Cost-Effectiveness of Xofigo in Bone-Metastatic Castration-Resistant Prostate Cancer: A Markov Model Analysis

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BACKGROUND

- Bone metastases occur frequently in metastatic castration-resistant prostate cancer (mCRPC), leading to significant morbidity from skeletal-related events:
  - Bone fracture
  - Spinal cord compression
- Disease progression limits the effectiveness of systemic therapies.
- Xofigo (radium-223 dichloride) delivers:
  - Targeted alpha radiation to bone lesions
  - Improved survival in patients without visceral disease

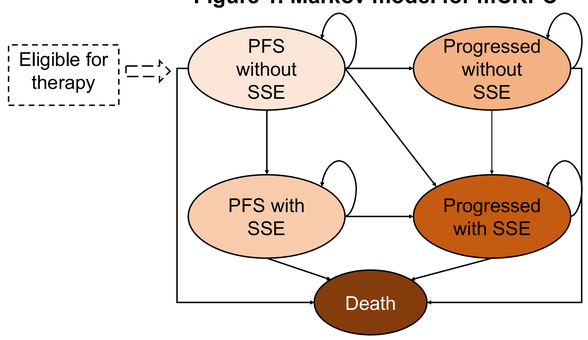
OBJECTIVE

Evaluate the cost-effectiveness of Xofigo in bone-metastasis CRPC without visceral involvement, compared to the standard of care (SOC) (goserelin, denosumab and external beam radiation therapy)

METHODS

- **Standard of care:** Goserelin + Denosumab + External beam radiation therapy (EBRT)
- **Markov model design:**
  - 24 cycles (1-month cycle length over 24-month time horizon)
  - 5 health states:
    - Progression-free survival without symptomatic skeletal events (PFS without SSE)
    - Progression without SSE
    - PFS with SSE
    - Progression with SSE
    - Death

Figure 1. Markov model for mCRPC[4,5]



- **Model inputs:** transitions, drug costs, hazard ratios and utilities were derived from published literature and clinical trial data[1,2,4,5,6]
  - Xofigo use was capped at 6 months according to the FDA-approved dosing[3]
- **Statistics:** analyzed with R application
  - Using the *heemod, dplyr* and *ggplot2* packages
- A willingness-to-pay (WTP) range of $50,000 - $150,000 per quality-adjusted life years (QALYs) was used to evaluate the cost effectiveness

RESULTS

Table 1. Hazard ratios from ALSYMPCA trial[6]

Overall Survival	Time to First SSE	PFS
0.70	0.554	0.475

Table 2. Monthly drug acquisition cost[1,2]

Treatment	Goserelin	Denosumab	EBRT	Xofigo (radium-223 dichloride)
Monthly cost	$1167	$690	$8,298	$36,103

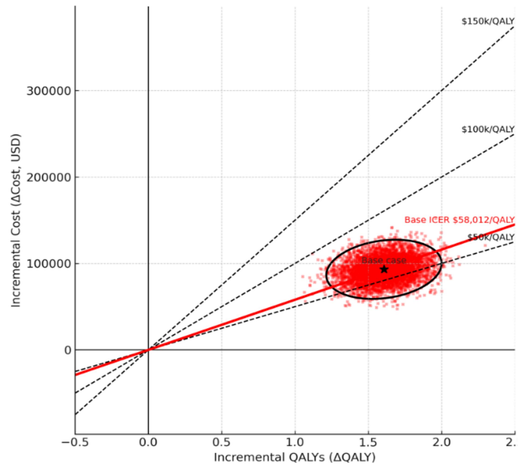
Table 3. Utilities to Xofigo and SOC[5]

PFS without SSE in Xofigo arm	PFS without SSE in SOC arm	Progression without SSE	PFS with SSE	Progression with SSE
0.617	0.554	0.475	0.511	0.474

Table 4. Total cost and QALYs outcomes of SOC and Xofigo treatment arms

Treatment	Total Cost	QALYs Gained
SOC	$141,722	9.2
Xofigo	$234,970	10.8

Figure 2. Incremental cost-effectiveness ratio plan



CONCLUSIONS

- Xofigo demonstrated a favorable cost-effectiveness profile despite a $93,247 higher incremental treatment cost when compared to SOC:
  - Incremental gain of 1.61 QALYs
  - Incremental cost-effectiveness ratio (ICER) of $58,012 per QALY gained
- The QALYs gained with Xofigo offered meaningful clinical benefits equivalent to approximately 20 months of perfect health, or 35 months at a utility of 0.55
- These findings suggested Xofigo may represent a high-value treatment option for appropriately selected patients with bone-metastasis CRPC, depending on payer's priorities and WTP thresholds

DISCUSSIONS

- At an ICER of $58,012 per QALY, Xofigo is within the WTP thresholds of $100,000 - $150,000 per QALY recommended by ICER[7]
- Despite a higher upfront cost, this radiopharmaceutical product may improve quality of life and reduce downstream costs from SSE
- This cost-effectiveness analysis (CEA) supports value-based decision-making and reinforces Xofigo's potential inclusion in oncology formularies
- Peters et al. (2017) found radium-223 to be cost-dominant versus abiraterone and cabazitaxel, while this CEA showed higher costs but a favorable ICER, highlighting how drug pricing, comparators, and healthcare context influence cost-effectiveness outcomes[8]
- Consistent with McKay et al. (2025) systematic literature review of 48 studies (~15,000 patients) which showed 2-5x longer survival and <10% fracture risk in those completing 5-6 Xofigo cycles, this CEA supports the value of earlier, complete treatment in appropriately selected, chemo-naïve mCRPC patients to maximize both clinical benefits and cost-effective care[9]

LIMITATIONS

- Utility values for Xofigo and SOC were assumed to be equivalent following disease progression
- The analysis relied on U.S. average wholesale prices, which may not reflect actual payer acquisition costs and are subject to market fluctuations

FUTURE DIRECTIONS

- Probabilistic sensitivity analysis to assess results robustness and parameter uncertainty
- Evaluate Xofigo in combination or sequencing with androgen receptor inhibitor (i.e: enzalutamide, abiraterone) to reflect evolving mCRPC treatment paradigms

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