



# Frequently asked questions about varicella vaccine

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## Summary

**Each year in Australia severe varicella and zoster infections cause a number of deaths and thousands of hospitalisations. A live attenuated varicella zoster virus vaccine has been available in Australia since 2000. This vaccine is recommended for all non-immune children over 12 months of age and all susceptible adults. There have been theoretical concerns about the vaccine leading to increased cases of zoster and varicella in adults because of a combination of waning vaccine-induced immunity and reduced immunological boosting from exposure to circulating virus. However, clinicians are encouraged to consider its use in all non-immune people apart from immunocompromised patients and pregnant women.**

Key words: immunisation, chickenpox, shingles.

(*Aust Prescr* 2005;28:2-5)

## Introduction

Varicella (chickenpox) is a highly contagious disease caused by the varicella zoster virus. Although people of all ages are

### In this issue...

Welcome to the year in which *Australian Prescriber* celebrates its thirtieth birthday. Many of the problems encountered 30 years ago remain with us. For example, patients are still dying from incorrect doses of potassium. James Reeve and colleagues therefore inform us what can be done to decrease the dangers of intravenous potassium.

Although aspirin has been available for many years, David Newgreen tells us that there is still controversy about aspirin's interaction with alcohol. Antidepressants are also a common cause of adverse events, but Kelsey Hegarty says that many mildly depressed patients can be managed without antidepressants.

affected, most cases occur in children under the age of five years. More than 90% of people have been infected by the age of 15 years. Herpes zoster (shingles) is caused by reactivation of latent varicella zoster virus in dorsal root ganglia.

While varicella is usually a mild illness in childhood, there can be serious morbidity and even death resulting from severe varicella, secondary bacterial infections, pneumonitis, encephalitis or myocarditis. Most complications of varicella infection occur in otherwise healthy children, although the relative risk of complication is highest in elderly or immunocompromised patients, pregnant women and their fetuses, and newborn infants.<sup>1,2</sup> In Australia an average of 3.5 people with primary varicella and 11 with herpes zoster died each year between 1980 and 1993. In South Australia and New South Wales, varicella admissions accounted for almost 1200 hospital bed days and zoster admissions for more than 7300 bed days each year.<sup>3</sup>

## Who should receive varicella zoster virus vaccine?

Live attenuated varicella zoster virus vaccine (Oka strain) has been available in Australia since 2000. In Australia, vaccination is recommended for everyone over the age of 12 months (including adults) without evidence of prior varicella infection.<sup>4</sup> A single subcutaneous dose should be given to children aged one to 13 years with no clinical history of varicella. The vaccine may be given at any time after 12 months of age. The Australian Standard Vaccination Schedule suggests that a convenient age for administration is 18 months. However, there are currently no other routinely scheduled vaccines for most Australian children at that age, so parents may choose to have their children immunised earlier. For example, a child could receive varicella zoster virus vaccine at the same time as their routine 12 month vaccines or, if parents prefer not to have their child receive four injections at one visit, as a separate immunisation four or more weeks later.

After the 14th birthday, two vaccines should be given at least one month apart to anyone with a negative clinical history of varicella and negative varicella serology. A blood test is recommended in this age group because most adults with a negative clinical history show serological evidence of immunity to varicella zoster virus. This strategy will avoid the expense of the vaccine and the potential (although extremely low) risk of adverse events. An alternative and equally acceptable strategy is to offer vaccine

to people aged  $\geq 14$  years with a negative clinical history of varicella without performing serology. There is no evidence that the vaccine is dangerous if given to people who are already immune to varicella. In fact trials are in progress to assess if the boosting effect of varicella zoster virus vaccine has the potential to prevent herpes zoster in older people.<sup>5</sup> Varicella zoster virus vaccine should not be given to immunocompromised patients because of risk of severe reaction, or to pregnant women because of unknown risks to the fetus.

### Who pays for the vaccine?

Although varicella zoster virus vaccine is recommended for all children, the federal government does not fund this vaccine. Parents therefore have to pay amounts varying from less than \$60 to almost \$100 per dose. Potential vaccinees should be advised to shop around for the cheapest price. Many private health insurance 'extras' policies provide partial reimbursement.

### How safe is the vaccine?

Since 1995 over 40 million doses have been distributed in the USA.<sup>6</sup> The vaccine has been shown to be safe in healthy children.<sup>7</sup> If reactions occur, they are usually limited to fever or local reactions at the injection site. Skin rash occurs in about 7% of healthy vaccinees, either at the injection site or more generalised, and may be vesicular.<sup>1,8</sup> Rashes caused by the vaccine usually appear approximately three weeks after immunisation. There is a small potential to transmit the vaccine virus at this time, mainly from direct contact with vesicles at the injection site.<sup>1</sup> Vaccinated individuals appear not to be able to transmit the vaccine virus by the respiratory route, and papules (as opposed to vesicles) at the injection site are rarely infectious. If a vesicular rash occurs following varicella zoster virus immunisation, it should be covered with a dressing and clothes if possible, careful handwashing should be encouraged, and the vaccinated individual should avoid contact with immunocompromised people, pregnant women (as much as practical) and be excluded from school only until the lesions have crusted.

Varicella zoster virus vaccine can be safely administered at the same time as other vaccines, although, if it is not given simultaneously, it should be given at least four weeks before or after other live vaccines.<sup>4</sup>

There have only been five reports of severe reactions in immunised children and they were later found to be immunocompromised.<sup>6</sup> No one is known to have died as a result of the vaccine virus.

### How effective is the vaccine?

Varicella zoster virus vaccine is highly effective in children and adults. A single dose completely protects 85% of immunised

children against developing clinical chickenpox. Immunised children who are not fully protected will almost always develop only mild disease if exposed to varicella zoster virus; vaccine effectiveness against moderate or severe disease is 97%.<sup>9</sup> Recently there have been some varicella outbreaks where the effectiveness of the vaccine was lower than expected.<sup>10,11,12,13</sup> Children immunised more than four years previously appeared at increased risk of breakthrough disease in these outbreaks, although almost all cases had mild disease. Despite having mild disease, immunised children with breakthrough disease are contagious and should be subject to the same school exclusion criteria used for other cases of chickenpox.

### Can the vaccine be used to prevent chickenpox after someone has been exposed?

The vaccine has been shown to be effective in preventing chickenpox if given within three days of exposure to varicella zoster virus<sup>14</sup>, although it may still have some benefit if given up to five days after exposure. Vaccination has also been effective in stopping varicella outbreaks, but in this situation it is recommended that the advice of public health personnel should be sought.<sup>2,15,16</sup> When not effective at preventing disease, post-exposure varicella vaccine may lead to milder disease in vaccinees.

### How long does vaccine-induced protection last?

The evidence currently suggests that the vaccine usually remains protective for at least 10 years after immunisation, although the proportion of protected people may decline gradually after the first few years. Protective levels among many children vaccinated in Japan have persisted more than 20 years after vaccination.<sup>9</sup> However, studies into the duration of effectiveness have assessed the vaccine in an environment where wild varicella zoster virus infections and natural boosting of immunity are common. Significant boosting of the varicella immune response has been reported after second injections given 4–6 years after the initial immunisation.<sup>17</sup> However, booster doses are not currently recommended. As the use of varicella zoster virus vaccine increases and exposure to wild-type virus decreases in the community, it is possible that the duration of protection may decrease. Should this prove to be the case, a booster dose of vaccine may be warranted.

### Will there be an increased risk of disease in older age groups?

There have been concerns that, by vaccinating children, the burden of disease will be shifted to an older age group who are at greater risk for more severe disease. It is clear that the proportion of cases in older age groups will increase as more

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children are immunised. However, it is not yet clear if the overall rates of disease in adults will increase because of waning protection from immunisation and reduced boosting from exposure to circulating varicella zoster virus.

A study in the USA five years after the introduction of the vaccine highlighted that cases of varicella declined in both children and susceptible adults, and hospitalisations for complicated varicella also substantially declined.<sup>18</sup> Although this observation is reassuring, the effect of immunisation on the epidemiology of varicella zoster virus infections in the community will require ongoing surveillance.

### **What effect will the vaccine have on the future risk of herpes zoster?**

Immunological boosting from circulating varicella zoster virus may protect adults from developing shingles. There is concern that this boosting will not occur as the proportion of children being vaccinated increases resulting in a short- to medium-term increase in cases of herpes zoster in adults. This effect has not yet been seen in the USA, although further surveillance will be required. There appears to be a reduced incidence of herpes zoster among immunised people, although the long-term risk is not yet known.

### **How should the vaccine be stored?**

There are two varicella zoster virus vaccines available in Australia: Varilrix (GlaxoSmithKline) and Varivax Refrigerated (CSL/Merck Sharp and Dohme). The two vaccines are equally effective. Both vaccines come in lyophilised preparations which require protection from light and should be stored at 2–8°C (or frozen). Varilrix can be stored for up to two years, and Varivax Refrigerated for up to 18 months from the date of manufacture. The diluents for each vaccine should not be frozen; they can be stored in the refrigerator or at ambient temperatures. Both vaccines should be used promptly after reconstitution: within 90 minutes for Varilrix or within 30 minutes for Varivax Refrigerated.<sup>4</sup>

### **Conclusion: who should have the vaccine?**

Although there are theoretical concerns that varicella zoster virus vaccine may alter the epidemiology of varicella zoster virus infections in the community, data from the USA where varicella immunisation has been routine since the mid-1990s suggest that the vaccine has had a positive impact.

Susceptible adults at high risk of exposure (for example healthcare workers, women prior to pregnancy, parents of young children, childcare workers and teachers) and all susceptible household contacts of immunosuppressed people should be given priority, but all healthy susceptible people over 12 months of age can be offered the vaccine.

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*Conflict of interest: none declared*

## Self-test questions

*The following statements are either true or false (answers on page 23)*

1. A skin rash may occur three weeks after an injection of varicella zoster virus vaccine.
2. Adults who request vaccination against varicella zoster virus are recommended to first have a blood test to check their immunity to the virus.

## Letters

Letters, which may not necessarily be published in full, should be restricted to not more than 250 words. When relevant, comment on the letter is sought from the author. Due to production schedules, it is normally not possible to publish letters received in response to material appearing in a particular issue earlier than the second or third subsequent issue.

### Tumour necrosis factor alpha inhibitors for the treatment of adult rheumatoid arthritis

Editor, – Professor McColl is to be congratulated for his admirable review of TNF-targeted antibodies (*Aust Prescr* 2004;27:43–6). These protein therapies may still need to be used as synergists with well-tried drugs such as methotrexate. They are very expensive and a real burden to both the Pharmaceutical Benefits Scheme (PBS) and to rheumatologists, who must provide much supportive data justifying the patient's need. Some of the criteria for their use may be suspect.<sup>1</sup>

Two of these antibodies can bind cell-bound TNF, perhaps inducing apoptosis of the TNF-producing cells. In the long term, this may compromise natural defences against comorbidities, for example tumours, tuberculosis. (The third drug (etanercept) binds TNF after release from the cells.)

There are much cheaper drugs for controlling TNF production such as thalidomide and oxpentifylline (pentoxifylline).<sup>2</sup> Thalidomide may be in the 'too-hard basket', but oxpentifylline has been used for more than 30 years to treat poor circulation.<sup>3</sup> Oxpentifylline is a proven alternative to steroids for controlling granulomatous inflammation in Hansen's disease.<sup>4,5</sup> So its safety is not an issue. Its short half-life<sup>3</sup> permits rapid suspension of use should compromising situations such as infections arise. For optimal efficacy in treating chronic inflammation oxpentifylline may have to be used synergistically.<sup>6</sup> One month's supply (400 mg tds) costs approximately \$80 in Australia.

You will not read much about company-sponsored trials as the drug is out of patent and regulatory agencies do not favour drug combinations. The big question is whether

support can be found for clinical trials of non-protein TNF-blockers. Positive outcomes might be much reduced costs to the PBS and widening the availability of TNF inhibition therapy.

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