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With the mRNA covid-19 vaccines being delivered to growing numbers of young people, researchers are looking again at the rare risk of myocarditis, reports Clare Wilson

AS THE UK offers a covid-19 vaccine to children aged 5 to 11, and officials consider the benefits of a fourth jab for adults, we still have an uncertain picture about the risks to the heart.

High-income countries are mainly administering the Pfizer/BioNTech and Moderna vaccines to their citizens. Based on mRNA, these contain a strand of genetic material that instructs cells to make the SARS-CoV-2 virus’s spike protein, prompting an immune response that protects against severe disease. These mRNA vaccines are effective, but in rare cases they have been linked to heart muscle inflammation, known as myocarditis.

Myocarditis often causes chest pain and breathlessness, which usually resolve without treatment. In severe cases, however, it can trigger heart damage.

Inflammation signals that the immune system’s activity is raised, but how myocarditis specifically comes about is unclear. “Arguably, it isn’t a single disease,” says Tefvik Ismail, a cardiologist at King’s College London, who has advised the UK Health Security Agency on the issue, but spoke to New Scientist in a personal capacity.

Myocarditis is also linked to other vaccines, medicines and to covid-19 itself, but regardless of cause, it is more common in males and younger people.

In December 2021, work led by a team at the University of Oxford looked at the prevalence of myocarditis after a covid-19 vaccine in more than 42 million people aged 13 or over in England. Males under 40 were most at risk. There were an additional 12 myocarditis events per 1 million males in the 28 days after a second Pfizer/BioNTech vaccine, as well as an additional 13 events after a third jab (medRxiv, doi.org/hnmn).

“Younger people’s lower covid-19 risk makes it difficult to assess the vaccines’ pros and cons”

Among this group, myocarditis was more common after the vaccines than it was after covid-19 itself, which caused an additional seven myocarditis cases. This contradicts an August 2021 US study, in which myocarditis after covid-19 was six times more likely than it was post-vaccination.

Unfortunately, varying myocarditis definitions make it difficult to compare country-to-country data, says Ismail.

Although the cases have been mainly linked to mRNA vaccines, the Oxford study also reported an additional 14 myocarditis events after a second Oxford/AstraZeneca dose, which is based on a different technology. It is therefore unclear whether the cases are linked to the spike protein or perhaps to a more universal vaccine component.

A study released last month adds to the uncertainty. A team at the University of Alberta, Edmonton, in Canada reviewed 46 studies on heart inflammation after an mRNA covid-19 vaccine. Male teens and young adults were most at risk, but the estimated prevalence ranged from 50 to 139 cases per million.

When it comes to children, 4.3 males and two females aged 5 to 11 develop myocarditis out of every 1 million second Pfizer/BioNTech doses, according to the US Centers for Disease Control and Prevention. “Given that there have been a few millions of vaccines given, we should be reassured by these estimates,” says Russell Viner at University College London.

Nevertheless, the UK’s Joint Committee on Vaccination and Immunisation (JCVI) was hesitant to recommend a low-dose jab for 5 to 11-year-olds. In February, the JCVI announced that this age group could receive a Pfizer/BioNTech dose on a “non-urgent” basis. England is due to roll these out this month, with programmes under way in the rest of the UK.

Myocarditis becomes less likely with a longer interval between vaccine doses. Rates are therefore expected to be lower in the UK, which administers doses 12 weeks apart, versus four weeks apart in the US, says Ismail. But the condition could become an issue as health officials consider fourth doses. In the UK, fourth vaccines are mainly being offered to older people, who are at a higher risk of covid-19 but not myocarditis.

Myocarditis aside, severe covid-19 has been linked to strokes, sepsis and even to the onset of diabetes, suggesting that the vaccines’ benefits outweigh any risk. While the dominant omicron variant is less virulent than its predecessors, more than 14,000 people were admitted to hospital with covid-19 in the past week in the UK.

Younger people’s lower risk of severe illness from covid-19 makes it difficult to assess the vaccines’ pros and cons for them, says Ismail. There are rare serious complications from infection but also rare adverse events from the vaccines, he says. “There’s a lot we don’t know,” says Ismail.