

Infection Risks and the Importance of Vaccinations

For People With Multiple Myeloma

The goal of this brochure is to help enhance and encourage informative discussions with your healthcare team about vaccinations.



Ask your healthcare team about your infection risk and vaccinations that may be right for you.

The topics and materials discussed in this brochure are not intended to replace discussions with your healthcare provider. Your healthcare providers are the most valuable resources for answering questions you may have regarding cancer, treatment, your health, and your well-being.



ONCOLOGY



Reasons Why People With Multiple Myeloma Are at Risk of Infections

Multiple myeloma impairs the immune system¹

Factors that may impact immune system function in people with multiple myeloma:



Age:

Multiple myeloma usually affects older people, who are more vulnerable to infections because immune response declines with age. Older people may also have comorbidities that can alter immune responses.²⁻⁴



Immunosuppression:

Most people with multiple myeloma produce fewer B-cells and T-cells that play an important role in fighting infections and other diseases.⁴



Treatments:

Multiple myeloma treatments used throughout the disease course may influence immune system responses, for example:

- **Steroids:** Corticosteroids that are used at high doses may increase immunosuppression (prevent or interfere with the development of an immune response), thereby lowering your ability to fight infections^{4,5}
- **Immune and targeted therapies:** Immunomodulatory agents, proteasome inhibitors, and monoclonal antibodies can cause myelosuppression (lower blood cell counts)⁶
- **Conventional chemotherapy:** Chemotherapy can suppress the immune system and lower the number of immune system cells, such as white blood cells³
- **Stem cell transplant:** The stem cell transplant process may also decrease the number of white blood cells and weaken the immune system³

Infections in people with multiple myeloma could cause potentially life-threatening events

Infections are common disease complications and unfortunately remain a major cause of hospitalizations and death.⁴

For people with multiple myeloma:

- The risk of infection may be up to 10 times higher than for the general population⁷
- Death rates of multiple myeloma patients due to infections are lower where vaccination rates are higher, such as in the United States⁸

Vaccinations Are Important for Protecting People With Multiple Myeloma From Infections

What vaccines do:

Train your immune system to recognize invading germs and make antibodies.⁹

What vaccines don't do:

Cause disease or put you at risk of its complications.⁹

What happens when you receive a vaccine?

When you receive a vaccine, your immune system responds by⁹:

- Recognizing the invading pathogen, such as a virus or bacteria
- Producing antibodies
- Remembering the pathogen so your body can fight infection

If you are then exposed to the pathogen in the future, your immune system can quickly destroy it before you become unwell. The vaccine is therefore a safe, smart way to produce an immune response in the body without causing illness.⁹

Terms to know about vaccines and vaccinations

Pathogen: a disease-causing organism, such as a bacteria or virus.¹⁰

Antigen: a part of the pathogen that causes the formation of antibodies.¹⁰

Vaccine: a tiny weakened nondangerous fragment of the organism and includes parts of the antigen.¹⁰

Live-attenuated vaccine: uses a weakened (or attenuated) form of the pathogen that causes a disease. Live vaccines create a strong and long-lasting immune response, sometimes giving lifetime protection. Examples include measles, mumps, rubella (MMR), and chickenpox vaccines.¹¹

Inactivated vaccine: uses a killed version of the pathogen that causes disease. Protection is not as strong as with live vaccines, so several doses over time (booster shots) may be required. Examples include rabies and flu (shot form only) vaccines.¹¹

Vaccination: the administration of a vaccine that uses your body's natural defenses to build resistance to specific infections and makes your immune system stronger.⁹



Who is recommended to receive vaccines?

- Centers for Disease Control and Prevention (CDC) recommend that most immunocompromised people, such as people with multiple myeloma, should receive vaccinations¹²
 - Close or household contacts of a person with multiple myeloma should be up to date with vaccines^{13,14}
 - Check guidelines from credible sources, such as the CDC and National Comprehensive Cancer Network (NCCN[®]), for specific vaccination recommendations
 - Consult with your healthcare team for their recommendations
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Who is NOT recommended to receive vaccines?

- Someone experiencing or recently exposed to an infection¹⁵
 - If you have had CAR-T therapy, vaccination should be delayed for at least 3 months after treatment ends to maximize vaccine efficacy¹³
 - On a case-by-case basis according to the advice of your oncologist and/or internist¹⁶
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Special circumstances: after hematopoietic stem cell transplant (HSCT)

- After HSCT, the antibodies for various pathogens that you had before, such as pneumococci (pathogen that causes pneumonia), are significantly reduced and you may be more susceptible to infections^{17,18}
- The NCCN has specific guidelines and a schedule for the vaccines you should receive after stem cell transplant^{13,14,18}
- People who have had an HSCT should be vaccinated with vaccines administered during early childhood: pneumococci, *Haemophilus influenzae* and meningococci, influenza, and recombinant VZV vaccine¹⁸
- Vaccination after HSCT should be delayed for at least 3 months after treatment ends to maximize vaccine efficacy¹³
- If you have had an HSCT, consult with your healthcare team about whether and when to receive any vaccinations

Questions You May Wish to Ask Your Healthcare Team About Vaccinations

1. Should I be vaccinated for flu, pneumonia, shingles, and/or COVID-19 or any other vaccinations?

2. When should I get the vaccines and who will provide them for me?

3. What are the concerns with getting vaccinated?

4. Should I get antibody testing after the COVID-19 vaccine? If so, how often?

5. How will I know if the COVID-19 vaccine is effective and I have sufficient antibody response?

6. Should I get a third mRNA dose (Pfizer or Moderna) in the primary series of COVID-19 vaccination doses and if so, when?

Should I get a first booster dose after the primary series?

And then a second booster dose?

7. Should I get a second dose and a booster after the Johnson & Johnson COVID-19 vaccine?

8. Can I mix and match COVID-19 vaccines, and if so, which combinations are right for me?

My recommended vaccinations

Vaccine	Date(s) given	Comments/reactions
<input type="checkbox"/> Flu		
<input type="checkbox"/> Pneumonia		
<input type="checkbox"/> Shingles #1		
<input type="checkbox"/> Shingles #2		
<input type="checkbox"/> COVID-19 #1		
<input type="checkbox"/> COVID-19 #2		
<input type="checkbox"/> COVID-19 #3		
<input type="checkbox"/> COVID-19 Booster #1		
<input type="checkbox"/> COVID-19 Booster #2		
<input type="checkbox"/> Other Vaccines:		

Vaccinations for Immunocompromised People, Including Those With Multiple Myeloma

Some health organizations have recommendations and guidelines for vaccines for people who are immunocompromised, such as those living with multiple myeloma or other types of cancer. Other organizations have guidelines specific to people with multiple myeloma. Consult with your healthcare team on which vaccinations are right for you.

Vaccination	Influenza	Pneumonia	Varicella zoster (shingles) ¹⁸
Recommending Organization(s)	EMN, WHO, CDC/ACIP, and NCCN ^{14,18,19}	CDC ¹²	EMN
Considerations	Immunocompromised patients should only receive the inactivated influenza vaccine. ^{14,19}	<p>There are 3 recommended vaccines for age 65 and older¹²:</p> <ul style="list-style-type: none"> • Pneumococcal conjugate vaccines, or PCV15 and PCV20 • Pneumococcal polysaccharide vaccine, or PPSV23 <p>Recommendation is for 1 dose PCV15 followed by PPSV23* OR 1 dose PCV20.</p> <p>*Also recommended for immunocompromised individuals such as with multiple myeloma.</p> <p>See CDC guidance for patients who have already received a previous dose of PCV13 and/or PPSV23.</p>	Multiple myeloma patients should receive the recombinant vaccine.
Timing	<ul style="list-style-type: none"> • Annually before flu season starts¹⁹ • During some period either before or after interventions that compromise immunity may be appropriate¹⁹ 	Specifics of dosing schedule are dependent on age and prior vaccination for pneumonia. ¹²	2 doses, by injection, 2 to 6 months apart.

Abbreviations: ACIP=Advisory Committee on Immunization Practices; CDC=Centers for Disease Control and Prevention; COVID-19=coronavirus disease 2019; EMN=European Myeloma Network; FDA=Food and Drug Administration; NCCN=National Comprehensive Cancer Network; WHO=World Health Organization.

COVID-19 vaccines were originally available under Emergency Use Authorization (EUA). On August 23, 2021, the Pfizer mRNA vaccine, now called Comirnaty[®], was the first COVID-19 vaccine to be officially approved for individuals 16 years of age and older by the FDA. Third doses of Comirnaty[®] for people who are immunocompromised are still available under EUA.²⁰

COVID-19*- Pfizer and Moderna	COVID-19* Johnson & Johnson (J&J) Janssen
CDC and Pfizer Product Label (EUA)	CDC
<ul style="list-style-type: none"> • Each person should consult with their healthcare team regarding whether and what dosing of COVID-19 vaccine is right for them • Complete your primary series of 3 COVID-19 vaccines and get a booster,²¹ and then a second booster may be given²³ 	<ul style="list-style-type: none"> • Each person should consult with their healthcare team regarding whether and what dosing of COVID-19 vaccine is right for them • For people who have received the first dose of the J&J COVID-19 vaccine, the CDC recommends a second dose with the Pfizer or Moderna COVID-19 vaccine and a booster of either the Pfizer or Moderna COVID-19 vaccine²¹ • Although mRNA vaccines are preferred for people 18 years and older, the J&J COVID-19 vaccine may be considered in some situations²¹
<ul style="list-style-type: none"> • Third dose in series: at least 4 weeks after a second dose^{21,22} • First mRNA booster should be given at least 3 months after 3rd dose²¹ • Second mRNA booster can be given at least 4 months after first booster²³ 	<ul style="list-style-type: none"> • Second dose 4 weeks after the 1st dose²¹ • Booster at least 2 months after 2nd dose²¹ • Adults who received a primary vaccine and booster dose of J&J Janssen COVID-19 vaccine at least 4 months ago may now receive a second booster dose using an mRNA COVID-19 vaccine²³

*Recommendations current as of March 30, 2022. Please consult with your healthcare team for the most up-to-date information.

Additional Online Resources*

American Cancer Society

www.cancer.org
1-800-227-2345

CancerCare®

www.cancercare.org
1-800-813-HOPE (4673)

Centers for Disease Control and Prevention (CDC)

www.cdc.gov

International Myeloma Foundation (IMF)

www.myeloma.org
1-800-452-2873

The Leukemia and Lymphoma Society (LLS)

www.lls.org
1-800-955-4572

Multiple Myeloma Research Foundation (MMRF)

www.themmr.org
1-203-229-0464

Myeloma Crowd

www.myelomacrowd.org
1-800-709-1113

World Health Organization (WHO)

www.who.int/health-topics/vaccines-and-immunization

*We hope you will use the resources above to find the people, tools, and education that will enable you to become an active participant in your care. Takeda Oncology is not affiliated with these organizations. By listing these resources, Takeda Oncology is not endorsing any service or group and we are not responsible for the content of these sites or services. They are provided here for informational purposes and are not meant to replace your healthcare provider's medical advice.

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