In the Literature

Anaplasmosis in the United States


The transmission of Anaplasma phagocytophilum, the etiologic agent of human granulocytic anaplasmosis in the United States, results from the bites of 1 of 2 tick species, *Ixodes scapularis* and *Ixodes pacificus*. The latter is restricted to the western United States, whereas the former, the predominant vector, occurs in a larger swath of the upper middle and eastern parts of the country [1]. Transmission of *A. phagocytophilum* by *I. scapularis*, however, is limited to areas in which its associated small mammal reservoirs also reside. *Ixodes scapularis* also transmits *Borrelia burgdorferi*, *Babesia microti*, *Borrelia miyamotoi*, and Powassan virus lineage II (deer tick virus), whereas *I. pacificus* is also a vector of *B. burgdorferi* and has been demonstrated to harbor *B. miyamotoi*.

Dahlgren and colleagues have summarized national passive surveillance data of this notifiable disease for the years 2008–2012, during which the total of 8896 cases reported constituted an incidence rate (IR) of 6.3 per million person-years. This was a significant increase from the 2.0 per million person-years in 2000–2007. Among the 38 states and New York City which reported cases, the 3 with the highest IRs were Minnesota, Wisconsin, and Rhode Island, with IRs of 97, 79, and 51 per million person-years, respectively. Peak incidences were maintained during May through August. The IR increased with increasing age and was greater for males than females.

Of the 7849 cases deemed unique by examination of available case report forms, 11% had an underlying immunosuppressive condition, defined as diabetes mellitus (n = 145), receipt of immunosuppressive medications (n = 52), asplenia (n = 24), and arthritis (n = 11). Among cases for which this information was available, the overall fatality rate was 0.3%, whereas it was 0.96% in those with immunosuppressive conditions and only 0.06% in those without immunosuppressive conditions—a 16-fold difference. All fatalities occurred in individuals ≥50 years of age. Life-threatening complications, such as renal failure (reported in 3%), adult respiratory distress (1%), meningitis or encephalitis (0.9%), pneumonia (0.5%), disseminated intravascular coagulation (0.4%), and sepsis (0.3%), were reported more frequently among patients with immunosuppressive conditions. Whether these complications were a direct result of the infection cannot be determined from the reported information.

Overall, 37% of cases were confirmed, 99% by detection of *A. phagocytophilum* nucleic acid in blood by polymerase chain reaction (PCR), while the remainder were diagnosed by serological tests and/or observation of morulae in blood smears. Detection of morulae is a very insensitive diagnostic method, and was reported in only 3% of the PCR-positive cases.

The increasing IR compared to earlier years may be related to greater awareness and availability of diagnostic tests, but is also likely the result of enlargement of the endemic area with the expanding range of *I. scapularis*. Despite improved awareness and means of diagnosis, the number of reported cases likely represents a significant underestimate. Whereas leukopenia, thrombocytopenia, and elevated serum hepatic aminotransferases commonly occur in the first week of illness (during which antibody tests are frequently negative), the overall presentation is commonly as a nonspecific febrile illness without clinical clues in the absence of knowledge of a recent tick bite [2]. Furthermore, although antibiotic therapy with doxycycline is effective, the illness is often self-limited in the absence of therapy. As a consequence, the diagnosis may never be considered.

References


Measles, Immunological Amnesia, and the Extended Benefits of Vaccination


Measles infection results in a strong virus-specific cellular and humoral immune response that leads to viral clearance and lifelong immunity. At the same time, it causes temporary lymphocytopenia and depletion of lymphocytes in lymph nodes.
These effects lead to immunosuppression that has been believed to be transient. The introduction of mass measles vaccination was associated with marked reductions in childhood mortality that was far in excess and of greater duration, lasting years, than that which could be attributed to a reduction in measles alone. The reason for this observation has been the subject of investigation.

Primate studies have led to the suggestion that, although peripheral blood lymphocytopenia resolves within weeks after measles virus infection, the resultant marked expansion of measles virus-specific lymphocytes is accompanied by loss of existing memory lymphocytes. This constitutes a sort of immunological amnesia that essentially resets the immune system so that there is loss of protection against microorganisms to which the patient has accumulated immunity up to that point in their lives. As a consequence, susceptibility to a wide variety of pathogens returns after measles infection, and it has been hypothesized that measles vaccination prevents this prolonged immunological deficit, with resultant protection from a variety of infectious diseases and improved survival.

Mina and colleagues examined this hypothesis by evaluating population-level data from the United Kingdom, the United States, and Denmark. In each, there was a significant decrease in nonmeasles mortality in the years after the introduction, 5 decades ago, of the measles vaccine. This effect lasted as long as 3 years and affected children 1–14 years of age. The effect paralleled a decrease in the risk of invasive bacterial infections in children up to 5 years of age. The results indicate that before its control, measles was responsible for up to one-half of childhood deaths from infectious diseases and that the major factor accounting for the subsequent decrease was the widespread introduction of measles vaccination.

These findings demonstrate that vaccine denialists are leaving children susceptible not only to measles, but to a variety of other potentially lethal infectious diseases.

Norovirus GII.17: Get Ready for the Next Wave


Noroviruses, the most frequent cause of outbreaks of acute viral gastroenteritis, have been likened to “shape shifters” because of their frequent evolution-driven antigenic changes [1]. Of the 7 genotypes, GII has been the one most commonly identified for more than a decade, with GII.4 Sydney having replaced GII.4 New Orleans as the dominant worldwide strain in 2012–2013. Over the following years, norovirus activity diminished as the population became increasingly immune. That immunity, coupled with viral genetic drift, however, exerts a selective pressure that leads to the emergent dominance of a new strain of norovirus every few years, as was seen to occur in the winter of 2014–2015 when 82% of a large number of outbreaks in Guangdong Province, China, were found to be due to norovirus GII.17, with genomic sequencing demonstrating it to be a variant of a strain that had been identified at least 4 years previously [2]. GII.17 has now become the predominant strain in additional Asian countries, and related viruses have been identified in New Zealand, Russia, Europe, and the United States.

Noroviruses utilize histo-blood group antigens expressed on the surface of intestinal epithelial cells as coreceptors and nonsecretors have reduced susceptibility to infection by several norovirus genotypes, and preliminary data suggest that this may be true of the new GII.17 variant. If this variant is host-restricted in this way, it could reduce the epidemic potential of the virus in regions where protective genetic features are dominant. Nonetheless, with continued spread of the virus to nonimmune populations, we are likely about to experience another peak of norovirus outbreaks and sporadic disease worldwide.

References