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Prediction of sustained biologic and targeted synthetic DMARD free remission in rheumatoid arthritis patients

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The goal of treatment in rheumatoid arthritis (RA) is to reach disease remission. Currently, there is no guidance on whether a patient can stop biologic or targeted synthetic disease-modifying antirheumatic drugs (b/tsDMARDs) after reaching remission without risking a relapse. Therefore, we aimed to predict the ability to achieve sustained remission after stopping b/tsDMARDs. We defined sustained remission as being off b/tsDMARD treatment for at least 1 year.

We identified several models that predicted if a patient stopping b/tsDMARD would be able to sustain remission for 1 year. These models included several variables that were measured at the time the b/tsDMARD treatment was stopped. The best four models are presented in Table 1.

For every prediction model, validation is necessary. The models have been tested on SCQM data and were found to be valid to predict sustained b/tsDMARD free remission. However, they have not been tested in external data and it therefore remains to be seen whether these models also apply to patients outside of SCQM.

Table 1. Variables selected by different model selection algorithms predicting sustained b/tsDMARD free remission

	Forward selection, entry level $p \leq 0.5$	Backward selection		LASSO selection
	≤ 10 variables	Stay level $p \leq 0.075$	Stay level $p \leq 0.05$	Regularization parameter: 0.49
Naïve c-statistics	0.77	0.82	0.77	0.75
Optimism corrected c-statistics	0.694	0.72	0.70	0.686
Heart diseases	x	-	-	-
Methotrexate use	x	-	-	x
RA duration	x	x	x	x
Other pain/anti-inflammatory drug use	x	x	x	x
IA of RA duration and	x	x	x	x

other pain/anti-inflammatory drug use				
Family history of RD	x	x	-	-
Duration of b/tsDMARD use	x	x	-	x
Prior infections	x	-	-	-
EuroQol score	-	x	x	-
DAS28esr score	-	x	-	-
HAQ score	-	x	-	-
IA of HAQ score and duration of b/tsDMARD use	-	x	-	-
Education	-	x	x	-

b/tsDMARD: biologic or targeted synthetics disease modifying antirheumatic drug; DAS28-esr: disease activity based on 28 joints and erythrocyte sedimentation rate; EuroQol: quality of life (EQ-5D); Fam. hist.: family history; HAQ: health assessment questionnaire; IA: interaction; LASSO: least absolute shrinkage and selection operator; med.: medication; miss.: missing; NA: not applicable; RA: rheumatoid arthritis; RD: rheumatic diseases; "x": variable was selected "-": variable was not selected