Multiple sclerosis (MS) is an autoimmune inflammatory demyelinating disease of the central nervous system (CNS) that is a leading cause of disability in young adults. Treatment directed at the rapid, aggressive progressive phase of MS is typically difficult. Natalizumab is an effective drug for the treatment of relapsing-remitting multiple sclerosis (RRMS). However, in rare cases, its use is associated with the development of progressive multifocal leukoencephalopathy (PML), a potentially fatal complication caused by the John Cunningham virus (JCV). It is thought that the JCV infects the tonsils or kidneys, but cannot replicate well in the cells of these organs. The virus can subsequently infect B-cells and travel to the central nervous system (CNS). Glial cells in the CNS are permissive to JCV replication, which contributes to the development of PML.

It is estimated that the majority of adults are positive for JCV antibodies. Studies on MS patients have reported a prevalence of 46-60% and an association between JCV antibody status and age, gender, national origin, and length of immunosuppressive therapy. Risk factors for infection with the JCV are not well understood. Environmental factors may play a role.

We identified patients who have been tested for antibodies to JCV and performed chart review to determine if there is a difference in terms of gender, age, area of residence, marital status, or smoking status between patients who tested positive and those who tested negative for JCV antibodies. We are reporting those results here.

The R statistical programming language was used to analyze the data. We applied Chi-Square, Fisher’s Exact, and t-tests to determine statistical significance. The Levene test was applied to assess normality of numerical data. The Agresti & Coull method was used to calculate a 95% CI (displayed as error bars in the graphs) around our observed counts of JCV antibody status. We had a 24.4%, 96.7%, and 99.9% chance of detecting small, medium, and large differences between groups, respectively.

Family members will be tested for JCV antibodies to determine if there is an association between family members’ JCV antibody status and patient JCV antibody status. We developed a questionnaire asking about environmental exposures. This questionnaire will be administered to patients with available JCV serology results to determine if there is a difference in exposures between groups.

**RESULTS**

![Figure 1](image1.png)  
**Figure 1** JCV Status by Gender

![Figure 2](image2.png)  
**Figure 2** JCV Status by Age

![Figure 3](image3.png)  
**Figure 3** JCV Status by City

![Figure 4](image4.png)  
**Figure 4** JCV Status by Marital Status

![Figure 5](image5.png)  
**Figure 5** JCV Status by Smoking Status

**CONCLUSIONS**

- The 48.8% prevalence of JCV antibodies in this patient population is consistent with that of other studies. In our study, gender and area of residence were associated with JCV antibody status, whereas age and marital status were not. It is theorized that JCV infection occurs through an environmental exposure, so it stands to reason that area of residence may influence JCV antibody status. A greater number of men were positive for JCV. It is possible that occupational exposures are a factor in this result.

- We are in the process of enrolling patients and family members and administering our exposures questionnaire to patients who agree to participate in our study. This work is ongoing.