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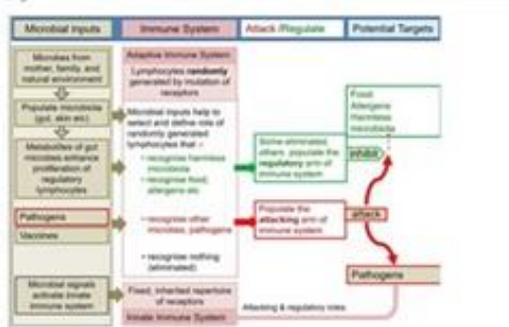


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[Is lack of exposure to germs during COVID-19 weakening our immune systems?](#)

The public are concerned that lack of exposure to “germs” during the COVID-19 pandemic lockdowns will have weakened our immune systems, making us more susceptible to colds, flu and other infections.



The role of the immune system in protecting against infection – the attacking arm

Since 2020, this has been the most frequently asked question to the IFH website (13,000 views). Without knowing what is meant by “germs” (any type of microbe or only harmful microbes?) and what is meant by “strong” this is a difficult question to answer.

Its original meaning was “Does exposure to harmful microbes strengthen our immune system to fight infections”. But in 1989 the hygiene hypothesis proposed the idea that rising rates of allergies was linked to “living in cleaner homes with higher standards of personal cleanliness”.^[1] This was an attractive concept to the media and public who interpreted it as further proof that our modern obsession with cleanliness and hygiene was not only weakening our ability to fight infection but also our ability to “fight off” allergies. This neat analogy has prevented us from understanding that allergies occur when the immune system erroneously “fights” allergens because it is unable to recognise that they are harmless. It is fighting allergens that causes the symptoms we experience.

This review summarises, for a lay readership, current understanding of how microbes interact with the immune system. A useful analogy is that the immune system comprises an army (the attacking arm) which also needs military police (the regulatory arm) to stop it from attacking things it should not, like pollen or foods. The rise in allergies results from failure of the regulatory arm. A further analogy is that the immune system is like a computer. We are borne with a fully functioning immune system but, to operate correctly, it needs programming by exposure to our microbial world, in order to know what to attack and what to tolerate.

The attacking arm

The **attacking arm of immune system** develops in response to exposure to harmful microbes that cause it to react in several ways, most particularly by generating antibodies which neutralise the pathogen. After recovery, the immune system retains memory cells that persist in the body. If re-exposed to the same pathogen, the system mounts the same response to fight off infection. This is the basis of vaccination where the vaccine stimulates antibody production without causing disease symptoms.

Because immunity through antibodies is specific (flu antibodies only protect against flu) the idea that - the more harmful, germs we encounter the “stronger” our immune system - is flawed. A healthy immune system remains fully functional and ready to fight any new infection or respond to a booster vaccine. Factors that reduce the health (strength) of the immune system - and its ability to fight infection - are poor lifestyle and poor health through poor nutrition, malnutrition, excessive alcohol consumption, drug abuse, stress, etc. Although, as outlined further in the paper, the idea that exposure to an infection can protect against other unrelated infections does have some validity, it is not an effective or safe way to boost infection immunity

The regulatory arm

Exposure to microbes also drives development of the **regulatory arm of the immune system**, but in this case it functions to block the immune system from attacking biological materials which it recognises, but which are harmless, like pollen or foods. This is important because if the immune system mounts an attack, the result is hay fever and food intolerance.

The regulatory arm is driven, not by exposure to harmful microbes, but mainly by exposure to maternal microbiota and microbiota from other humans and from natural environments (including exposure to animals). These have been called Old Friends microbiota because they co-habited with humans during the era when our immune system was evolving. These microbial species need to be tolerated rather than attacked and have evolved an essential role in regulating the immune system to tolerate other harmless materials

Data indicate that the underlying problem is altered lifestyles that have caused loss of contact with our “Old Friends”. This includes spending less time outdoors and less time interacting with friends and family (due to smaller family sizes). Since early life exposure is important, opting for natural childbirth and breast feeding are also important, whilst avoiding unnecessary use of antibiotics and adopting a healthy fibre-rich diet are important for sustaining a healthy diverse gut microbiota. Unfortunately, extensive publicity given to the so-called hygiene hypothesis has created a received wisdom that “being too clean” is also an underlying cause.[2] If home and personal cleanliness has an effect its impact is likely to be small relative to lifestyle factors.[1]

Looking to the future

In future, if we are to control both the burden of hygiene-related communicable disease and of immune dysregulation-related non-communicable diseases, we will need to view the microbial world in a fundamentally different way. We need an integrated educational approach which enables the public to understand the key issue i.e. how the immune system works to defend against infection, while the Old Friends microbes drive the regulatory arm of the immune system and reduce the risk of developing immunoregulatory disorders. We need messaging that makes sense i.e. hygiene advice based on managing risks of exposure to harmful microbes, [3][4] and lifestyle advice that enables exposure to essential microbes.

1. Bloomfield SF, Rook GA, Scott EA, Shanahan F, Stanwell-Smith R, Turner P. Time to abandon the hygiene hypothesis: new perspectives on allergic disease, the human

- 507 microbiome, infectious disease prevention and the role of targeted hygiene. Perspect 508 Public Health. 2016;136(4):213-24. [DOI: 10.1177/1757913916650225]
2. Bloomfield, S. F. (2018). Perceptions of cleanliness, hygiene and hygiene issues – a survey of UK and US media coverage 1989 to 2017 <https://www.ifh-homehygiene.org/review/perceptions-cleanliness-hygiene-and-hygiene-issues-%E2%80%93-survey-uk-and-us-media-coverage-1989>
 3. Developing and promoting hygiene in home and everyday life to meet 21st Century needs; what can we learn from the COVID-19 pandemic? <https://www.ifh-homehygiene.org/review/developing-and-promoting-home-and-everyday-life-hygiene-meet-21st-century-needs-what-can-we>
 4. Breaking the chain of infection in our homes and everyday lives: a practical approach to encourage effective Targeted Hygiene <https://www.ifh-homehygiene.org/online-learning/breaking-chain-infection-our-homes-and-everyday-lives-practical-approach-encourage>

[Are we too clean? - the hygiene hypothesis misnomer](#)



The idea that too much cleanliness and hygiene may be an underlying cause of rising allergies in children has been widely publicised and discussed in recent years. The idea was first put forward in 1989 and was named the “Hygiene Hypothesis”.

Although the link between microbial exposures and health is now well established, it is thought that the major underlying cause is lifestyle changes, and that cleanliness and hygiene are unlikely to be involved.

Since publication of the so-called hygiene hypothesis in 1989, IFH has constantly reviewed the evidence to better understand the implications for hygiene and cleanliness. It has become apparent that in the future, we will need to view the microbial world we live in very differently. Getting the public to see hygiene as part of a healthy lifestyle which combines effective hygiene behaviours, with behaviours that reconnect with essential microbes could have a huge impact on the burden of both infectious diseases and immunoregulatory disorders, and ultimately, the

development of sustainable health.

This new website area contains the latest reviews on this issue and its relationship with the need for prevention of infectious diseases through Targeted Hygiene.

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