

Supplementary Table 1 Numbers available for each of the analyses in Table 2 (Treatment effectiveness after 6 and 12 months of secukinumab treatment)

		All patients (n=1860)	b/tsDMARD naïve patients (n=414)	1 prior b/tsDMARD (n=448)	2 or more prior b/tsDMARDs (n=998)	p-value*	
Secukinumab drug retention rate, % (95%CI), n at risk	6 months	82% (80-84%) n=1340	90% (87-93%) n=315	83% (79-86%) n=330	78% (76-81%) n=695	0.001	
	12 months	72% (69-74%) n=795	84% (81-88%) n=166	73% (69-78%) n=193	66% (63-69%) n=436	<0.001	
Median (95%CI) time in weeks to secukinumab withdrawal due to loss of efficacy or adverse events before 12 months**, n of withdrawals		21 (20-22) n=367	22 (16-28) n=39	21 (19-23) n=84	21 (19-23) n=244	0.21	
BASDAI, median (IQR), n available	6 months	3.9 (1.8-5.9) n=1069	2.8 (1.4-4.1) n=234	3.0 (1.5-5.7) n=243	4.8 (2.7-6.6) n=592	<0.001	
	12 months	3.9 (1.9-6.3) n=660	2.4 (1.3-3.9) n=140	3.2 (1.7-6.0) n=149	5.0 (2.6-6.8) n=371	<0.001	
BASFI, median (IQR), n available	6 months	3.9 (1.8-6.3) n=765	2.4 (0.7-4.7) n=148	4.0 (1.3-6.3) n=147	4.4 (2.4-6.6) n=470	<0.001	
	12 months	4.1 (1.8-6.5) n=462	2.1 (0.5-4.3) n=80	3.6 (1.4-6.4) n=92	4.7 (2.7-6.7) n=290	<0.001	
ASDAS, median (IQR), n available	6 months	2.6 (1.9-3.3) n=925	2.2 (1.7-2.7) n=197	2.4 (1.7-3.1) n=209	2.8 (2.1-3.6) n=519	<0.001	
	12 months	2.5 (1.8-3.4) n=531	1.9 (1.5-2.6) n=102	2.3 (1.6-3.2) n=117	2.8 (2.0-3.5) n=312	<0.001	
BASDAI <2, %, n available	6 months	Crude	26% n=1069	37% n=234	35% n=243	18% n=592	<0.001
		LUNDEX adjusted**	21% n=1069	34% n=234	28% n=243	13% n=592	<0.001
	12 months	Crude	25% n=660	41% n=140	29% n=149	18% n=371	<0.001
		LUNDEX adjusted**	16% n=660	31% n=140	18% n=149	11% n=371	<0.001

BASDAI <4, %, n available	6 months	Crude	51% n=1069	71% n=234	60% n=243	40% n=592	<0.001
		LUNDEX adjusted**	40% n=1069	65% n=234	47% n=243	30% n=592	<0.001
	12 months	Crude	51% n=660	76% n=140	56% n=149	39% n=371	<0.001
		LUNDEX adjusted**	32% n=660	57% n=140	36% n=149	23% n=371	<0.001
ASDAS <1.3, %, n available	6 months	Crude	9% n=925	13% n=197	13% n=209	6% n=519	0.001
		LUNDEX adjusted**	7% n=925	12% n=197	11% n=209	5% n=519	<0.001
	12 months	Crude	11% n=531	18% n=102	15% n=117	7% n=312	0.002
		LUNDEX adjusted**	7% n=531	13% n=102	9% n=117	4% n=312	0.002
ASDAS <2.1, %, n available	6 months	Crude	24% n=925	32% n=197	26% n=209	20% n=519	0.002
		LUNDEX adjusted**	19% n=925	29% n=197	21% n=209	15% n=519	<0.001
	12 months	Crude	27% n=531	44% n=102	27% n=117	21% n=312	<0.001
		LUNDEX adjusted**	17% n=531	33% n=102	17% n=117	12% n=312	<0.001
Change in BASDAI from baseline to 6 months, n available	Mean (SD)	-2.1 (2.6) n=893	-3.7 (2.5) n=220	-2.1 (2.5) n=203	-1.4 (2.3) n=470	<0.001	
	Median (IQR)	-1.9 (-3.9, -0.2) n=893	-3.9 (-5.4, -2.0) n=220	-1.9 (-3.8, -0.1) n=203	-1.0 (-2.8, 0.1) n=470	<0.001	
Change in BASDAI from baseline to 12 months, n available	Mean (SD)	-2.1 (2.5) n=514	-3.3 (2.6) n=129	-2.1 (2.3) n=118	-1.4 (2.4) n=267	<0.001	
	Median (IQR)	-1.6 (-3.7, -0.2) n=514	-3.4 (-5.4, -1.2) n=129	-1.9 (-3.6, -0.5) n=118	-1.1 (-2.5, 0.0) n=267	<0.001	
Change in ASDAS from baseline to 6 months, n available	Mean (SD)	-1.1 (1.3) n=753	-2.0 (1.1) n=184	-1.1 (1.3) n=172	-0.7 (1.2) n=397	<0.001	

		Median (IQR)	-1.1 (-2.0, -0.2) n=753	-1.9 (-2.9, -1.2) n=184	-1.1 (-2.0, -0.1) n=172	-0.6 (-1.6, 0.0) n=397	<0.001
Change in ASDAS from baseline to 12 months, n available		Mean (SD)	-1.1 (1.3) n=396	-2.0 (1.3) n=83	-1.2 (1.2) n=88	-0.7 (1.2) n=225	<0.001
		Median (IQR)	-0.9 (-2.0, -0.1) n=396	-2.0 (-3.1, -1.0) n=83	-1.2 (-2.2, -0.3) n=88	-0.5 (-1.5, -0.1) n=225	<0.001
BASDAI50 response, %	6 months	Crude	53% n=893	79% n=220	53% n=203	40% n=470	<0.001
		LUNDEX adjusted**	42% n=893	72% n=220	42% n=203	30% n=470	<0.001
	12 months	Crude	47% n=514	67% n=129	53% n=118	36% n=267	<0.001
		LUNDEX adjusted**	29% n=514	51% n=129	34% n=118	21% n=267	<0.001
ASAS20 response, %	6 months	Crude	40% n=522	66% n=107	41% n=91	32% n=324	<0.001
		LUNDEX adjusted**	32% n=522	60% n=107	32% n=91	24% n=324	<0.001
	12 months	Crude	37% n=281	69% n=51	35% n=52	29% n=178	<0.001
		LUNDEX adjusted**	23% n=281	52% n=51	22% n=52	17% n=178	<0.001
ASAS40 response, %	6 months	Crude	28% n=522	57% n=107	23% n=91	19% n=324	<0.001
		LUNDEX adjusted**	22% n=522	52% n=107	18% n=91	14% n=324	<0.001
	12 months	Crude	22% n=281	55% n=51	19% n=52	14% n=178	<0.001
		LUNDEX adjusted**	14% n=281	42% n=51	12% n=52	8% n=178	<0.001
ASDAS CII, %	6 months	Crude	49% n=753	77% n=184	52% n=172	35% n=397	<0.001
		LUNDEX adjusted**	39% n=753	70% n=184	41% n=172	26% n=397	<0.001

	12 months	Crude	46% n=396	72% n=83	52% n=88	33% n=225	<0.001
		LUNDEX adjusted**	29% n=396	55% n=83	33% n=88	19% n=225	<0.001
ASDAS MI, %	6 months	Crude	25% n=753	46% n=184	25% n=172	15% n=397	<0.001
		LUNDEX adjusted**	20% n=753	42% n=184	20% n=172	11% n=397	<0.001
	12 months	Crude	26% n=396	51% n=83	27% n=88	17% n=225	<0.001
		LUNDEX adjusted**	16% n=396	39% n=83	17% n=88	10% n=225	<0.001

*Drug retention rates were compared by Kaplan-Meier with log-rank test, continuous measures by ANOVA or Kruskal-Wallis, as appropriate, and proportions by Chi-Square test. **Patients with at least 6/12 months from secukinumab start to date of data cut, as appropriate; ASDAS, Ankylosing Spondylitis Disease Activity Score; ASAS20/40, Assessment of Spondyloarthritis International Society 20/40 response, ASDAS CII, ASDAS Clinically Important Improvement (≥ 1.1); ASDAS MI, ASDAS Major Improvement (≥ 2.0); BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; BASDAI50, at least 50% improvement in BASDAI score or an absolute change of 2 (on a 0-10 scale); BASFI, Bath Ankylosing Spondylitis Functional Index.

Supplementary Table 2 Numbers available for each of the analyses in Table 3 (Retention, inactive disease, LDA and response rates after 6 and 12 months of secukinumab treatment stratified across European registries (ICEBIO (Iceland) is excluded from the table due to <10 patients at secukinumab initiation))

	Months	ARTIS n=449	RRBR n=301	SCQM n=227	ATTRA n=213	DANBIO n=151	BIOBAD ASER n=132	TURKBIO n=96	NOR- DMARD n=71	biorx.si n=64	Reuma.pt n=57	GISEA n=48	ROB-FIN n=43	p-value*
Retention rate, % (95%CI), n at risk	6 n=1334 [§]	78% (74-82%) n=318	89% (86-93%) n=236	77% (71-83%) n=169	88% (84-93%) n=154	73% (67-81%) n=94	82% (75-89%) n=90	82% (75-91%) n=59	76% (66-87%) n=43	87% (80-96%) n=57	93% (86-100%) n=48	89% (80-99%) n=36	70% (57-85%) n=30	<0.001
	12 n=792 [§]	64% (59-69%) n=212	85% (81-90%) n=117	64% (58-71%) n=115	84% (79-90%) n=86	64% (56-73%) n=57	75% (67-83%) n=58	<10 patients	56% (43-71%) n=20	83% (74-93%) n=52	86% (77-96%) n=29	86% (77-97%) n=23	53% (40-71%) n=23	<0.001
BASDAI<2, %	6 n=1069	10% n=255	56% n=199	17% n=89	35% n=147	11% n=111	0% n=13	42% n=73	12% n=33	25% n=48	11% n=47	9% n=22	25% n=28	<0.001
	12 n=660	9% n=156	71% n=94	9% n=81	44% n=62	15% n=80	20% n=49	<10 patients	7% n=15	17% n=46	21% n=29	19% n=16	33% n=21	<0.001
BASDAI<4, %	6 n=1069	31% n=255	89% n=199	34% n=89	67% n=147	26% n=111	38% n=13	64% n=73	45% n=33	54% n=48	36% n=47	46% n=22	43% n=28	<0.001
	12 n=660	31% n=156	96% n=94	35% n=81	73% n=62	36% n=80	47% n=49	<10 patients	33% n=15	46% n=46	59% n=29	63% n=16	62% n=21	<0.001
ASDAS<1.3, %	6 n=925	7% n=237	13% n=199	8% n=67	9% n=142	4% n=90	<10 patients	18% n=67	7% n=30	0% n=11	5% n=44	13% n=23	8% n=12	0.09
	12 n=531	5% n=148	15% n=94	8% n=67	20% n=61	12% n=64	14% n=14	<10 patients	0% n=14	0% n=10	8% n=26	23% n=13	10% n=10	0.11
ASDAS<2.1, %	6 n=925	15% n=237	35% n=199	18% n=67	32% n=142	16% n=90	<10 patients	25% n=67	27% n=30	27% n=11	11% n=44	35% n=23	25% n=12	<0.001
	12 n=531	18% n=148	52% n=94	19% n=67	31% n=61	19% n=64	57% n=14	<10 patients	7% n=14	10% n=10	27% n=26	23% n=13	20% n=10	<0.001
BASDAI50 response, %	6 n=893	34% n=182	86% n=199	29% n=41	68% n=147	28% n=106	33% n=12	52% n=66	36% n=31	57% n=23	53% n=38	28% n=18	32% n=28	<0.001
	12 n=514	21% n=102	92% n=94	24% n=45	68% n=62	29% n=73	50% n=48	<10 patients	13% n=15	72% n=18	53% n=19	31% n=13	37% n=19	<0.001
ASAS20 response, %	6 n=522	31% n=167	-	30% n=33	63% n=146	27% n=106	-	46% n=63	-	<10 patients	-	-	<10 patients	<0.001
	12 n=281	18% n=98	-	31% n=39	74% n=62	36% n=73	-	<10 patients	-	<10 patients	-	-	<10 patients	<0.001
ASAS40 response, %	6 n=522	18% n=167	-	24% n=33	52% n=146	12% n=106	-	29% n=63	-	<10 patients	-	-	<10 patients	<0.001
	12 n=281	7% n=98	-	15% n=39	55% n=62	21% n=73	-	<10 patients	-	<10 patients	-	-	<10 patients	<0.001

* Comparisons across the registries were performed with Kaplan-Meier with log rank test for retention rates and Chi-Square test for disease states and response rates. [§] n at risk at 6 months including

ICEBIO is 1340 and at 12 months including ICEBIO and TURKBIO 795; - not collected; ASDAS, Ankylosing Spondylitis Disease Activity Score; ASAS20/40, Assessment of Spondyloarthritis International Society 20/40 response; ASDAS CII, ASDAS Clinically Important Improvement (≥ 1.1); ASDAS MI, ASDAS Major Improvement (≥ 2.0); BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; BASDAI50, at least 50% improvement in BASDAI score or an absolute change of 2 (on a 0-10 scale); BASFI, Bath Ankylosing Spondylitis Functional Index

Supplementary Table 3 Comparison of secukinumab effectiveness across time since diagnosis

		Time since diagnosis <2 years (n=197)	Time since diagnosis 2-4 years (n=353)	Time since diagnosis >4 years (n=1010)	p-value*
Secukinumab retention rate, % (95%CI) <i>n at risk at 6/12 months</i>	6 months	83% (78-89%) n=148	82% (78-86%) n=255	83% (80-85%) n=732	0.96
	12 months	73% (66%-80%) n=84	73% (68-78%) n=147	73% (70-76%) n=430	0.94
BASDAI <2, %, n available	6 months	32% n=113	20% n=206	32% n=582	0.005
	12 months	27% n=79	23% n=125	29% n=361	0.44
BASDAI <4, %, n available	6 months	65% n=113	46% n=206	56% n=582	0.004
	12 months	58% n=79	46% n=125	56% n=361	0.12
ASDAS<1.3, %, n available	6 months	14% n=96	9% n=176	11% n=498	0.43
	12 months	16% n=62	10% n=99	11% n=280	0.49
ASDAS<2.1, %, n available	6 months	26% n=96	21% n=176	27% n=498	0.42
	12 months	23% n=62	24% n=99	32% n=280	0.18
BASDAI50, %, n available	6 months	66% n=101	55% n=166	54% n=499	0.06
	12 months	56% n=63	44% n=100	53% n=286	0.24
ASAS20, %, n available	6 months	51% n=55	40% n=98	43% n=262	0.41
	12 months	42% n=36	35% n=60	47% n=127	0.33
ASAS40, %, n available	6 months	38% n=55	30% n=98	30% n=79	0.47
	12 months	25% n=36	17% n=60	30% n=127	0.15
ASDAS CII, %, n available	6 months	60% n=83	50% n=143	52% n=422	0.32

	12 months	48% n=46	44% n=73	52% n=223	0.46
ASDAS MI, %, n available	6 months	34% n=83	27% n=143	26% n=422	0.36
	12 months	33% n=46	27% n=73	29% n=223	0.82

*Drug retention rates were compared with Kaplan-Meier with log-rank test, continuous measures by ANOVA or Kruskal-Wallis, as appropriate, and proportions by Chi-Square test. ASDAS, Ankylosing Spondylitis Disease Activity Score; ASAS20/40, Assessment of Spondyloarthritis International Society 20/40 response; ASDAS CII, ASDAS Clinically Important Improvement (≥ 1.1); ASDAS MI, ASDAS Major Improvement (≥ 2.0); BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; BASDAI50, at least 50% improvement in BASDAI score or an absolute change of 2 (on a 0-10 scale); BASFI, Bath Ankylosing Spondylitis Functional Index. 300 patients had missing values for time since diagnosis.

Supplementary Table 4 Heterogeneity in baseline characteristics and disease activity across the European registries

	ARTIS n=449	RRBR n=301	SCQM n=227	ATTRA n=213	DANBIO n=151	BIO BADASER n=132	TURKBIO n=96	NOR- DMARD n=71	biorex.si n=64	Reuma.pt n=57	GISEA n=48	ROB-FIN n=43	ICEBIO n=8	p-value
Age (years), mean (SD), n available	48 (13) n=449	48 (11) n=301	47 (11) n=227	44 (11) n=213	46 (12) n=151	50 (11) n=132	43 (11) n=96	48 (10) n=71	49 (13) n=64	46 (12) n=57	50 (13) n=48	47 (13) n=43	<10 patients	<0.001
Men, % n available	42% n=449	73% n=301	39% n=227	70% n=213	52% n=151	71% n=132	53% n=96	44% n=71	61% n=64	60% n=57	65% n=48	51% n=43	<10 patients	<0.001
Years since diagnosis, mean (SD), n available	7 (9) n=212	11 (9) n=301	9 (8) n=227	10 (8) n=212	8 (8) n=144	13 (10) n=132	9 (7) n=83	15 (11) n=48	11 (11) n=63	12 (10) n=48	9 (7) n=44	10 (10) n=40	<10 patients	<0.001
Current smokers, %, n available	13% n=449	11% n=301	33% n=179	42% n=184	30% n=150	43% n=121	42% n=81	13% n=55	29% n=63	33% n=46	44% n=27	26% n=35	<10 patients	<0.001
Patient's global (0-100), median (IQR), n available	69 (53-82) n=327	70 (50-80) n=301	65 (50-80) n=100	70 (50-80) n=213	80 (60-92) n=141	70 (30-80) n=11	60 (44-80) n=84	75 (51-88) n=63	80 (50-80) n=11	77 (65-90) n=42	<10 patients	41 (16-74) n=25	<10 patients	<0.001
Physician's global (0-100), median (IQR), n available	40 (25-50) n=156	<10 patients	50 (30-60) n=127	70 (56-80) n=206	18 (10-35) n=90	<10 patients	30 (12-40) n=85	40 (23-50) n=39	50 (0-70) n=11	57 (40-80) n=34	<10 patients	40 (17-50) n=27	<10 patients	<0.001
HAQ (0-3), mean (SD), n available	1.0 (0.6) n=222	1.6 (0.5) n=42	<10 patients	1.3 (0.6) n=213	1.1 (0.6) n=140	<10 patients	0.9 (0.6) n=83	0.8 (0.5) n=63	1.2 (0.6) n=34	<10 patients	1.1 (0.7) n=37	<10 patients	<10 patients	<0.001
BMI (kg/m ²), median (IQR), n available	<10 patients	27 (24-32) n=301	27 (20-31) n=162	26 (23-30) n=180	26 (22-30) n=78	28 (24-31) n=109	27 (25-30) n=70	<10 patients	27 (23-31) n=62	25 (22-29) n=20	29 (25-30) n=31	27 (24-32) n=42	<10 patients	0.35
CRP (mg/L), median (IQR), n available	4 (1-11) n=337	23 (10-45) n=301	5 (2-10) n=127	18 (8-34) n=206	6 (2-16) n=124	2 (0-9) n=46	9 (3-25) n=86	3 (2-11) n=66	20 (5-43) n=36	16 (9-43) n=41	3 (2-9) n=46	4 (2-8) n=31	<10 patients	<0.001
ESR (mm/h), median (IQR), n available	12 (6-27) n=302	43 (27-63) n=301	10 (4-25) n=114	28 (14-44) n=196	-	17 (6-37) n=42	-	15 (5-27) n=48	28 (16-45) n=36	24 (10-47) n=42	15 (7-21) n=31	9 (2-17) n=31	-	<0.001
Pain (0-100), median (IQR), n available	69 (54-82) n=325	80 (60-90) n=301	70 (50-80) n=99	70 (55-80) n=213	73 (55-86) n=141	-	60 (40-77) n=84	64 (49-80) n=62	70 (58-80) n=34	-	-	47 (25-69) n=35	<10 patients	<0.001

Fatigue (0-100), median (IQR), n available	74 (57-87) n=318	70 (50-80) n=301	70 (53-80) n=96	70 (55-80) n=213	81 (56-92) n=141	-	50 (30-70) n=83	70 (50-80) n=33	-	-	-	-	<10 patients	<0.001
BASDAI, median (IQR), n available	6.5 (5.1-8.0) n=266	6.4 (4.4-7.6) n=301	6.1 (4.8-7.3) n=94	6.2 (5.2-7.9) n=213	6.7 (5.0-8.0) n=139	6.2 (4.7-7.6) n=130	3.9 (2.8-5.8) n=87	6.1 (4.6-7.6) n=64	5.9 (5.0-6.9) n=25	6.9 (5.5-8.0) n=44	5.0 (3.0-6.0) n=37	4.2 (1.9-6.7) n=39	<10 patients	<0.001
BASFI, median (IQR), n available	5.4 (3.3-7.1) n=256	-	4.7 (2.2-6.5) n=91	6.2 (3.6-7.6) n=213	6.3 (3.8-7.7) n=139	-	3.6 (1.7-6.2) n=87	-	5.5 (3.5-7.9) n=25	6.7 (5.7-8.0) n=38	5.0 (2.0-6.0) n=10	<10 patients	<10 patients	<0.001
ASDAS, median (IQR), n available	3.2 (2.7-4.1) n=252	4.2 (3.5-4.8) n=301	3.1 (2.7-4.0) n=87	4.0 (3.3-4.7) n=206	3.6 (2.9-4.2) n=120	3.6 (2.8-4.1) n=32	3.2 (2.5-3.9) n=83	3.5 (2.7-3.8) n=58	<10 patients	3.9 (3.2-4.7) n=40	2.7 (2.2-3.3) n=36	3.0 (1.0-4.1) n=15	<10 patients	<0.001
b/tsDMARD naive patients, %, n available	7% n=449	33% n=301	9% n=227	55% n=213	5% n=151	48% n=132	21% n=96	3% n=71	22% n=64	25% n=57	31% n=48	16% n=43	<10 patients	<0.001
-, not collected; *Comparisons between the registries were performed with Chi-Square test, ANOVA or Kruskal-Wallis, as appropriate. BMI, body mass index (kg/m ²); ASDAS, Ankylosing Spondylitis Disease Activity Score; BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; BASFI, Bath Ankylosing Spondylitis Functional Index; CRP, C-reactive protein (mg/L); csDMARD, conventional synthetic Disease Modifying Anti-Rheumatic Drug; ESR, erythrocyte sedimentation rate (mm/h); HAQ, Health Assessment Questionnaire; IQR, interquartile range; SD, standard deviation														

Supplementary table 5 Response rates in patients previously treated with ≥ 3 b/tsDMARDs

Patients previously treated with ≥ 3 b/tsDMARDs		
BASDAI50 response	6 months, n=256	38%
	12 months, n=146	30%
ASAS20 response	6 months, n=197	31%
	12 months, n=115	33%
ASAS40 response	6 months, n=197	18%
	12 months, n=115	16%
ASDAS CII	6 months, n=218	33%
	12 months, n=127	29%
ASDAS MI	6 months, n=218	12%
	12 months, n=127	16%

Supplementary Figure 1 Pooled 12-month secukinumab retention probabilities adjusted for age, time since diagnosis and gender, stratified by previous b/tsDMARD treatment (Cox Proportional Hazards model , $p < 0.001$)

