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# PLAGUE HYSTERIA

## A HISTORICAL PERSPECTIVE

### THE NEUROLOGICAL COMPONENT OF INFECTIOUS DISEASE

Monica Arnell

When a person mentions that they have been exposed to an infectious disease of any kind, you may have observed that the people talking to them instinctively use their hand to cover their mouth or lean back and avoid contact. This is not surprising, because just the words “infectious disease” tend to conjure up ideas ranging an average flu to more extreme symptoms such as open sores or epidemics like the Black Death that swept through medieval Europe. A less common category of symptoms that often stem from these diseases are neurological complications, which can be far more serious and often deadlier than the rest if the disease is left to develop without treatment.

Neurological components of infectious disease are symptoms that result when the disease attacks the brain or central nervous system. These symptoms vary in severity; they can cause headaches due to swelling of brain tissue and increased pressure, mental psychosis and atypical behavior, or an overall decrease in

will we be able to prevent their spread and the ostracism of victims.

#### TUBERCULOSIS: THE WHITE PLAGUE

Although it is usually the unique and characteristic complications of each infectious disease that cause illness and eventually death, neurological symptoms have been historically perplexing as they are not readily apparent at the first signs of infection. Tuberculosis can present such seemingly unexplainable symptoms. The disease was previously and popularly known as “Consumption” because it seemed to consume the body from within, in addition to being coined the “White Plague” due to the pallor of victims’ faces. Spread through the air by coughs and sneezes, it is caused by mycobacterium and primarily affects the lungs in 75% of cases. Children or immunosuppressed individuals, however, may become infected in other areas, including the central nervous system (Golden and Vikram 2005).

A common manifestation of the disease in these populations is meningitis, or inflammation of the meninges, which is the protective covering of the brain and spinal cord. The mycobacteria that cause Tuberculosis travel to the brain and attack the tissues of the meninges, causing them to swell as an inflammatory response. The most common symptoms are severe headache

and fever, but if not treated quickly with antibiotics, epilepsy, deafness, and cognitive deficits can develop due to the pressure of the swelling inside the skull (Sáez-Llorens and McCracken 2003).

Tuberculosis became known as the major killer during the Industrial Revolution and was cited by famous authors such as Edgar Allen Poe, who suffered many familial losses from the disease. The neurological symptoms were often overlooked during the era because the disease itself was poorly understood and no treatment had yet been discovered. Tuberculosis victims were thought to be crazed vampires, prey-

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“Tuberculosis victims were thought to be crazed vampires, preying on their infected family members one by one and coughing up their blood. They often suffered from epileptic attacks and amnesic symptoms.”

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brain function due to the deterioration of brain tissue by disease-infected cells. In some cases, neurological symptoms are quite rare, as they present themselves years after infection. However, these complications are quite serious and especially prevalent in particular diseases. Throughout history, there have been episodes of contagious diseases causing mass hysteria not only due to their rapid spread and deadliness, but also to the resulting extreme mental and behavioral changes that were so poorly understood. Neurological symptoms continue to be a prevalent component of modern infectious diseases; only through education

ing on their infected family members one by one and coughing up their blood. They often suffered from epileptic attacks and amnesic symptoms. The unprovoked seizures and unexplained memory loss led bystanders to believe that these victims were monsters (Sledzik and Bellantoni 1994).

In present day, tuberculosis can be treated with antibiotics and is screened with a skin test. However, it is still a public health concern, infecting 25,000 new individuals each year in the United States alone (Kumar et al. 2007).

#### SYPHILIS: CUPID'S DISEASE

In addition to tuberculosis, syphilis, a sexually-transmitted disease caused by the bacterium *Treponema Pallidum*, has been well documented for centuries and is still a common disease today. The disease has three stages and primarily presents open sores on the genitalia. The secondary phase occurs within 1-6 months after contact if the disease is not treated, which is not uncommon (Fraser). This phase is characterized by non-itchy rashes on moist parts of the body; however, two percent of individuals are left with meningitis and its associated cognitive deficits. Tertiary syphilis, which occurs between 1 and 10 years after infection without treatment, can present with large swollen areas of the skin and even bone, causing physical outgrowths visible all over the body, including the face. At this point, the immune system is so debilitated that it cannot completely rid the organism of infection and inflammation, leaving rounded tumor-like masses all over the body (Clark and Danbolt 1964). These deformities were described in many literary works throughout the Renaissance, as they were misunderstood and incurable at the time.

The most serious complication, which can be contracted at any stage, is neurosyphilis, a direct attack of the bacteria on the central nervous system. This disease can be detected with a test of cerebrospinal fluid, although it is even possible to have a false negative test. Multiple case studies of individuals with neurosyphilis in the last few decades have shown that its most harmful effects are psychotic symptoms. Patients show inability to concentrate, severe anxiety, amnesia, depression, delusions, and even hallucinations (Friedrich et al. 2009). These psychoses gave rise to a mass hysteria about the disease beginning in the Renaissance period and spanning all the way into the early 1800's.

Syphilis was such a widely spread disease that it

appeared in many famous art forms, both in the artwork and the artist themselves. The main characters of Edgar Allen Poe's *The Tell-Tale Heart* and Charles Dickens' *A Tale of Two Cities* were both characterized by the psychosis of syphilis. Rather than try to explain the disease or aid in awareness, most artists chose to depict the disease with its most horrific and bizarre symptoms. Their frightful images only amplified the already present anxiety regarding the disease and its victims. The disease also gained notoriety after taking many famous lives. The notorious criminal Al Capone died of it, and individuals as powerful as Adolf Hitler and Napoleon Bonaparte also were suspected to have had the disease (Oriol 1994). Today, syphilis remains a very common sexually transmitted disease. It is very sensitive to penicillin and can be cured if it is discovered and treated early (Singh and Romanowski 1999).

#### THE STRUGGLE CONTINUES

Today, responses to infectious diseases are somewhat less hysterical. Much of this is due to education and more effective treatment, as technology has helped scientists develop a better understanding of disease. We have also learned from history that supernatural explanations and stigmatization reactions do not explain or help the cause. Though they are better understood today, many infectious diseases still have neurological symptoms of which the general population is not typically aware.

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“Though they are better understood today, many infectious diseases still have neurological symptoms of which the general population is not typically aware.”

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West Nile Virus, for example, caused quite a panic due to its recent outbreak in the United States. During the greatest scare from 2002 to 2007, an average of around 4,500 infections and 170 deaths were added to the toll each year in the United States alone. In 2008, however, the disease started to become more controlled; the total amount of cases decreased to 1,356 and the number of deaths decreased to 18 (Centers for Disease Control and Prevention 2008). This disease, named after the West Nile District of Uganda, where it is believed to have originated, swept across the nation by mosquitoes and infected blood transfusions. Most cases are either asymptomatic or manifest as a fever, but the more uncommon form presents as meningitis.

In a 1998 study done by Tsai et al. in Romania, 352

of 393 patients confirmed to have West Nile Virus also had acute central nervous system infections. In each case, the infection was either caused by meningitis, as mentioned previously, or by encephalitis. Encephalitis is an acute inflammation of the brain tissue caused by bacterial infection. Patients suffer from headaches, fever, weakness, and seizures due to the bacterial attack on the nervous system. Depending on which part of the brain is involved, symptoms can also include stiffness of limbs and slowness of gait similar to that seen in Parkinson's disease, or clumsiness, also known as ataxia (Tsai et al. 1998).

Ticks can also be the spreading agents of neurological disease. Lyme disease is a very common bacterial infection in the Northern Hemisphere that is spread by tick bites. The first symptoms are fever and headache. If left untreated, this disease will attack the central nervous system, causing meningitis and muscle palsy, which involves paralysis or uncontrolled movements. The nervous system degeneration can also result in psychosis. As the bacteria move through the nervous system, they can cause hallucinations or delusional beliefs, unusual or bizarre behavior, and impaired social interaction. These behaviors, if not traced to a tick bite, are often mistakenly diagnosed as Schizophrenia or Bipolar Disorder (Fallon and Nields 1994), which contributes to the discrimination that the patient then suffers, not unlike the tuberculosis-related vampire accusations.

#### WHAT CAN WE DO?

The hysteria and discrimination we have encountered in the past were a direct result of a lack of knowledge and understanding of infectious diseases. Neurological symptoms have confused families, frightened bystanders, and impeded the discovery of treatments. Given technological advances such as present-day antibiotics, vaccines, prevention strategies, and the Internet as an information source, it is very important to remain educated and aware of these issues in order to fight infection. If left untreated, the infamous diseases of the past such as syphilis and tuberculosis which are still prevalent today can develop into diseases that cause deterioration of the nervous system. When travelling to foreign and especially tropical places, one puts themselves at risk by exposing themselves to unfamiliar bacteria and diseases. It is important to learn about your destination and obtain the proper vaccines and medications to better protect yourself.

With a broader knowledge of the potential effects of disease, people will also be more understanding and accepting of mental health issues. The increase in documentation of neurological symptoms associated with infectious disease cases has demanded an

entirely new field of study. The emerging field of Neuroinfectious Disease is now considered a subspecialty of Neurology in many hospitals. This field calls for a revision in the way that doctors treat neurological symptoms if they are the result of infectious disease as opposed to other causes like genetic disorders. Practitioners are also required to perform extensive clinical and lab-based research in order to increase scientific attention to the subspecialty (Millichap and Epstein 2009).

Although resources for prevention and treatment are readily available in the United States, this is not the case in third world countries, which suffer at much higher levels due to complications of untreated disease and basic public health maladies such as malnutrition. Throughout history, infectious diseases have produced symptoms, neurological and otherwise, which have struck fear in the hearts of men. Only through education, awareness and understanding can modern medicine aid victims and ultimately conquer these diseases.

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