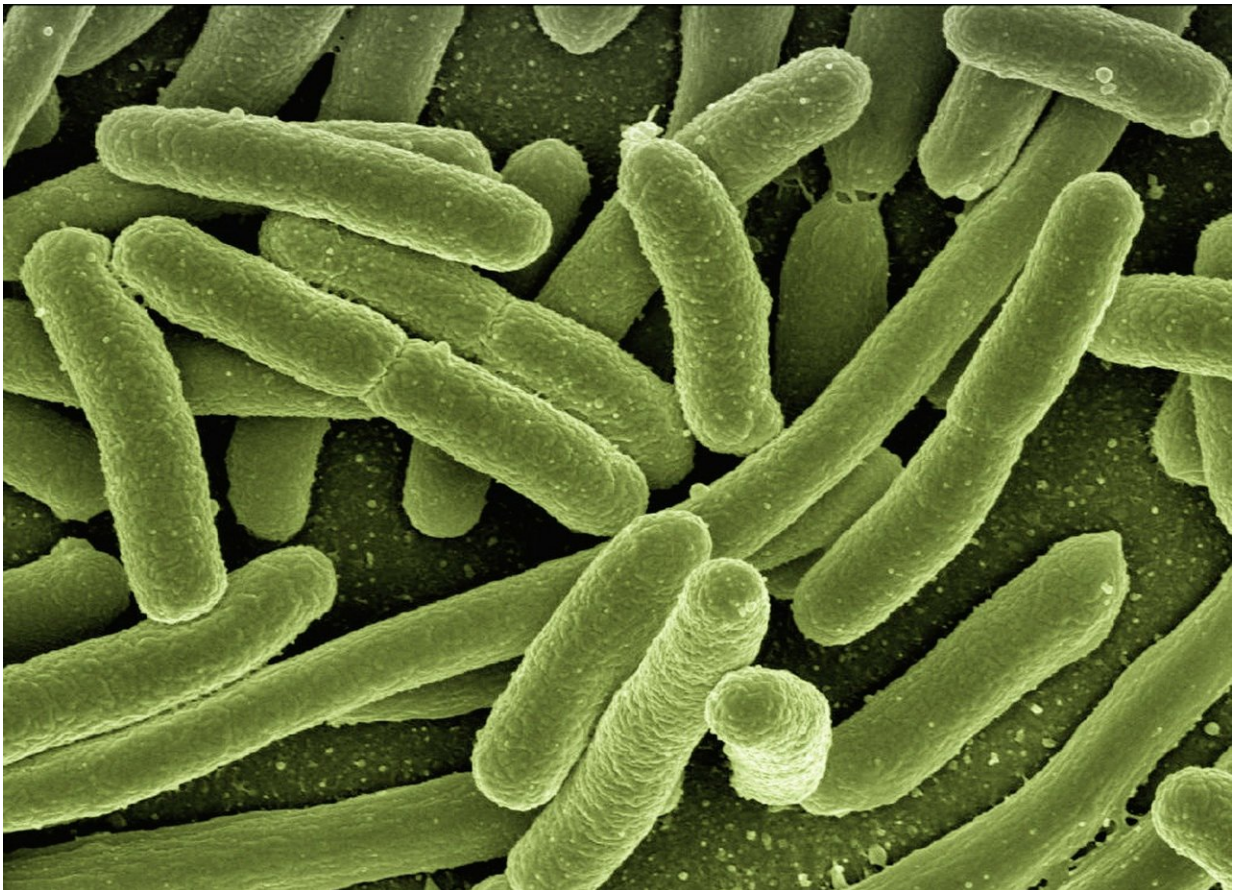


The hygiene hypothesis is out of date and is undermining public health

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Researchers are concerned that attitudes to hygiene are being undermined by the hygiene hypothesis, and that this misleading

misnomer could contribute to the spread of infectious disease.

The diverse ecosystem of microorganisms in our body – the microbiome – is essential for our health. A key function of the microbiome is to ensure that the immune system does not overreact to harmless stimuli, such as pollen and foods; thus causing allergies or other immune disorders such as inflammatory bowel disease, type 2 diabetes or multiple sclerosis.

The hygiene hypothesis, first cited in 1989, proposed that a rapid rise in childhood allergies was due to lack of [exposure](#) to childhood infections. It was suggested that this was due to smaller family sizes and higher standards of home and [personal hygiene](#). The idea that being too clean was the underlying cause of rising allergies was widely publicised even though it was quickly realised that the link to hygiene was incorrect. The exposure we need isn't to childhood infections, but to [beneficial microbes](#).

Despite this, according to a survey by the International Scientific Forum on Home Hygiene (IFH), 20 of the 25 news articles (80 percent) published about this issue over the last 20 years have cited hygiene as a cause of reduced exposure to friendly microbes and 40 percent cite the "hygiene hypothesis" as an explanation for the link to immunological disorders.

In 2003 Professor Graham Rook (University College, London), proposed an alternative, more plausible, hypothesis. He proposed that during human evolution, microbes have evolved into an essential role in regulating our [immune system](#). He also argued that the microbes involved are not infections, but friendly microbes which make up our human microbiome. These are acquired by exposure to other humans or animals and microbiota from our natural environment. Professor Rook named this the "Old Friends Hypothesis."

Researchers now agree that a range of lifestyle changes including an increase in Caesarean section (C-section) births, less breast-feeding, smaller family sizes, and less time outdoors are underlying causes of reduced exposure to friendly microbes, whilst altered diet and antibiotics have adverse effects on the composition of the microbiome.

But – says Professor Sally Bloomfield from the London School of Hygiene and Tropical Medicine – "there is little or no evidence that the adverse effects are the result of personal or household hygiene and cleanliness."

Professor Rook agreed with this statement saying "It isn't really hygiene. The common infections of childhood measured by hygiene are designed to combat 'crowd infections' that appeared much too late in our evolutionary history to have evolved into an essential role in the development of human immune systems. The organisms that we evolved to require are the microbiota of our mothers, and organisms from the natural environment. Continuing to call it the hygiene hypothesis leads people to interpret more recent findings in a way which is quite wrong."

Professor Bloomfield said, "As health professionals our concern is that this continual promotion of the [hygiene hypothesis](#) misnomer is making the public confused and distrustful about hygiene, hence increasing the spread of infectious disease."

A questionnaire carried out by the Royal Society for Public Health found that 55 percent of people surveyed thought that keeping homes too clean prevents children from coming into contact with beneficial bacteria.

"Hygiene in our homes and [everyday lives](#) plays a crucial role in preventing the spread of foodborne and other infectious diseases which have a significant impact on health and prosperity. For example, every

year 1 in 4 people gets a norovirus [infection](#), and up to 31 percent of foodborne infections originate at home. What's most worrying is that this is happening at a time when hygiene is becoming even more important." says Professor Bloomfield. Our elderly population is growing, and immunity to infection decreases with age. In addition, hygiene in home and everyday life has been included in the Government's 2019 UK five-year plan as a key way to tackle antibiotic resistance, as it reduces the need for the prescription of antibiotics and the spread of resistant strains.

With this considered, Professor Bloomfield and her colleagues are calling for change. "It may be helpful to encourage children to spend more time playing outdoors. But undefined messages in the media from microbiome experts, such as 'we must stop washing our hands,' are unacceptable. because handwashing at critical times (using the toilet, preparing food) is also critical to breaking the chain of infection."

Professor Bloomfield said, "In future we are going to have to view our microbial world very differently, but people need clear and consistent messaging which makes sense." We are still a long way from knowing which 'beneficial microbes' we need and which lifestyle changes are most important to reconnect us with them. What we do know is that good hygiene practices such as handwashing, food hygiene, respiratory [hygiene](#) and so on are targeted at preventing exposure to harmful microbes and are vital for preventing infections, tackling antibiotic resistance and taking control of our own health."

Provided by Microbiology Society

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