

# How measles can do long-lasting damage to children's immune systems

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By Clare Wilson

*Low vaccination rates have led to measles outbreaks in several countries, but many people are unaware of how the virus can have an effect called 'immune amnesia'*

Measles is in the news again, with outbreaks being reported in the UK, US and elsewhere, due to declining rates of vaccination with the measles, mumps and rubella (MMR) vaccine. In England, the problem has been declared a national incident, to help health officials take steps to limit further spread.

The reduced MMR vaccination rates are partly due to a sharp drop in uptake in the early 2000s, after false claims were made that the vaccine could cause autism, combined with people staying away from health services due to the covid-19 pandemic.



Measles is resurgent in several countries

Public health messaging about measles is now everywhere, but there is one unusual effect of this virus that many may be unaware of: its ability to trigger a sustained weakening of the immune system, sometimes called “immune amnesia”.

Doctors have long known that measles has a broad immunosuppressive effect, but the reason why was only discovered about a decade ago.

In 2012, work in monkeys showed that this happens because the measles virus targets certain immune cells, including a subtype responsible for producing antibodies to previously encountered bacteria and viruses, called memory B cells.

Normally, these live in lymph nodes and the spleen for years after infections. If we reencounter the pathogen that the memory B cells make antibodies against, they quickly start multiplying, often wiping it out before we notice any symptoms. Yet when we are infected by measles, the virus takes over some of these very cells.

Eventually another branch of the immune system called T cells starts killing the measles-infected memory B cells. This means we get rid of the measles infection, but it also means that many of our memory B cells are wiped out, which has a terrible effect on our ability to fight off other illnesses, such as ear infections, diarrhoea and pneumonia.

Indeed, worldwide, more deaths occur from secondary infections that happen after the initial measles illness than as a direct result of the measles virus itself.

This phenomenon was studied in people for the first time in 2013, when there was an outbreak of measles in an Orthodox Protestant community in the Netherlands that frowns on vaccinations. The families in this community usually go to the same churches and socialise together, so measles tends to sweep through their children every 5 to 10 years.

As the outbreak began, some families let researchers take blood samples from their children, both before and after their measles infection. It was a unique opportunity because most of the parents still refused to get their children vaccinated and yet they were happy to cooperate with the scientists, says Rik de Swart at Erasmus University Medical Center in the Netherlands, who led the work.

De Swart's team found that the infection caused an alarming 10 to 40 per cent loss in the diversity of the children's antibodies to other pathogens. This damage didn't happen in response to receiving the measles vaccine, which was studied in a control group of children.

Other work suggests it takes about three years for people's immune systems to return to their former strength after measles.

The longer-term effects of measles doesn't get that much attention, which may be partly because the research in the Netherlands was only published in November 2019 and a few months later, the world's virologists turned their attention to a different virus: covid-19.

Today, many of the public health messages about measles vaccination focus on the direct effects of the infection. This is understandable, given that 1 in 5 children with measles require a hospital visit, according to National Health Service England.

But perhaps doctors should also be bringing the immunosuppressive effects of measles to wider attention, says Simon Williams, a public health doctor at Swansea University in the UK.

Williams also points out that in most countries, people of any age who think they may not have had the two recommended MMR doses are eligible to receive them. "It's a damaging, nasty disease, but the way it can also suppress the immune system has gone under the radar," he says.

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