

Estimating the effects of Aducanumab on lifetime and ten-year risks of Alzheimer's disease

Inflating treatment effects

Aducanumab has not been shown to have a massive treatment effect on the probability of developing Alzheimer's disease (AD). The relative risk (RR) for 1-year transitions is likely in the range of 0.75-1. However, it may be useful to see how a treatment with a larger effect would impact lifetime risks of AD. To that end, we assume RRs of 0.75, 0.50, and 0.25 to see how they change lifetime and ten-year risks.

Lifetime Risks

Females

We format tables such that each table represents a given starting state in the multistate model. Columns correspond to lifetime risks for each $RR \in (1, 0.75, 0.50, 0.25)$ for each age (rows).

Table 1: Lifetime risks for females in state 1 (Normal)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	20.14 %	17.84 %	14.56 %	9.62 %
65	18.73 %	16.48 %	13.32 %	8.68 %
70	16.63 %	14.48 %	11.55 %	7.4 %
75	13.82 %	11.87 %	9.3 %	5.83 %
80	10.42 %	8.78 %	6.73 %	4.1 %
85	7.07 %	5.82 %	4.34 %	2.57 %
90	4.14 %	3.33 %	2.41 %	1.38 %
95	2.07 %	1.62 %	1.14 %	0.63 %

Table 2: Lifetime risks for females in state 2 (Amyloid)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	30.97 %	27.81 %	23 %	15 %
65	29.29 %	26.1 %	21.32 %	13.63 %
70	26.86 %	23.66 %	19.01 %	11.85 %
75	23.52 %	20.38 %	16.02 %	9.68 %
80	19.09 %	16.2 %	12.38 %	7.21 %
85	13.77 %	11.38 %	8.42 %	4.72 %
90	8.39 %	6.74 %	4.82 %	2.6 %
95	4.27 %	3.34 %	2.32 %	1.21 %

Table 3: Lifetime risks for females in state 3 (Neurodegeneration)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	30.27 %	28.08 %	24.85 %	19.69 %
65	27.58 %	25.31 %	22.01 %	16.88 %
70	24.45 %	22.12 %	18.82 %	13.87 %
75	20.8 %	18.46 %	15.27 %	10.72 %
80	16.54 %	14.32 %	11.44 %	7.58 %
85	11.87 %	9.98 %	7.67 %	4.79 %
90	7.31 %	5.96 %	4.4 %	2.59 %
95	3.82 %	3.02 %	2.15 %	1.21 %

Table 4: Lifetime risks for females in state 4 (A + N)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	41.87 %	38.47 %	32.93 %	22.69 %
65	40.8 %	37.21 %	31.46 %	21.18 %
70	38.9 %	35.08 %	29.13 %	19.04 %
75	35.85 %	31.81 %	25.78 %	16.22 %
80	31.19 %	27.04 %	21.23 %	12.79 %
85	24.69 %	20.78 %	15.71 %	9.02 %
90	16.87 %	13.73 %	9.99 %	5.48 %
95	9.91 %	7.81 %	5.48 %	2.89 %

Table 5: Lifetime risks for females in state 5 (A + N + MCI)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	95.63 %	93.65 %	88.86 %	72.95 %
65	93.57 %	90.7 %	84.23 %	65.84 %
70	90.06 %	85.96 %	77.56 %	57.26 %
75	84.71 %	79.07 %	68.7 %	47.55 %
80	76.19 %	68.96 %	57.21 %	36.95 %
85	63.81 %	55.51 %	43.66 %	26.27 %
90	46.68 %	38.83 %	28.94 %	16.32 %
95	29.89 %	23.87 %	16.99 %	9.09 %

Males

Table 6: Lifetime risks for males in state 1 (Normal)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	13.87 %	12.19 %	9.87 %	6.48 %
65	12.89 %	11.25 %	9.01 %	5.84 %
70	11.33 %	9.78 %	7.73 %	4.92 %
75	9.25 %	7.87 %	6.11 %	3.81 %
80	6.75 %	5.64 %	4.28 %	2.6 %
85	4.38 %	3.57 %	2.64 %	1.56 %
90	2.38 %	1.9 %	1.36 %	0.78 %
95	1.03 %	0.8 %	0.56 %	0.31 %

Table 7: Lifetime risks for males in state 2 (Amyloid)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	23.1 %	20.54 %	16.76 %	10.71 %
65	21.85 %	19.26 %	15.51 %	9.71 %
70	19.89 %	17.32 %	13.7 %	8.37 %
75	17.19 %	14.71 %	11.38 %	6.74 %
80	13.63 %	11.42 %	8.59 %	4.91 %
85	9.5 %	7.75 %	5.65 %	3.11 %
90	5.43 %	4.31 %	3.04 %	1.62 %
95	2.43 %	1.88 %	1.29 %	0.67 %

Table 8: Lifetime risks for males in state 3 (Neurodegeneration)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	23.1 %	21.41 %	18.98 %	15.22 %
65	20.83 %	19.07 %	16.58 %	12.85 %
70	18.18 %	16.38 %	13.9 %	10.33 %
75	15.16 %	13.38 %	11.01 %	7.77 %
80	11.72 %	10.08 %	8 %	5.31 %
85	8.12 %	6.77 %	5.16 %	3.23 %
90	4.7 %	3.79 %	2.78 %	1.64 %
95	2.16 %	1.7 %	1.2 %	0.68 %

Table 9: Lifetime risks for males in state 4 (A + N)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	33.62 %	30.61 %	25.86 %	17.45 %
65	32.88 %	29.69 %	24.73 %	16.28 %
70	31.27 %	27.87 %	22.77 %	14.53 %
75	28.6 %	25.04 %	19.94 %	12.25 %
80	24.46 %	20.91 %	16.13 %	9.5 %
85	18.88 %	15.67 %	11.65 %	6.55 %
90	12.38 %	9.94 %	7.12 %	3.84 %
95	6.56 %	5.11 %	3.54 %	1.84 %

Table 10: Lifetime risks for males in state 5 (A + N + MCI)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	92.93 %	90.1 %	83.93 %	66.37 %
65	90.37 %	86.56 %	78.74 %	59.24 %
70	85.99 %	80.9 %	71.31 %	50.68 %
75	79.54 %	73.01 %	61.89 %	41.31 %
80	69.91 %	62.11 %	50.26 %	31.4 %
85	56.66 %	48.4 %	37.23 %	21.79 %
90	40.15 %	32.86 %	24.03 %	13.26 %
95	23.87 %	18.79 %	13.17 %	6.93 %

Ten-year risks

Females

Table 11: Ten-year risks for females in state 1 (Normal)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	0.2 %	0.18 %	0.16 %	0.13 %
65	0.47 %	0.41 %	0.35 %	0.26 %
70	1.07 %	0.92 %	0.74 %	0.53 %
75	2.2 %	1.84 %	1.43 %	0.95 %
80	3.68 %	3.04 %	2.3 %	1.44 %
85	4.68 %	3.81 %	2.82 %	1.68 %
90	3.84 %	3.08 %	2.22 %	1.27 %
95	2.06 %	1.62 %	1.14 %	0.63 %

Table 12: Ten-year risks for females in state 2 (Amyloid)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	1.26 %	1.04 %	0.77 %	0.43 %
65	2.5 %	2.06 %	1.52 %	0.85 %
70	4.65 %	3.84 %	2.84 %	1.58 %
75	7.83 %	6.47 %	4.78 %	2.66 %
80	11.05 %	9.11 %	6.71 %	3.73 %
85	11.5 %	9.39 %	6.85 %	3.76 %
90	8.17 %	6.55 %	4.68 %	2.51 %
95	4.27 %	3.34 %	2.32 %	1.21 %

Table 13: Ten-year risks for females in state 3 (Neurodegeneration)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	3.6 %	3.51 %	3.39 %	3.25 %
65	4.32 %	4.11 %	3.85 %	3.54 %
70	5.52 %	5.09 %	4.55 %	3.88 %
75	7.33 %	6.5 %	5.48 %	4.21 %
80	9.34 %	8.01 %	6.38 %	4.38 %
85	9.67 %	8.08 %	6.17 %	3.88 %
90	7.07 %	5.76 %	4.24 %	2.5 %
95	3.82 %	3.02 %	2.15 %	1.21 %

Table 14: Ten-year risks for females in state 4 (A + N)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	7.07 %	6.08 %	4.7 %	2.76 %
65	10.71 %	9.2 %	7.11 %	4.18 %
70	15.5 %	13.3 %	10.27 %	6.02 %
75	20.79 %	17.79 %	13.69 %	7.99 %
80	24.43 %	20.76 %	15.85 %	9.17 %
85	23.1 %	19.31 %	14.47 %	8.2 %
90	16.76 %	13.63 %	9.9 %	5.42 %
95	9.9 %	7.81 %	5.48 %	2.89 %

Table 15: Ten-year risks for females in state 5 (A + N + MCI)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	93.47 %	87.93 %	75.88 %	50.63 %
65	91.72 %	85.9 %	73.74 %	48.92 %
70	88.64 %	82.41 %	70.13 %	46.08 %
75	83.83 %	76.95 %	64.5 %	41.67 %
80	75.84 %	68.14 %	55.66 %	34.92 %
85	63.74 %	55.36 %	43.4 %	25.94 %
90	46.68 %	38.83 %	28.93 %	16.3 %
95	29.89 %	23.87 %	16.99 %	9.09 %

Males

Table 16: Ten-year risks for females in state 1 (Normal)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	0.2 %	0.18 %	0.16 %	0.13 %
65	0.47 %	0.41 %	0.35 %	0.26 %
70	1.07 %	0.92 %	0.74 %	0.53 %
75	2.2 %	1.84 %	1.43 %	0.95 %
80	3.68 %	3.04 %	2.3 %	1.44 %
85	4.68 %	3.81 %	2.82 %	1.68 %
90	3.84 %	3.08 %	2.22 %	1.27 %
95	2.06 %	1.62 %	1.14 %	0.63 %

Table 17: Ten-year risks for females in state 2 (Amyloid)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	1.26 %	1.04 %	0.77 %	0.43 %
65	2.5 %	2.06 %	1.52 %	0.85 %
70	4.65 %	3.84 %	2.84 %	1.58 %
75	7.83 %	6.47 %	4.78 %	2.66 %
80	11.05 %	9.11 %	6.71 %	3.73 %
85	11.5 %	9.39 %	6.85 %	3.76 %
90	8.17 %	6.55 %	4.68 %	2.51 %
95	4.27 %	3.34 %	2.32 %	1.21 %

Table 18: Ten-year risks for females in state 3 (Neurodegeneration)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	3.6 %	3.51 %	3.39 %	3.25 %
65	4.32 %	4.11 %	3.85 %	3.54 %
70	5.52 %	5.09 %	4.55 %	3.88 %
75	7.33 %	6.5 %	5.48 %	4.21 %
80	9.34 %	8.01 %	6.38 %	4.38 %
85	9.67 %	8.08 %	6.17 %	3.88 %
90	7.07 %	5.76 %	4.24 %	2.5 %
95	3.82 %	3.02 %	2.15 %	1.21 %

Table 19: Ten-year risks for females in state 4 (A + N)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	7.07 %	6.08 %	4.7 %	2.76 %
65	10.71 %	9.2 %	7.11 %	4.18 %
70	15.5 %	13.3 %	10.27 %	6.02 %
75	20.79 %	17.79 %	13.69 %	7.99 %
80	24.43 %	20.76 %	15.85 %	9.17 %
85	23.1 %	19.31 %	14.47 %	8.2 %
90	16.76 %	13.63 %	9.9 %	5.42 %
95	9.9 %	7.81 %	5.48 %	2.89 %

Table 20: Ten-year risks for females in state 5 (A + N + MCI)

Age	RR=1	RR=0.75	RR=0.5	RR=0.25
60	93.47 %	87.93 %	75.88 %	50.63 %
65	91.72 %	85.9 %	73.74 %	48.92 %
70	88.64 %	82.41 %	70.13 %	46.08 %
75	83.83 %	76.95 %	64.5 %	41.67 %
80	75.84 %	68.14 %	55.66 %	34.92 %
85	63.74 %	55.36 %	43.4 %	25.94 %
90	46.68 %	38.83 %	28.93 %	16.3 %
95	29.89 %	23.87 %	16.99 %	9.09 %