

ONLINE SUPPLEMENTARY DATA

Supplementary Table 1. Search strategy for systematic literature review.

Database: PubMed <1960 to present>

1. Ankylosing Spondylitis [mh] or Ankylosing Spondylitis [tiab] or Bechterew Disease [tiab] or Bechterew's Disease [tiab] or Ankylosing Spondyloarthritis [tiab] or Ankylosing Spondyloarthritis [tiab] or Rheumatoid Spondylitis [tiab] or Spondylarthritis Ankylopoietica [tiab] or Ankylopoietic Spondylitis [tiab] or Ankylosing Spondylarthritis [tiab] or Ankylosing Spondylarthritis [tiab] or Marie-Struempell Disease [tiab]
2. Tumor Necrosis Factor-alpha/antagonists & inhibitors [mh] or anti-tnf [tiab] or adalimumab [tiab] or certolizumab [tiab] or etanercept [tiab] or golimumab [tiab] or infliximab [tiab] or CT-P13 [tiab] or remsima [tiab]
3. Randomized Controlled Trial [PT] OR Controlled Clinical Trial [PT] or randomly [tiab] OR randomiz* [tiab] OR randomized [tiab] OR controlled [tiab] OR double-blind* [tiab] or single-blind* [tiab] OR placebo [tiab] or RCT [tiab]
4. 1 and 2 and 3

Database: Embase <1960 to present>

1. 'ankylosing spondylitis'/exp/mj or 'bechterew disease'/exp OR 'bechterew disease' OR 'bechterews disease' OR 'ankylosing spondyloarthritis' OR 'ankylosing spondyloarthritis' OR 'rheumatoid spondylitis' OR 'spondylarthritis ankylopoietica'/exp OR 'spondylarthritis ankylopoietica' OR 'ankylopoietic spondylitis'/exp OR 'ankylopoietic spondylitis' OR 'ankylosing spondylarthritis'/exp OR 'ankylosing spondylarthritis' OR 'ankylosing spondylarthritis' OR 'marie-struempell disease'
2. 'tumor necrosis factor inhibitor' or 'anti-tnf' or adalimumab or certolizumab or etanercept or golimumab or infliximab or CT-P13 or remsima
3. 'controlled clinical trial'/exp OR 'randomized clinical trial'/exp randomly OR randomiz* OR randomis* OR 'single blind' OR 'double blind' OR placebo
4. 1 and 2 and 3

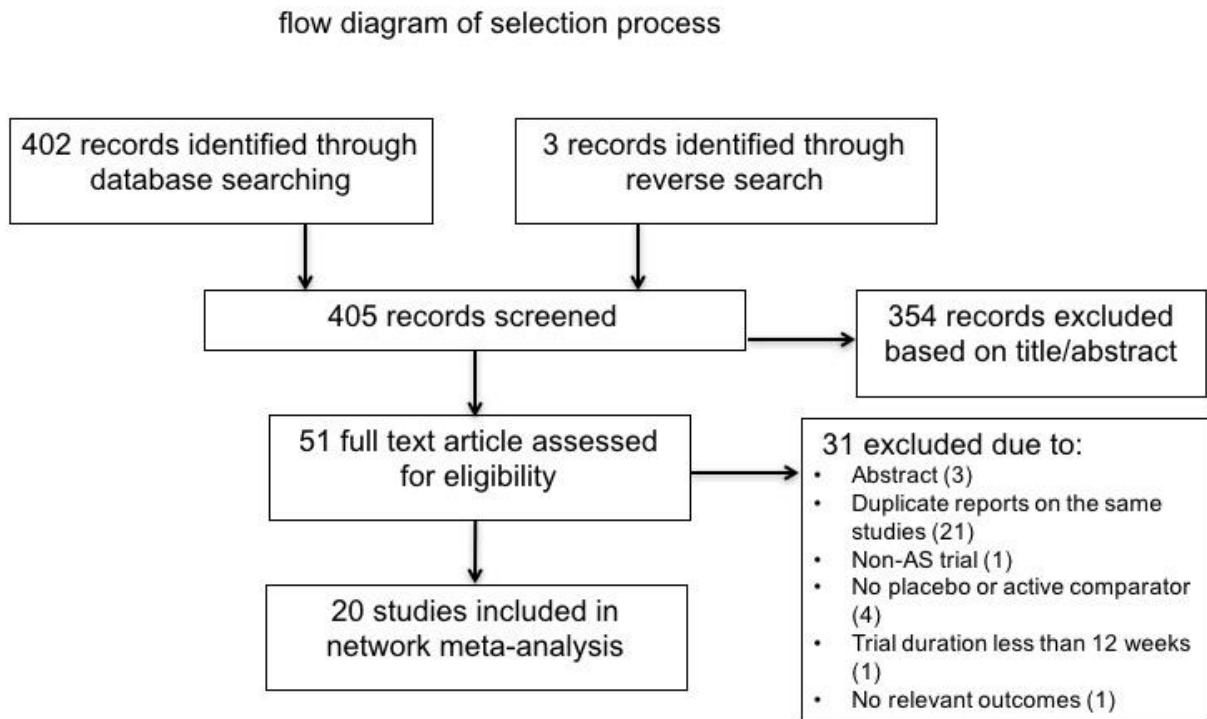
Database: Cochrane CENTRAL <to present>

1. (Ankylosing Spondylitis or Bechterew Disease or Bechterew's Disease or Ankylosing Spondyloarthritis or Ankylosing Spondyloarthritis or Rheumatoid Spondylitis or Spondylarthritis Ankylopoietica or Ankylopoietic Spondylitis or Ankylosing Spondylarthritis or Ankylosing Spondylarthritis or Marie-Struempell Disease):ti,ab,kw
2. Ankylosing Spondylitis: (MeSH)
3. ('tumor necrosis factor inhibitor' or 'anti-tnf' or adalimumab or certolizumab or etanercept or golimumab or infliximab or CT-P13 or remsima):ti,ab, kw
4. (1 or 2) and 3

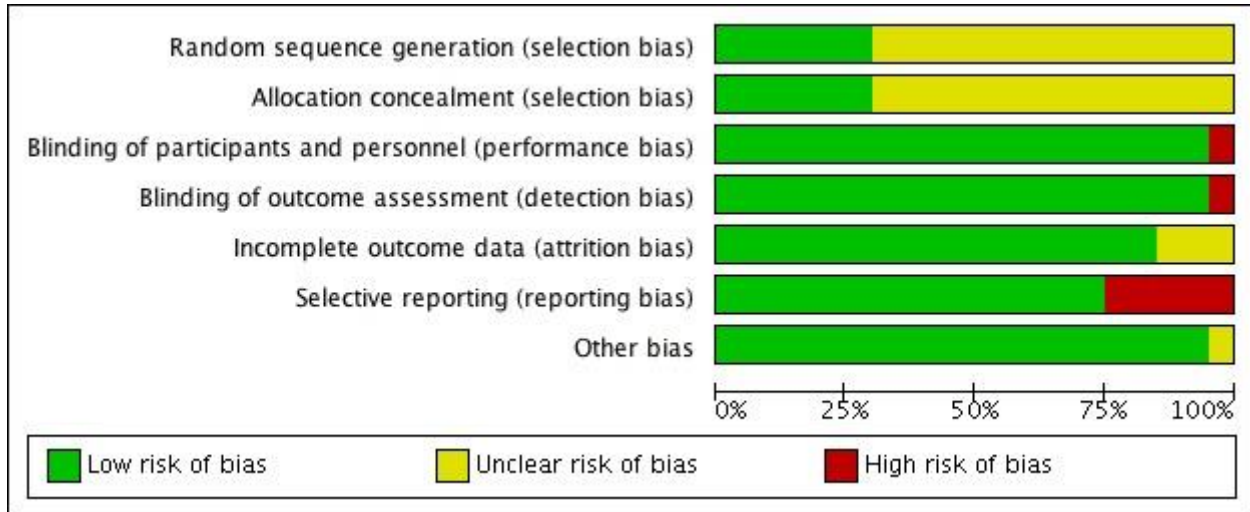
Database: Scopus <1960 to present>

1. TITLE-ABS-KEY(ankylosing spondylitis OR bechterew disease OR bechterew's disease OR ankylosing spondyloarthritis OR ankylosing spondyloarthritides OR rheumatoid spondylitis) OR spondylarthritis ankylopoietica OR ankylopoietic spondylitis OR ankylosing spondylarthritis OR ankylosing spondylarthritides OR marie-struempell disease)
2. TITLE-ABS-KEY((tumor necrosis factor inhibitor or anti-tnf or adalimumab or certolizumab or etanercept or golimumab or infliximab or CT-P13 or remsima)
3. TITLE-ABS-KEY(randomly OR randomization OR randomize* OR randomis* OR placebo OR controlled OR double-blind* OR single-blind* OR rct)
4. 1 and 2 and 3

Supplementary Figure 1. Flow diagram of literature selection process.



Supplementary Figure 2. Summary of risk-of-bias assessment.



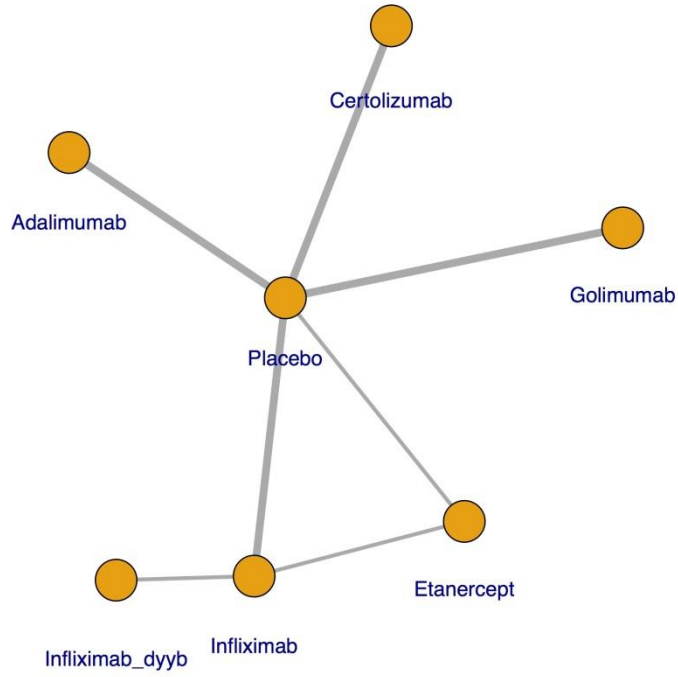
Supplementary Table 2. *Dbar* values of each analysis.

Week	Outcome	<i>Dbar</i>	Number of arms
Week 12	BASDAI	39.90	40
Week 12	BASFI	42.95	42
Week 12	CRP	37.82	36
Week 24	BASDAI	22.68	22
Week 24	BASFI	25.68	26
Week 24	CRP	23.55	24

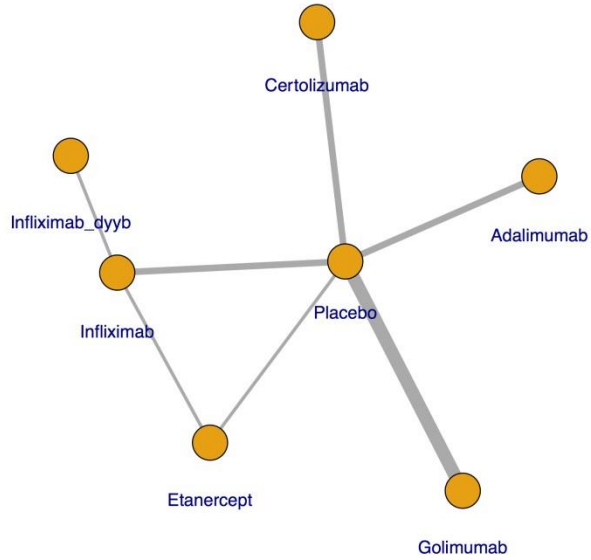
Supplementary Figure 3. Network of treatment comparison at 24 weeks.

The size of the node corresponds to the number of total trial participants. Direct comparisons are linked with a line; the line thickness is proportional to the number of trials that assessed the comparison. A. BASDAI; B. BASFI; C. CRP.

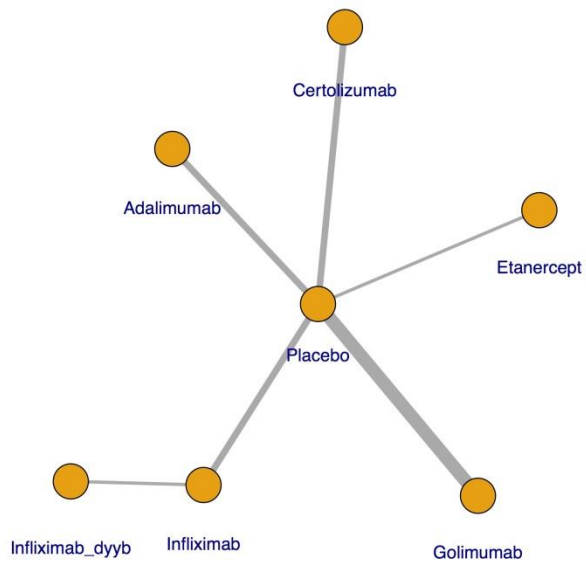
Supplementary Figure 3A. 24-week analysis on BASDAI



Supplementary Figure 3B. 24-week analysis on BASFI



Supplementary Figure 3C. 24-week analysis on CRP



Supplementary Table 3. Comparative efficacy of changes in BASDAI, BASFI and CRP at 12 weeks by meta-regression.

The relative effect size is presented as mean difference (MD) with 95% credible interval (CrI). Each cell represents a paired comparison. The rows represent the reference medication for each comparison, and the columns represent the comparators. A negative value means greater improvement by the comparator, indicating the comparator is more efficacious than the reference drug. A positive value means less improvement by the comparator, indicating the reference drug is more efficacious than the comparator. Cells in bold are statistically significant comparisons at $p < 0.05$. A. BASDAI changes at 12 weeks; B. BASFI changes at 12 weeks; C. CRP changes at 12 weeks. NA: not available.

Supplementary Table 3A. Comparative efficacy of BASDAI changes at 12 weeks, adjusted for baseline BASDAI and baseline CRP. Regression coefficients: baseline BASDAI: 0.82 (-0.12,1.8), baseline CRP: 0.35 (-0.55,1.2).

Drug	Adalimu -mab	Certolizu -mab	Etanercept	Golimumab	Infliximab	Infliximab _dyyb
Adalimu -mab	-					
Certolizu -mab	0.19 (-0.89, 1.3)	-				
Etanercept	-0.35 (-1.2, 0.45)	-0.53 (-1.7, 0.59)	-			
Golimumab	0.48 (-0.63, 1.7)	0.29 (-0.83, 1.5)	0.83 (-0.33, 2.1)	-		
Infliximab	1.3 (0.31, 2.2)	1.1 (0.02, 2.2)	1.7 (0.73, 2.5)	0.83 (-0.29, 1.8)	-	
Infliximab _dyyb	1.3 (-0.13, 2.7)	1.1 (-0.41, 2.6)	1.7 (0.28, 3)	0.84 (-0.71, 2.2)	0.00 (-1, 1)	-
Placebo	-1.4 (-2, -0.74)	-1.6 (-2.4, -0.71)	-1 (-1.7, -0.36)	-1.9 (-2.7, -1.1)	-2.7 (-3.3, -2)	-2.7 (-3.9, -1.4)

Supplementary Table 3B. Comparative efficacy of BASFI changes at 12 weeks, adjusted for baseline

BASFI and baseline CRP. Regression coefficients: baseline BASFI: 0.057 (-0.54, 0.7), baseline CRP: 0.72

(0.053, 1.3).

Drug	Adalimu -mab	Certolizu -mab	Etanercept	Golimumab	Infliximab	Infliximab _dyyb
Adalimu -mab	-					
Certolizu -mab	-0.34 (-1.2, 0.56)	-				
Etanercept	-0.17 (-0.78, 0.57)	0.18 (-0.54, 0.92)	-			
Golimumab	-0.17 (-0.79, 0.56)	0.18 (-0.69, 1.1)	0.00 (-0.65, 0.62)	-		
Infliximab	0.57 (-0.18, 1.3)	0.91 (0.09, 1.7)	0.74 (0.14, 1.2)	0.73 (-0.06, 1.4)	-	
Infliximab _dyyb	0.37 (-0.65, 1.4)	0.72 (-0.39, 1.7)	0.54 (-0.42, 1.4)	0.54 (-0.55, 1.5)	-0.19 (-0.92, 0.51)	-
Placebo	-1.5 (-2, -0.96)	-1.2 (-1.8, -0.52)	-1.3 (-1.7, -1)	-1.3 (-1.9, -0.84)	-2.1 (-2.5, -1.5)	-1.9 (-2.7, -0.96)

Supplementary Table 3C. Comparative efficacy of CRP changes at 12 weeks, adjusted for baseline CRP.

Regression coefficient: baseline CRP: -0.4 (-1.1, 0.36).

Drug	Adalimu -mab	Certolizu -mab	Etanercept	Golimumab	Infliximab	Infliximab _dyyb
Adalimu -mab	-					
Certolizu -mab	-0.5 (-1.5, 0.61)	-				
Etanercept	0.24 (-0.52, 1.1)	0.74 (-0.33, 1.8)	-			
Golimumab	0.16 (-0.72, 1.1)	0.68 (-0.48, 1.8)	-0.07 (-0.87, 0.75)	-		
Infliximab	0.35 (-0.52, 1.3)	0.85 (-0.29, 2)	0.11 (-0.75, 1)	0.18 (-0.81, 1.2)	-	
Infliximab _dyyb	NA	NA	NA	NA	NA	-
Placebo	-1.2 (-1.7, -0.52)	-0.66 (-1.6, 0.23)	-1.4 (-1.9, -0.89)	-1.3 (-2, -0.65)	-1.5 (-2.3, -0.81)	NA

Supplementary Table 4. Comparative efficacy of changes in BASDAI, BASFI and CRP at 24 weeks by meta-regression.

The relative effect size is presented as mean difference (MD) with 95% credible interval (CrI). Each cell represents a paired comparison. The rows represent the reference medication for each comparison, and the columns represent the comparators. A negative value means greater improvement by the comparator, indicating the comparator is more efficacious than the reference drug. A positive value means less improvement by the comparator, indicating the reference drug is more efficacious than the comparator. Cells in bold are statistically significant comparisons at $p < 0.05$. A. BASDAI changes at 24 weeks; B. BASFI changes at 24 weeks; C. CRP changes at 24 weeks.

Supplementary Table 4A. Comparative efficacy of BASDAI changes at 24 weeks, adjusted for baseline

BASDAI and baseline CRP. Regression coefficients: baseline BASDAI: 0.3 (-0.75, 1.3), baseline CRP: 0.89 (-0.29, 2.1).

Drug	Adalimu -mab	Certolizu -mab	Etanercept	Golimumab	Infliximab	Infliximab _dyyb
Adalimu -mab	-					
Certolizu -mab	0.33 (-0.98, 1.6)	-				
Etanercept	-0.25 (-1.6, 1.1)	-0.57 (-2, 0.88)	-			
Golimumab	-0.14 (-1.5, 1)	-0.46 (-1.8, 0.72)	0.11 (-1.4, 1.4)	-		
Infliximab	0.63 (-0.65, 1.8)	0.31 (-0.96, 1.5)	0.88 (-0.26, 1.9)	0.77 (-0.38, 2)	-	
Infliximab _dyyb	1.2 (-0.51, 2.9)	0.9 (-0.79, 2.6)	1.5 (-0.14, 3)	1.4 (-0.26, 3.1)	0.6 (-0.55, 1.7)	-
Placebo	-1.6 (-2.5, -0.68)	-1.9 (-2.8, -1)	-1.3 (-2.5, -0.26)	-1.5 (-2.3, -0.51)	-2.2 (-3, -1.4)	-2.8 (-4.2, -1.4)

Supplementary Table 4B. Comparative efficacy of BASFI changes at 24 weeks, adjusted for baseline

BASFI and baseline CRP. Regression coefficients: baseline BASFI: -1.1 (-2.5, 0.82), baseline CRP: 0.9 (-0.29, 1.8).

Drug	Adalimu -mab	Certolizu -mab	Etanercept	Golimumab	Infliximab	Infliximab _dyyb
Adalimu -mab						
Certolizu -mab	-0.49 (-1.8, 1.1)					
Etanercept	-0.71 (-2, 0.88)	-0.21 (-1.6, 1.2)				
Golimumab	0.00 (-1.3, 1.3)	0.5 (-1.3, 2)	0.71 (-1, 2.1)			
Infliximab	-0.52 (-1.8, 1.1)	-0.02 (-1.3, 1.3)	0.19 (-0.82, 1.3)	-0.52 (-2.1, 1.4)		
Infliximab _dyyb	-0.12 (-1.9, 2)	0.38 (-1.4, 2.3)	0.59 (-1, 2.3)	-0.12 (-2.1, 2.3)	0.4 (-0.85, 1.7)	

Placebo	-1.8 (-2.7, -0.75)	-1.4 (-2.4, -0.35)	-1.1 (-2.2, -0.17)	-1.9 (-2.8, -0.63)	-1.3 (-2.4, -0.43)	-1.7 (-3.4, -0.21)
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Supplementary Table 4C. Comparative efficacy of CRP changes at 24 weeks, adjusted for baseline CRP.

Regression coefficient: baseline CRP: -0.46 (-1.2, 0.31).

Drug	Adalimu -mab	Certolizu -mab	Etanercept	Golimumab	Infliximab	Infliximab _dyyb
Adalimu -mab						
Certolizu -mab	-0.71 (-1.7, 0.23)					
Etanercept	-0.08 (-1.2, 0.85)	0.64 (-0.53, 1.7)				
Golimumab	-0.17 (-1, 0.55)	0.53 (-0.37, 1.4)	-0.09 (-1, 0.88)			
Infliximab	-0.08 (-1.1, 0.74)	0.63 (-0.39, 1.6)	0.00 (-1.1, 1.1)	0.1 (-0.78, 0.89)		
Infliximab _dyyb	-0.16 (-1.6, 1.1)	0.56 (-0.89, 2)	-0.08 (-1.6, 1.4)	0.01 (-1.3, 1.3)	-0.08 (-1.1, 0.94)	
Placebo	-1.3 (-2, -0.76)	-0.6 (-1.4, 0.12)	-1.2 (-2, -0.38)	-1.1 (-1.6, -0.68)	-1.2 (-1.9, -0.54)	-1.1 (-2.3, 0.06)