

New Diseases Make the Headlines



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Unlike many other fields of medicine, in infectious diseases there have been several significant therapeutic advances and numerous startling occurrences.

What have been the therapeutic advances?

Management of sepsis

The introduction of recombinant human-activated protein C, with its antithrombotic, anti-inflammatory, and profibrinolytic properties, has been shown in clinical trials to reduce mortality in patients with severe sepsis.¹ While this therapy may offer some therapeutic advantages, the cost of the treatment and the increased incidence of serious bleeding complications require it be used by skilled individuals in a supervised setting using strict patient selection criteria.

Antibacterial therapy for antibiotic-resistant gram-positive bacteria

The two most significant advances in this area are the development of quinupristin-dalfopristin, a parenteral streptogramin, and linezolid, an oxazolidinone with both oral and parenteral preparations. Both agents have activity against gram-positive micro-organisms resistant to other antimicrobials. Quinupristin-dalfopristin is inactive against *Enterococcus faecalis*, but effective in the management of vancomycin-resistant *Enterococcus faecium*. In Canada, most methicillin-resistant *Staphylococcus aureus* (MRSA) can still be treated with antibiotics, such as trimethoprim/sulfamethoxazole, clindamycin, and the quinolones. However, the vancomycin-resistant enterococci will require management with either of these two new, potent anti-gram-positive agents.

Highly active antiretroviral therapy

The development and institution of highly active antiretroviral therapy for the treatment of persons infected with the human immunodeficiency virus (HIV) has had a dramatic impact in the care of these patients. The multiple drug regimens have led to improved long-term patient survival and decreased the number of opportunistic infections and complications. Antiretroviral regimens, however, are complex, possess potential serious side-effects, and may be associated with suboptimal adherence (which may ultimately lead to antiretroviral drug-resistant mutant strains of HIV). A dilemma in the treatment of persons with HIV is when to initiate antiretroviral therapy in those who are asymptomatic, where the benefits are less clearly established and may be outweighed by potential complications.

What are some new diseases?

In addition to advances in therapeutics, the past 10 years have brought to our attention a variety of new disease entities (Table 1).

Bioterrorism

After the Sept. 11, 2001 tragedy, there has been a renewed interest in many of the agents which could be used for bioterrorist activities.

Anthrax. Caused by *Bacillus anthracis*, anthrax has been the first infectious agent to be used in bioterrorism. Its ease of distribution and its potential to cause significant morbidity and mortality

Table 1

Infectious diseases discovered in the last 10 years

Bioterrorism (the following agents can be used toward bioterroristic ends)

- Anthrax
- Smallpox
- Botulinum toxin
- Viral hemorrhagic fever viruses

Zoonosis

- Hantavirus
- West Nile virus
- Monkeypox virus
- SARS

Nosocomial and occupational infections

Prion diseases

- Bovine spongiform encephalopathy
- CJD

SARS: Severe acute respiratory syndrome
CJD: Creutzfeldt-Jakob disease

has made it an ideal agent towards this end.

Smallpox. Although smallpox has not yet been used as an agent of bioterrorism, its morbidity and mortality, and the relative ease with which the disease can spread makes it ideal as a bioterrorist agent. The global eradication of smallpox in the '70s led to the termination of smallpox vaccination. Therefore, the lack of systematic and community-wide smallpox vaccination means that a large proportion of the population is at risk for smallpox infection. This has led to extensive debates as to whether smallpox vaccination should be undertaken. There are several questions surrounding smallpox vaccination, specifically what residual immu-

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Table 2

Potential bioterrorism agents

Botulinum toxin

- Leads to flaccid paralysis and may ultimately culminate in death

Bacillus anthracis

- Its pulmonary and central nervous system consequences can be grave

Ebola

- Can be easily spread to others in bodily fluids and secretions of those affected, leading to the widespread disbursement of an agent with lethal complications

nity remains in those who have had previous vaccinations and who should be vaccinated against the disease.

Some other potential bioterrorism agents are listed in Table 2.

Zoonosis

A number of conditions have come to the forefront where the human is a bystander in the transmission of disease from animal to animal. These conditions have a significant impact on the human host.

Hantavirus. Hantavirus is transmitted to humans by the inhalation of aerosolized rodent excreta or through direct contact with the rodent. The Hantavirus pulmonary syndrome (HPS) can present with a non-specific febrile prodrome, but progresses rapidly to noncardiogenic pulmonary edema, respiratory failure, and shock (complicated by thrombocytopenia and multiple organ failure). There have been a few cases of HPS in

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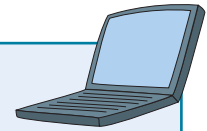
Canada, although it remains a rare condition.

West Nile virus. West Nile virus first appeared in North America in 1999, associated with an outbreak of meningoencephalitis leading to seven deaths in the New York area. Surveillance was immediately undertaken for this agent and it was subsequently found that West Nile virus led to the largest arbovirus meningoencephalitis outbreak in North America.² The clinical manifestations of West Nile virus disease range from asymptomatic infection to meningoencephalitis, with some individuals suffering severe neurologic disease (such as encephalitis, meningitis, acute flaccid paralysis, or movement disorders). The infection may ultimately culminate in death, although this is rare. The spread of West Nile virus has been documented to have occurred quickly across the U.S. and Canada.

The West Nile virus life cycle involves transmission from bird to mosquito to bird, therefore, municipalities have embraced mosquito control as a key mechanism to control the transmission of West Nile. It is critical that public awareness campaigns be undertaken by public health departments and primary care providers so as to demystify this condition. The public must be aware that, although West Nile virus is in the community, the persons who become critically ill are few, and those with significant sequelae are rare.

Monkeypox. The recent outbreak of monkeypox during May and June, 2003, in Wisconsin, Illinois, Indiana, and New Jersey, once again highlights the importance of zoonotic infections. The individuals involved in this outbreak had purchased sick prairie dogs. The monkeypox virus is related to smallpox

Surf your way to...



1. Health Canada Bureau of Infectious Diseases:
www.hc-sc.gc.ca/pphb-dgspsp/bid/bmi/index.html
2. The Vaccine and Infectious Disease Organization (University of Saskatchewan):
www.vido.org
3. Centers for Disease Control and Prevention:
www.cdc.gov

and the clinical manifestations are similar, with patients experiencing a prodrome consisting of fever, headache, myalgias, chills, and drenching sweats. Most of the affected people have recovered uneventfully. The most appropriate method to prevent acquisition of the monkeypox virus is to avoid prairie dogs and rodents imported from Africa. Hand hygiene and respiratory protection are also essential.

SARS. The recent outbreak of the severe acute respiratory syndrome (SARS) in Toronto was a direct extension of the outbreak in Asia, presumably by means of an international traveller. SARS, with its attendant public fear and panic, has become a warning to all that epidemics, and possibly pandemics, of infectious diseases are, indeed, possible. Although planning for pandemic influenza has been ongoing for several years, SARS has been a stern warning that those plans must be finalized so that we can minimize, control, or even prevent the spread of a global influenza epidemic. SARS has highlighted the psychological, health-care, and occupational impacts of an infectious disease in the community and in the health-care environment.

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SARS has also highlighted how quickly an infectious agent can spread within a health-care facility despite presumably optimal infection prevention and control measures. In addition to these issues, SARS has also brought forth the importance of intensifying our public health networks and infection prevention and control strategies.

Nosocomial and occupational infections

There has been an increasing awareness of hospital-acquired infections and the need for aggressive infection prevention and control strategies. SARS has brought to the forefront the paramount importance of such basic measures as personal protection and hand hygiene. A recent survey of Canadian health-care institutions found that infection prevention and control services were suboptimal countrywide.³ If we consider the increasing importance of antibiotic-resistant bacteria in Canadian hospitals (particularly vancomycin-resistant enterococcus and methicillin-resistant *Staphylococcus aureus*), Canada could potentially face a similar dilemma to that which is currently being faced in the U.S. In the U.S., an increasing number of patients are becoming colonized and/or infected with antibiotic-resistant micro-organisms.

The risk of acquiring occupational infections, particularly blood-borne infections, is high among health-care workers. Thankfully, post-exposure prophylaxis for hepatitis B and HIV exists. Unfortunately, there is no post-exposure prophylaxis for hepatitis C virus, however, there are some therapeutic options if infections are detected early.

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Liver function tests should be performed before the initiation of treatment, and periodically thereafter. Special attention should be paid to patients who develop elevated serum transaminase levels, and in these patients, measurements should be repeated promptly and then performed more frequently.

The effects of atorvastatin-induced changes in lipoprotein levels, including reduction of serum cholesterol on cardiovascular morbidity, mortality, or total mortality have not been established.

† A patient-year represents the total time of exposure to LIPITOR as defined by the sum of each patient time on LIPITOR.⁵


Prion diseases

Transmissible spongiform encephalopathies, also known as prion diseases, are a group of progressive, neurodegenerative disorders that affect both humans and animals.

“Mad cow disease.” Recently, bovine spongiform encephalopathy has made the headlines and the implication of tainted cattle is potentially devastating for the Canadian beef industry.

CJD. In humans, Creutzfeldt-Jakob disease (CJD) has become an area of intense interest, despite the absence of an appropriate therapy. The management of persons with CJD is fraught with controversy and panic. Thankfully, numerous agencies, including Health Canada, have published infection control guidelines for classic CJD.

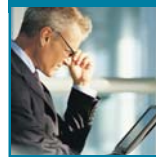
What does the future hold?

More sophisticated biodiagnostic techniques are likely to come to the forefront. In addition, information technology, such as the Internet, will play a greater role in the dissemination of information to health-care providers and the public. For all the entities discussed in this summary, Health Canada and the Centers for Disease Control Web sites have useful information for health-care providers and the public. 

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