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CONTENTS/SUMMARIES

REVIEWS

Summary: Helminth parasites infect almost one-third of the world's population, primarily in tropical regions. However, regions where helminth parasites are endemic record much lower prevalences of allergies and autoimmune diseases, suggesting that parasites may protect against immunopathological syndromes. Most helminth diseases are spectral in nature, with a large proportion of relatively asymptomatic cases and a subset of patients who develop severe pathologies. The maintenance of the asymptomatic state is now recognized as reflecting an immunoregulatory environment, which may be promoted by parasites, and involves multiple levels of host regulatory cells and cytokines; a breakdown of this regulation is observed in pathological disease. Currently, there is much interest in whether helminth-associated immune regulation may ameliorate allergy and autoimmunity, with investigations in both laboratory models and human trials. Understanding and exploiting the interactions between these parasites and the host regulatory network are therefore likely to highlight new strategies to control both infectious and immunological diseases.

Summary: Sepsis is among the most common causes of death in hospitals. It arises from the host response to infection. Currently, diagnosis relies on nonspecific physiological criteria and culture-based pathogen detection. This results in diagnostic uncertainty, therapeutic delays, the mis- and overuse of antibiotics, and the failure to identify patients who might benefit from immunomodulatory therapies. There is a need for new sepsis biomarkers that can aid in therapeutic decision making and add information about screening, diagnosis, risk stratification, and monitoring of the response to therapy. The host response involves hundreds of mediators and single molecules, many of which have been proposed as biomarkers. It is, however, unlikely that one single biomarker is able to satisfy all the needs and expectations for sepsis research and management. Among biomarkers that are measurable by assays approved for clinical use, procalcitonin (PCT) has shown some usefulness as an infection marker and for antibiotic stewardship. Other possible new approaches consist of molecular strategies to improve pathogen detection and molecular diagnostics and prognostics based on transcriptomic, proteomic, or metabolic profiling. Novel approaches to sepsis promise to transform sepsis from a physiologic syndrome into a group of distinct biochemical disorders and help in the development of better diagnostic tools and effective adjunctive sepsis therapies.

Summary: West Nile Virus was introduced into the Western Hemisphere during the late summer of 1999 and has been causing significant and sometimes severe human diseases since that time. This article briefly touches upon the biology of the virus and provides a comprehensive review regarding recent discoveries about virus transmission, virus acquisition, and human infection and disease.

Summary: This review starts with discussions of several infectious causes of eosinophilic pneumonia, which are almost exclusively parasitic in nature. Pulmonary infections due specifically to *Ascaris*, hookworms, *Strongyloides*, *Paragonimus*, filariasis, and *Toxocara* are considered in detail. The discussion then moves to noninfectious causes of eosinophilic pulmonary infiltration, including allergic sensitization to *Aspergillus*, acute and chronic eosinophilic pneumonias, Churg-Strauss syndrome, hypereosinophilic syndromes, and pulmonary eosinophilia due to exposure to specific medications or toxins.

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Summary: The substantial use of antibiotics in the clinic, combined with a dearth of new antibiotic classes, has led to a gradual increase in the resistance of bacterial pathogens to these compounds. Among the various mechanisms by which bacteria endure the action of antibiotics, those affecting influx and efflux are of particular importance, as they limit the interaction of the drug with its intracellular targets and, consequently, its deleterious effects on the cell. This review evaluates the impact of porins and efflux pumps on two major types of resistance, namely, mutational and adaptive types of resistance, both of which are regarded as key phenomena in the global rise of antibiotic resistance among pathogenic microorganisms. In particular, we explain how adaptive and mutational events can dramatically influence the outcome of antibiotic therapy by altering the mechanisms of influx and efflux of antibiotics. The identification of porins and pumps as major resistance markers has opened new possibilities for the development of novel therapeutic strategies directed specifically against these mechanisms.

Summary: The spread of *Enterobacteriaceae*, primarily *Klebsiella pneumoniae*, producing KPC, VIM, IMP, and NDM carbapenemases, is causing an unprecedented public health crisis. Carbapenemase-producing enterobacteria (CPE) infect mainly hospitalized patients but also have been spreading in long-term care facilities. Given their multidrug resistance, therapeutic options are limited and, as discussed here, should be reevaluated and optimized. Based on susceptibility data, colistin and tigecycline are commonly used to treat CPE infections. Nevertheless, a review of the literature revealed high failure rates in cases of monotherapy with these drugs, whilst monotherapy with either a carbapenem or an aminoglycoside appeared to be more effective. Combination therapies not including carbapenems were comparable to aminoglycoside and carbapenem monotherapies. Higher success rates have been achieved with carbapenem-containing combinations. Pharmacodynamic simulations and experimental infections indicate that modification of the current patterns of carbapenem use against CPE warrants further attention. Epidemiological data, though fragmentary in many countries, indicate CPE foci and transmission routes, to some extent, whilst also underlining the lack of international collaborative systems that could react promptly and effectively. Fortunately, there are sound studies showing successful containment of CPE by bundles of measures, among which the most important are active surveillance cultures, separation of carriers, and assignment of dedicated nursing staff.

Summary: Numerous studies have reported that individuals can simultaneously harbor multiple distinct strains of *Mycobacterium tuberculosis.* To date, there has been limited discussion of the consequences for the individual or the epidemiological importance of mixed infections. Here, we review studies that documented mixed infections, highlight challenges associated with the detection of mixed infections, and discuss possible implications of mixed infections for the diagnosis and treatment of patients and for the community impact of tuberculosis control strategies. We conclude by highlighting questions that should be resolved in order to improve our understanding of the importance of mixed-strain *M. tuberculosis* infections.