



# Cost Effectiveness Analysis of the AcrySof Cachet Phakic Intraocular Lens



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## Introduction

Myopia, commonly referred to as nearsightedness, is a visual defect in which the focusing power of the cornea and the lens is too great with respect to the length of the eye. Light rays are bent too much, and they converge in front of the retina rather than directly on it resulting in blurred vision and difficulty seeing distant objects. Myopia is a leading cause of visual impairment throughout the world and its prevalence is on the increase (1). Javitt et al. estimated that the economic cost of myopia in the US was about \$4.6 billion in 1990, which included the cost of vision products, professional services, and time spent obtaining care (2). High Myopia is defined as subjects with a spectacle prescription of more than -6.00 Diopters in both eyes. High myopia is so debilitating that without correction with glasses or contact lenses people are virtually blind.

Phakic intraocular lenses (PIOLs) can be surgically implanted to supplement the eye's natural crystalline lens and if successful, can reduce or cure common vision disorders such as myopia. Clinical trial outcomes reported for the novel PIOL, the AcrySof Cachet (Cachet), appear favourable when compared to the currently approved Visian and Artisan PIOLs (3-5). The objective of this analysis was to determine the threshold price of the Cachet for it to dominate Visian and Artisan.

## Methods

A Markov cost-effectiveness model was developed that compared the Cachet to the Visian and Artisan PIOLs in a hypothetical cohort of US patients with moderate to high myopia. The Markov model used three transitional health states based on Snellen decimal visual acuities of: 20/20 or better (Snellen decimal = 1.0), between 20/20 & 20/40 (Snellen decimal = 0.5) and worse than 20/40 (Snellen decimal = 0.25). The initial starting state probabilities were based on the proportion of patients within each Snellen visual acuity classification and were taken directly from the respective labels (3-5). The absorbing state was natural death with the time dependent transition probabilities based on observed general population rates by age and gender from the Centers for Disease Control and Prevention (CDCP) (6). The analysis compared three treatment arms, which modelled the costs and benefits of the cohort implanted with the Cachet, Visian and Artisan PIOLs over a 40 year time horizon. The time horizon was based on the remaining life expectancy for a 35 year-old lens recipient. A payer perspective was adopted and costs/benefits were discounted at 3% per annum.

Figure 1 illustrates the Markov health state diagram. PIOL implantation occurred at the beginning of the first cycle, after which patients were allocated to one of the following uncorrected distance visual acuity (UCDVA) health states: '20/20 or better', 'Between 20/20 and 20/40' and 'Worse than 20/40'. Post-operative results were taken from the CE Mark (Cachet) and FDA approved (Visian and Artisan) PIOL product labels; these are summarised in Table 1. Post implantation, natural death was modelled based on observed general population rates by age and gender from the Centers for Disease Control and Prevention (CDCP) (6).

Figure 1: Markov state diagram

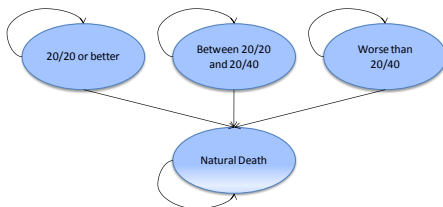


Table: Proportion of patients achieving defined UCDVA levels (3-5)

UCDVA	AcrySof Cachet	Visian	Artisan
20/20 or better	84.1%	65.4%	47.1%
Between 20/20 and 20/40	14.0%	31.3%	46.5%
Worse than 20/40	1.9%	3.3%	6.4%

The procedural cost, \$3412, was based on a global IOL report by MarketScope. The same report elicited the prices for the Visian and Artisan PIOLs; \$750 and \$695 respectively (7). Patients with less than 20/20 UCDVA were modelled as needing either glasses and/or contact lenses to achieve optimal vision; it was assumed that 50% of these patients wore glasses and 50% wore contact lenses. Average annual costs for patients who purchased corrective devices came from research by Jobson and Vision Council (the Vision Watch Report) (8). The average annual cost of glasses (including frames and lenses) was estimated to be \$115.92 and the average annual cost of contact lenses was estimated to be \$248.42. The base case assumed that on average, the annual cost of all corrective devices was \$182.17.

Probabilities for adverse events and associated procedures were derived from the CE Mark (Cachet) and FDA approved PIOL product labels and physician interviews (3-5). Surgical and drug costs for the treatment of adverse events and/or associated procedures were estimated using reference based physician fee estimates and the Medi-Span Price Rx database (9-12).

Effectiveness was expressed as vision adjusted life years (VALYs), which represents a quantification of benefits derived from accumulated UCDVA. Total VALYs were calculated by associating Snellen decimal scores with each UCDVA health state. This system assigned a score of 1 to vision which was 20/20 or better, 0.5 if vision was between 20/20 and 20/40, and 0.25 if vision was worse than 20/40.

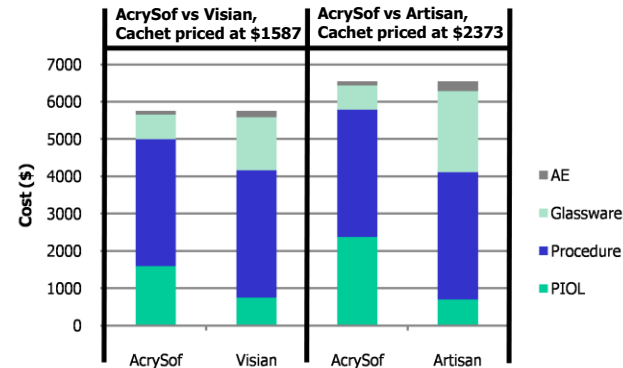
Uncertainty was addressed through univariate and probabilistic sensitivity analysis (PSA). Visian and Artisan implantation requires an iridotomy but there is uncertainty as to whether this is a separate cost or bundled into the cost of the procedure. Physician interviews suggested costs were bundled and a sensitivity analysis tested the impact of this assumption on the results.

## Results

In the base case analysis the threshold prices at which the AcrySof Cachet dominated the competitors was \$1587 and \$2373 for the Visian and Artisan PIOLs, respectively. Under the model assumptions the total cost per patient over 40 years was estimated at \$5760 and \$6546 for the Visian and Artisan PIOLs, respectively; Figure 2 illustrates the breakdown of costs. The probabilistic sensitivity analyses showed that at these prices, the probabilities that Cachet economically dominated the Visian and Artisan PIOLs were 59% and 63%, respectively.

Assuming that iridotomy costs were not bundled into the procedural cost changed the results significantly. The Cachet economically dominated Visian up to a threshold price of \$2531, and for Artisan up to a threshold price of \$3317. If the iridotomy costs are unbundled and charged separately the Cachet price thresholds increased correspondingly by an additional \$944, the assumed cost of an iridotomy.

Figure 2: Breakdown of 40 year costs for Cachet, Visian and Artisan



## Conclusions

Given its greater efficacy and favourable adverse events profile, the AcrySof Cachet was economically dominant up to a price twice that of the Visian PIOL and three times that of the Artisan PIOL with a considerable degree of certainty. Results vary according to the costing and other assumptions made, particularly in relation to the bundling of iridotomy costs.

Considering that new technologies seldom exhibit both lower lifetime costs and greater effectiveness needed to demonstrate economic dominance, the degree of certainty achieved by the probabilistic sensitivity analysis is a testament to the Cachet's capability of providing high quality vision in high myopia patients.

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