

## A case of junk science, conflict and hype

**Despite accumulating evidence that vaccines are safe, vaccination uptake is falling, driving a resurgence in old scourges of society.**

The year 2008 has seen more outbreaks of mumps and measles in the USA, Canada, and UK, among other Western countries. Both diseases had been almost completely eradicated in the Western hemisphere before the 1990s because of the introduction of the measles mumps and rubella (MMR) vaccine in 1979. What has driven this upsurge?

A decrease in 'uptake' of the MMR vaccine fuelled by vaccine skeptics is the main cause behind the resurgence of these diseases in recent years. In 1998, Andrew Wakefield and colleagues published a paper in *The Lancet* linking the MMR vaccine to autism. This coincided with a growing belief that environmental cues were causing the increase in autism. The anti-vaccine movement jumped on this, and the ensuing media frenzy continues to this day.

Many studies have refuted Wakefield's claims. Furthermore, Wakefield had a serious conflict of interest, as his research was secretly funded by personal-injury lawyers whose clients were suing MMR vaccine makers. The paper was retracted and Wakefield is being tried for professional misconduct. Despite this, the rumors that the MMR vaccine causes autism persists. But vaccine scares are hardly new.

One of the earliest vaccine scares dates back to 1806, when authorities in Northampton, UK, had to deal with growing revelations that the smallpox vaccine caused the death of a child. A scare linking thiothermal, a vaccine adjuvant, to autism led to its elimination from most US and European vaccines despite the lack of evidence supporting such a link. Indeed, although thiothermal use was banned, autism cases continue to increase.

Such scares have lessened vaccine uptake, but many other criticisms, fueled by a small but vocal anti-vaccine movement, have also had an influence. Arguments used by vaccine skeptics both past and present have changed relatively little. They often suggest that vaccination is motivated by profit and is an infringement of personal liberty and choice; vaccines violate the laws of nature and are temporary or ineffective; and good hygiene is sufficient to protect against disease. Governmental conspiracy theories also abound.

Vaccine skeptics constantly ignore or refuse to recognize the facts. If the government did not make vaccination mandatory—and in most countries, 'opting out' is allowed on religious or other ethical grounds—herd immunity would not be achieved and disease outbreaks would continue on a mass scale. Huge numbers of scientific papers support the safety and efficacy of vaccination. If governments were determined to 'cover up' side effects, then why was the rhesus monkey-derived rotavirus vaccine immediately withdrawn once a side effect was noted?

On the flip side, vaccine skeptics are easy to criticize. The anti-vaccine movement is driven mainly by 'junk science', litigious greed, hype and ego, as noted in Paul Offit's new book on the autism controversy. Many skeptics have an obvious conflict of interest. One glaring example described by Offit is the father-and-son team of Mark and David Greier. Mark, under

the patronage of the anti-vaccine movement, has published many papers on the adverse effects of vaccination and advocates chelation therapy to treat autism. Conveniently, his son David runs a medical-legal consulting firm that provides expert testimony in vaccine injury trials.

The internet is increasingly used as a source of health information. Unfortunately, vaccine skeptics have recognized this, and anti-vaccine websites have proliferated. Some are filled with anti-vaccine quotes from physicians linked financially to autism research. They use scare-mongering tactics with pictures of children allegedly injured by vaccines to feed on parents' concerns. Alongside such pictures, stories written by other parents who feel their child's disability was caused by vaccination, on the basis of temporal rather than causal evidence, abound. Risks associated with vaccination are exaggerated and the scientific literature is 'cherry picked' to deceptively support their bogus views.

In the West, where vaccine scares are more common, parents with unvaccinated children tend to be well educated with ready access to information sources. Fed misinformation by vaccine skeptics, such parents prefer not to immunize their children because they perceive the risk of vaccination to be greater than that of a disease they have never encountered. What vaccine skeptics fail to mention is that diseases such as measles can be lethal or can cause life-long disabilities. Another pro-vaccine argument often ignored is that healthy children perform better at schools, and healthy adults are more productive at work.

Who is to blame for this state of affairs? How the media reports such stories is one main cause. Attempting balance by giving vaccine skeptics and pro-vaccine advocates equal weight in news stories leads people to believe the evidence for and against vaccination is equally strong. Often, generalist reporters, rather than specialists, write on complex immunological issues. Some tabloid publications thrive on scare stories—in 2006, the *Daily Mail* announced "Scientists fear MMR link to autism" on the basis of a poster presentation of unpublished research by Arthur Kingsman, a doctor at a private autism clinic.

Governments are not blameless. For example, after the BSE scare, and the refusal of UK Prime Minister Tony Blair to reveal whether his own son had received the MMR vaccine, conspiracy theories grew and public confidence in the vaccine diminished. The net result was a further drop in vaccine uptake and new outbreaks of measles.

Given that the anti-vaccination movement has been around for more than two centuries, it is unlikely to disappear. But one solution, perhaps, is for governments to be more proactive, funding mass-education campaigns to relay the facts simply and emphasize the many advantages of vaccination. Immunologists themselves should stand up and publicly promote the history, successes, safety and efficacy of the world's vaccination program. It should not be forgotten that vaccination is one of the greatest achievements of modern science.