

Cost-Effectiveness of Aducanumab, Lecanemab, and Donanemab for Early Alzheimer’s Disease in the US

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UNIVERSITY of WASHINGTON

THE CHOICE INSTITUTE

School of Pharmacy

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Filmon Haile, PharmD^{1,2}, Josh Carlson, PhD¹ Kyueun Lee, PhD¹

¹ The CHOICE(Comparative Health Outcomes, Policy, and Economics) Institute, University of Washington ²*AbbVie Inc., North Chicago, IL, USA*

Background

- **Alzheimer’s Disease (AD)** is the most common type of dementia which involves the part of the brain that controls thought, memory and language¹
- Economic burden of AD was about \$321 billion, in addition to \$271 billion in unpaid caregiving in 2022²
- There are limited treatments available for AD: Aduhelm(aducanumab, approved in 2021), Leqembi (lecanemab, approved in 2023), and Donanemab (pending for approval)³
- Understanding the clinical and economic impacts of these novel AD therapies will be vital in optimizing US healthcare outcomes and expenditure

Objective

- Assess cost-effectiveness of aducanumab, lecanemab, and donanemab at a Willingness-to-pay(WTP) threshold of \$150,000 per Quality Adjusted Life Year (QALY)

Methods

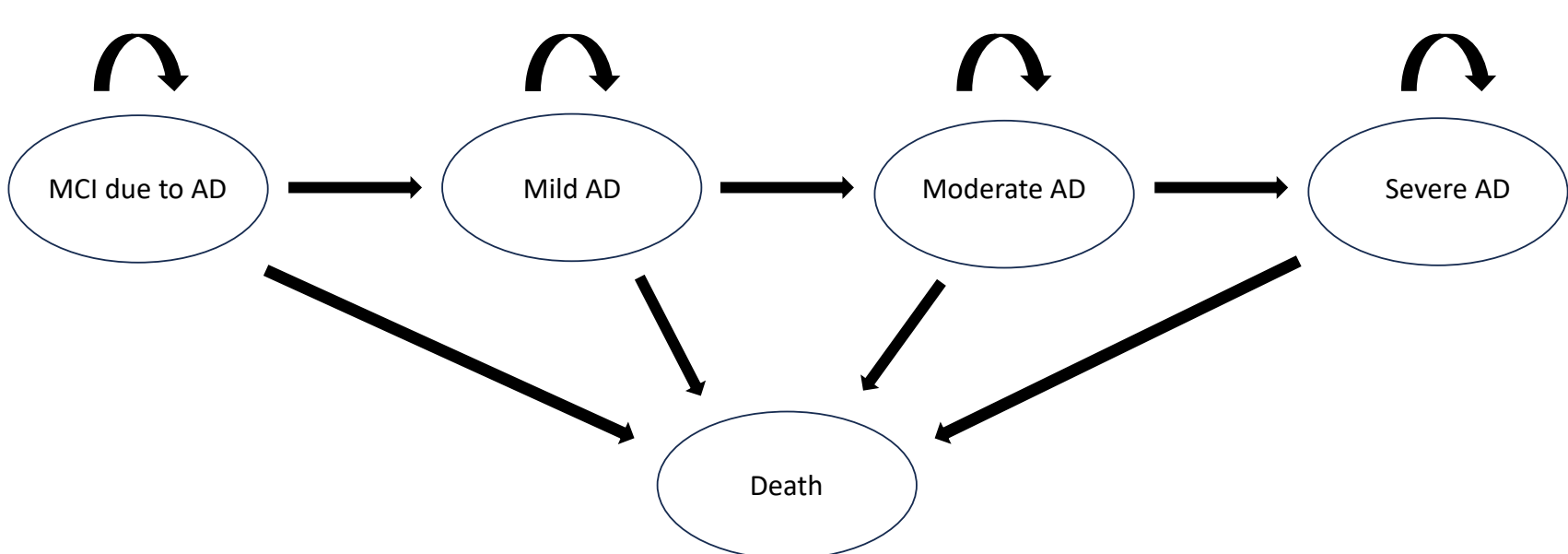


Figure 1. Five-state Markov Model Structure

- 1-month cycle length to capture dynamic progression and short lifespan after AD diagnosis
- AD clinical stage was derived from the Clinical Dementia Rating Scale(CDR)
- Death rates derived from National Vital Statistics Reports life tables then converted to monthly probabilities
 - Monthly death rates then multiplied by relative risk of death based on AD stage

Methods

Table 1. Model Input Parameters			
Transition Probabilities		Costs	
Supportive Care monthly transition probabilities		Monthly Background Healthcare Sector	
MCI to Mild AD	0.022	MCI	\$691.00
MCI to Death	0.006	Mild AD	\$1,049.00
Mild to Moderate AD	0.035	Moderate AD	\$1,274.00
Mild AD to Death	0.010	Severe AD	\$3,764.00
Moderate to Severe AD	0.044	Monthly Caregiver Costs	
Moderate AD to Death	0.013	MCI	\$2,239.74
Severe AD to Death	0.033	Mild AD	\$3,667.98
Lecanemab compared to Supportive Care		Moderate AD	\$5,485.74
MCI to Mild AD	0.690	Severe AD	\$9,673.08
Mild to Moderate AD	0.690	Lecanemab	
Aducanumab compared to Supportive Care		Lecanemab monthly cost	\$2,208.33
MCI to Mild AD	0.890	Screening (once)	\$6,957.00
Mild to Moderate AD	0.890	Aducanumab	
Donanemab compared to Supportive Care		Aducanumab yr1 (12months)	\$1,708.33
MCI to Mild AD	0.680	Aducanumab yr2 or later (≥12mth)	\$2,350.00
Mild to Moderate AD	0.680	Screening (once)	\$6,957.00
Utilities		Donanemab	
MCI due to AD	0.830	Donanemab monthly cost	\$2,208.00
Mild AD	0.795	Screening (once)	\$17,096.00
Moderate AD	0.610	Hospitalizations	
Severe AD	0.440	Symptomatic ARIA	\$35,934.00
Probabilities Adverse Events		Symptomatic ARIA	\$796.80
Symptomatic ARIA	-0.14	Other Parameters	
Lecanemab		Discount, costs(months)	0.25%
Symptomatic ARIA	0.035	Discount, health outcomes(months)	0.25%
Hospitalization related to ARIA	0.008	Donanemab	
Aducanumab	0.200	Symptomatic ARIA	0.052
Symptomatic ARIA	0.020	Hospitalization related to ARIA	0.015
Hospitalization related to ARIA	0.014	Donanemab	
Donanemab	0.052	Donanemab	
Symptomatic ARIA	0.015	Donanemab	
Hospitalization related to ARIA	0.015	Donanemab	

Population and Assumptions

- Population
 - Mean age 75yo
 - 65% start in MCI, 35% in mild AD
- Background Healthcare costs
 - Include Inpatient, outpatient, home care, medication, long-term care
- Adverse Events
 - Hospitalization cost based on 11.6day average stay as a results of ARIA
- Assumptions
 - Patients can progress forward and backwards between AD stages

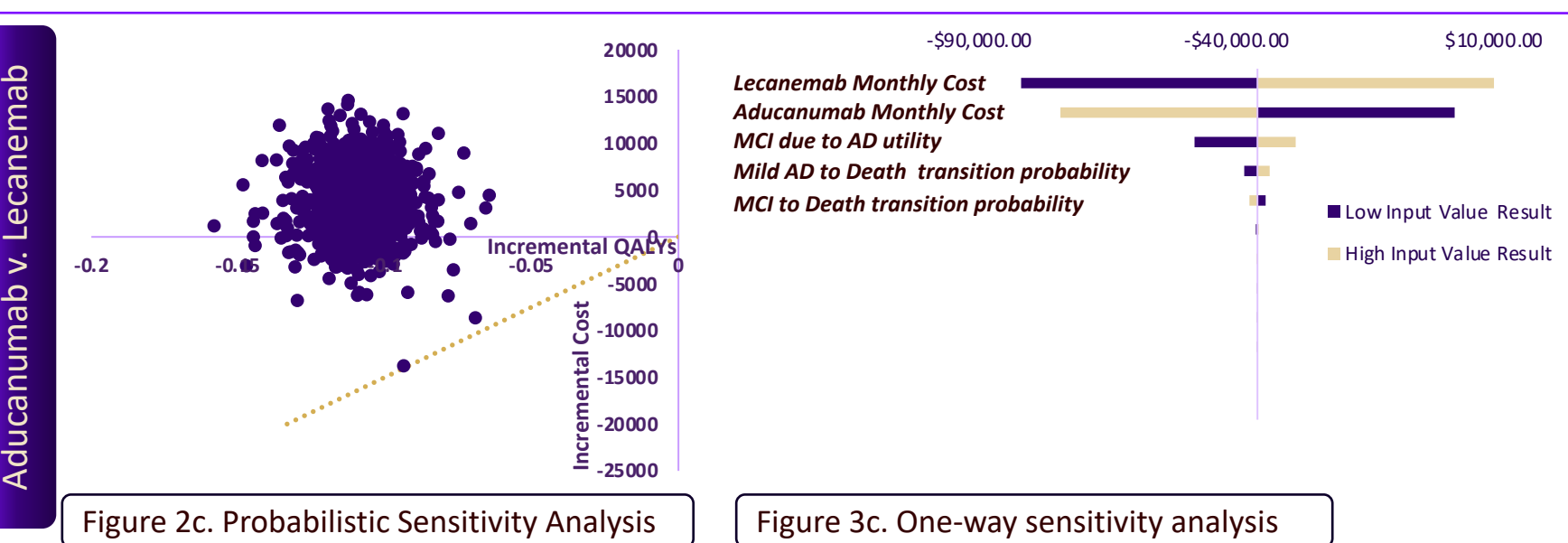
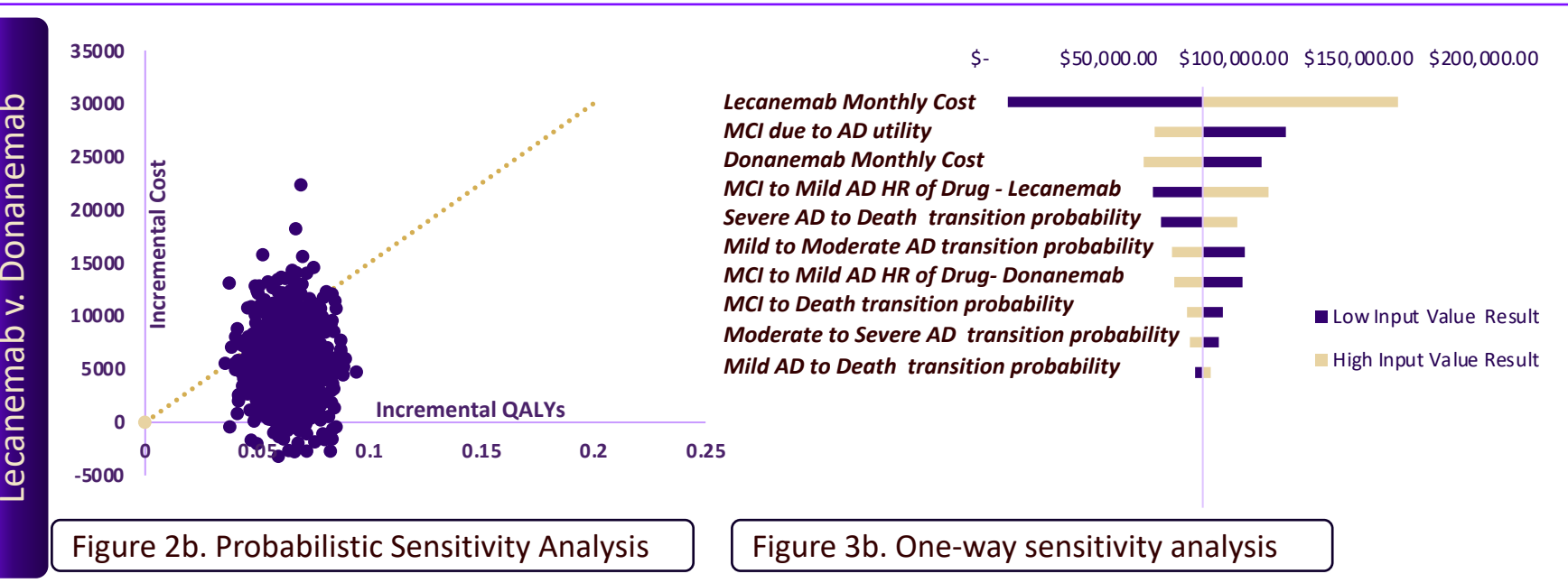
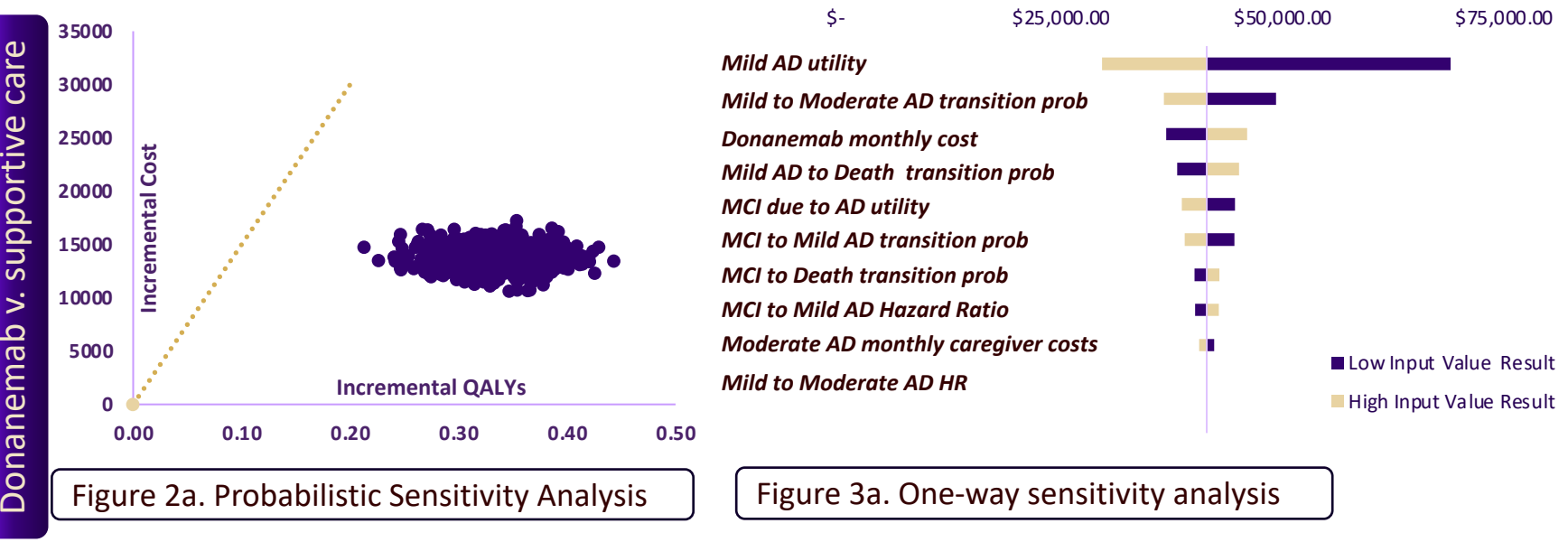
Results

Comparative Results

Table 2. Comparative Results			
	Cost	QALYs	ICER
Supportive Care	\$44,447.46	2.63	--
Donanemab	\$58,119.74	2.96	\$41,351.89
Lecanemab	\$63,716.41	3.02	\$87,397.54
Aducanumab	\$67,635.87	2.91	Dominated

- Aducanumab was dominated by lecanemab (more costly and less effective)
- At a WTP of \$150,000/QALY, lecanemab was cost-effective.

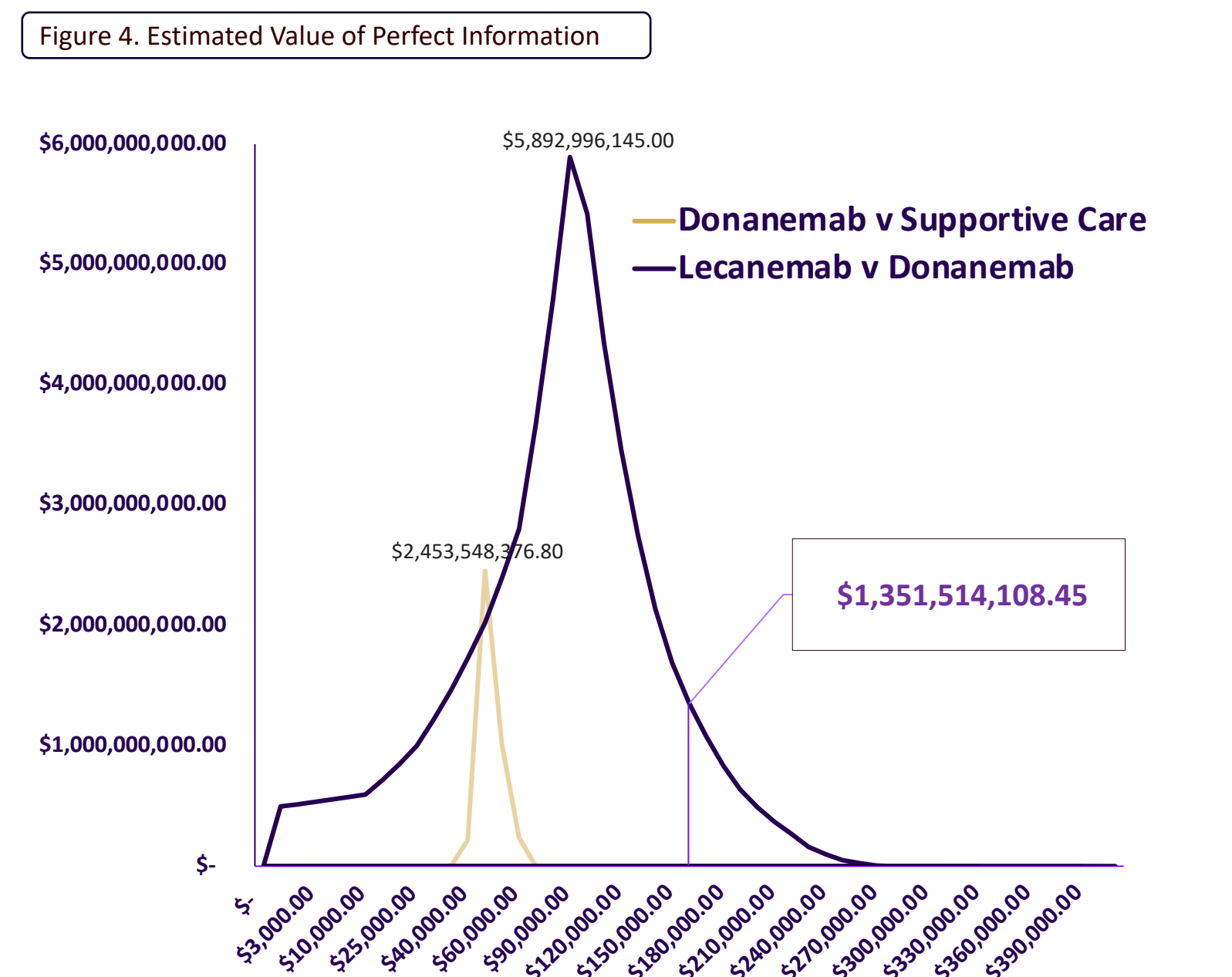
Probabilistic Sensitivity Analyses and One-Way Sensitivity



- Donanemab was more costly and more effective 100% of the time compared to supportive care (1000 simulations), and the main driver was the utility value of Mild AD
- Lecanemab was more costly and more effective 96.7% and less costly and more effective 3.3% of the time compared to donanemab, and the main driver was lecanemab monthly cost
- Aducanumab was more costly and less effective 89% and less costly and less effective 11% of the time compared to lecanemab, and main driver was lecanemab monthly cost

Results

Estimated Value of Perfect Information(EVPI)



- At a WTP of \$150,000/QALY, additional information did not change the optimal decision on choosing between donanemab and supportive care
- Additional information carried much higher value (\$1.35B) when choosing between lecanemab and donanemab

Conclusion

- At a WTP of \$150,000/QALY:**
 - Donanemab is cost-effective compared to supportive care
 - Lecanemab is cost-effective compared to donanemab
 - Aducanumab is more costly but less effective than Lecanemab

Limitations

- We used a time-horizon of 60 months, though lifetime horizon may be preferable
- The drugs clinical trials differed in their primary endpoint measures, so comparing true clinical impact is difficult
- Aducanumab, lecanemab, and donanemab are only clinically beneficial during MCI and Mild AD so limited-duration use may help lower costs

References

1. Matthews, K.A., Xu, W., Gaglioni, A.H., Holt, J.B., Croft, J.B., Mack, D. and McGuire, L.C. (2019), Racial and ethnic estimates of Alzheimer's disease and related dementias in the United States (2015–2060) in adults aged ≥65 years. *Alzheimer's & Dementia*, 15: 17-24. <https://doi.org/10.1016/j.jalz.2018.06.3063>

2. Skaria AP. The economic and societal burden of Alzheimer disease: managed care considerations. *Am J Manag Care*. 2022 Sep;28(10 Suppl):S188-S196. doi: 10.37765/ajmc.2022.89236. PMID: 36197132.

3. FDA/CEDR resources page. Food and Drug Administration Web site. <http://www.fda.gov/cder/approval/index.htm>. Accessed April 7, 2007.