

## **Emergence of Infectious Diseases into the 21st Century**

Stephen A. Berger

As of 2008, mankind is confronted by 346 generic infectious diseases, distributed in a seemingly haphazard fashion across 220 countries. An average of three new diseases are described every two years - and a new infecting organism is published every week. Over 1,600 human pathogens have been reported, each with a specific set of phenotypic, genomic and susceptibility characteristics which must be confronted by diagnostic laboratories and clinicians. The pathogens are in turn confronted by 276 generic anti-infective agents and 67 vaccines - marketed under 10,493 proprietary names.

Table 1 lists many of the major infectious diseases and pathogens which have been reported since 1972. Many conditions on this list (ie, Lyme disease, Legionellosis, Cyclosporiasis) are in fact old diseases which were only "discovered" when technology permitted us to recognize their presence. This is also true of many "new" pathogens, which could only be discovered because of the advent of molecular biology and other sophisticated laboratory techniques.

Perhaps the most striking development in this regard has been the explosion in "new" viral respiratory pathogens: Acanthamoeba polyphaga mimivirus, Bat reovirus, Human Bocavirus, Human Coronavirus HKU1, Human Coronavirus NL63, Human CoV 229E, Human CoV OC43, HRV-A, HRV-B, HRV-C, Human metapneumovirus, Karolinska Institutet virus, New Haven Coronavirus, Small Anellovirus, Tioman virus, Torque tenovirus and Washington University polyomavirus.

Another trend in this regard has been the discovery of infectious etiologies for "non-infectious" diseases: Kaposi sarcoma, peptic ulcer, cervical cancer, Whipple's disease, to name a few.

Paradoxically, while technology has allowed us to discover and treat new diseases and pathogens, it has also contributed to the evolution of the diseases themselves. Broad-spectrum antibiotics, immunosuppressive drugs, prosthetic and transplantation surgery have each created a niche for opportunistic pathogens. Indeed, each breakthrough in the prolongation of human life and ability to treat heretofore fatal diseases is inevitably followed by an interesting list of Infectious Diseases challenges. On a broader scale, the scope of Infectious Diseases will be increasingly challenged by societal pressures related to overpopulation, air travel, global warming, conflict, famine, deforestation and bioterrorism.

**Table 1: Year Agent Disease**

Year	Agent	Disease
1973	Rotavirus	Rotavirus disease
1975	Parvovirus B19	Fifth disease
1976	Cryptosporidium parvum	Cryptosporidiosis
1977	Ebola virus	Ebola
1977	Legionella pneumophila	Legionellosis
1977	Hantavirus	Hemorrhagic fever
1977	Campylobacter jejuni	Campylobacteriosis
1980	T-lymphotrophic virus	T-cell leukemia
1981	Toxigenic S. aureus	Toxic shock syndrome
1982	E. coli O157:H7	Hemorrhagic colitis, HUS
1982	HTLV-II	Hairy cell leukemia
1982	Borrelia burgdorferi	Lyme disease
1983	HIV	AIDS
1983	Helicobacter pylori	Peptic ulcer disease
1985	Enterocytozoon bienersi	Microsporidiosis
1986	Chlamydia pneumoniae	Pneumonia
1986	Cyclospora cayatenensis	Cyclosporidiosis
1988	Human Herpes 6	Roseola infantum
1988	Hepatitis E virus	Hepatitis E
1989	Ehrlichia chaffeensis	Ehrlichiosis
1989	Hepatitis C virus	Hepatitis C
1989	Guanarito virus	Venezuelan hemorrhagic fever
1990	Rickettsia honei	Flinders Island spotted fever
1992	Bartonella henselae	Cat scratch disease
1993	Sin nombre virus	Hantavirus pulmonary syndrome
1994	Sabia virus	Brazilian hemorrhagic fever
1995	Human herpesvirus 8	Kaposi sarcoma
1999	Nipah virus	Nipah virus disease
2003	SARS Coronavirus	SARS