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Opinion Article

# Emerging Therapies of Infectious Diseases

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## ABOUT THE STUDY

Infections that have recently emerged within a population or whose incidence or geographic range is rapidly increasing or threatens to increase in the near future are considered emerging infectious diseases. Emerging infections can be caused by:

- Infectious agents that were previously undetected or unknown
- Known pathogens that have spread to new geographic areas or populations
- Agents that were previously unknown but now play a role in specific diseases.
- Re-emergence of agents whose disease incidence had significantly decreased in the past but has now reappeared. This type of disease is referred to as re-emerging infectious diseases.

The people traveling much more frequently and over much greater distances than in the past, living in densely populated areas, and coming into closer contact with wild animals, the potential for emerging infectious diseases to spread quickly and cause global epidemics is a major concern.

Furthermore, as discussed in the section on bioterrorism agents, diseases may emerge as a result of deliberate introduction into human, animal, or plant populations for terrorist purposes. Anthrax, Smallpox, and Tularemia are examples of these diseases.

The emergence of new infectious diseases or the re-emergence of "old" infectious diseases is influenced by a variety of factors. Some are caused by natural processes, such as pathogen evolution, but many are caused by human behavior and practices. Consider how the human population's interaction with our environment has evolved, particularly in the last century. Population growth, migration from rural to urban areas, international air travel, poverty, wars, and destructive environmental changes caused by economic development and land use have all contributed to these changes.

For an emerging disease to become established, at least two circumstances may occur: an infectious agent must be introduced into a vulnerable population, and the agent must have the ability to spread easily from person to person and cause disease. The infection must also be able to sustain itself within the population, which means that more and more people must become infected.

Many new diseases emerge when infectious agents from animals are transmitted to humans (referred to as zoonoses). The possibility of humans coming into close contact with animal species that are potential hosts of an infectious agent grows as the human population grows in size and spreads into new geographical areas. When combined with increases in human density and mobility, it is clear that this combination poses a serious threat to human health.

Climate change is becoming a growing source of concern as a contributor to the spread of infectious diseases. Diseases can spread to new geographic areas as the Earth's climate warms and habitats change. Warming temperatures, for example, allow mosquitoes and the diseases they transmit to spread into previously unexplored areas.

One particularly important factor in disease recurrence is antimicrobial resistance, the acquired resistance of pathogens to antimicrobial agents such as antibiotics. Bacteria, viruses, and other microorganisms can evolve over time and develop resistance to the drugs used to treat pathogen-caused diseases. As a result, drugs that were once effective in disease control are no longer effective. Despite the greater need for better, more effective antiviral, antifungal, and anti-parasitic agents, effective therapies for infectious diseases continue to evolve, primarily through the introduction of new antibiotics.

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