Table 1. Definition of AIIRD (A) and immunosuppressive agents (B).

A. AIIRD
Rheumatoid Arthritis
Juvenile idiopathic arthritis
Systemic lupus erythematosus
Antiphospholipid syndrome
Adult Still's disease
Systemic sclerosis
Sjogren syndrome
Mixed connective tissue disease
Relapsing polychondritis
Giant cell arteritis
Polymyalgia rheumatica
Takayasu arteritis
ANCA-associated vasculitis:
Microscopic polyangiitis

Granulomatosis with polyangiitis
Eosinophilic granulomatosis with polyangiitis or allergic granulomatous angiitis (Churg-Strauss syndrome)
Polyarteritis nodosa
Behcet disease
Anti-GBM antibody disease (Goodpasture disease)
Cryoglobulinemic syndrome
Inflammatory myositis:
Polymyositis, dermatomyositis, clinically amyopathic dermatomyositis, inclusion body myositis, antisynthetase syndrome
Eosinophilic myositis
Eosinophilic fasciitis
Spondyloarthritis
Ankylosing spondylitis
Psoriatic arthritis
Periodic fever syndromes:
Familial Mediterranean Fever (FMF), TNF receptor associated syndrome (TRAPS),

cryopyrin associated syndrome (CAPS)

B. Immunosuppressive agents

Glucocorticoids
Synthetic DMARDs: methotrexate, sulfasalazine, leflunomide, hydroxychloroquine
Azathioprine
Mycophenolic acid preparations
Cyclosporine
Tacrolimus
Cyclophosphamide
Biological DMARDs:
TNF-a blocking agents: infliximab, etanercept, adalimumab, certolizumab, golimumab
Anti-CD20: rituximab
Anti-IL6: tocilizumab, sarilumab
Anti-BLyS: belimumab

Anti-CTLA4: abatacept
Anti-IL17: secukinumab, ixekizumab
Anti-IL1: canakinumab, anakinra, rilonacept
Anti-IL12/IL-23: ustekinumab
Synthetic targeted DMARDs: tofacitinib, baricitinib
Phosphodiesterase 4 inhibitor: apremilast

AIIRD: auto-immune inflammatory rheumatic disease(s), ANCA: anti-neutrophil cytoplasmic antibodies, DMARD – disease-modifying antirheumatic drug,

GBM: glomerular basement membrane, IL: interleukin, TNF: tumor necrosis factor

Table 1. Herpes zoster infection pooled incidence rates (IR) and pooled incidence rate ratios (IRR).

Disease	AIIRD patients				Controls				Comparison of AIIRD patients & controls			
	Number of studies	Q-test p-value	Pooled IR	95% CI	Number of studies	Q-test p-value	Pooled IR	95% CI	Number of studies	Q-test p-value	Pooled IRR	95% CI
RA	9	<.0001	11.6	9.4-14.0	4	<.0001	6.5	4.7-8.2	4	<.0001	2.3	2.1-2.6
PsA	1	----	9.1	7.8-10.5	0	----	----	----	0	----	----	----
AS	1	----	11.0	8.2-14.3	0	----	----	----	----	----	----	----
SLE	4	<.0001	18.9	8.0-29.7	3	<.0001	5.1	4.5-5.6	3	<.0001	4.0	2.3-5.7
Sjogren	1	----	18.7	17.1-20.5	1	----	8.6	8.1-9.0	1	----	1.2	0.7-2.0
DM	4	0.6	36.0	32.3-39.7	2	0.5	7.0	6.2-7.8	2	0.7	5.1	4.3-5.9
GCA	1	----	11.3	6.4-16.2	1	----	10.0	7.0-13.3	1	----	2.2	2.0-2.4
Overall	21	<.0001	15.1	13.1-17.1	11	<.0001	6.2	6.0-6.5	11	<.0001	2.9	2.4-3.3

Legend:

AIIRD – autoimmune inflammatory rheumatic disease(s), IR – incidence ratio, IRR – incidence rate ratio, RA – rheumatoid arthritis, PsA – psoriatic arthritis,

AS – ankylosing spondylitis, SLE – systemic lupus erythematosus, DM – dermatomyositis, GCA – giant cell arteritis

Table 2 . Pooled prevalence and pooled prevalence ratios of genital human papilloma virus (A), high-risk human papilloma virus (B), cervical high grade squamous epithelial lesions (HGSIL) (C)

A.

AIIRD	*HPV*				*HPV pooled prevalence ratio (comparison to controls)*				
	Number of studies	*Q-test p-value*	*Pooled prevalence*	*95% CI*	*Number of studies*	*Q-test p-value*	*Pooled Prevalence ratio*	*95% CI*	*P values*
SLE	10	<.0001	26%	16-38%	4	0.0	1.6	0.7-3.4	0.233
RA	2	0.099	20%	12-29%	2	0.2	0.7	0.5-1.1	0.147
SSs	1	----	32%	17-52%	1	----	0.8	0.4-1.6	0.616
Overall	13	<.0001	26%	17-36%	7	0.0	1.1	0.6-1.9	0.775

B.

AIIRD	*High-risk HPV pooled prevalence*				*High-risk HPV pooled prevalence ratio (comparison to controls)*				
	Number of studies	*Q-test p-value*	*Pooled prevalence*	*95% CI*	*Number of studies*	*Q-test p-value*	*Pooled Prevalence ratio*	*95% CI*	*P value*
SLE	9	<.0001	21%	15-28%	3	<.0001	1.2	0.5-3.1	0.642
RA	1	----	28%	17-43%	1	----	1.1	0.6-1.9	0.805
SSs	1	----	28%	17-48%	1	----	0.8	0.4-1.7	0.606
Overall	11	<.0001	22%	17-28%	5	<.0001	1.1	6.0-6.5	0.681

C.

AIIRD	HGSIL pooled prevalence				HGSIL pooled prevalence ratio (comparison to controls)				
	Number of studies	Q-test p-value	Pooled prevalence	95% CI	Number of studies	Q-test p-value	Pooled Prevalence ratio	95% CI	P value
SLE	6	0.2	1%	0-2%	2	0.9	7.7	1.1-54.3	0.039
RA	2	>0.1	1%	0-4%	2	0.3	0.2	0.0-1.0	0.049
Overall	8	0.31	1%	0-2%	4	0.0	1.6	0.2-14.6	0.692

Legend: HPV – human papilloma virus, RA – rheumatoid arthritis, SLE – systemic lupus erythematosus, SSc – systemic sclerosis

Table 3. Hepatitis B studies characteristics and Hepatitis B surface antigen (HbsAg)/Hepatitis B core antibody (anti-HBc) rates.

Author, Year	Country	Study Design	Study Outcome	AIIRD, Controls, Sample size	Serology, AIIRD	Serology, Controls	LoE
Zhao 2010[79]	China	Cross-sectional	Prevalence	859 SLE, 83,830 controls	HBsAg 2.3%	HBsAg 10.74%	3b
Mori S 2011[80]	Japan	Cross-sectional	Prevalence	239 RA	HBsAg+ 0.8% Anti-HBc 25.1%	NA	3b
Zheng 2012[81]	China	Cross-sectional	Prevalence	698 RA, 439 AS, 172 other SpA*, 220 OA, 606 controls	HBsAg: RA 9.6% AS 25.39% SpA 14.53%	HBsAg Controls 12.87% OA 8.18%	3b
Alishiri 2013[82]	Iran	Cross-sectional	Prevalence	268 RA	HBsAg 1.49% Anti-HBc 3.35%	NA	4
Watanabe 2013[83]	Japan	Cross-sectional	Prevalence	248 SLE	HBsAg 0.8% Anti-HBc 13.6%	NA	3b
Watanabe 2014[84]	Japan	Cross-sectional	Prevalence	7650 RA 1,031 SLE ___ 837 RA 267 SLE	HBsAg: RA 1.1 SLE 0.3% Anti-HBc: RA 25.6%	NA	3b

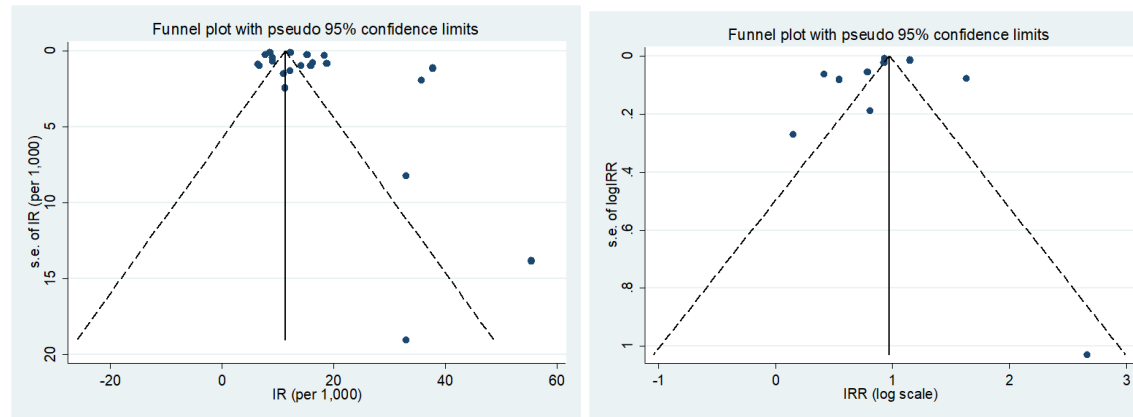|							
					SLE 14.2%		
Sui 2014[85]	China	Cross-sectional	Prevalence	155 SLE 3122 controls	HBsAg 2.58%	HBsAg 4.58%	3b
Chen 2015[86]	China	Cross-sectional	Prevalence	3981 SLE, controls (general population survey, sample size NA)	HBsAg 3.3%, Anti-HBc 25.8%	HBsAg 7.2% Anti-HBc 34.1%	3b
Feuchten-berger 2016[87]	Germany	Cross-sectional	Prevalence	766 RA 58 AS 226 SpA 36 Vasculitis	HBsAg: RA - 0.2% AS, SpA, Vasculitis – 0 Anti-HBc: RA – 6.5% AS – 6.8% SpA – 5.3% Vasculitis – 2.8%	NA	3b
Chiu 2018[88]	Taiwan	Cross-sectional	Prevalence	564 RA 142 AS 77 Pso/PsA	HBsAg: RA 8.5% AS 16.2% Pso/PsA 7.8% Anti-HBc: RA 63.5% AS 38.6% Pso/PsA 50.6%	NA	3b

Legend: AIIRD – autoimmune inflammatory rheumatic disease(s), AS – ankylosing spondylitis, HbsAg – hepatitis B surface antigen, anti-HBc Ab – anti-hepatitis B core antibody, OA – osteoarthritis, PsA – psoriatic arthritis, Pso – psoriasis RA – rheumatoid arthritis, SLE – systemic lupus erythematosus, SpA – spondyloarthropathy

Table 4. Prevalence of HbsAg and anti-HBc Ab.

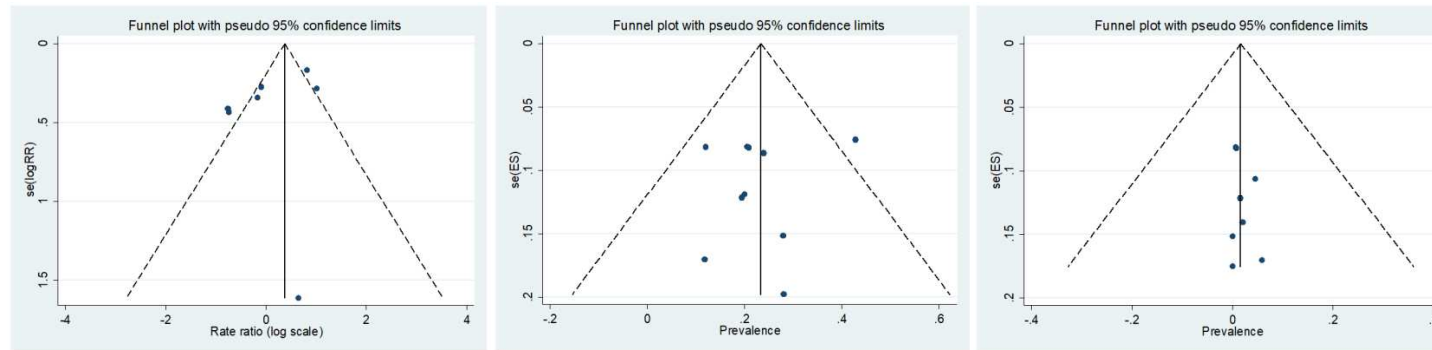| Seroprevalence	AIIRD	N studies	Q test P-value	Pooled prevalence	95%CI	Seroprevalence	AIIRD	N studies	Q test P-value	Pooled prevalence	95%CI
HbsAg	AS	4	<.0001	7%	0%-22%	**Anti-HBc**	AS	2	<.0001	28%	22%-34%
	RA	6	<.0001	3%	0%-6%		RA	5	<.0001	22%	5%-46%
	SLE	5	<.0001	1%	0%-3%		SLE	5	<.0001	9%	0%-27%
	SpA	3	<.0001	5%	0%-10%		SpA	2	<.0001	13%	10%-17%
	Vasculitis	1	-	0%	0%-10%		Vasculitis	1	-	3%	0%-14%
	All	**19**	**<.0001**	**3%**	**1%-5%**		**All**	**15**	**<.0001**	**15%**	**7%-26%**

Legend: HbsAg – hepatitis B surface antigen, anti-HBc Ab – anti-hepatitis B core antibody, AIIRD – autoimmune inflammatory rheumatic disease(s), AS – ankylosing spondylitis, RA – rheumatoid arthritis, SLE – systemic lupus erythematosus, SpA – spondyloarthropathy

Figure 1. Funnel plot of herpes zoster pooled incidence rate (left) and incidence rate ratio (right).
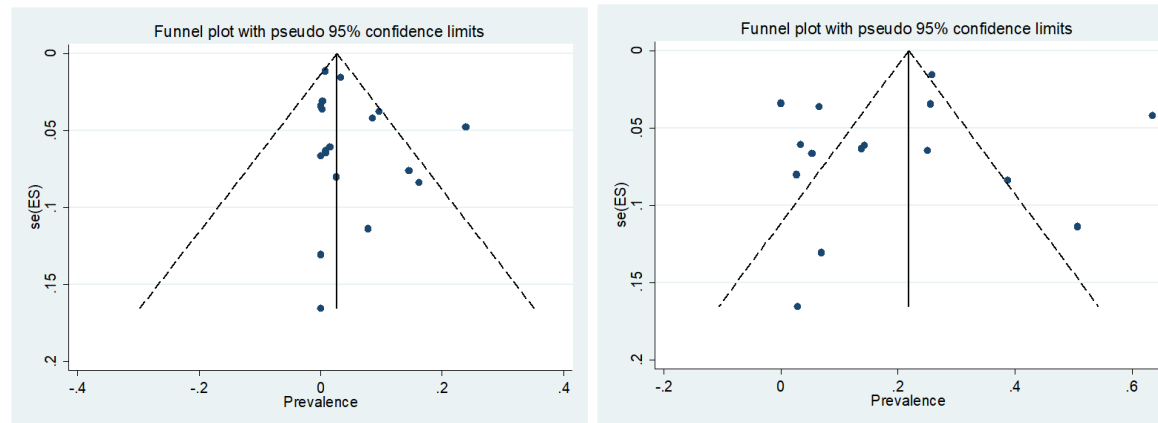

Egger test p value, meta-regression with quantitative quality score p value and meta-regression with descriptive quality assessment p-value: 0.15, 0.37, 0.76

for IR (cases) and 0.666, 0.428 and 0.183 for pooled IRR, respectively.

Figure 2. Funnel plots of prevalence of HPV (left), high-risk HPV (middle) and HGSIL (right).

Egger test p value, meta-regression with quantitative p value and meta-regression with descriptive p-value for HPV, high risk HPV and HGSIL: 0.896, 0.183, 0.464; 0.363, 0.393, 0.313; 0.454, 0.112, 0.109, respectively.

Figure 3. Funnel plots of HBsAg (left panel) and anti-HBc (right panel) prevalence.

Legend: HbsAg – hepatitis B surface antigen, anti-HBc Ab – anti-hepatitis B core antibody

Egger test p value, meta-regression with quantitative p value and meta-regression with descriptive p-value for HBsAg and anti-HBc: 0.142, 0.089, 0.186; and 0.579, 0.404, 0.618, respectively.