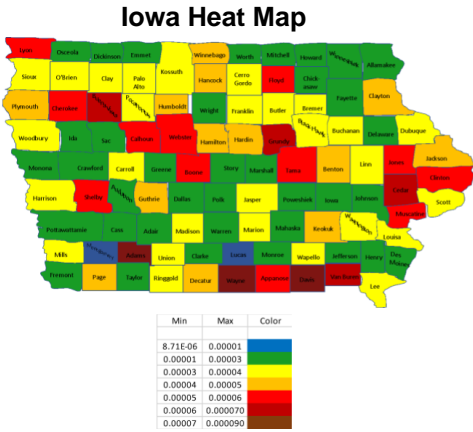


Introduction

The incidence of Glioblastoma (GBM), the most aggressive primary brain tumor, has increased over 30 years. Agricultural chemicals have been questioned for their role, as some are known to be neurotoxic, yet are commonplace items. Various organizations, including the IARC, have conflicting conclusions on these chemicals and their carcinogenicity. Furthermore, previous studies in this topic use investigative techniques that are subject to bias. This study aims to improve these investigations and arguments by using the SEER database and NWIS Water Quality database to examine potential associations between agricultural chemicals and glioblastoma incidence in a moderate Iowa population size.

Methods

The NCI SEER database was queried using SEER*stat, for all glioblastoma cases from 2004 – 2014 (age: 0 to 85+ years). All counties in Iowa were included. The incidence of tumor cases per year for each county using population census data was calculated. A geographic heat map of Iowa was created to visualize “GBM clusters” within the state (Fig. 1). Average water pollutant measurements for Atrazine, Chlorpyrifos, Glyphosate, and Imidacloprid were obtained for the same years from the NWIS. These were interpreted as a proxy for chemical usage. Statistical analyses was conducted for significance and association, using Spearman’s Rho for nonparametric data.



Heat map of glioblastoma incidence in Iowa. The U.S. incidence is approximately 2-3 per 100,000 people.

Results

N=1100 patient cases from 99 counties were identified for analysis; males = 650 and females =450. Atrazine measurements(n=62), Chlorpyrifos (n=52), and Imidacloprid (n=18) did not show a significant association with tumor incidence (Rho=0.064, 0.018, -0.01231; P>.05, respectively). Glyphosate showed a moderate positive association with incidence, but this was not statistically significant (n=21, rho=0.58, P=.99).

Conclusions

Of the four mainstream agricultural chemicals, atrazine, chlorpyrifos, and imidacloprid showed non-significant non-associations with tumor incidence. Glyphosate, a known neuro-toxic pesticide, showed moderate association with tumor incidence, but was statistically insignificant.

Learning Objectives

- 1-Analyze the Incidence of GBM in Iowa Counties from 2004-2010
- 2-Compare the varying levels of agricultural water pollutants to GBM incidence
- 3-Describe a possible association between agricultural water pollutants and GBM incidence

References

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