

Professor Sillence, from SSPA Professional Advisory Board has provided information about COVID-19 immunization relevant to people with skeletal dysplasia here in Australia.

COVID-19 IMMUNIZATION / VACCINATION FOR PEOPLE WITH SKELETAL DYSPLASIAS

People living with dwarfing disorders/skeletal dysplasias in Australia, New Zealand and our Pacific neighbours face a very different situation from that of people in the USA, Central and South America, UK and Europe. The early and strict quarantine restrictions at our borders since February 2020 mean that we have a very low incidence of COVID -19 infections, including serious infections needing intensive care. Most people know that regular hand washing (hand hygiene), social distancing and mask wearing can give us major protection against getting infected, spreading the infection to others and getting sick from COVID. To break the cycle of infection and transmission, our governments need to offer immunization in a tiered manner to the whole population.

The COVID-19 (SARS-cov-2) virus and its Variants

The coronaviruses are named for their appearance under a high-powered microscope. The surface of the virus is covered with proteins which stick out and this coating of spikes looks like a halo. The spikes which stick onto human cells have become the target of many vaccines.

COVID-19 is not the first coronavirus that public health officials have had to deal with. There have been two similar epidemics, SARS in Asia (2003) and MERS (2014) in the Middle East. These never spread to the whole world i.e. became a pandemic and they were managed by Public Health measures. This meant that we were already preparing for an epidemic sometime, somewhere. Scientists were already working on a vaccine strategy for more than 15 years. There are over a hundred different companies developing vaccines at the present time and several vaccines have been through the cycle of testing for safety and effectiveness, called clinical trials. Four seasonal human coronavirus infections (Common Cold), circulate each year, mostly causing mild upper respiratory infections.



The Use of Vaccines to Prevent Severe Symptoms and Population Spread

COVID-19 is very infectious. It survives for several hours on body surfaces and on items that are handled. It can also be transmitted in the air through coughing, via droplets in the air and via air conditioning. Since January 2020, over 107 million people world-wide have been

infected and over 2 million people have died. We want to avoid people getting infected and if exposed and symptomatic, to only have the mildest form of the infection.

Children have a much lower frequency of infection although a small number of children can have a very severe form of response to COVID known as Multisystem Inflammatory Syndrome (MIS). There have been no reported trials of vaccines for children under the age of 16 years, another reason why we should all get vaccinated to protect the children.

Similarly, with the elderly who have increased vulnerability and a high mortality, we need to vaccinate carers and then elderly people themselves. One of the best summaries of vaccine development and information for people in general can be found in the February 2021 edition of the magazine known as The Australian Prescriber(1). The Australian and New Zealand government websites on COVID19 immunization/vaccination are excellent and are constantly updated (2, 3).

Vaccines Available and their Planned Introduction

In both Australia and New Zealand, vaccines have been approved by expert panels of doctors, pharmacists and scientists, before they are offered to people. In Australia this body is known as the Therapeutic Goods Advisory Committee. They have consulted with the WHO and the European Medicines Authority. Both countries are planning a staged program with a priority list starting with immunization for Quarantine workers including all staff who work at quarantine facilities and frontline workers such as nurses and doctors and workers in the Aged care systems. Depending on the availability of vaccine, it is then planned to offer immunization to other at-risk groups and eventually the whole population. There are 3 vaccines approved for Emergency use. These 3 vaccines are bioengineered to use cells in the person receiving immunization, to produce an immune response to the Spike protein on COVID-19.

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| i. | BioNTech/Pfizer | 2 doses |
| ii. | Moderna INIAID | 2 doses |
| iii. | Astra Zeneca | 2 doses |

The BioNTech/Pfizer vaccine is ready to go and both countries expect that the first shipment of vaccine doses will arrive at the end of February. It has to be stored/transported and dispensed from a very low temperature container and that will mean that it is only given from centres with these facilities. The Moderna vaccine does not require such low temperature when ready to inject in people. The Astra Zeneca vaccine was developed with Australian assistance, and will also be manufactured in Australia by CSL/Boehringer. It is more robust and does not need ultra-low temperature storage so it will be far more portable to non-urban centres and remote towns in our countries.

All the vaccines have to be injected, usually just under the skin on the shoulder, and the two doses are given several weeks apart. The amount injected is tiny. There may be some swelling at the injection site over several days and a small proportion of people immunized, may have a low-grade fever for a few days. These symptoms are minor compared to the infection.

Challenges for health workers and people with Short Stature/skeletal dysplasias

SSPA members know that there are over 300 different dwarfing disorders/skeletal dysplasias. The clinical, X-ray and genetic distinction is usually a huge challenge for most doctors or health workers such as public health nurses.

There are no body size or weight vaccine recommendations at present, but for most adults the vaccine dose does not need to be modified.

Special consideration must be given to those people with Skeletal Dysplasias who have some type of Immunodeficiency. The best-known skeletal dysplasia with Immunodeficiency is Cartilage Hair Hypoplasia (CHH). A recent review of the issues with regard to COVID-19

immunization with live vaccines in CHH and other syndromes with possible immunodeficiency was undertaken by the expert staff of the CHH registry (4). They concluded that individuals considered for immunization with a live vaccine should have recent and thorough immunological studies performed to assess their immunological response to injection with a vaccine.

This means that all people with skeletal dysplasias with any type of immunodeficiency should have a proper diagnosis and current immunological studies. The PAB will make this an agenda item for its next PAB round table as we will need a network of experts who can offer investigation in Australia and New Zealand to people with short stature who do not know their primary diagnosis. The 3 vaccines above are bioengineered and not live vaccines. Several inactivated vaccines are also separately being tested at the present time and these may be needed for some rare disorders.

Everyone must be aware that while Governments in Australia and New Zealand have moved quickly to develop diagnostic services and plans for progressive immunization against the original COVID-19/SARS-cov-2 virus, viruses keep changing. This is sometimes described as evolution in virus strains. We already know about a London strain, South African and South American. These are identified by sequencing the letters of the genetic code of each virus. It is hoped that the presently available vaccines will be effective. Vaccine manufacturers are already preparing to re-engineer the vaccines if this is not the case, similar to the way that Flu vaccines are updated each year.

REFERENCES

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3. New Zealand Covid19 Vaccination. <https://covid19.govt.nz/health-and-wellbeing/covid-19-vaccines/getting-a-covid-19-vaccine/>
4. Vakkilainen S, Kleino I, Honkanen J et al. The safety and Efficacy of Live Viral Vaccines in Patients with Cartilage-Hair Hypoplasia. Frontiers in Immunology 11: 1-8 2020.

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