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# **Introductory Chapter: Meningoencephalitis**

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<http://dx.doi.org/10.5772/intechopen.70366>

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## **1. Introduction**

Meningitis continues to claim many lives, despite the availability of potent antibiotics to destroy the deadly pathogens. Acute bacterial meningitis (ABM) is an uncommon but potentially fatal neurologic emergency that requires prompt recognition, diagnostic evaluation, and initiation of parenteral antibiotics [1]. Bacterial meningitis is very serious and can be deadly. Death can occur in as little as a few hours.

Common causes of bacterial meningitis vary by age group (newborns, babies and children, teens and young adults, older adults). And certain people are at increased risk for bacterial meningitis, those including: age, community setting, certain medical conditions, working with meningitis-causing pathogens, and travel [1].

It is very important to highlight the clinical overlap between encephalitis and meningoencephalitis.

The diagnosis becomes challenging when patients present with nonspecific clinical features. Meningitis results from inflammation of the pia-arachnoid meninges as well as cerebrospinal fluid [2, 3]. Encephalitis refers to inflammation of the brain parenchyma and is typically characterized by cognitive deficits. Of the pathogens reported to cause encephalitis, the majority are viruses.

However, despite extensive testing, the etiology of encephalitis remains unknown in most patients. Another major challenge for patients with encephalitis is to determine the relevance of an infectious agent identified outside of the CNS; these agents may play a role in the neurologic manifestations of illness but not necessarily by directly invading the CNS. In addition, it is important to distinguish between infectious encephalitis and post infectious or post immunization encephalitis, encephalomyelitis [e.g., acute disseminated encephalomyelitis (ADEM)], which may be mediated by an immunologic response to an antecedent antigenic stimulus from an infecting microorganism or immunization [4].

It is important to realize that guidelines cannot always account for individual variation among patients. They are not intended to supplant physician judgment with respect to particular patients or special clinical situations. The Infectious Diseases Society of America considers adherence to these guidelines to be voluntary, with the ultimate determination regarding their application to be made by the physician in the light of each patient's individual circumstances [4].

The clinical distinction between meningitis and encephalitis is frequently blurred as patients often present with signs and symptoms of both conditions. These patients can best be described as having meningoencephalitis, the pathologic condition that results when inflammation spreads from the CSF and meninges to the adjacent brain parenchyma [1]. Inflammation of the central nervous system can be acute, subacute, or chronic in duration and community, or nosocomial in origin. Although meningeal inflammation may be due to medications, neoplastic or autoimmune processes, or nonbacterial microbes (e.g., viruses, fungi, or parasites), bacterial infection remains the most studied cause.

The existing literature on ABM is limited in several ways. First, much of the research on the pathophysiology of meningitis has been based on experimental rabbit and rat models. Second, much of our current understanding about the clinical features, diagnosis, and prognosis of ABM has been extracted from chart reviews. These reviews rarely report methodology and are heavily dependent on the availability and accuracy of the medical records. Furthermore, because reviewers cannot adequately control for confounding variables, the retrospective data cannot be used to establish cause-effect relationships; only potential associations between variables can be pointed out. Third, a good number of trials involving bacterial etiology and therapy have been conducted in the international setting. In general, the results of these studies cannot be extrapolated to practice within the United States. The external validity of all studies must be assessed before a new treatment strategy can be adopted [1].

It is always very important to distinguish community-acquired bacterial meningitis from encephalitis, aseptic meningitis, and intracranial abscess.

Microbiologists play a critical role in gathering data both for clinical and public health decision making [5]. Thus, high-quality surveillance, including molecular methods and fine typing, is crucial to accurately detect and assess changes in the epidemiology of bacteria (e.g., invasive meningococcal disease) and ensure sufficient understanding of the need for, and impact and effectiveness of, vaccination [5].

The priority of the vaccine and how it can be integrated into the national immunization program are also important to consider [6]. Considering these factors, the cost effectiveness and feasibility of introducing a new vaccine needs to be based on country-specific assessments [7].

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