Cost-effectiveness Analysis of Different Recombinant Factor VIII for Prophylactic Treatment of Previously Untreated Patients with Severe Hemophilia A in China

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INTRODUCTION

- Hemophilia A is a hereditary bleeding disorder caused by mutations in the gene for coagulation factor VIII (Factor VIII, FVIII). Approximately 49.7% of hemophilia patients have severe disease.[1]
- In China, multiple recombinant FVIII products, including antihemophilic factor (recombinant) plasma/albumin-free method (rAHF-PFM) and BAY 81-8973, have been approved for hemophilia A replacement therapy.
- Pro-inflammatory responses during the initial FVIII replacement therapy can cause the development of neutralizing antibodies (inhibitors) that substantially discount the effects of FVIII replacement therapy in patients with hemophilia A.[2]

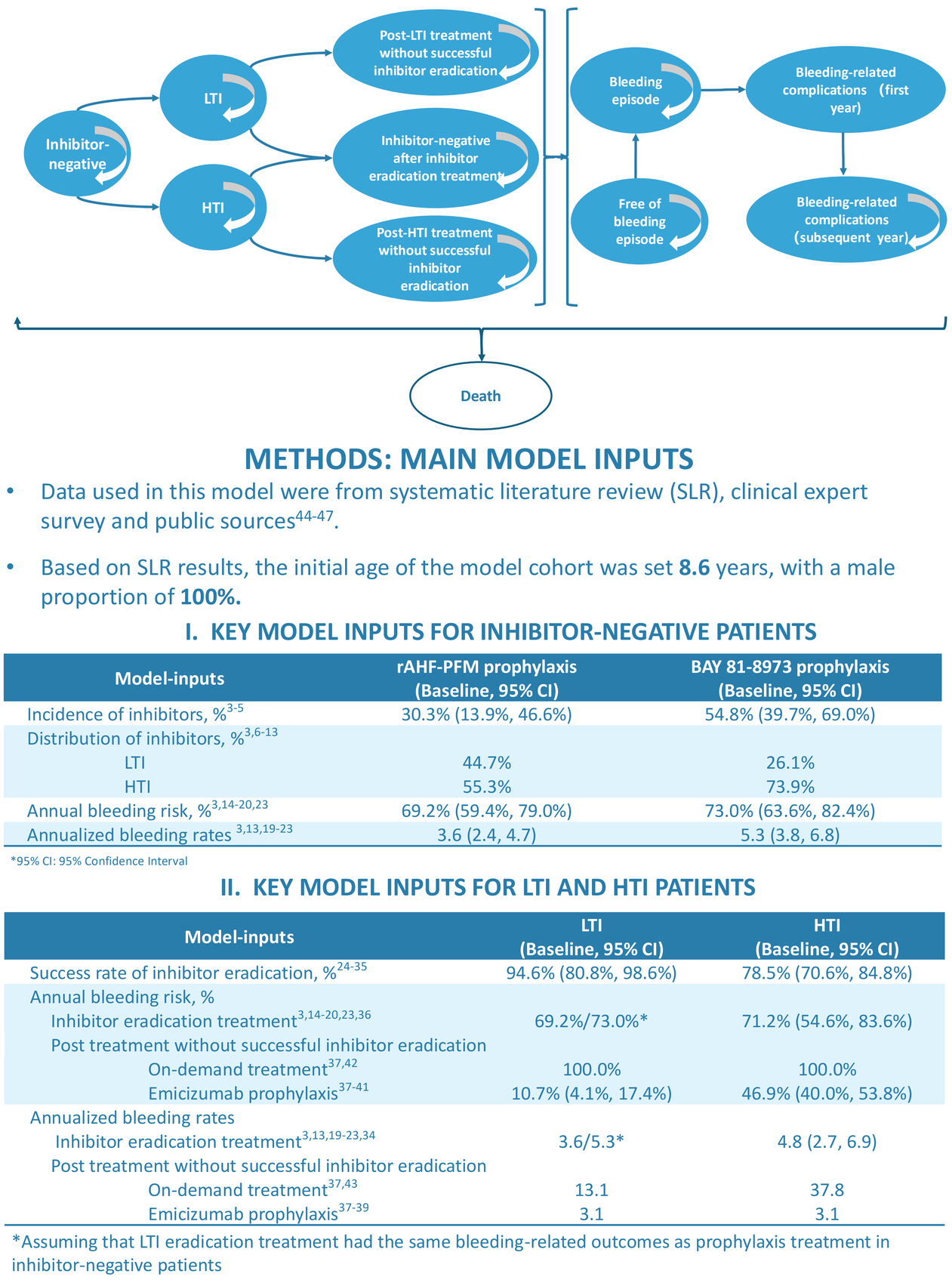
OBJECTIVES

- To assess the cost-effectiveness of two recombinant factor VIII (rFVIII) products for prophylactic treatment of previously untreated patients (PUPs) with severe hemophilia A from the perspective of Chinese healthcare system.

METHODS: MODEL DESIGN

Model features	
Model cohort	PUPs with hemophilia A in China
Primary health states	• Inhibitor-negative • Post low-titer inhibitor (LTI) treatment without successful inhibitor eradication • Post-High-titer inhibitor (HTI) treatment without successful inhibitor eradication • Bleeding-related complications (intracranial hemorrhage, hemophilic arthropathy, gastrointestinal bleeding) • Death
FVIII prophylaxis treatment scenarios	rAHF-PFM vs. BAY 81-8973
Model outputs	• Total risk of developing FVIII inhibitor • Lifetime total bleeding episodes • Lifetime total risk of bleeding related complications • Life years • Quality-Adjusted Life Years (QALYs) • Lifetime direct medical costs • Incremental cost-effectiveness ratio (ICER)
Perspective	Healthcare system in China
Time Horizon	Lifetime
Model cycle length	1-year
Annual discount rate	5% for both health benefits and costs

METHODS: MODEL STRUCTURE



METHODS: MAIN MODEL INPUTS

- Data used in this model were from systematic literature review (SLR), clinical expert survey and public sources[44-47].
- Based on SLR results, the initial age of the model cohort was set **8.6** years, with a male proportion of **100%.**

I. KEY MODEL INPUTS FOR INHIBITOR-NEGATIVE PATIENTS

Model-inputs	rAHF-PFM prophylaxis (Baseline, 95% CI)	BAY 81-8973 prophylaxis (Baseline, 95% CI)
Incidence of inhibitors, %[3-5]	30.3% (13.9%, 46.6%)	54.8% (39.7%, 69.0%)
Distribution of inhibitors, %[3,6-13]		
LTI	44.7%	26.1%
HTI	55.3%	73.9%
Annual bleeding risk, %[3,14-20,23]	69.2% (59.4%, 79.0%)	73.0% (63.6%, 82.4%)
Annualized bleeding rates [3,13,19-23]	3.6 (2.4, 4.7)	5.3 (3.8, 6.8)

*95% CI: 95% Confidence Interval

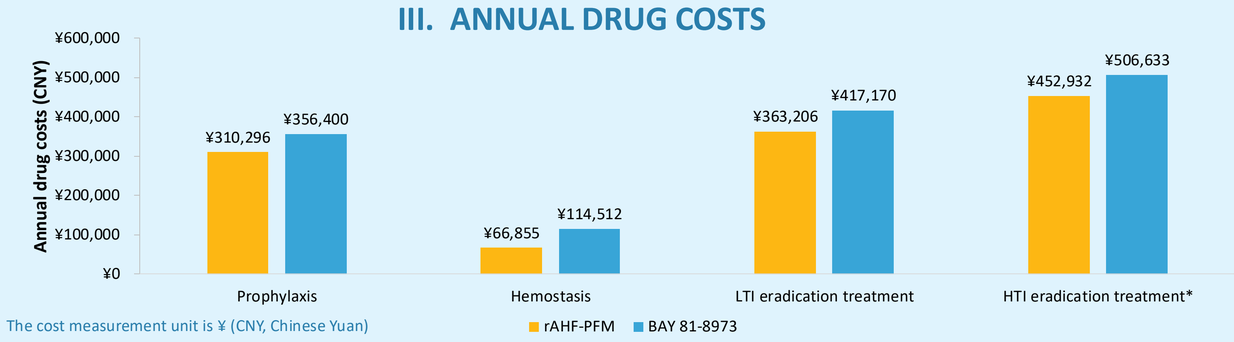
II. KEY MODEL INPUTS FOR LTI AND HTI PATIENTS

Model-inputs	LTI (Baseline, 95% CI)	HTI (Baseline, 95% CI)
Success rate of inhibitor eradication, %[24-35]	94.6% (80.8%, 98.6%)	78.5% (70.6%, 84.8%)
Annual bleeding risk, %		
Inhibitor eradication treatment[3,14-20,23,36]	69.2%/73.0%*	71.2% (54.6%, 83.6%)
Post treatment without successful inhibitor eradication		
On-demand treatment[37,42]	100.0%	100.0%
Emicizumab prophylaxis[37-41]	10.7% (4.1%, 17.4%)	46.9% (40.0%, 53.8%)
Annualized bleeding rates		
Inhibitor eradication treatment[3,13,19-23,34]	3.6/5.3*	4.8 (2.7, 6.9)
Post treatment without successful inhibitor eradication		
On-demand treatment[37,43]	13.1	37.8
Emicizumab prophylaxis[37-39]	3.1	3.1

*Assuming that LTI eradication treatment had the same bleeding-related outcomes as prophylaxis treatment in inhibitor-negative patients

METHODS: MAIN MODEL INPUTS (CONTINUED)

III. ANNUAL DRUG COSTS



The cost measurement unit is ¥ (CNY, Chinese Yuan)

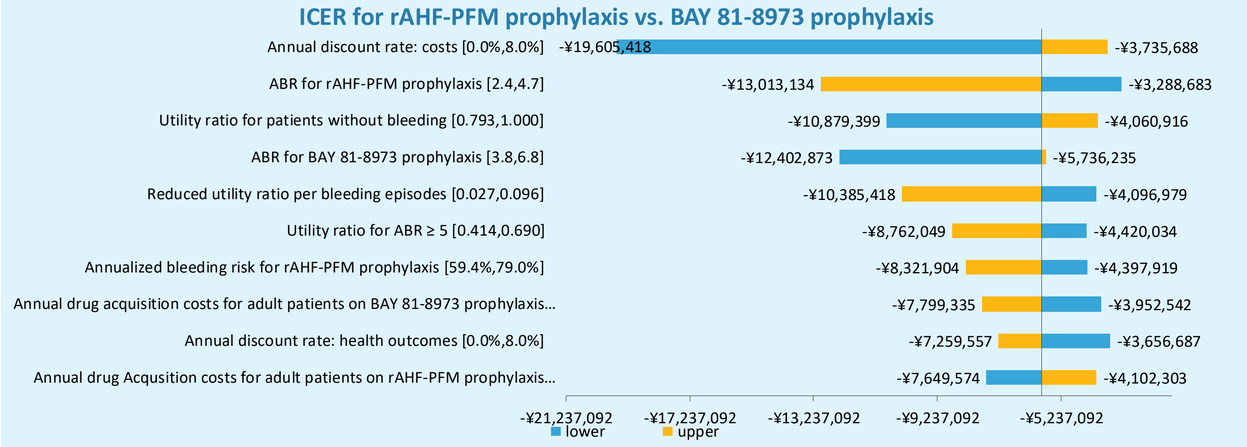
*The costs of HTI eradication treatment were the weighted drug acquisition costs of rFVIII and plasma-derived FVIII according to the surveyed distribution from clinical experts (rFVIII accounting: 78.8%; plasma-derived FVIII: 21.2%)

RESULTS: BASE CASE ANALYSIS

Prophylactic treatment scenario	rAHF-PFM	BAY 81-8973	Difference
Lifetime total clinical outcomes			
Bleeding episodes	198.2	353.4	**-155.2**
Risk of developing FVIII inhibitors	0.302	0.545	**-0.244**
Risk of intracranial hemorrhage	0.042	0.043	**-0.001**
Risk of hemophilic arthropathy	0.916	0.920	**-0.003**
Risk of gastrointestinal bleeding	0.010	0.011	**-0.001**
Cost-effectiveness analysis results (discounted)			
Total life year	17.965	17.910	0.055
Total QALY	9.290	8.511	0.779
Lifetime direct medical costs	¥12,060,222	¥16,638,625	**-¥4,578,403**
ICER for rAHF-PFM vs. BAY 81-8973	**-¥5,875,939 (Superiority)**		

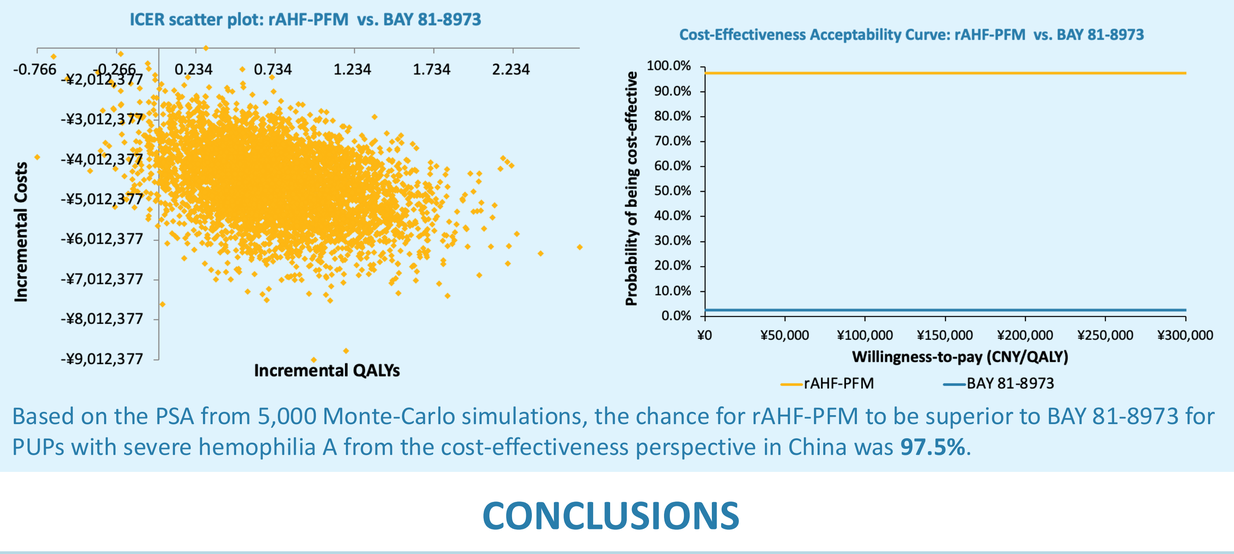
Likely through substantially reducing bleeding episode, prophylactic treatment with rAHF-PFM had cost-effectiveness superiority over BAY 81-8973 for PUPs with severe hemophilia A in China

RESULTS: ONE-WAY SENSITIVITY ANALYSIS



The cost-effectiveness of rAHF-PFM relative to BAY 81-8973 was mainly driven by annual discounting rate for cost, ABR of rAHF-PFM and BAY 81-8973, and quality of life utility for patients without the occurrence of any bleeding episodes.

RESULTS: PROBABILISTIC SENSITIVITY ANALYSIS (PSA)



Based on the PSA from 5,000 Monte-Carlo simulations, the chance for rAHF-PFM to be superior to BAY 81-8973 for PUPs with severe hemophilia A from the cost-effectiveness perspective in China was **97.5%**.

CONCLUSIONS

- Based on the best available evidence, prophylactic treatment with rAHF-PFM for PUPs with severe hemophilia A is highly likely to demonstrate superiority over BAY 81-8973 from the cost-effectiveness perspective of the healthcare system in China.
- The cost-effectiveness superiority of rAHF-PFM over BAY 81-8973 for PUPs with hemophilia A in Chinese patients is highly stable under the overall uncertainty in the cost-effectiveness analysis.

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This poster is intended for healthcare professionals