

Table 5. The effect of different medication on the outcomes efficacy, immunogenicity, and safety.

Medication	Effect of medication on efficacy	Effect of medication on safety – adverse events	Effect of medication on safety – disease activity	Effect of medication on immunogenicity
Anti-TNFα				
Anti-TNF α (not further specified)	n=1 Invasive pneumococcal disease in 1 patient.	n = 24 No difference in AE and respiratory tract infections between patients with and without anti-TNF α .	n= 17 Decrease in DA parameters in patients using anti-TNF α compared with patients using MTX.	N=60 ^a No difference in seroprotection, seroconversion or post-vaccination GMTs in patients using anti-TNF α compared with control. 4 patients were non respondent to Hepatitis A vaccine and 4 to Hepatitis B vaccine.
Adalimumab				n=5 No difference in seroprotection, seroconversion or post-vaccination GMTs in patients using adalimumab compared with control.
Etanercept		n=31 No AEs related to etanercept.		n=49 No difference in seroprotection, seroconversion or post-vaccination GMTs in patients using etanercept compared with control. One patient had an vaccine response after the second dose. ^b
Immunosuppressives				
Abatacept	n=1 Chickenpox infection with normal disease course in 1 JIA patient. ^b			n=30 No effect of abatacept on protective antibody levels. No response to the second dose in 1 patient. ^b
Interleukin inhibitors				
Tocilizumab				n=6 No difference in seroprotection, seroconversion or post-vaccination GMTs in patients using tocilizumab compared with control.
Anakinra				n=4 No difference in seroprotection, seroconversion or post-vaccination GMTs in patients using anakinra compared with control.
Amino salicylates				
Sulfasalazine				n=1 Patient using sulfasalazine was negative for anti-hepatitis B.
DMARDs				
DMARDs (not further specified)		n=30		n=79

		No AE related to DMARDs.		No differences in seroprotection, seroconversion, or GMTs in patients using DMARDs compared with control. n=40 No effect on titers rates. ^c
Methotrexate	n=1 Chickenpox infection in 1 JIA patient with normal disease course. ^b	n=18 No difference in AEs between patients with and without MTX.	n=60 No difference in JADAS score and flares between vaccinated and unvaccinated patients using MTX. ^c	n=228 No difference in seroprotection, seroconversion or post-vaccination GMTs in patients using MTX compared with control. n=95 1 patients had no seroprotection for mumps. ^c 1 patient had no seroprotection for mumps, no effect on measles and rubella. ^c No effect of MTX on GMT and seroprotection. ^c
NSAIDs				
NSAIDs				n=10 Usage of NSAIDs had no effect on the immune response.
Biologics				
Biologics (not further specified)		n=15 No AEs related to biologics.	n=15 No difference in JADAS score and flares between vaccinated and unvaccinated patients using biologics. ^c	n=15 Revaccinated patients taking biologics at the time of revaccination were seroprotected. ^c n=3 No increase in antibody concentrations (n=3) when using biologics at time of first vaccination. ^b
Corticosteroids				
Glucocorticosteroid				n=28 Usage of glucocorticosteroids had no effect on GMT or seroprotection. n=28 Usage of glucocorticosteroids had no effect on GMT and seroprotection. ^c
Combinations				
Corticosteroids and MTX	n=1 Chickenpox infection in 1 JIA patient with normal disease course. ^b		n=2 Temperature elevation and mild rash after vaccination. ^b	
TNF and MTX		n=8 No difference in AEs between		n=8 No differences in seroprotection, seroconversion or post-vaccination

		patients with and without MTX.		GMTs in patients using anti-TNF α combined with MTX compared with control.
MTX, corticosteroids and ciclosporine			n=1 Temperature elevation and mild rash after vaccination ^b	

AE, adverse event; DA, disease activity; GMT, geometric mean titer; JIA, juvenile idiopathic arthritis; DMARDs, disease-modifying antirheumatic drugs; JADAS, Juvenile Arthritis Disease Activity Score; MTX, methotrexate; NSAIDs, non-steroidal anti-inflammatory drugs; TNF, tumor necrosis factor.

^aExact patient number is unknown, because one study did not report the exact amount of patients using anti-TNF α

^bStudy results in patients receiving VZV vaccination

^cStudy results in patients receiving MMR vaccination