Cost-effectiveness of combined treatment with alteplase (rt-PA) and Cerebrolysin in acute ischemic hemispheric stroke in Austria

Evelyn Walter, Marlies Bauer, Sandra Ressl
IPF Institute for Pharmacoconomic Research, Vienna, Austria

Objectives
Worldwide, stroke is the third most common cause of death in developed countries with declining death rates. In Austria the incidence rate of stroke is 2.1 – 2.3 per thousand annually. Cerebrolysin prevents acute neuronal damage and accelerates recovery after stroke. The purpose of this analysis was to determine costs of stroke for Austria in general and to estimate the cost-effectiveness of Cerebrolysin in combination with alteplase compared to alteplase alone. The analysis should assess health economic advantages in the acute care due to a faster improvement in neurological impairment and for rehabilitation in early post-acute phase and quantify the correlated reduced resource use in the health care and social system.

Methods
A Markov-model was developed based on the mRS states 90 days after stroke to simulate consequences over a 10-year time-horizon. Consequences include recurrent stroke, deteriorated mRS, death due to recurrent stroke or other reasons. Health benefits were measured in quality-adjusted life years (QALYs) and life years (Lys). Monte-Carlo-simulation accounted for uncertainty. Probabilities were derived from RCTs and open-label studies; direct costs (2014) were derived from published sources from the payer perspective. QALYs, life years and costs were projected over a 10 years horizon. Costs and outcomes were discounted according to the national guidelines with 5%.

Clinical Data
The model input parameters were drawn from published literature (Table 1). Health states after ischemic stroke were defined by mRS. The distribution of health states after 90 days of Cerebrolysin-treated patients versus non-Cerebrolysin (Placebo) were derived from the study of Lang et al. (2013). Transition to a worse disability state took place as a consequence of a recurrent stroke. The Model assumes different recurrence rates over time according to the publication of Chambers et al. (2002). The model has used probabilities over the first 2 years from the second European Stroke Prevention Study (ESPS-2).

Resource Use and Costs
The cost assessment is based on the assignment of costs to the health states. The costs of each health state are determined by the resource utilisation of the state. The cost assessment is based on the assignment of costs to the health states. The cost assessment is based on the assignment of costs to the health states. The cost assessment is based on the assignment of costs to the health states. The cost assessment is based on the assignment of costs to the health states.

Direct medical costs derived from a number of publicly available sources like the DRG catalogue (LKF) and official price lists for the Austrian Health Insurance funds. When necessary, prices were adjusted to 2014 prices using the consumer price index.

Results
Total costs in the Cerebrolysin group over a 10-year time horizon led to discounted costs of € 61,468.67. Per-patient costs in the comparator group are estimated at € 62,257.88 in Austria. Acute stroke treatment resulted in a discounted quality-adjusted life expectancy of 3.77 years. The corresponding life expectancy without quality adjustment amounts to 6.70 Lys. The saving potential due to adding Cerebrolysin to the acute treatment would reduce costs by € 789.20 and increase QALYs by 0.014 (= 5 days with perfect health) per patient.

Sensitivity Analysis (SA)
In the probabilistic SA costs were varied assuming a Beta distribution and utilities with a Gamma distribution. Monte Carlo probabilistic SA, resulted of 500 patient's incremental cost versus incremental effects revealed that Cerebrolysin is cost-effective against no Cerebrolysin in more than 83.2% of simulations with a willingness-to-pay value up to € 20,000; (Fig. 3a). When performing the deterministic one-way SA we vary first stroke costs, nursing or rehabilitation facility costs, recurrent stroke costs, mortality rate, utilities and the discount rate. Among inputs considered the nursing and rehabilitation costs and first stroke costs exhibit the greatest influence (Fig. 3b).

Conclusion
From a health economic perspective, Cerebrolysin is a cost-effective therapy; it mainly reduces event costs due to early remobilization and, in addition, rehabilitation and nursing-home cost.

References

This study was funded by EVER Neuro Pharma Austria.