EE508

Number Needed to Treat and Cost-per-event avoided for Dupilumab versus Other Asthma Biologics for the Treatment of Moderate-to-Severe Asthma

Asthma

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Background

- Multiple biologics have been approved in the United States (US) and Europe for treating patients with moderate-to-severe asthma with different phenotypes. However, there have been no head-to-head trials evaluating their comparative efficacy.[1–4]
- Results from the US-ADVANTAGE, a large real-world evidence (RWE) study involving patients with moderate-to-severe asthma from the US, demonstrated a significant improvement in exacerbation rates and systemic corticosteroid (SCS) prescriptions with the treatment of dupilumab compared to omalizumab, benralizumab or mepolizumab.[5]
- To support payers' "decisions-making" on the use of different biologic therapies in Italy, we estimated the number-needed-to-treat (NNT), and cost-per-event avoided (CPEA) using exacerbation data from the US-ADVANTAGE study for dupilumab versus mepolizumab, benralizumab, and omalizumab.

Objective

- **To compare the NNT and CPEA for dupilumab versus mepolizumab, benralizumab, and omalizumab in preventing asthma exacerbation rates (AER) in Italy for a one-year period.**

Conclusions

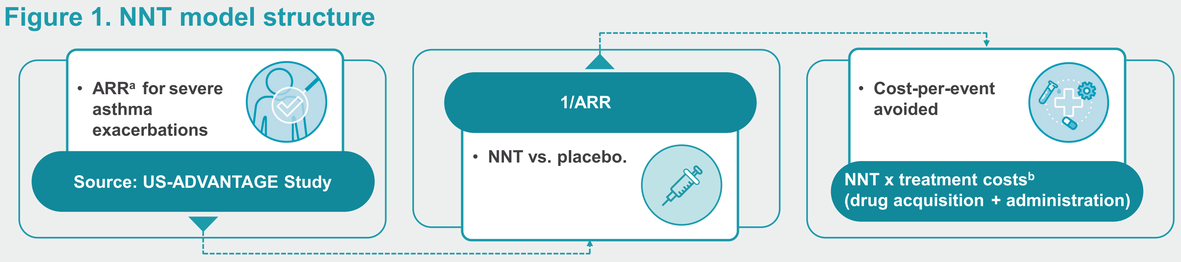
- **In our model, dupilumab demonstrated a lower NNT and CPEA per year compared to other asthma biologics for preventing severe exacerbations in patients with moderate-to-severe asthma.**
- **These findings indicate favorable treatment benefits and economic value for dupilumab compared to benralizumab, mepolizumab or omalizumab.**
- **This model uses RWE data to determine efficacy outcomes and list prices for biologics instead of their net prices, which are some limitations to its applicability.**

METHODS & RESULTS

Model overview and inputs

- An Excel-based tool was developed to estimate the NNT to avoid one severe asthma exacerbation over a period of one year (**Figure 1**).
- Data on AER were gathered from the US-ADVANTAGE study[1]. Drug costs were sourced from the visible prices of drugs listed in the Italian official gazette. All prices were expressed in euros (€). The cost inputs are shown in **Table 1.**

Figure 1. NNT model structure



[a]Absolute difference in severe exacerbation rates: dupilumab vs. benralizumab, mepolizumab or omalizumab; [b]Source: Italian drug prices listed in the official gazette. The treatment cost was defined as the drug cost of the biologic treatment with a duration corresponding to a period of one year. The treatment frequency differed among biologics. ARR, absolute risk reduction; NNT, number-needed-to-treat; US, United States.

Table 1. Model costs inputs

	Dupilumab	Mepolizumab	Benralizumab	Omalizumab
Cost per unit (Listed, €)	640.0	1,203.4	2,316.6	369.6
Dosing frequency	200 mg/300 mg Q2W	100 mg Q4W	30 mg Q8W (Q4W for the first 3 doses)	Various Q2W/Q4W[a]
Units/year	26	13	7	13
Annual treatment costs	16,640.0	15,644.5	16,215.9	14,414.4

[a]Omalizumab dosage dependent on weight and IgE levels.
IgE, immunoglobulin E; Q2W, every two weeks; Q4W, every four weeks; Q8W, every eight weeks.

Patient population

- In the base case analysis, patients with ≥2 exacerbations prior to biologic initiation were included to compare the efficacy of dupilumab with mepolizumab and benralizumab, while patients with ≥1 exacerbation were included for the comparison of dupilumab with omalizumab.

Cost-per-event avoided evaluation

- For each biologic, the CPEA/year was computed by multiplying treatment costs (biologic and administration costs) by the NNT to obtain the corresponding 1-year incremental cost to avoid one exacerbation versus standard of care (SoC).

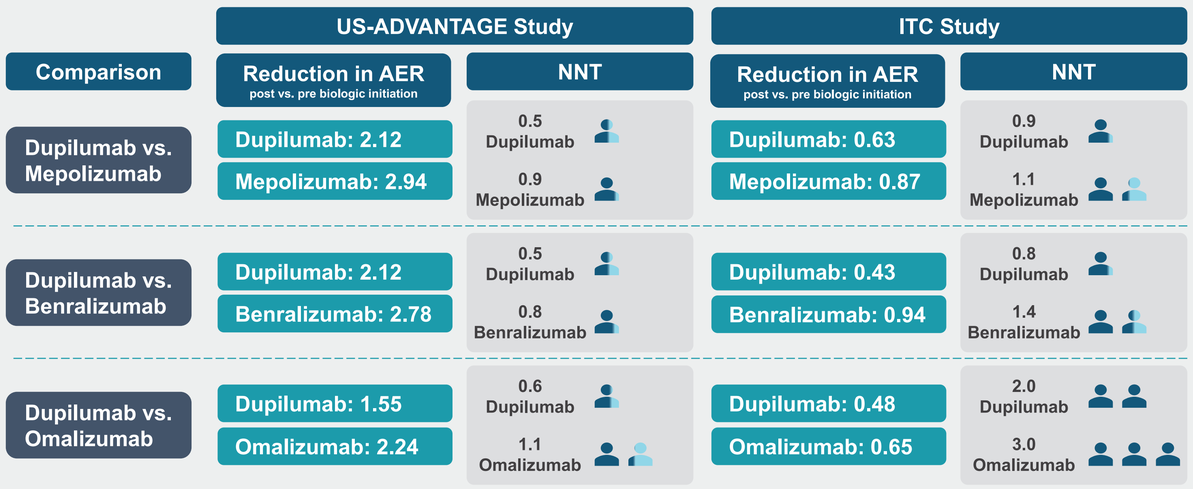
Sensitivity Analysis

- To further validate the analysis, efficacy data from a published indirect treatment comparison (ITC) study[6], involving clinical trial data, were used from the matched cohorts.
- Sensitivity analyses with varying discounting scenarios (20%, 30% and 40%) were applied to the CPEA/year.

Results

- Dupilumab demonstrated a lower NNT to avoid one severe asthma exacerbation, compared to mepolizumab, benralizumab and omalizumab as derived from the RWE study (US-ADVANTAGE) (**Figure 2**). Similar results were obtained when the exacerbation data were derived from the ITC study.

Figure 2. Reduction in asthma exacerbation rates (annual) post vs. pre biologic initiation and NNT to avoid one additional exacerbation event for each biologic

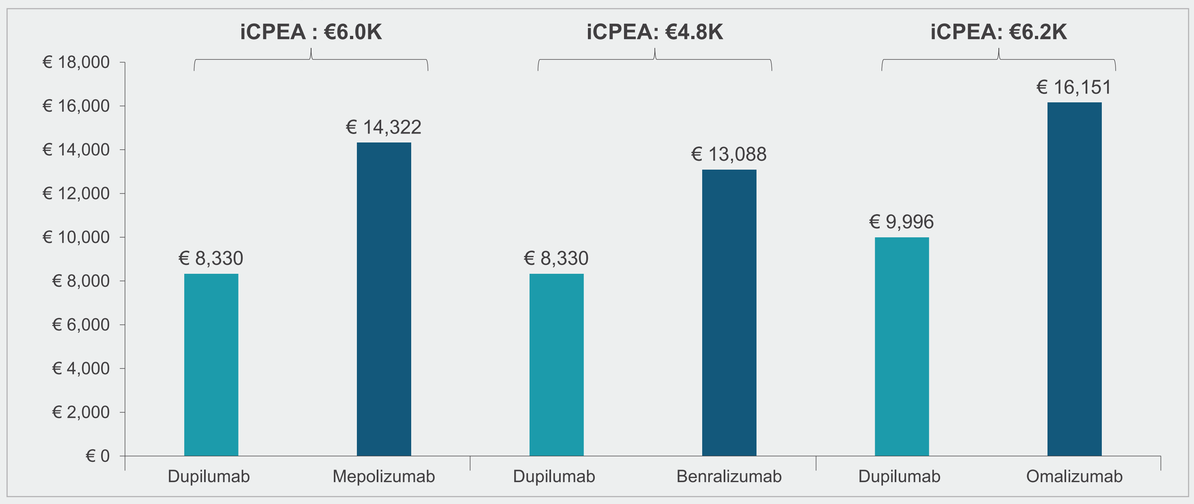


In US-ADVANTAGE, severe asthma exacerbation is defined as: (1) an outpatient/ER visit with an asthma diagnosis and an SCS prescription within 5 days before or after, or (2) an inpatient visit with an asthma diagnosis. Severe AERs were 3.16 and 4.07 in patients experiencing ≥1 and ≥2 exacerbations, respectively, with SoC treatment.
In RCTs for ITC, a severe asthma exacerbation is defined as a deterioration requiring SCS for ≥3 days or hospitalisation/ER visit with CS treatment. Severe AERs were 1.74, 1.65 and 0.99 in mepolizumab-like, benralizumab-like and omalizumab-like population, respectively, with SoC treatment.
AER, asthma exacerbation rate; CS, corticosteroid; ER, Emergency room; ITC, indirect treatment comparison; NNT, number-needed-to-treat; SoC, standard of care; SCS, systemic corticosteroid.

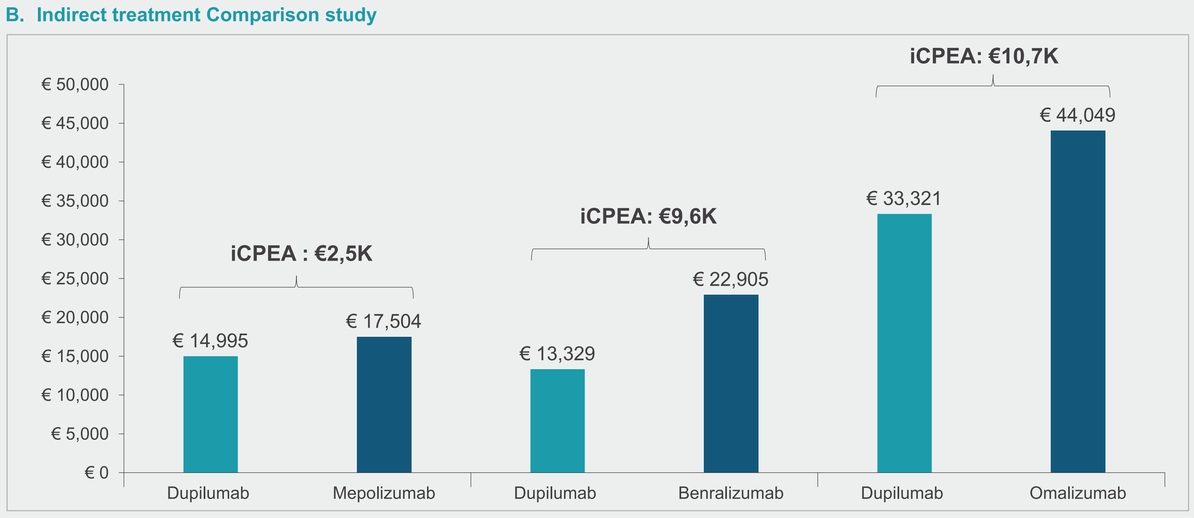
- The CPEA calculated using results from US-ADVANTAGE study was lower for dupilumab versus. other biologics. The corresponding one-year incremental cost was found to be higher for other biologics, relative to dupilumab (**Figure 3A**). Similar results were observed with the ITC study (**Figure 3B**).

Figure 3. Cost-per-event avoided (€): dupilumab vs. other biologics

A. Real-world evidence study (US-ADVANTAGE)



B. Indirect treatment Comparison study



All incremental values for mepolizumab, benralizumab, and omalizumab, relative to dupilumab, have been rounded.
iCPEA, incremental cost-per-event avoided.

- Lower incremental CPEA/year was also confirmed by sensitivity analyses in all the discounting scenarios (**Table 2**).

Table 2. iCPEA/year for dupilumab vs. other biologics across various discounting scenarios.

	Base case		20% discount		30% discount		40% discount	
	CPEA/year	iCPEA	CPEA/year	iCPEA	CPEA/year	iCPEA	CPEA/year	iCPEA
Dupilumab vs. Mepolizumab								
RWE	**8,330**	5,991	6,666	4,839	5,834	4,263	5,002	3,687
	14,322		11,506		10,098		8,690	
ITC	**14,995**	2,510	11,999	2,063	10,502	1,840	9,004	1,617
	17,504		14,063		12,342		10,621	
Dupilumab vs. Benralizumab								
RWE	**8,330**	4,758	6,666	3,828	5,834	3,362	5,002	2,887
	13,088		10,494		9,197		7,889	
ITC	**13,329**	9,576	10,666	7,698	9,335	6,759	8,004	5,820
	22,905		18,364		16,094		13,824	
Dupilumab vs. Omalizumab								
RWE	**9,996**	6,155	8,000	4,981	7,001	4,393	6,003	3,806
	16,151		12,980		11,395		9,809	
ITC	**33,321**	10,728	26,665	8,735	23,337	7,739	20,009	6,742
	44,049		35,400		31,076		26,752	

All values are expressed in €.
CPEA/year has been calculated using NNT values for each biologic and corresponding discounting scenarios has been applied to the base case.
CPEA, cost-per-event avoided; iCPEA, incremental CPEA; ITC, indirect treatment comparison; NNT, number-needed-to-treat; RWE, real-world evidence.

REFERENCES

1. Braido F., et al. *J Asthma*. 2022;59(9):1908–1913.
2. New add-on treatment for patients with severe asthma. Available from New add-on treatment for patients with severe asthma | European Medicines Agency (EMA) (europa.eu). Accessed on 03 Oct 2024.
3. Nucala. Available from Nucala | European Medicines Agency (EMA) (europa.eu). Accessed on 03 Oct 2024.
4. Fasenra. Available from Fasenra | European Medicines Agency (EMA) (europa.eu). Accessed on 03 Oct 2024.
5. Blaiss M et al., *Ann Allergy Asthma Immunol*. 2024;132(4):463-468.e1.
6. Bateman ED., et al. Respir Med. 2022; 191:105991.

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DISCLOSURES

FJ and FF: Employees of Sanofi; may hold stocks and/or stock options in the company.
WC and LF: Sanofi; Former employees at the time of data synthesis and abstract development.
ZW: Employee of Regeneron Pharmaceuticals, Inc., may hold stocks and/or stock options in the company.

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