

## Vaccine Controversy Medical Oversight

The anti-vaccination movement has gained significant influence because of its extremely diverse underlying support. From distrust of governmental policies regarding vaccination to scientific data that seemingly proves the dangers of vaccination, the discourses are able to reach and impact a large number of the public. My research this semester focused on the expansion of recommendations made by the Centers for Disease Control and Prevention (CDC) concerning the seasonal influenza vaccine, the vaccine industry as a whole, and scientific literature relating vaccinations and adverse effects.

The Advisory Committee on Immunization Practices (ACIP), formed under the CDC, determines which strains will be included in the influenza vaccine each year and the annual recommendations involving the vaccine. In past years, the ACIP has recommended that only people under the age of 19 and above the age of 49 receive the seasonal influenza vaccine. However, these recommendations were significantly expanded for the 2010-2011 influenza season to include all persons over the age of six months.

The 2009 H1N1 outbreak in the United States is the primary reason the ACIP documents for their expansion of recommendations. They reference studies of the H1N1 strain disproportionately affecting healthy, young adults in the United States and Canada compared to other strains of the influenza virus in previous years, which were not known to severely affect this age group. Because the 2010-2011 vaccine contains the H1N1 strain, along with two other common influenza strains, the ACIP currently recommends that all adults receive the vaccine. In their report, the ACIP only cited

three references for this decision, leading the research team to question whether or not other motives were involved. This segued into my research of the vaccine industry as a whole.

The vaccine industry is presently facing a state of decline. Currently, only four companies control 80% of the vaccine market. Instead, most companies focus on pharmaceuticals because of their larger potential for profit. The production of a single vaccine requires 12 to 15 years of research and between \$500 million and \$1 billion, a time-consuming and costly process for a vaccine that is typically only used one time per person. Furthermore, 60% of the costs of vaccine production are fixed, meaning they do not change regardless of how much product is produced. When there is a larger demand for a vaccine, there is an increase in production volume and a decrease in production costs and prices. As the largest purchaser of vaccines, the government would favor a lower cost. However, this would require a higher demand for the product. This situation could account for a possible undocumented motive for the expansion of the influenza vaccine recommendations, which could potentially increase public distrust of the government's recommendations concerning vaccinations.

Another public concern regarding vaccination is the adverse effects associated with them that are frequently highlighted by the media. To determine the legitimacy of these claims, I studied the scientific evidence concerning the adverse effects, specifically literature dealing with multiple immunizations, autoimmune diseases post-vaccination, and mechanisms through which adverse effects may be triggered.

In a book published by the Institute of Medicine, *Immunization Safety Review: Multiple Immunizations and Immune Dysfunction*, an in depth examination is provided of the clinical, epidemiological, and biological evidence of the effects of multiple immunizations on the immune system. The book addresses many parents' concerns that

their children are receiving too many vaccines. This is one of the principal arguments in the anti-vaccination movement. The authors study correlations between multiple immunizations and both type 1 diabetes and asthma, which are examples of autoimmunity and overreaction of the immune system respectively. The book concludes that the clinical and epidemiological evidence does not support a causal relationship between multiple immunizations and type 1 diabetes; the risk of asthma is indeterminate. The literature review of the biological mechanisms reveals that the relationships are more than only theoretical, though there is a large range of evidence provided. The institute recommends that there be continued public health attention to multiple vaccinations and immune dysfunction but does not recommend a policy change in the United States. Depending on what the reader chooses to focus on, this book presents information that could either support or hinder the anti-vaccination movement, reflecting the complexity of the issue and the importance of public education.

Autoimmune diseases after receiving a vaccine are documented in the scientific literature usually in the form of individual case studies, since such events are atypical. I was able to find cases of Still's Disease, Immune Thrombocytopenic Purpura, and Acute Disseminated Encephalomyelitis post-vaccination. These three case studies provide examples of three different autoimmune diseases following vaccination in an adult, child, and adolescent. However, in each of these papers, it was stated that such a reaction is either extremely rare or completely undocumented. Additionally, in the studies of the patients who developed Still's Disease and Immune Thrombocytopenic Purpura, it was noted in the discussion that there is a documented relationship between the virus for which the patients were vaccinated against and the autoimmune disease that they developed. While these papers provide examples that can be used as support

for the anti-vaccination movement, they provide stronger examples of the importance of vaccination, as the viruses themselves are more likely to induce autoimmunity.

Guillain-Barre Syndrome is an autoimmune disease mediated by anti-ganglioside antibodies. Due to the famous outbreak in 1976 following swine flu vaccination, this syndrome is frequently mentioned in anti-vaccination discourse. The disease is commonly preceded by the bacterium *Campylobacter Jejuni* because of its structural similarity to human gangliosides. This led researchers to develop the hypothesis of a vaccine component similarly mimicking gangliosides to induce an autoimmune response. The swine flu vaccine was found to induce anti-ganglioside antibodies in susceptible people, but the component that caused of the induction was never identified.

This mechanism of molecular mimicry is noted in the literature as the most likely mechanism through which autoimmunity is triggered by vaccinations. In this mechanism, something in the vaccination resembles a structure in the human body. When antibodies are produced against the vaccination, they also attack the similar structure in the body, creating autoimmunity. However, all of the literature that I studied discussed the importance of vaccinations despite the biological theories behind vaccine-induced autoimmunity.

Because the discourses concerning vaccination refusal are so diverse and complex, it will not only take increased understanding of them, but will also require the combined efforts of many fields to regain the public's trust. Until this happens, it appears that the anti-vaccination movement will continue to gain momentum.