Relapse activity and disability progression in COVID-vaccinated patients with multiple sclerosis: Homologous vs. heterologous vaccination scheme

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Background

Vaccination reduces the likelihood of a severe COVID-19 disease course. Therefore, vaccination against COVID-19 is generally recommended, also for people with autoimmune diseases such as multiple sclerosis (MS). Nevertheless, some people with MS (PwMS) have concerns about the vaccinations due to fear of disease worsening after the vaccinations.

Objective

We aimed to analyze relapse activity and disability progression of PwMS stratified by COVID-19 vaccination scheme (homologous [HOM] vs. heterologous [HET]) considering basic as well as booster immunization.

Results

Table 1. Study population stratified by COVID-19 vaccination scheme

	Total N=2,062	**HET: mRNA + vector** N=260	**HET: different mRNA** N=577	**HOM:** N=1,225	**p-value**
Age [years] *median (25%, 75% quantile)*	47.5 (39.0, 54.8)	47.4 (39.1, 57.4)	48.4 (40.2, 55.5)	47.0 (38.2, 54.3)	**0.012**
Gender *N (%)*					1.0
Male	433 (21.2)	52 (20.2)	127 (22.1)	254 (20.9)	
Female	1607 (78.5)	205 (79.8)	446 (77.6)	956 (78.7)	
Diverse	6 (0.3)	0 (0.0)	2 (0.3)	4 (0.3)	
MS course *N (%)*					0.3
RRMS	1542 (74.8)	189 (72.7)	444 (76.9)	909 (74.2)	
SPMS	359 (17.4)	55 (21.2)	86 (14.9)	218 (17.8)	
PPMS	78 (3.8)	9 (3.5)	26 (4.5)	43 (3.5)	
Undefined	83 (4.0)	7 (2.7)	21 (3.6)	55 (4.5)	
Disease duration [years] *median (25%, 75%)*	11.2 (5.7, 18.8)	11.5 (3.3, 19.4)	12.4 (6.6, 19.2)	10.9 (5.3, 18.7)	0.073
DMT-treated *N (%)*	1522 (73.9)	182 (70.0)	422 (73.3)	918 (75.1)	0.2
Relapses within the year prior to 1st vaccination *N (%)*	295 (14.3)	38 (14.6)	83 (14.4)	174 (14.2)	1.0
Time from latest pre-vaccination relapse to 1st vaccination [months] *median (25%, 75% quantile)*	3.3 (1.35, 7.0)	3.2 (1.3, 7.6)	3.85 (1.4, 7.5)	3.2 (1.3, 6.6)	0.4
Relapses following any vaccination *N (%)*	105 (5.1)	18 (6.9)	30 (5.2)	57 (4.7)	0.3
ARR (95% CI)	0.23 (0.21-0.26)	0.31 (0.17-0.53)	0.26 (0.21-0.32)	0.22 (0.19-0.25)	0.4

ARR – annualized relapse rate; CI – confidence interval; DMT – disease-modifying therapy; HET – heterologous vaccination theme; HOM – homologous vaccination scheme; MS – multiple sclerosis; N – number of patients; PDDS – patient-determined disease steps

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Declaration of interest: Niklas Frahm is an employee of the MSFP. Moreover, he is an employee of Rostock's University Medical Center and received travel funds for research meetings from Novartis. David Ellenberger, Firas Fneish, Sarah Schilling and Melanie Peters had no personal financial interests to disclose other than being employees of the German MS Registry. Judith Haas serves as president of the German MS Society, federal association, which receives funding from a range of public and corporate sponsors, recently including BMG, G-BA, The German MS Trust, Biogen, BMS, Merck Serono, Novartis, Roche, Sanofi, and Viatris. None resulted in a conflict of interest. Micha Löbermann received speaker honoraria from Sanofi, AbbVie and Pfizer, he served as investigator in vaccine studies sponsored by Janssen, GSK and Novartis. Friedemann Paul has received speaking fees, travel support, honoraria from advisory boards and/or financial support for research activities from Bayer, Novartis, Biogen, Bristol Myers Squibb, Teva, Sanofi ventis/Genzyme, Merck Serono, Alexion, Chugai, MedImmune, Shire, German Research Council, Werth Stiftung of the City of Cologne, German Ministry of Education and Research, EU FP7 Framework Program, Arthur Arnstein Foundation Berlin, Guthy Jackson Charitable Foundation and National Multiple Sclerosis of the USA. He serves as academic editor for PLoS ONE and associate editor for Neurology, Neuroimmunology and Neuroinflammation. Dieter Pöhlau received speaking fees, travel support and financial support for research projects from: Allmirall, Bayer, Biogen-Idec, Merck-Serono, Octapharma, Novartis, Roche, Sanofi-Aventis and Teva. Anna-Lena Röper is an employee of the MSFP and Germany MS society, which is funded by many public and corporate sponsors. She received travel funds from Novartis. None resulted in a conflict of interest. Alexander Stahmann has no personal financial interests to disclose, other than being the leader of the German MS Registry, which receives (project) funding from a range of public and corporate sponsors, recently including G-BA, The German MS Trust, German MS Society, Biogen, Bristol Myers Squibb, Merck, Novartis, Roche, Sanofi and Viatris. Herbert Temmes has no personal pecuniary interests to disclose, other than being the Secretary General of the German MS Society, federal association, which receives funding from a range of public and corporate sponsors, recently including Bundesgesundheitsministerium (BMG), The German Innovation Fund (G-BA), The German MS Trust, Biogen, Bristol Myers Squibb, Merck Serono, Novartis, Roche, Sanofi, Viatris (former Mylan). Uwe K. Zettl has received speaking fees, travel support and /or financial support for research activities from Alexion, Almirall, Bayer, Biogen, Bristol Myers Squibb, Janssen, Merck Serono, Novartis, Octapharma, Roche, Sanofi Genzyme, Teva as well as EU, BMBF, BMWi and DFG.

Methods

This study is based on a longitudinal observational study regarding the safety and tolerability of COVID-19 vaccines in PwMS [1]. Acquisition of socio-demographic, clinical and vaccination data was conducted via several pseudonymized online surveys. PwMS with a minimum age of 18 years, a diagnosis of MS and a basic immunization (usually two vaccinations) as well as ≥1 booster vaccination against COVID-19 were included (N=2,062). Patients with HOM (same vaccine) and HET vaccination schemes (mRNA + vector vaccines or different mRNA vaccines) were compared regarding relapse activity following vaccination and disability status (patient-determined disease steps [PDDS]).

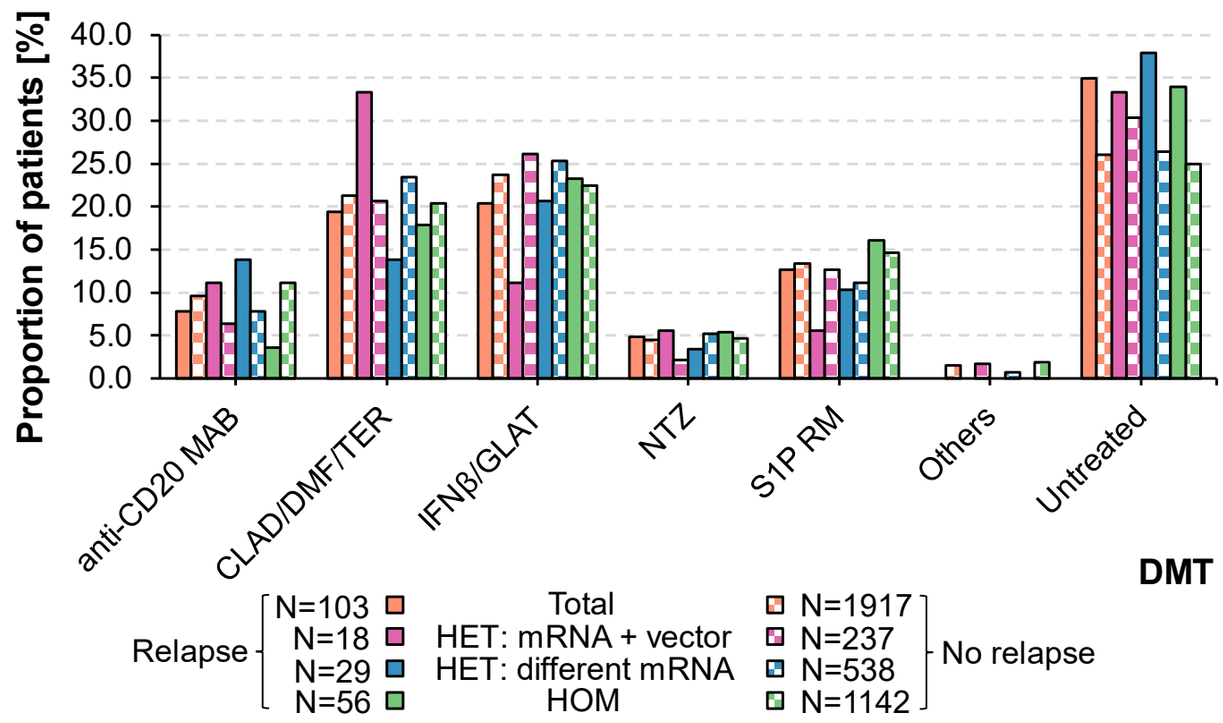

Figure 1. Use of DMT in MS patients with and without relapses following COVID-19 vaccination stratified by vaccination scheme.
CLAD – cladribine; DMF – dimethyl fumarate; DMT – disease-modifying therapy; GLAT – glatiramer acetate; HET – heterologous vaccination scheme; HOM – homologous vaccination scheme; IFNβ – interferon beta; MAB – monoclonal antibody; N – number of patients; NTZ – natalizumab; PDDS – patient-determined disease steps; S1P RM – sphingosine-1-phosphate receptor modulator; TER - teriflunomide.

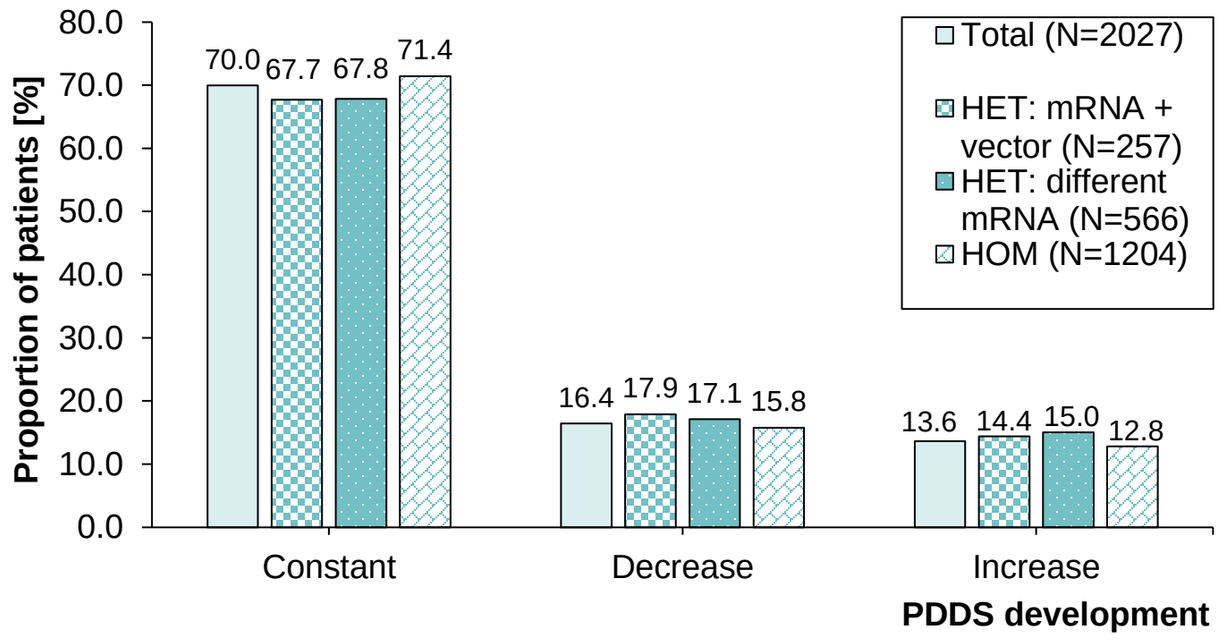

Figure 2. Changes of disability level (PDDS) from 1st COVID-19 vaccination to booster vaccination.
HET – heterologous vaccination scheme; HOM – homologous vaccination scheme; N – number of patients; PDDS – patient-determined disease steps.

Conclusions

The frequency of relapses and disability progression following COVID-19 vaccinations do not appear to be associated with the type of vaccination regimen administered.

References

[1] Frahm N, Fneish F, Ellenberger D, et al. SARS-CoV-2 vaccination in patients with multiple sclerosis in Germany and the United Kingdom: Gender-specific results from a longitudinal observational study. Lancet Reg Health - Eur 2022; 22: 100502.