Population health benefit of introducing new biologic treatments in atopic dermatitis

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Introduction and objectives

Atopic dermatitis (AD) is a chronic and relapsing skin condition characterized by itchy dry skin and inflammation. AD has a negative impact on a wide range of life domains[1,2]. The treatment goal is to achieve disease control, prevent flares and avoid side effects[3]. There is currently only one biologic treatment option (dupilumab) available for patients with moderate-to-severe AD who are intolerant or refractory to conventional topical and/or systemic treatments.

A potential new treatment option tralokinumab, a fully human monoclonal antibody that works by neutralizing the IL-13 cytokine, may be approved as the second biologic product. Several other treatment options may follow in the coming years.

The purpose of this analysis is to assess the population health benefits of introducing new treatment options for patients with moderate-to-severe AD. The hypothesis is that the share of patients in disease control will increase as the number of treatment options increases.

Methods

A model was developed to evaluate the marginal impact in years with treatment control. A decision tree structure was applied with treatment cycles of four weeks. The model estimated treatment success in a population of 1,000 patients over 10 years.

More specifically, we analyzed treatment lines that included dupilumab and tralokinumab. Patients were anticipated to switch to next-in-line treatment if they did not achieve EASI 50 after 16 weeks of treatment.

After the induction period it was assumed that patients would discontinue treatments gradually with a discontinuation rate of 1% per four-week cycle. This was tested in a sensitivity analysis.

Results

More patients would be in control if several treatment options were available. With only one treatment option available (dupilumab) and 1,000 patients, the total number of years with treatment control would be 4,727, corresponding to 53% of the patient years being left out of treatment control over a 10-year period (see table 1). By introducing more new treatment options, the total number of years with treatment control would increase.

Introducing tralokinumab in the model could increase the number of years with treatment control to 7,512 (corresponding to 25% of the patients left out of treatment control over a 10-year period). This is illustrated in Figure 1. The order of treatment did not have an impact on the outcomes from the model.

To test how many treatments that are required to ensure that almost all patients are in treatment control over 10 years, we introduced eight different treatment options with EASI50 outcomes after 16 weeks similar to the outcome of tralokinumab. This would minimize the patients left out of treatment control to 5 out of 10,000. This is illustrated in Figure 2.

We assessed how a change in the discontinuation rates impacted the number of years with treatment control. Changing the discontinuation rate to 0.5% increased the number of years with treatment control to 6,071 and 8,584 for one and two treatment options, respectively, whereas a discontinuation rate of 2% would decrease the number of years with treatment control to 3,143 and 5,708 for one and two treatment options, respectively. See Table 1 for more details.

Results

Figure 1. Number of years with treatment control by two selected treatments (dupilumab and tralokinumab) (1,000 patients)

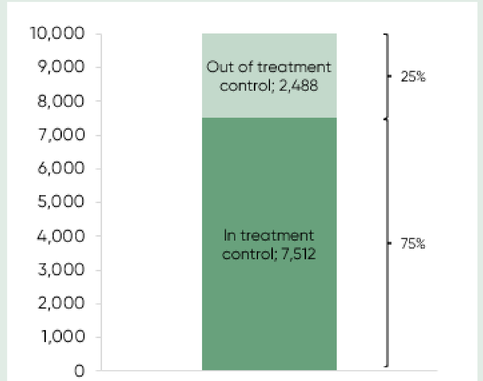

Figure 2. Number of years with treatment control by eight selected treatments (1,000 patients)

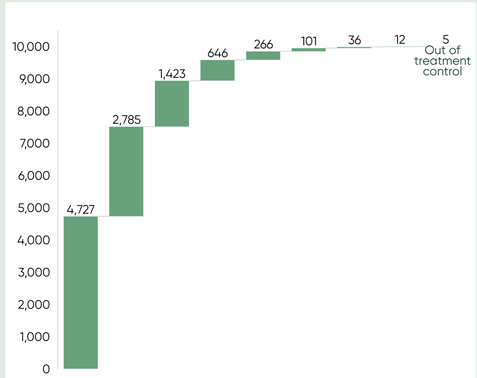

Table 1. Total number of years with treatment control over a 10-year period (1,000 patients)

	Discontinuation rates		
	Base-case	Sensitivity analysis	
	1.0%	0.5%	2.0%
One treatment option	4,727 (53%)	6,071 (39%)	3,143 (69%)
Two treatment options	7,512 (25%)	8,584 (14%)	5,708 (43%)

Note: The numbers in brackets represent the share of patient years being left untreated over a 10-year period.

Conclusion

The number of years with treatment control in a population will depend on e.g., the number of treatment options available, the clinical response to the treatments, and discontinuation rates for each treatment.
Introducing a second biologic treatment option will be a great benefit for patients with AD. Moreover, three or more treatment options will further increase the number of years with treatment control. To reduce the share of moderate-to-severe AD patients out of disease control, it is therefore important to have more biologic treatment options available.

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