

Come clean

It has become popular to blame 'excessive hygiene' for increases in the number of children with allergies, but the truth is quite different, finds **Meredith Jones-Russell**

Allergies are on the rise. So, can we really keep children better protected from allergy by exposing them to more dirt, or is cleanliness still next to godliness when it comes to supporting the immune system?

According to the European Academy of Allergy and Clinical Immunology, more than 150 million EU citizens suffer from chronic allergic diseases, and by 2025 over half of the European population will be affected. As for the UK, it has some of the highest prevalence rates of allergies in the world, with over 20 per cent of the population suffering from one or more.

In the face of these figures, several reports have suggested that exposing children to more bacteria in 'dirtier' environments will help to boost their immune systems.

EARLY EXPOSURE

The *European Community Respiratory Health Survey II* found that children who lived on farms up to the age of five had a reduced risk of developing allergic diseases in adulthood. Exposure to the diversity of microbes present on a farm reduced the overall reactivity of children's immune systems, the results suggested, so they did not develop an intolerance of theoretically harmless agents such as pollen and food.

Research published by the British Society for Immunology found that giving newborns probiotics decreased allergy incidence five, ten and 20 years later, and a Swedish study said parents who licked dummies which had fallen on the ground before putting them back in their children's mouths had children with fewer allergies than those who washed them.

Most recently, in May, a study of acute lymphoblastic leukaemia



found one form of the paediatric cancer was more likely to develop in children who were raised in a 'clean environment' as toddlers, leaving them unexposed to virus infections at an important stage of their immune system development.

HYGIENE HYPOTHESIS

Articles about these findings are often accompanied by the suggestion that excessive cleanliness is, therefore, a direct cause of increased allergy and infection incidence, in many cases backed up by the so-called 'hygiene hypothesis', first proposed by epidemiologist Professor David Strachan in 1989.

According to the theory, early exposure to things we consider dirty, such as allergens, bacteria or viruses, can strengthen the immune system and protect against allergies later on.

The hypothesis was based on the observation that hay fever was inversely associated with the number of brothers and sisters a

child was brought up with, and that older siblings were more likely to get hay fever than younger ones.

As more siblings present more potential sources of viral infections, Professor Strachan suggested allergies might in fact be prevented by 'infection in early childhood, transmitted by unhygienic contact with older siblings, or acquired prenatally.'

Several studies have agreed with the idea that microbial exposure is more possible when children spend time outdoors or with others, whether in larger families, as Professor Strachan suggested, or at nursery or school.

Babies who attend nursery are less likely to suffer childhood leukaemia when they get older than those who do not mix with others, according to research by the UK Childhood Cancer Study.

However, Professor Strachan added that insufficient microbial exposure can be caused not only by low levels of contact with people, but also by a trend towards 'improved household

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amenities and higher standards of personal cleanliness.

MISLEADING MISNOMER

It is these higher standards of cleanliness that scientists have warned makes the hygiene hypothesis misleading, as cleanliness in fact remains necessary to prevent the spread of harmful microbes which could lead to infections.

Professor Markus Ege of Dr von Hauner Children's Hospital at Ludwig Maximilian University in Munich says, 'I would call the term "hygiene hypothesis" a misnomer. It is not about household or personal hygiene or cleanliness but transmission of infections, which David Strachan called "unhygienic" in his legendary paper.

'In our data, we see associations between cleanliness and bacterial markers and between bacterial markers and allergies, but not between cleanliness and allergies. So, I do not think that allergies are related to our approach to cleanliness and hygiene, rather the spectrum of microbial exposure has changed profoundly during the last decades. And this cannot be restored by just using less aggressive cleaning.'

This 'profound change' is partly linked to lifestyle developments that have seen children spending more time inside and in urbanised environments, away from a number of non-harmful microbes which have historically had positive effects on health.

Professor Sally Bloomfield of the London School of Hygiene and Tropical Medicine and the

International Scientific Forum on Home Hygiene says a range of lifestyle changes are contributing to children's lack of exposure to microbes, including:

- less social interaction
- less time spent in outdoor play
- excessive antibiotic use
- poor diet
- Caesarean sections rather than natural childbirth
- bottle rather than breastfeeding.

'When Strachan proposed the hygiene hypothesis, he was on to something important; that is, a link between microbial interaction with the human body and risk of immune disease. But his proposed explanation of what was happening was incorrect,' Professor Bloomfield explains.

'We do indeed need exposure to microbes, particularly in early life, but not those that cause infections. The exposure we need is to as broad a range as possible of largely non-harmful microbes that inhabit our human, animal and natural environment. This "programmes" the immune system so it does not react to things like pollen and other allergens. If our body starts to attack allergens, that is what causes allergies.'

OLD FRIENDS

Professor Bloomfield says the idea of microbial 'old friends' should replace the hygiene hypothesis in people's minds. The 'old friends' theory, developed by Professor Graham Rook in 2003, suggests children may not be meeting enough of the microbes that have helped teach the immune system for millennia which microbe species are harmless, such as pollen



FURTHER INFORMATION

- www.ifh-homehygiene.org
- www.immunology.org
- <https://campaignresources.phe.gov.uk/resources/campaigns/34-stay-well-this-winter-/resources>
- www.allergyuk.org
- www.e-bug.eu
- <https://pips.ecs.soton.ac.uk/player/play/germdefence>
- www.ndna.org.uk/nursery-hygiene

and food allergens, and how to tolerate them.

If the immune system loses touch with its microbial 'old friends', it can start to attack, according to Professor Rook's study, creating allergic reactions.

Even if rigorous cleanliness does reduce microbial exposure, its impact is likely to be very small compared with other lifestyle factors, Professor Bloomfield says. 'The problem is that the mantra that "we have become too clean for our own good" continues to be repeated as if it is a proven fact.'

GOOD PRACTICE

Professor Bloomfield says in order to avoid the most harmful microbes, it is vital that standards of cleanliness are not relaxed, particularly:

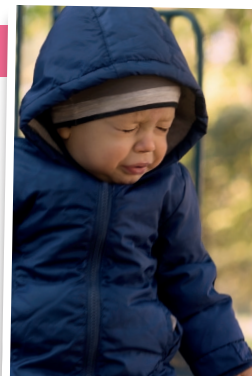
- when dealing with food
- when touching surfaces frequently touched by others
- when using the toilet
- when coughing or sneezing (respiratory hygiene)
- in relation to pet hygiene
- in relation to hand hygiene.

'The dangerous myths about being too clean are undermining public confidence in hygiene, at a time when the need for good hygiene is becoming even greater,' she says.

'There is nothing to suggest that relaxing standards of home cleanliness and hygiene would help us to tackle allergies, but plenty of evidence to suggest that it increases the risk of getting an infection.'

Dr Radhul Chodhari of the Royal College of Paediatrics and Child Health adds, 'Medical advice is not to take the hygiene hypothesis at face value. Don't leave children in a mud bath for two hours, but on the other hand, a reasonably clean kitchen is fine; no-one needs to be so paranoid that they are cleaning every three minutes. Striking a reasonable balance is key.

'In a nursery environment, taking a reasonable approach to hygiene is particularly important. It should be about a balance of outdoor experience and playing with others, but also rational handwashing and taking simple precautions, such as using the advice distributed by Public Health England in the winter months, and offering a good diversity of food to prevent allergies.' ■



allergies: common causes

According to Allergy UK, the most common causes of allergic reactions are:

- **Pollen from trees and grasses** Allergic rhinitis or hay fever is the most common form of non-infectious rhinitis, affecting 10-30 per cent of adults and as many as 40 per cent of children.
- **Food** Food allergies affect 3-6 per cent of children in the developed world. Incidence is estimated to be greater in toddlers (5-8 per cent) than in adults (1-2 per cent). In children, eggs, milk, soya, wheat and peanuts are the most common food allergies.
- **Insects, such as wasps and bees** Children under 12 have a lower risk than adults of

recurring reactions to stings.

- **Medicines** are among the three leading causes of anaphylactic reactions. Between 1998 and 2005, serious adverse drug reactions rose 2.6-fold.
- **Furry or hairy pets** such as cats and dogs, horses, rabbits and guinea pigs
- **Proteins** secreted from house dust mites
- **Moulds**