Cost-Effectiveness Analysis of Pertuzumab with Trastuzumab and Chemotherapy Compared to Trastuzumab and Chemotherapy in the Adjuvant Treatment for Patients with HER2-Positive Early Breast Cancer at High Risk of Recurrence in China

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Disclosure

- Funding source: Shanghai Roche Pharmaceuticals Ltd.
- Research contributors:

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- All contributors declare there is no competing interest.

1 Background & Objective

▷ Background

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Background

- For Chinese females, breast cancer is the most commonly diagnosed malignancy with 304 thousands new patients diagnosed in 2015 [1].
- In China, about 25% of women with new diagnoses of breast cancer had tumors that overexpressed human epidermal growth factor 2 (HER2-positive breast cancer) [2].
- HER2-positive breast cancer tumors are more aggressive, more likely to invade lymph nodes, more likely to recur and metastasize, and are associated with shorter patient survival [3].

[1] Zheng R., et al. Chin J Oncol, 2019, 41(1), 19-28. (In Chinese)
[2] Garrison, L.J., et al. Value Health, 2019. 22(4): p. 408-415.
[3] Liao, N. Chin Clin Oncol, 2016, 5(3), 41.

1 Background & Objective

Background

- Although patients with HER2-positive early breast cancer at high risk of recurrence (HR-negative or node-positive) received treatment of trustuzumab (the only standard treatment for HER2-positive eBC before pertuzumab appeared on the market), about 1/3 of them experienced a recurrence or death.
- Pertuzumab reduced the risk of an invasive disease free survival (iDFS) event by 19% compared with placebo [1].
- The cohorts at high risk of recurrence appeared to derive most benefit from the adjuvant treatment of pertuzumab [1].

[1] Von Minckwitz G , et al. New England Journal of Medicine, 2017:NEJMoa1703643.

1 Background & Objective

Objective

- To estimate the cost-effectiveness of pertuzumab with trastuzumab and chemotherapy (PHT) vs trastuzumab and chemotherapy (HT) as the adjuvant treatment for Chinese patients with HER2-positive early breast cancer at high risk of recurrence.

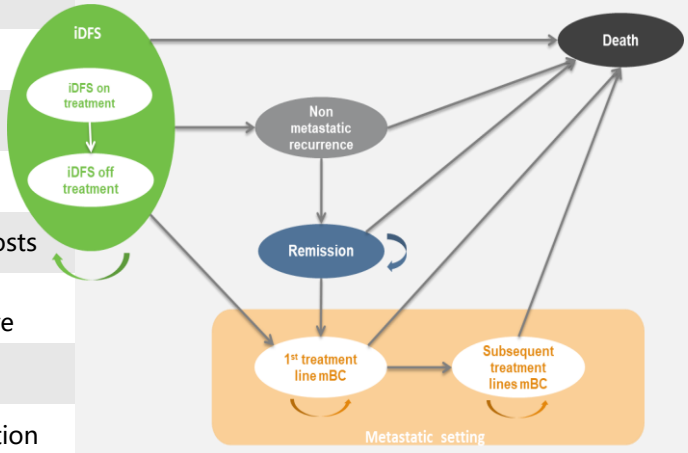
2 Study Design

- ▷ Model Structure
- ▷ Model Inputs

2 Study Design — Model Structure

Items	Study Design
Population	Chinese, HER2-positive, eBC, High risk of recurrence
Intervention	PHT
Comparator	HT
Outcome	QALY
Costs	Direct medical costs, Indirect costs
Perspective	societal perspective, Healthcare system perspective
Model	Markov model
Time horizon	Monthly cycle, Life time simulation

- The Markov model was constructed on 6 health states.
- The Markov model was constructed to estimate the ICER.



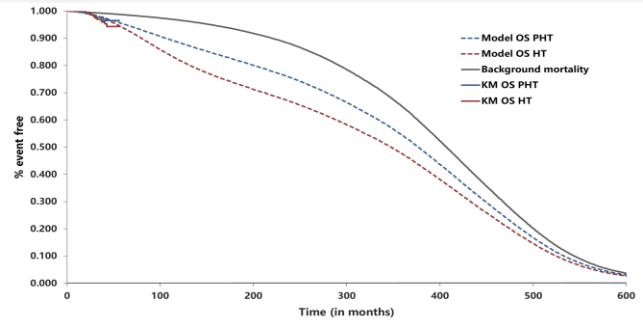
2 Study Design — Clinical Inputs

- Main clinical input was the time spent in invasive Disease Free Survival state, estimated by parametric extrapolations from the Chinese subgroup data observed in the clinical trial APHINITY.
- Other clinical inputs were taken from CTNeoBC study and CLEOPATRA study.
- Utilities in each state applied to calculate the quality adjusted life years (QALYs) were calculated from EQ-5D results of Chinese patients in APHINITY with Chinese Tariffs and the published literatures and adjusted using the utility data of Chinese general population [1].
- Outcomes were discounted at 5%.

[1] Guan H., et al. Chinese Health Economics, 2015, 34(02), 5-12. (In Chinese)

2 Study Design — Clinical Inputs

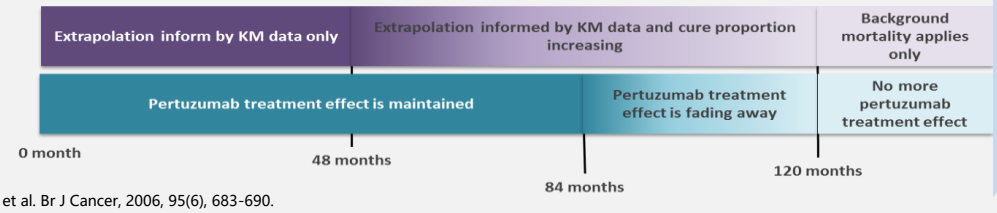
Survival curves



Utilities

Items	PHT	HT
EFS-On chemo	0.837	0.831
EFS-On treatment/off chemo	0.884	0.876
EFS-Off treatment	0.923	0.907
Locoregional recurrence	0.837	0.831
Remission	0.923	0.907
Metastatic not progressed [1]	0.764	
Metastatic progressed [1]	0.506	

Clinical Assumptions



[1] Lloyd, A., et al. Br J Cancer, 2006, 95(6), 683-690.

2 Study Design — Cost Inputs

- The modelled adjuvant costs comprised drugs, administration, adverse events management, follow-up and therapeutic costs.
- Indirect costs using human capital method were included when analyzed from the societal perspective.
- All costs were mainly obtained from real world data and local published resources.
- Costs were discounted at 5%.

2 Study Design — Costs Inputs

Drug Costs

Items	Composition (mg)	Price (¥)
Pertuzumab	420	18,800.00
Trastuzumab	440	7,270.16
Docetaxel	20	1,300.00
Lapatinib	17,500	4,666.20
Pyrotinib	6,000	9,960.00
Capecitabine	4,480	122.49

Average Monthly Medical Costs

Health State	Treatment	Follow up
iDFS (1-2y)	-	242.31
iDFS (3-5y)	0.00	109.93
iDFS (after 5y)	0.00	100.03
Non metastatic recurrence	16,982.23	400.01
Remission	0.00	39.59
1st treatment line mBC (Trastuzumab resistance)	13,851.04	300.72
Subsequent treatment lines mBC (Trastuzumab resistance)	15,670.42	342.01
1st treatment line mBC	13,128.70	205.28
Subsequent treatment lines mBC	13,499.77	356.49

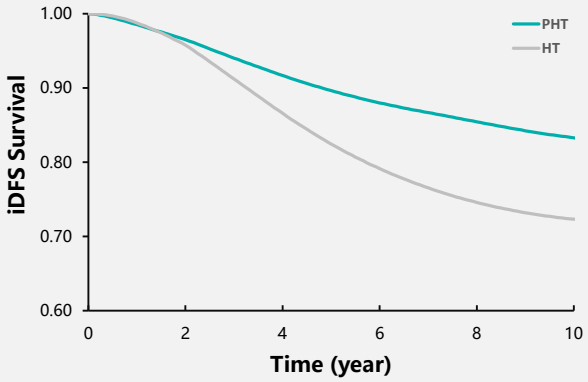
3 Results

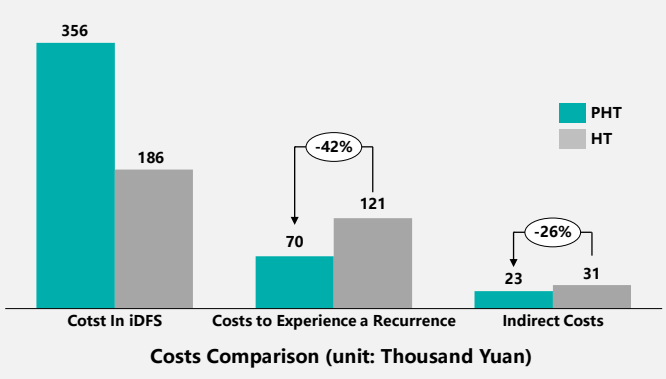
- ▷ Basecase Results
- ▷ Sensitivity analysis Results

3 Results

Basecase Analysis

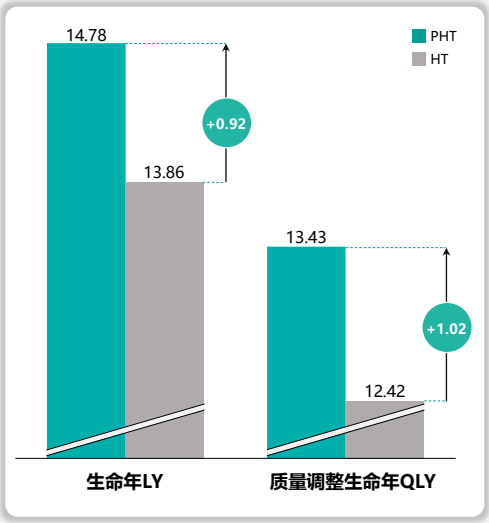
- Acquisition cost of pertuzumab was the main driver to the cost increase, but over the time this was partially offset by the prevention of BC recurrences.
- Compared to HT, PHT could save about 26% of indirect costs.



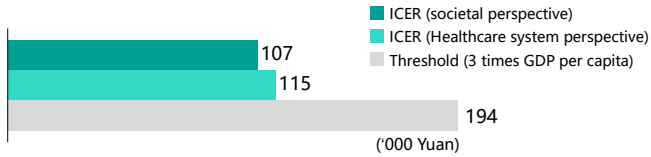


3 Results

Basecase Analysis



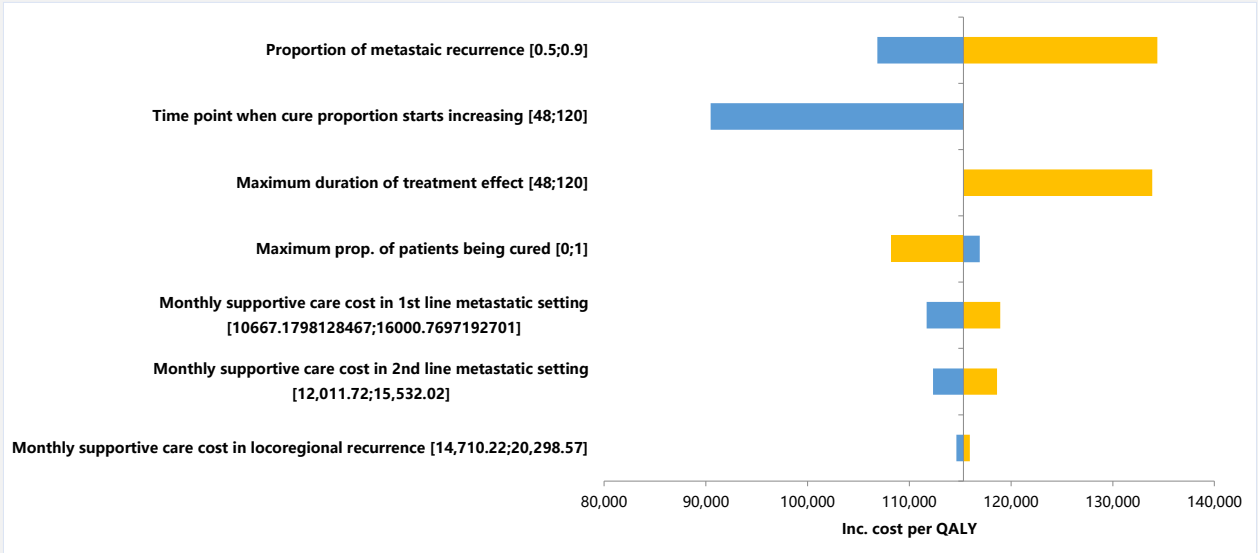
PHT provided 1.02 more QALYs and 0.92 more LYs with additional costs than HT.



Both ICERs were between 1~2 times GDP per capita, far below the local threshold of 3 times GDP per capita.

3 Results

Sensitivity Analyses



CEAC (societal Perspective)

CEAC (Healthcare System Perspective)

4 Discussion & Conclusion

▷ Discussion

▷ Conclusion

Interpretation & Application:

- The Ministry of Human Resources and social Security (MoHRSS) uses a threshold of ¥193,932 per QALY gained. Therefore, the use of pertuzumab is projected to be cost-effective in patients with early HER2-positive breast cancer at a high risk of recurrence.
- Since 2019, economic evidence becomes mandatory in NDRL.
- Pertuzumab was approved in the adjuvant setting by National Medical Products Administration (NMPA) in 2018, this research could provide evidence for pertuzumab in the adjuvant setting to MoHRSS.

4 Discussion & Conclusion

Discussion

Strengths:

- The main clinical inputs——both efficacy and utilities—— were obtained from the Chinese patients' data in the APHINITY trial.
- In consideration of influence of early cancer on the labor loss, the ICERs were calculated from both societal perspective and healthcare system perspective.

Limitations:

- Clinical trial data extrapolated to a lifetime horizon was the uncertainty about the additional benefit of the intervention after the follow-up period.

4 Discussion & Conclusion

Conlusion

- **Compared to HT, PHT is more cost-effective in the adjuvant treatment for patients with HER2-positive early breast cancer at high risk of recurrence in China.**

Acknowledgements: This analysis was funded by Shanghai Roche Pharmaceuticals Ltd.

Thank You!