developing an abnormal blood condition called MGUS (monoclonal gammopathy of undetermined significance) compared with individuals in the general population. The disorder, characterized by an abnormal level of a plasma protein, requires lifelong monitoring as it is a pre-cancerous condition that can lead to multiple myeloma, a painful cancer of the plasma cells in the bone marrow.

"Previously, inconclusive evidence has linked agricultural work to an increased multiple myeloma risk. Our study is the first to show an association between pesticide exposure and an excess prevalence of MGUS," said lead author Ola Landgren, MD, PhD, of the National Cancer Institute (NCI), which is part of the National Institutes of Health, U.S. Department of Health and Human Services. "This finding is particularly important given that we recently found in a large prospective cancer screening study that virtually all multiple myeloma patients experienced a MGUS state prior to developing myeloma."

"As several million Americans use pesticides, it's important that the risks of developing MGUS from the use of pesticides is known," added senior study author and NCI investigator Michael Alavanja, DrPH.

The blood of study participants, who were individuals licensed to apply restricted-use pesticides, was assessed for MGUS prevalence. The

median age of participants was 60 years (range 30-94 years), and all lived in either Iowa or North Carolina. Participants also completed questionnaires providing comprehensive occupational exposure information for a wide range of pesticides, including information such as the average number of days of pesticide use per year, years of use, use of protective gear while applying pesticides, and pesticide application methods. Information on smoking and alcohol use, cancer histories of the participants' first-degree relatives, and other basic demographic and health data were also obtained. Individuals with prior histories of lymphoproliferative malignancies (such as multiple myeloma or lymphoma) were excluded. Cancer incidence and mortality were monitored annually, and, after five years, follow-up interviews were conducted to update the information about participants' occupational exposures, medical histories, and lifestyle factors.

For comparison, data were obtained from a large MGUS-screening study conducted by the Mayo Clinic, and the results from the pesticide-exposed group were compared with the assessments of 9,469 men from the general population of Olmsted County, Minnesota. The two groups were similar in terms of age, race, and educational attainment. Because of the low prevalence of women among workers who apply pesticides, women were excluded from the study.

In the pesticide-exposed group, no MGUS cases were observed among those who were less than 50 years of age, but the prevalence of MGUS in those older than 50 was 6.8 percent, which is 1.9 times higher than the general population study group of men in Minnesota.

The researchers also evaluated the potential association between MGUS prevalence and 50 specific pesticides for which usage data were known. Of the chemicals studied, a significantly increased risk of MGUS was observed among users of dieldrin (an insecticide), carbon-tetrachloride/carbon disulfide (a fumigant mixture), and chlorothalonil (a

fungicide). The MGUS risk for these agents increased 5.6-fold, 3.9-fold, and 2.4-fold, respectively. Several other insecticides, herbicides, and fungicides were associated with MGUS, but not significantly.

"There is great concern regarding the increase in frequency in mature B-cell malignancies in the Western world and what may be the cause of this. A number of reports in the past have linked exposure to pesticides with increased risk of these types of cancers, but the present study is the first to link agricultural work to a pre-malignant condition," said John G. Gribben, MD, DSc, Professor of Experimental Cancer Medicine at Barts and the London School of Medicine, who is not affiliated with the study. "It is vital to assess the risk of workplace exposure and disease, and the results lend further support to providing safe workplace practices to limit exposure to potential carcinogens."

"Our findings are intriguing," stated Dr. Landgren. If replicated in a larger sample from our study and other large studies, further work should focus on gaining a better understanding of the molecular basis of MGUS and multiple myeloma. Ultimately, this will result in the identification of novel molecular targets involved in the progression from MGUS to multiple myeloma and in the development of targeted therapies."

Source: American Society of Hematology