

Immunity and the Real Science Behind (Editorial)

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Pathogenic microorganisms, commonly called germs or bugs, are all around us. They can be easily transmitted from one person to another. Once they get past your natural barriers that include the skin, mucus membranes, they get into your body, your bloodstream and your cells. At this point, your immune system kicks in and fights back to destroy the pathogens causing infection.

Immunity from disease is actually conferred by two cooperative defense systems, called nonspecific, innate immunity and specific, acquired immunity:

1. The innate immune response is the non-specific, first response to foreign threats. Immune cells recognize a potential threat, ring the alarm, and the inflammatory response begin.
2. The acquired immune response is a specific attack on foreign threats. Key players in the acquired immune response include T cells, B cells, and antibodies.

The goal of the inflammatory response during infection is to prevent the pathogen from spreading to other parts of the body. The inflammatory response involves several physiological mechanisms:

1. Local blood vessels dilate
2. Immune cells are recruited to the infection site
3. Necessary enzymes and proteins activated

Most microorganisms encountered in daily life are repelled before they cause detectable signs and symptoms of disease. These potential pathogens, which include viruses, bacteria, fungi, protozoan's, and worms, are quite diverse and therefore a nonspecific defense system that diverts all types of this varied microscopic horde equally is quite useful to an organism. The innate immune system provides this kind of nonspecific protection through a number of defense mechanisms, which include:

1. physical barriers such as the skin,
2. chemical barriers such as antimicrobial proteins that harm or destroy invaders,
3. cells that attack foreign cells and body cells harboring infectious agents.

Herd immunity is an important element in the balance between the host population and the micro-organism, and represents the degree to which the community is susceptible or not to an infectious disease as a result of members of the population having acquired active immunity from either previous infection or prophylactic immunization is defined as the resistance of a group of people to an attack by a disease to which a large proportion of the members of the group are immune.

Herd immunity can be measured:

1. Indirectly from the age distribution and incidence pattern of the disease if it is clinically distinct and reasonably common. This is an insensitive and inadequate method for infections that manifest sub-clinically.
2. Directly from assessments of immunity in defined population groups by antibody surveys (sero-epidemiology) or skin tests; these may show 'immunity gaps' and provide an early warning of susceptibility in the population. Although it may be difficult to interpret the data in absolute terms of immunity and susceptibility, the observations can be standardized to reveal trends and differences between various defined population groups in place and time.

In conclusion:

1. Herd immunity forms the theoretical basis for mass vaccination programs.
2. The concept of herd immunity is important because when we carry out immunization programs, it may not be necessary to achieve 100% immunization rates to immunize the population successfully.
3. Vaccines administered by the subcutaneous or intramuscular route prevent dissemination of bacteria or viruses to multiple organs but may not prevent infection.
4. The decision whether to introduce herd immunity artificially by immunization against a particular disease will depend on several epidemiological principles.
 - ✓ The disease must carry a substantial risk.
 - ✓ The risk of contracting the disease must be considerable.
 - ✓ The vaccines must be tested and proof safe as well as effective.

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- ✓ Vaccines must be available on time and administered on specific timeframe covering the existing variant/variants.
5. We can achieve highly effective protection by immunizing a large part of the population; the remaining part will be protected because of herd immunity.
 6. Vaccines that are administered by the intranasal route prevent both infection and dissemination of bacteria or viruses.
 7. Viral antigens often change as a consequence of antigenic drift, antigenic shift, or genetic reassortment.
 8. If immunity is only partial, we will not build up a large proportion of immune people in the community.
 9. Infections must induce solid immunity.
 10. The degree to which herd immunity is achieved depends on the extent to which the population approaches a random mixing.

Herd immunity occurs because disease spreads from one person to another in any community. Once a certain proportion of people in the community are immune, the likelihood is small that an infected person will encounter a susceptible person to whom he can transmit the infection; more of his encounters will be with people who are immune. **The presence of a large proportion of immune persons in the population lessens the likelihood that a person with the disease will come into contact with a susceptible individual.**

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