Kalydeco, the drug that treats the cause of cystic fibrosis, not just symptoms

May 3 2017, by Odette Erskine

Credit: AI-generated image (disclaimer)

Kalydeco (ivacaftor) is a drug used to treat cystic fibrosis, a disorder that affects many organs, particularly the lungs. Cystic fibrosis is Australia's most commonly inherited disorder.

The drug has been in the news recently because, as of May 1, 2017 a

wider range of people are now eligible to receive it under the Pharmaceutical Benefits Scheme (PBS).

Before May 1, more than 200 Australians over the age of six years were eligible for Kalydeco. Widening its subsidy to certain younger patients aged two to five means another 30 children can benefit. This accounts for 10 to 12% of patients with cystic fibrosis.

Before PBS listing in 2014, patients and families needed to find A$300,000 per year to fund the drug. Now, for eligible patients, it is available for A$6.30 a script for concession-card holders and A$38.80 for general patients. But patients will still need to satisfy specific criteria (have specific gene mutations) to qualify.

What is cystic fibrosis?

Cystic fibrosis affects one in 3,600 live births in Australia. It is caused by defects in a single gene, known as the cystic fibrosis transmembrane regulator (CFTR).

The gene has a critical role in controlling how chloride ions (salt) move in and out of cells via proteins called chloride channels. Too much salt and not enough water can lead to mucus becoming very thick and sticky, which can build up in the lungs (and other organs).

This sticky mucus clogs the tiny air passages in the lungs and traps bacteria. Repeated infections and blockages can cause irreversible lung damage, which is the most common cause of death in people with this condition.

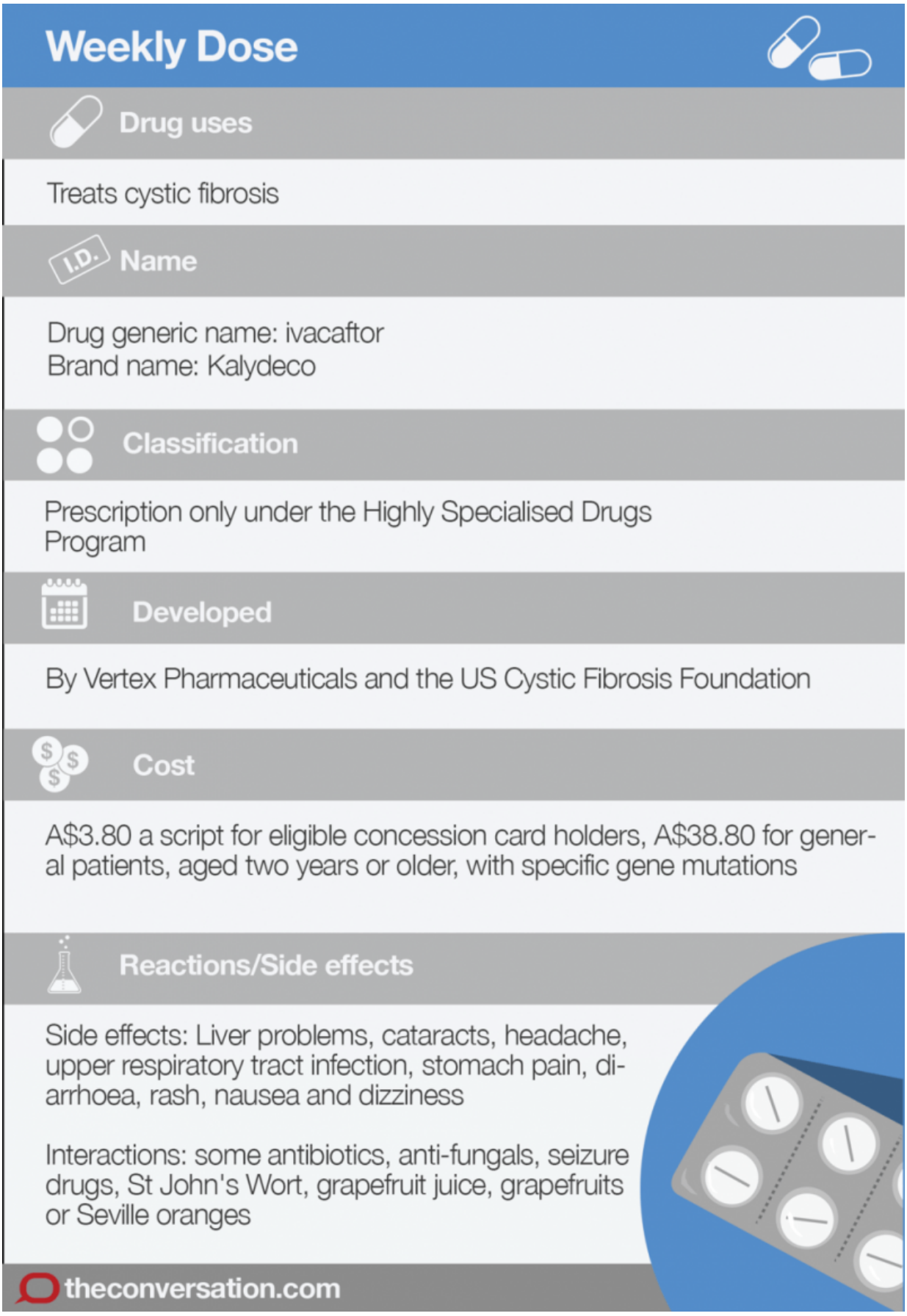
Mucus can also cause problems in the pancreas, preventing the release of enzymes needed to digest food and so leading to nutrition problems.

Patients can also have liver disease, chronic sinus infections, diabetes and fertility problems due to this faulty gene.

How does Kalydeco work?

The drug was discovered as part of a collaboration with Vertex Pharmaceuticals Inc in the USA and Cystic Fibrosis Foundation, US. It took more than 14 years to develop.

Until it became available, drug therapies for cystic fibrosis were less targeted and only aimed at reducing symptoms in an attempt to slow the disease.


Weekly Dose
Drug uses
Treats cystic fibrosis
Name
Drug generic name: ivacaftor
Brand name: Kalydeco
Classification
Prescription only under the Highly Specialised Drugs Program
Developed
By Vertex Pharmaceuticals and the US Cystic Fibrosis Foundation
Cost
A$3.80 a script for eligible concession card holders, A$38.80 for general patients, aged two years or older, with specific gene mutations
Reactions/Side effects
Side effects: Liver problems, cataracts, headache, upper respiratory tract infection, stomach pain, diarrhoea, rash, nausea and dizziness
Interactions: some antibiotics, anti-fungals, seizure drugs, St John's Wort, grapefruit juice, grapefruits or Seville oranges
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Kalydeco

Researchers have found more than 2,000 genetic mutations in the CFTR gene and each leads to a different defect in the chloride channels. Kalydeco is the first medicine to treat the underlying cause of cystic fibrosis in people with specific mutations in this CFTR gene.

It works by targeting certain abnormal chloride channels and opening them to allow chloride ions to move in and out of the cell. This leads to an increase in water levels in the airways helping to thin the mucus.

By keeping the airways well hydrated, mucus can be cleared from the airways, reducing the risk of lung infections and progressive lung damage. The reduction in mucus also affects the pancreatic ducts, which in turn results in improvement in glucose levels reducing patients' risk of cystic fibrosis-related diabetes.

Studies of drugs like Kalydeco, which work to counter the effects of the faulty CFTR gene, suggest they increase the lifespan of people with cystic fibrosis and decrease the severity of illness. Treating the condition at an earlier stage in the progression of disease may also limit organ damage, reduce illness due to chest infections and improve respiratory-related quality of life.

How do patients take it?

In Australia, the medication is available on the Highly Specialised Drugs Program, which means only doctors with experience in treating cystic

fibrosis can prescribe it. The drug comes as a tablet or oral solution that patients take twice a day.

To increase the absorption of Kalydeco, patients take the medication with fatty foods such as butter, eggs, cheese, nuts, avocados, or whole milk.

How about side-effects and interactions?

Some patients have high levels of certain liver enzymes while on the drug (which might be a sign of a stressed liver) so doctors need to keep an eye on these. And some adolescents and children develop cataracts (clouding of the eye lens) while on the drug so need to have their eyes monitored.

Most common side effects include: headache, upper respiratory tract infection, stomach pain, diarrhoea, rash, nausea and dizziness. People should also not drive or operate machinery until they know how Kalydeco affects them.

Taking the drug with some antibiotics (like rifampicin and rifabutin); seizure medications (phenytoin, carbamazepine or phenobarbital); and the herbal supplement St John's Wort can substantially decrease the effectiveness of Kalydeco.

Patients are also recommended to avoid taking it with grapefruit juice, grapefruits or Seville oranges because this makes them increasingly sensitive to it. Anti-fungal medications (ketoconazole, itraconazole, posaconazole, voriconazole or fluconazole), other antibiotics (such as clarithromycin or erythromycin) can also increase Kalydeco exposure, so if taking these medicines at the same time, patients need lower doses of the cystic fibrosis drug.

With the new PBS listing for Kalydeco, younger patients have been provided access to the life-saving treatment aimed at addressing the underlying cause of cystic fibrosis, instead of only treating its symptoms.

This article was originally published on The Conversation. Read the original article.

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