**Supplementary Material**

**Cost-effectiveness Analysis of Secukinumab in Ankylosing Spondylitis from the Canadian Perspective**

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Table S1 Population inputs to define baseline characteristics

|  |  |  |
| --- | --- | --- |
| **Input** | **Mean** | **SD** |
| Percentage male | 69.5% | N/A |
| Age (years) | 42.37 | N/A |
| Weight (kg) | 78.20 | 16.882 |

N/A= not applicable; SD=standard deviation

Source: MEASURE 1 and MEASURE 2 study pooled trial data (data not published).

Table S2 Drug dosing, mode of administration and number of doses in each treatment period in AS patients

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  | Number of Doses | | |
| Administration | Drug | Dose | First 3 Months | Months 4-6 | Subsequent 3-month Periods |
| Subcutaneous | Secukinumab1 | 150 mg | 7.00 | 3.00 | 3.00 |
| Adalimumab2 | 40 mg | 7.00 | 6.00 | 6.52 |
| Certolizumab pegol3 | 200 mg | 10.00 | 6.00 | 6.52 |
| Etanercept4 | 50 mg | 13.00 | 13.00 | 13.04 |
| Golimumab5 | 50 mg | 3.00 | 3.00 | 3.00 |
| Intravenous | Infliximab6 | 5 mg/kg | 3.00 | 2.00 | 1.63 |

AS: Ankylosing spondylitis; mg:milligrams

Table S3 BASDAI 50 Response at 3 Months for biologic-naïve AS patients7

|  |  |  |
| --- | --- | --- |
| **Administration** | **Treatment** | **BASDAI 50 Response** |
| Subcutaneous | Secukinumab | 41.53% |
| Certolizumab pegol | 44.20% |
| Etanercept | 36.80% |
| Adalimumab | 48.85% |
| Golimumab | 47.20% |
| Intravenous | Infliximab | 44.20% |

AS: Ankylosing spondylitis; BASDAI = Bath Ankylosing Spondylitis Disease Activity Index;

Data for Certolizumab pegol and infliximab were not available and were assumed equivalent to the lowest biologic in the network meta-analysis

Table S4 Short-term changes in BASDAI and BASFI at 3 months in Biologic-naïve AS patients

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Secukinumab** | **Certolizumab pegol** | **Etanercept** | **Adalimumab** | **Infliximab** | **Golimumab** |
| Change in BASDAI | Responders\* | -4.60 | -5.57 | -4.47 | -4.56 | -7.94 | -5.32 |
| Non responders | -1.01 | -1.28 | -1.02 | -0.81 | -1.82 | -1.37 |
| Change in BASFI | Responders | -3.75 | -3.59 | -3.44 | -3.15 | -3.96 | -4.07 |
| Non responders | -1.17 | -0.89 | -0.85 | -0.78 | -0.98 | -0.71 |

AS: Ankylosing spondylitis; BASDAI = Bath Ankylosing Spondylitis Disease Activity Index; BASFI = Bath Ankylosing Spondylitis Functional Index. \*Responders are those that showed BASDAI 50 response at 3 month.

Source: Biologic-naïve change in BASDAI data were not available for SEC and CER P and were assumed equivalent to the average of other biologics in the network meta-analysis. Biologic-naïve change in BASFI data for CER P was not available and were assumed equivalent to the average of other biologics in the network meta-analysis (excluding secukinumab).

Table S5 Long-term changes in BASFI for secukinumab and comparators in biologic-naïve AS patients

|  |  |
| --- | --- |
| **Input** | **Mean** |
| Annual rate of mSASSS change for mSASSS ≥ 10 for all biologics | 1.4408 |
| BASFI change associated with 1 unit change in mSASSS | 0.0578 |
| Biologic treatment effect on mSASSS progression for comparators | 0.4208 |
| Biologic treatment effect on mSASSS progression for secukinumab a | 0.1539 |
| Time to treatment effect (years) | 0b |

AS: Ankylosing spondylitis; BASFI = Bath Ankylosing Spondylitis Functional Index; mSASSS = modified Stoke Ankylosing Spondylitis Spine Score.

a This figure was calculated using the overall background progression rate of 0.98 units/year from Ramiro,2013 study9 and MEASURE 1 week 104 mSASSS progression figure of 0.3.8

b Based on input from clinical expert.

Table S6 Annual treatment specific biologic withdrawal rates

|  |  |  |  |
| --- | --- | --- | --- |
| Administration | Drug | Year 1 | Year 2+ |
| Subcutaneous | Secukinumab | 15.3% | 1.6% |
| Adalimumab10, 11 | 13.0% | 9.3% |
| Certolizumab pegol12 | 12.6% | 11.0% |
| Etanercept13,14 | 25.1% | 25.1% |
| Golimumab15 | 15.1% | 6.2% |
| Intravenous | Infliximab11,16 | 2.1% | 15.7% |

Source: Secukinumab from MEASURE 1 and MEASURE 2 clinical study report (data not published)

Table S7 Outpatient medical support costs for all biologics

|  |  |  |
| --- | --- | --- |
| **Input** | **Mean** | **Unit** |
| Specialist visit17 | CAD 22.56 | Per visit |
| Full blood count18 | CAD 9.26 | Per test |
| Erythrocyte sedimentation rate19 | CAD 10.93 | Per test |
| Liver function test18 | CAD 14.63 | Per test |
| Urea and electrolytes18 | CAD 6.00 | Per test |
| Chest radiograph20 | CAD 40.11 | Per test |
| Tuberculosis Heaf test 21 | CAD 16.44 | Per test |
| Antinuclear antibodies22 | CAD 24.53 | Per test |
| DNA test22 | CAD 20.83 | Per test |

DNA = deoxyribonucleic acid; CAD=Canadian Dollar

Table S8 Adverse event rates over a 3-month period

|  |  |  |  |
| --- | --- | --- | --- |
| **Administration** | **Drug** | **Serious Infection** | **Malignancy** |
| Subcutaneous | Secukinumab (MEASURE 1 & 2 trial) | 0.16% | 0.0015% |
| Adalimumab23 | 0.35% | 0.12% |
| Certolizumab pegol12 | 0.67% | 0.00% |
| Etanercept13 | 0.00% | 0.00% |
| Golimumab15 | 0.19% | 0.03% |
| Intravenous | Infliximab16 | 0.52% | 0.13% |

Source: Secukinumab from Novartis data on file (data not published)

Serious infections considered included tuberculosis or other serious infection, such as such as septicemia, bronchopneumonia, kidney or unitary tract infection, lower respiratory disease, or bronchitis.

Table S9 Utility weight inputs used in the model to calculate QALYs

|  |  |  |
| --- | --- | --- |
| **Parameter** | **MEASURE 1 & 2 data** | **Mcleod,2007**24 |
| Intercept | 0.9610 | 0.8772 |
| BASFI coefficient | -0.0330 | -0.0323 |
| BASDAI coefficient | -0.0442 | -0.0384 |
| Male coefficient | -0.0111 | -0.0279 |
| Age coefficient | -0.0005 | 0.0017 |

BASDAI = Bath Ankylosing Spondylitis Disease Activity Index; BASFI = Bath Ankylosing Spondylitis Functional Index

For base-case analysis, utilities calculated from MEAURE 1 and MEASURE 2 trials are included (data not published). For alternative scenario analysis, utilities obtained from McLeod et al. 2007 are included.

Table S10 Adverse event disutilities

|  |  |  |
| --- | --- | --- |
| **Adverse event** | **Disutility** | **Source** |
| **Serious infection** | -0.156 | Stevenson,201625 |
| **Malignancy** | -0.017 | Sullivan and Ghushchyan, 200626 |

Serious infections disutility applied for 1 month. Disutility for malignancy was assumed to be applied for 1 year

Table S11 Age related annual mortality rates27

| **Age (years)** | **Male** | **Female** | **Age (years)** | **Male** | **Female** |
| --- | --- | --- | --- | --- | --- |
| 18 | 0.00064 | 0.0003 | 54 | 0.00470 | 0.00295 |
| 19 | 0.00071 | 0.0003 | 55 | 0.00516 | 0.00322 |
| 20 | 0.00078 | 0.0003 | 56 | 0.00568 | 0.00353 |
| 21 | 0.00082 | 0.0003 | 57 | 0.00624 | 0.00386 |
| 22 | 0.00083 | 0.0003 | 58 | 0.00686 | 0.00423 |
| 23 | 0.00082 | 0.0003 | 59 | 0.00755 | 0.00464 |
| 24 | 0.00079 | 0.0003 | 60 | 0.00830 | 0.00510 |
| 25 | 0.00075 | 0.0003 | 61 | 0.00914 | 0.00560 |
| 26 | 0.00073 | 0.0003 | 62 | 0.01005 | 0.00615 |
| 27 | 0.00072 | 0.00031 | 63 | 0.01106 | 0.00677 |
| 28 | 0.00073 | 0.00033 | 64 | 0.01217 | 0.00745 |
| 29 | 0.00074 | 0.00035 | 65 | 0.01340 | 0.00821 |
| 30 | 0.00077 | 0.00038 | 66 | 0.01475 | 0.00905 |
| 31 | 0.00081 | 0.00041 | 67 | 0.01624 | 0.00999 |
| 32 | 0.00086 | 0.00045 | 68 | 0.01788 | 0.01102 |
| 33 | 0.0009 | 0.00049 | 69 | 0.01969 | 0.01218 |
| 34 | 0.00096 | 0.00053 | 70 | 0.02168 | 0.01347 |
| 35 | 0.00101 | 0.00058 | 71 | 0.02388 | 0.01490 |
| 36 | 0.00108 | 0.00063 | 72 | 0.02630 | 0.01650 |
| 37 | 0.00115 | 0.00068 | 73 | 0.02898 | 0.01828 |
| 38 | 0.00123 | 0.00074 | 74 | 0.03193 | 0.02028 |
| 39 | 0.00131 | 0.00081 | 75 | 0.03518 | 0.02250 |
| 40 | 0.00141 | 0.00088 | 76 | 0.03877 | 0.02499 |
| 41 | 0.00151 | 0.00096 | 77 | 0.04273 | 0.02777 |
| 42 | 0.00163 | 0.00104 | 78 | 0.04711 | 0.03088 |
| 43 | 0.00176 | 0.00114 | 79 | 0.05193 | 0.03437 |
| 44 | 0.00191 | 0.00124 | 80 | 0.05726 | 0.03828 |
| 45 | 0.00207 | 0.00135 | 81 | 0.06314 | 0.04267 |
| 46 | 0.00225 | 0.00147 | 82 | 0.06963 | 0.04760 |
| 47 | 0.00245 | 0.00160 | 83 | 0.07680 | 0.05313 |
| 48 | 0.00268 | 0.00175 | 84 | 0.08471 | 0.05935 |
| 49 | 0.00293 | 0.00190 | 85 | 0.09345 | 0.06634 |
| 50 | 0.00322 | 0.00208 | 86 | 0.10311 | 0.07421 |
| 51 | 0.00354 | 0.00226 | 87 | 0.11378 | 0.08308 |
| 52 | 0.00389 | 0.00247 | 88 | 0.12556 | 0.09308 |
| 53 | 0.00427 | 0.00270 | 89 | 0.13858 | 0.10435 |
| 90 | 0.15297 | 0.11708 | 101 | 0.34856 | 0.32078 |
| 91 | 0.16852 | 0.13112 | 102 | 0.36799 | 0.34270 |
| 92 | 0.18490 | 0.14622 | 103 | 0.38718 | 0.36455 |
| 93 | 0.20204 | 0.16236 | 104 | 0.40601 | 0.38612 |
| 94 | 0.21988 | 0.17950 | 105 | 0.42436 | 0.40726 |
| 95 | 0.23440 | 0.19754 | 106 | 0.44214 | 0.42778 |
| 96 | 0.25251 | 0.21631 | 107 | 0.45925 | 0.44755 |
| 97 | 0.27115 | 0.23596 | 108 | 0.47562 | 0.46646 |
| 98 | 0.29020 | 0.25639 | 109 | 0.49120 | 0.48440 |
| 99 | 0.30953 | 0.27744 | 110 | 1.00000 | 1.00000 |
| 100 | 0.32903 | 0.29896 |  |  |  |

Table S12 Disease specific and adverse event related mortality inputs considered in the analysis

|  |  |
| --- | --- |
| **Input** | **Relative Risk** |
| **Disease specific mortalitya** | |
| Male | 1.63 |
| Female | 1.38 |
| **Adverse event related mortalityb** | |
| Tuberculosis | 1.65 |
| Other serious infection | 1.65 |
| Malignancy |  |
| 1 Year | 1.41 |
| 2 Years | 1.41 |

Disease-specific mortality data obtained from Bakland, 201128

Mortality data for adverse event obtained from Abuabara, 201029

a Relative risk of mortality in AS patients compared to general population; b Relative risk of mortality in AS patients having adverse event compared to AS patients not having adverse event

Table S13 Sensitivity analysis inputs for biologic-naive base-case population

| **Variable** | **Base case** | **Lower Bound** | **Upper Bound** | **Distribution used in Probabilistic sensitivity analysis** |
| --- | --- | --- | --- | --- |
| Discount rate - costs | 1.50% | 0.0% | 5.0% | Not varied |
| Discount rate - outcomes | 1.50% | 0.0% | 5.0% | Not varied |
| Baseline BASDAI | 6.75 | 5.40 | 8.10 | Not varied |
| Baseline BASFI | 6.38 | 5.10 | 7.65 | Not varied |
| Baseline BASDAI responders: Secukinumab | 6.23 | 4.98 | 7.47 | Not varied |
| Baseline BASDAI responders: Certolizumab pegol | 6.23 | 4.98 | 7.47 | Not varied |
| Baseline BASDAI responders: Etanercept | 6.23 | 4.98 | 7.47 | Not varied |
| Baseline BASDAI responders: Adalimumab | 6.23 | 4.98 | 7.47 | Not varied |
| Baseline BASDAI responders: Infliximab | 6.23 | 4.98 | 7.47 | Not varied |
| Baseline BASDAI responders: Golimumab | 6.23 | 4.98 | 7.47 | Not varied |
| Baseline BASDAI responders: Conventional care | 6.34 | 5.07 | 7.61 | Not varied |
| Baseline BASDAI non-responders: Secukinumab | 6.90 | 5.52 | 8.28 | Not varied |
| Baseline BASDAI non-responders: Certolizumab pegol | 6.90 | 5.52 | 8.28 | Not varied |
| Baseline BASDAI non-responders: Etanercept | 6.90 | 5.52 | 8.28 | Not varied |
| Baseline BASDAI non-responders: Adalimumab | 6.90 | 5.52 | 8.28 | Not varied |
| Baseline BASDAI non-responders: Infliximab | 6.90 | 5.52 | 8.28 | Not varied |
| Baseline BASDAI non-responders: Golimumab | 6.90 | 5.52 | 8.28 | Not varied |
| Baseline BASDAI non-responders: Conventional care | 6.88 | 5.50 | 8.25 | Not varied |
| Baseline BASFI responders: Secukinumab | 5.69 | 4.55 | 6.83 | Not varied |
| Baseline BASFI responders: Certolizumab pegol | 5.69 | 4.55 | 6.83 | Not varied |
| Baseline BASFI responders: Etanercept | 5.69 | 4.55 | 6.83 | Not varied |
| Baseline BASFI responders: Adalimumab | 5.69 | 4.55 | 6.83 | Not varied |
| Baseline BASFI responders: Infliximab | 5.69 | 4.55 | 6.83 | Not varied |
| Baseline BASFI responders: Golimumab | 5.69 | 4.55 | 6.83 | Not varied |
| Baseline BASFI responders: Conventional care | 5.77 | 4.62 | 6.93 | Not varied |
| Baseline BASFI non-responders: Secukinumab | 6.83 | 5.47 | 8.20 | Not varied |
| Baseline BASFI non-responders: Certolizumab pegol | 6.83 | 5.47 | 8.20 | Not varied |
| Baseline BASFI non-responders: Etanercept | 6.83 | 5.47 | 8.20 | Not varied |
| Baseline BASFI non-responders: Adalimumab | 6.83 | 5.47 | 8.20 | Not varied |
| Baseline BASFI non-responders: Infliximab | 6.83 | 5.47 | 8.20 | Not varied |
| Baseline BASFI non-responders: Golimumab | 6.83 | 5.47 | 8.20 | Not varied |
| Baseline BASFI non-responders: Conventional care | 6.38 | 5.10 | 7.65 | Not varied |
| Annual rate of MSASSS change for MSASSS≥10 - Secukinumab | 1.440 | 1.152 | 1.728 | Normal |
| Annual rate of MSASSS change for MSASSS≥10 - TNFs | 1.440 | 1.152 | 1.728 | Normal |
| BASFI change with 1 unit change in MSASSS | 0.057 | 0.046 | 0.068 | Normal |
| Treatment effect on progression - Secukinumab | 0.153 | 0.122 | 0.184 | Normal |
| Treatment effect on progression - TNFs | 0.420 | 0.336 | 0.504 | Normal |
| Relative risk BASDAI response: Second line | 1.00 | 0.80 | 1.20 | Not varied |
| Relative risk Δ BASDAI: Second line | 1.00 | 0.80 | 1.20 | Not varied |
| Relative risk Δ BASFI: Second line | 1.00 | 0.80 | 1.20 | Not varied |
| Discontinuation year 1: Secukinumab | 15.3% | 12.3% | 18.4% | Normal |
| Discontinuation year 1: Certolizumab pegol | 12.6% | 10.1% | 15.1% | Normal |
| Discontinuation year 1: Etanercept | 25.1% | 20.1% | 30.2% | Normal |
| Discontinuation year 1: Adalimumab | 13.0% | 10.4% | 15.7% | Normal |
| Discontinuation year 1: Infliximab | 2.1% | 1.7% | 2.6% | Normal |
| Discontinuation year 1: Golimumab | 15.1% | 12.1% | 18.1% | Normal |
| Discontinuation year 2: Secukinumab | 1.6% | 1.3% | 2.0% | Normal |
| Discontinuation year 2: Certolizumab pegol | 11.0% | 8.8% | 13.2% | Normal |
| Discontinuation year 2: Etanercept | 25.1% | 20.1% | 30.2% | Normal |
| Discontinuation year 2: Adalimumab | 9.3% | 7.5% | 11.2% | Normal |
| Discontinuation year 2: Infliximab | 15.7% | 12.6% | 18.9% | Normal |
| Discontinuation year 2: Golimumab | 6.2% | 4.9% | 7.4% | Normal |
| Drug acquisition cost: Secukinumab | CAD 822.50 | CAD 658.00 | CAD 987.00 | Not varied |
| Drug acquisition cost: Certolizumab pegol | CAD 664.51 | CAD 531.61 | CAD 797.41 | Not varied |
| Drug acquisition cost: Etanercept | CAD 405.99 | CAD 324.79 | CAD 487.18 | Not varied |
| Drug acquisition cost: Adalimumab | CAD 769.97 | CAD 615.98 | CAD 923.96 | Not varied |
| Drug acquisition cost: Infliximab | CAD 987.56 | CAD 790.05 | CAD 1,185.07 | Not varied |
| Drug acquisition cost: GOL | CAD 1,555.17 | CAD 1,244.14 | CAD 1,866.20 | Not varied |
| Subcutaneous therapy training | CAD 0.00 | CAD 0.00 | CAD 0.00 | Normal |
| IV administration | CAD 0.00 | CAD 0.00 | CAD 0.00 | Normal |
| Cost equation intercept | CAD 2,413.31 | CAD 1,930.65 | CAD 2,895.98 | Log-normal |
| BASFI coefficient | 0.40 | 0.32 | 0.48 | Normal |
| Tuberculosis cost | CAD 57,181.60 | CAD 45,745.28 | CAD 68,617.93 | Gamma |
| Other serious infection cost | CAD 21,661.56 | CAD 17,329.25 | CAD 25,993.87 | Gamma |
| Malignancy cost | CAD 29,662.47 | CAD 23,729.97 | CAD 35,594.96 | Gamma |
| GP visit cost | CAD 21.90 | CAD 17.52 | CAD 26.28 | Gamma |
| Specialist visit cost | CAD 21.90 | CAD 17.52 | CAD 26.28 | Gamma |
| Full blood count cost | CAD 8.99 | CAD 7.19 | CAD 10.78 | Gamma |
| Erythrocyte sedimentation rate cost | CAD 10.61 | CAD 8.49 | CAD 12.73 | Gamma |
| Liver function test cost | CAD 14.20 | CAD 11.36 | CAD 17.04 | Gamma |
| Urea and electrolytes test cost | CAD 5.83 | CAD 4.66 | CAD 7.00 | Gamma |
| Chest radiograph cost | CAD 38.94 | CAD 31.15 | CAD 46.73 | Gamma |
| Tuberculosis Heaf test cost | CAD 15.96 | CAD 12.77 | CAD 19.15 | Gamma |
| Antinuclear antibodies cost | CAD 23.82 | CAD 19.06 | CAD 28.58 | Gamma |
| DNA double-stranded test cost | CAD 20.22 | CAD 16.18 | CAD 24.26 | Gamma |
| Serious infection probability: Secukinumab | 0.16% | 0.13% | 0.20% | Beta |
| Serious infection probability: Certolizumab pegol | 0.67% | 0.54% | 0.81% | Beta |
| Serious infection probability: Etanercept | 0.00% | 0.00% | 0.00% | Beta |
| Serious infection probability: Adalimumab | 0.35% | 0.28% | 0.42% | Beta |
| Serious infection probability: Infliximab | 0.52% | 0.41% | 0.62% | Beta |
| Serious infection probability: Golimumab | 0.19% | 0.15% | 0.23% | Beta |
| Serious infection probability: Conventional care | 0.00% | 0.00% | 0.00% | Beta |
| Malignancy probability: Secukinumab | 0.00% | 0.00% | 0.00% | Beta |
| Malignancy probability: Certolizumab pegol | 0.00% | 0.00% | 0.00% | Beta |
| Malignancy probability: Etanercept | 0.00% | 0.00% | 0.00% | Beta |
| Malignancy probability: Adalimumab | 0.12% | 0.10% | 0.15% | Beta |
| Malignancy probability: Infliximab | 0.13% | 0.10% | 0.15% | Beta |
| Malignancy probability: Golimumab | 0.03% | 0.02% | 0.04% | Beta |
| Malignancy probability: Conventional care | 0.00% | 0.00% | 0.00% | Beta |
| AS mortality relative risk - males | 1.63 | 1.30 | 1.96 | Log-normal |
| AS mortality relative risk - females | 1.38 | 1.10 | 1.66 | Log-normal |
| Tuberculosis mortality relative risk | 1.65 | 1.32 | 1.98 | Not varied |
| Other serious infection mortality relative risk | 1.65 | 1.32 | 1.98 | Not varied |
| Malignancy relative risk: Year 1 | 1.41 | 1.13 | 1.69 | Not varied |
| Malignancy relative risk: Year 2 | 1.41 | 1.13 | 1.69 | Not varied |
| Utility intercept | 0.961 | 0.77 | 1.15 | Normal |
| Utility BASFI coefficient | -0.0330 | -0.0264 | -0.0396 | Normal |
| Utility BASDAI coefficient | -0.0442 | -0.0354 | -0.0530 | Normal |
| Utility male coefficient | -0.0111 | -0.0089 | -0.0133 | Normal |
| Utility age coefficient | -0.0005 | -0.0004 | -0.0006 | Normal |
| Serious infection disutility: Year 1 | -0.1560 | -0.1248 | -0.1872 | Normal |
| Serious infection disutility: Year 2 | 0.0000 | 0.0000 | 0.0000 | Normal |
| Serious infection disutility: Years 3+ | 0.0000 | 0.0000 | 0.0000 | Normal |
| Malignancy disutility | -0.0174 | -0.0139 | -0.0209 | Normal |
| BASDAI 50 at 3 months: Secukinumab | 41.53% | 15.21% | 73.77% | Normal |
| BASDAI 50 at 3 months: Certolizumab pegol | 44.20% | 19.27% | 72.44% | Normal |
| BASDAI 50 at 3 months: Etanercept | 36.80% | 14.92% | 65.89% | Normal |
| BASDAI 50 at 3 months: Adalimumab | 48.85% | 38.43% | 59.37% | Normal |
| BASDAI 50 at 3 months: Infliximab | 44.20% | 19.27% | 72.44% | Normal |
| BASDAI 50 at 3 months: Golimumab | 47.20% | 28.39% | 66.85% | Normal |
| BASDAI 50 at 3 months: Conventional care | 16.73% | 13.07% | 21.17% | Normal |
| 3-month responder BASDAI change: Secukinumab | -4.602 | -2.982 | -6.222 | Normal |
| 3-month responder BASDAI change: Certolizumab pegol | -5.569 | -4.010 | -7.127 | Normal |
| 3-month responder BASDAI change: Etanercept | -4.474 | -2.743 | -6.206 | Normal |
| 3-month responder BASDAI change: Adalimumab | -4.562 | -3.970 | -5.155 | Normal |
| 3-month responder BASDAI change: Infliximab | -7.941 | -5.836 | -10.046 | Normal |
| 3-month responder BASDAI change: Golimumab | -5.316 | -4.004 | -6.629 | Normal |
| 3-month responder BASDAI change: Conventional care | -3.061 | -2.404 | -3.718 | Normal |
| 3-month non-responder BASDAI change: Secukinumab | -1.007 | -0.652 | -1.361 | Normal |
| 3-month non-responder BASDAI change: Certolizumab pegol | -1.275 | -0.886 | -1.575 | Normal |
| 3-month non-responder BASDAI change: Etanercept | -1.025 | -0.608 | -1.375 | Normal |
| 3-month non-responder BASDAI change: Adalimumab | -0.806 | -0.837 | -1.087 | Normal |
| 3-month non-responder BASDAI change: Infliximab | -1.819 | -1.290 | -2.220 | Normal |
| 3-month non-responder BASDAI change: Golimumab | -1.368 | -0.906 | -1.500 | Normal |
| 3-month non-responder BASDAI change: Conventional care | -0.701 | -0.539 | -0.833 | Normal |
| 3-month responder BASFI change: Secukinumab | -3.748 | -2.294 | -5.202 | Normal |
| 3-month responder BASFI change: Certolizumab pegol | -3.594 | -2.211 | -4.978 | Normal |
| 3-month responder BASFI change: Etanercept | -3.444 | -1.914 | -4.975 | Normal |
| 3-month responder BASFI change: Adalimumab | -3.145 | -2.622 | -3.668 | Normal |
| 3-month responder BASFI change: Infliximab | -3.965 | -2.119 | -5.811 | Normal |
| 3-month responder BASFI change: Golimumab | -4.072 | -2.816 | -5.327 | Normal |
| 3-month responder BASFI change: Conventional care | -1.627 | -0.945 | -2.308 | Normal |
| 3-month non-responder BASFI change: Secukinumab | -1.174 | -0.718 | -1.629 | Normal |
| 3-month non-responder BASFI change: Certolizumab pegol | -0.886 | -0.651 | -1.465 | Normal |
| 3-month non-responder BASFI change: Etanercept | -0.849 | -0.555 | -1.442 | Normal |
| 3-month non-responder BASFI change: Adalimumab | -0.775 | -0.778 | -1.089 | Normal |
| 3-month non-responder BASFI change: Infliximab | -0.977 | -0.624 | -1.710 | Normal |
| 3-month non-responder BASFI change: Golimumab | -0.712 | -0.781 | -1.477 | Normal |
| 3-month non-responder BASFI change: Conventional care | -0.401 | -0.258 | -0.629 | Normal |

AS=Ankylosing spondylitis; BASDAI = Bath Ankylosing Spondylitis Disease Activity Index; BASFI = Bath Ankylosing Spondylitis Functional Index; DNA: deoxy ribonucleic acid; GP=general practitioner; IV=intravenous; MSASSS= modified stoke ankylosing spondylitis spinal score

Table S14 List of published studies evaluating cost-effectiveness of biologics in AS

| **Publication year** | **Population** | **Country of focus** | **Model type** | **Comparators** | **Key results** |
| --- | --- | --- | --- | --- | --- |
| 201730 | Active AS unresponsive to conventional treatment | Turkey | Markov model | Secukinumab, certolizumab pegol, etanercept, adalimumab and infliximab | Biologic-naïve: cost for secukinumab € 4,644-9134 lower than others and  Experienced population: cost for secukinumab € 7,641-15,297 lower than others  Biologic-naïve: 0.20-0.86 QALYs gained with secukinumab treatment  Experienced population: 0.26-1.06 QALYs gained with secukinumab |
| 201731 | AS | Colombia | Markov model | TNF-α inhibitors | Incremental QALYs for secukinumab vs.  certolizumab pegol: 0.099  etanercept: 0.164  adalimumab: 0.046  Incremental costs for secukinumab vs.  certolizumab pegol: -$28,472,133  etanercept: -$27,696,705  adalimumab: -$39,077,037 |
| 201732 | Active AS responding inadequately to conventional treatment | UK | Markov model | Secukinumab, etanercept, etanercept biosimilar, infliximab | ICER for secukinumab vs.  etanercept originator: 10,173 per QALY gained  etanercept biosimilar: 11,417 per QALY gained |
| 201733 | Active AS responding inadequately to conventional treatment | UK | Combined decision tree/Markov state-transition model | Secukinumab, anti-TNF therapies | Biolgic-naïve: Secukinumab dominated adalimumab and infliximab and ICER was less than £20,000 per QALY gained vs. certolizumab pegol and etanercept.  Biologic experienced: ICER for secukinumab vs. conventional care: £4,817 per QALY gained |
| 201734 | AS | Bulgaria | Not reported | Secukinumab  Etanercept  Infliximab  Adalimumab  Golimumab  Certolizumab Pegol | Secukinumab dominated certolizumab pegol, etanercept, adalimumab, golimumab and was cost-effective in comparison to infliximab considering WTP threshold of three times GDP per capita in Bulgaria (ICER: 27 552 BGN/QALY) |
| 201635 | AS | Russia | Not reported | Adalimumab  Certolizumab Pegol  Etanercept  Golimumab  Infliximab | Secukinumab had the lowest ICER 35 in comparison to all other biologics |

AS=ankylosing spondylitis; BGN=Bulgarian lev; GDP=gross domestic product; ICER=incremental cost effectiveness ratio; QALY= quality adjusted life years; TNF=tumor necrosis factor; UK=United Kingdom; WTP=willingness to pay

**Figure S1 One-way sensitivity analysis among biologic naïve population**

**SEC vs CER P**

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**SEC vs ETN branded**

****

**SEC vs ETN BS**

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**SEC vs ADA**

****

**SEC vs INF**

****

**SEC vs INF BS**

****

**SEC vs GOL**

****

ADA = adalimumab; CER P = certolizumab pegol; ETN = etanercept; ETN BS = etanercept biosimilar; GOL = golimumab; INF = infliximab; INF BS = infliximab biosimilar; SEC = secukinumab

BASDAI = Bath Ankylosing Spondylitis Disease Activity Index; BASFI = Bath Ankylosing Spondylitis Functional Index;

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