

Table S1 Disease-modifying anti-rheumatic drugs used in the definition of diseases

Category	Drugs
csDMARD	Methotrexate, Hydroxychloroquine, Leflunomide, Sulfasalazine, Tacrolimus, Cyclosporine, D-penicillamine, Bucillamine, Azathioprine, Minocycline, Mizoribine
bDMARD	Adalimumab, Etanercept, Infliximab, Golimumab, Rituximab, Abatacept, Tocilizumab
tsDMARD	Tofacitinib

Abbreviations: csDMARD, conventional synthetic disease-modifying anti-rheumatic drug; bDMARD, biologic disease-modifying anti-rheumatic drug; tsDMARD, targeted synthetic disease-modifying anti-rheumatic drug.

Table S2 The risk of gallstone disease and undergoing cholecystectomy according to exposure to biologic DMARDs (bDMARDs) and targeted synthetic DMARDs (tsDMARDs) in patients with rheumatoid arthritis (RA)

Outcome	Subgroup	N	Occurrence	Duration	Rate	Adjusted HR	P value
Gallstone disease							
By RA status and bDMARDs or tsDMARDs use	Control	139,569	7,697	762662.98	10.09	1(Ref.)	<0.001
	RA, untreated with bDMARDs or tsDMARDs	42,734	3,514	226062.55	15.54	1.57 (1.50–1.63)	
	RA, treated with bDMARDs or tsDMARDs	3,789	361	20958.34	17.22	1.79 (1.61–1.99)	
By RA seropositivity and bDMARDs or tsDMARDs use	Control	139,569	7,697	762662.98	10.09	1(Ref.)	<0.001
	SPRA, untreated with bDMARDs or tsDMARDs	29,655	2,497	156750.13	15.93	1.61 (1.54–1.68)	
	SPRA, treated with bDMARDs or tsDMARDs	3,474	333	19336.22	17.22	1.79 (1.60–1.99)	
	SNRA, untreated with bDMARDs or tsDMARDs	13,079	1,017	69312.42	14.67	1.47 (1.38–1.57)	
	SNRA, treated with bDMARDs or tsDMARDs	315	28	1622.12	17.26	1.82 (1.26–2.64)	
Cholecystectomy							
By RA status and bDMARDs or tsDMARDs use	Control	139,569	1553	776916.98	2.00	1(Ref.)	<0.001
	RA, untreated with bDMARDs or tsDMARDs	42,734	551	233026	2.36	1.20 (1.09–1.32)	
	RA, treated with bDMARDs or tsDMARDs	3,789	27	21831.34	1.24	0.63 (0.43–0.93)	
By RA seropositivity and bDMARDs or tsDMARDs use	Control	139,569	1553	776916.98	2.00	1(Ref.)	<0.001
	SPRA, untreated with bDMARDs or tsDMARDs	29,655	393	161702.82	2.43	1.24 (1.11–1.39)	
	SPRA, treated with bDMARDs or tsDMARDs	3,474	26	20117.85	1.29	0.67 (0.45–0.98)	
	SNRA, untreated with bDMARDs or tsDMARDs	13,079	158	71323.18	2.22	1.11 (0.94–1.31)	
	SNRA, treated with bDMARDs or tsDMARDs	315	1	1713.49	0.58	0.29 (0.04–2.06)	

RA, rheumatoid arthritis; SPRA, seropositive RA; SNRA, seronegative RA; bDMARD, biologic disease-modifying anti-rheumatic drug; tsDMARD, targeted synthetic disease-modifying anti-rheumatic drug.

Table S3 Stratified analysis of the association between RA status and gallstone disease and cholecystectomy risk by age, sex and underlying disease

Variables	Subgroup	Gallstone disease		Cholecystectomy	
		RA vs. Control		RA vs. Control	
		aHR (95% CI)	P interaction	aHR (95% CI)	P interaction
Sex	Male	1.57 (1.46–1.69)	0.755	1.13 (0.95–1.36)	0.826
	Female	1.59 (1.52–1.663)		1.16 (1.04–1.3)	
Age (years)	40–59	1.60 (1.51–1.69)	0.693	1.15 (1.0–1.32)	0.896
	≥60	1.57 (1.49–1.66)		1.16 (1.02–1.33)	
Obesity	No	1.61 (1.53–1.69)	0.267	1.17 (1.04–1.33)	0.678
	Yes	1.54 (1.44–1.64)		1.13 (0.97–1.31)	
Diabetes mellitus	No	1.58 (1.51–1.64)	0.582	1.12 (1.01–1.24)	0.119
	Yes	1.62 (1.48–1.78)		1.37 (1.08–1.73)	
Hyperlipidemia	No	1.53 (1.46–1.61)	0.028	1.03 (0.91–1.17)	0.003
	Yes	1.67 (1.57–1.78)		1.39 (1.19–1.62)	

RA, rheumatoid arthritis; aHR, adjusted hazard ratio; CI, confidence interval.