

Vaccination Survey

Dear Patients,

we kindly ask you to take part in this initiative. This anonymous survey is intended to increase the awareness of myeloma patients and their care team on the importance of vaccinations for the prophylaxis of infections.

Many thanks for the few minutes of your time. We kindly ask for completion of the survey until December 15, 2020.

1) I am member of one (or more) of the following self-help groups or regularly inform myself on the websites of (multiple answers possible):

- Myelom Deutschland e.V.
- Multiples Myelom Selbsthilfe Österreich
- Myelom-Lymphom Hilfe Österreich
- I am not a member of a self-help group

2) Year of birth

3) Sex male female

4) Residence

5) Are you a myeloma patient or a relative?

- I am a myeloma patient
- I am a relative living in the same household (please continue at question 13)

6) When have you been diagnosed with multiple myeloma?

Year/Month

7) When was treatment started?

Year/Month

8) How many treatment lines have you received?

- 1 2 3 4 5 >5

9) Which was your first treatment?

10) Did you undergo an autologous stem cell transplantation?

yes no

11) How many infections did you have the year before multiple myeloma was diagnosed?

none 1-3 4-6 >6

12) How many infections did you have during the first 6 months of your first treatment?

none 1-3 4-6 >6

13) Did you receive any recommendations for vaccination from your doctor/care team, and if yes, for which vaccines?

Which vaccinations have you actually received? (please specify)

	Recommended by doctor	Vaccinations I have received	Year/Month (last shot)	
Influenza	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no	If yes, when?	
Pneumococci	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no	If yes, when?	
Herpes zoster	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no	If yes, when?	
Hepatitis A	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no	If yes, when?	
Hepatitis B	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no	If yes, when?	
TBE*	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no	If yes, when?	
Haemophilus infl.	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no	If yes, when?	
MMR**	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no	If yes, when?	
DTP***	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no	If yes, when?	

*tick borne encephalitis, ** measles/mumps/rubella, ***diphtheria/tetanus/pertussis

14) The response to vaccination can be verified through investigation of antibody levels. This information can be helpful for further recommendations on vaccination. Have you had an investigation of antibody levels after one of the following vaccinations (multiple answers possible)?

Influenza

Pneumococci

Herpes zoster

Other:

15) Do you object to vaccinations in general?

- yes no (please continue at question 17)

16) If yes, what are your reasons? (multiple answers possible)

- I think vaccinations are not effective/helpful
- I am afraid of short-term side effects
- I am afraid of long-term side effects
- Skepticism towards pharmaceutical industry
- Other:

17) Vaccines against COVID-19 will be available soon; will you be willing to get vaccinated?

- yes (please continue at question 19) no

18) If no, what are your reasons? (multiple answers possible)

- I think these vaccines will not be effective/helpful
- I am afraid of short-term side effects
- I am afraid of long-term side effects
- Skepticism towards pharmaceutical industry
- No experience on long-term effects on safety is available
- Other:

19) Have you already had COVID-19?

- yes no

20) How satisfied are you with the quality of your communication regarding vaccination with your doctor/care team?

- very satisfied satisfied sufficient dissatisfied very dissatisfied

Thank you again for taking the time to complete this survey!

Myelom-Lymphom Hilfe Österreich, Multiples Myelom Selbsthilfe Österreich, Myelom Deutschland e.V. and Wilhelminen Cancer Research Institute, Vienna, Austria.

Supplementary Table 1. Recommendations for vaccination in patients with multiple myeloma⁴

Infections	Vaccine type	Recommendation	Doses	Supported by	Comments
Influenza	Trivalent or quadrivalent (strains selected according seasonal prevalence)	All patients, non-immune family members, close contacts and HCWs	2, if antibody response after 1 st administration documented, 1, yearly	CDC NCCN	CDC recommends high-dose flu vaccine in people 65 years of age or older
Hepatitis A	Inactivated hepatitis A vaccine	Patients travelling to areas of high endemicity	2	NCCN	May test ≥1 month after last dose
Hepatitis B	Recombinant hepatitis B vaccine	Patients travelling to areas of high endemicity, behavioral /occupational exposure, hemodialysis	3	NCCN	May test ≥1 month after last dose, Revaccination in non-responder, consider booster dose if antibody level <10IU/L, may retest every 5 years
Pneumococci	PCV13	All patients	1	CDC, IDSA, NCCN	Conjugated vaccine to a mutant diphtheria toxin induces T cell response
	PV23	>2 months, or 6-12 months after PCV13 according to other CDC	1-3 Repeat in 3 years	NCCN for pts <65 years at first dose	Polysaccharide vaccine, less immunogenic than PCV
Haemophilus influenzae	Haemophilus influenzae type B conjugate	All patients	1	CDC, NCCN ¹	May test ≥ 1 month after last dose ¹ also in patients travelling to endemic areas or in case of local outbreak
Meningococci	Meningococcal conjugate	Patients with asplenia, complement deficiency, recurrent episodes of bacterial infections*	1	CDC, NCCN ¹	¹ also in patients travelling to endemic areas or in case of local outbreak
Tetanus, diphtheria toxoids, and pertussis combined	Tetanus and diphtheria toxoids, and acellular pertussis	Patients who did not receive a primary vaccination for TDP, or a booster dose of tetanus and diphtheria toxoid vaccine. May be limited to tetanus only based on epidemiological prevalence	3	CDC, NCCN, WHO	May test for tetanus antibody titers at baseline and ≥1 month after last dose Booster dose of tetanus every 10 years
Herpes zoster					
	Recombinant VZV glycoprotein E vaccine	All patients with MM	2	EMN	Antibody response in 80.4%
	Inactivated VZV vaccine ¹	All patients with MM	4	EMN	Estimated vaccine efficacy: 63%

¹ only in case Recombinant VZV glycoprotein E vaccine is not available, CDC-Center of Disease Control, NCCN- National Comprehensive Cancer Network, IDSA- Infectious Disease Society of America, EMN- European Myeloma Network

Supplementary Table 2. Preliminary considerations for vaccination of patients with multiple myeloma against COVID-19

Infections	Vaccine type*	Recommendation	Doses	Supported by	Comments
SARS-CoV-2	RNA-vaccine ^{1,2} , Adenovirus vector vaccine ^{3,4,5,5} , Inactivated SARS-CoV-2 vaccine ^{6,7} , Peptide vaccine ⁸	All patients with MGUS, SMM, well controlled multiple myeloma. Patients with active disease undergoing therapy may be vaccinated but there is no clear consensus among experts.	2, for most vaccines	IMS**	Immune response to vaccination may be impaired by both myeloma induced-immune impairment, and by anti-myeloma therapy. Protective response may be even lower in patients with poorly controlled disease.

*approved vaccines at time of writing: ¹Pfizer-BioNtech, ²Moderna, ³Sputnik, ⁴Oxford-Astra Zeneca, ⁵anoSinoBiologics, ⁶Janssen Pharmaceutica, ⁷Sinovac, ⁸Bharat Biotech, ⁸Vector Institute, **International Myeloma Society

Supplementary Table 3: Recommended vaccination schedule after autologous or allogeneic HCT (according to NCCN®)¹⁰

Inactivated Vaccines ¹	Recommended Timing after HCT	Number of Doses
DTaP (Diphtheria/Tetanus/Acellular Pertussis)	6-12 months	3
	6-12 months	3
Pneumococcal vaccination <ul style="list-style-type: none"> • Conjugated 13-valent vaccine • Upon completion of PCV13 series, then PPSV23 	6-12 months ≥12 months	3 1
Hepatitis A ² (Hep A)	6-12 months	2
Hepatitis B ² (Hep B)	6-12 months	3
Meningococcal conjugate vaccine ³	6-12 months	1-2
Influenza (injectable) ⁴	4-6 months	1 ⁴ , annually
Inactivated Polio vaccine	6-12 months	3
Recombinant zoster vaccine	50-70 days after autologous HCT May be considered after allogeneic HCT ⁵	2
Human papillomavirus (HPV) vaccine	>6-12 months For patients up to age 26, consider up to age 45	3
Live Vaccines	Recommended Timing after HCT	Number of Doses
Measles/Mumps/Rubella (MMR) ⁶	≥24 months (if no GVHD or ongoing immunosuppression and patient is seronegative for measles, mumps, and/or rubella)	1-2
Varicella vaccine ⁶	≥24 months (if no GVHD or ongoing immunosuppression and patient is seronegative for varicella)	1
Zoster vaccine ^{6,7} (category 3)	May be considered at ≥24 months (if no GVHD or ongoing immunosuppression)	1

¹ Inactivated vaccines may be given as a combined vaccine. Vaccination may be postponed for patients receiving >20mg of prednisone.

² Strongly consider if clinically indicated. May consider Hepatitis A and B combined vaccine if immunization for both is needed.

³ Meningococcal B vaccine should be considered for high-risk patients such as patients with asplenia or complement deficiency or patients receiving eculizumab.

⁴ As antibody response may be suboptimal, EMN recommends a second administration, or confirmation of antibody response by adequate testing

⁵ Efficacy in allogeneic HCT, in the presence of GVHD, or ongoing immunosuppression as not been established (Bastidas A et al. JAMA 2019;322:123-133)

⁶ MMR and varicella/zoster vaccines may be given together or 4 weeks apart

⁷ Because of insufficient data on safety and efficacy of live zoster vaccine among HCT recipients, physicians should assess the immune status of each recipient on a case-by-case basis and determine the risk for infection before using the vaccine. Randomized data exist for use of the recombinant zoster vaccine in patients receiving autologous HCTs but not for the live zoster vaccine.