Clinical Outcomes of Low-Risk Stage II Colon Cancer Survivors Adhering to Guidelines: A Microsimulation Model

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DISCLOSURE

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Background

- Low-risk stage II colon cancer (CC) patients are treated with curative-intent surgery after diagnosis as recommended in the guidelines
- After surgery, the guidelines recommend that the survivors undergo surveillance to monitor for potential recurrences
- Despite being classified as low risk, some of these patients are still at risk of recurrence
- Success with the recurrence detection within the current surveillance guidelines is unknown

Objective & Approach

- To assess the detection rates and clinical outcomes of low-risk stage II CC survivors following the standard-of-care (SOC) guidelines

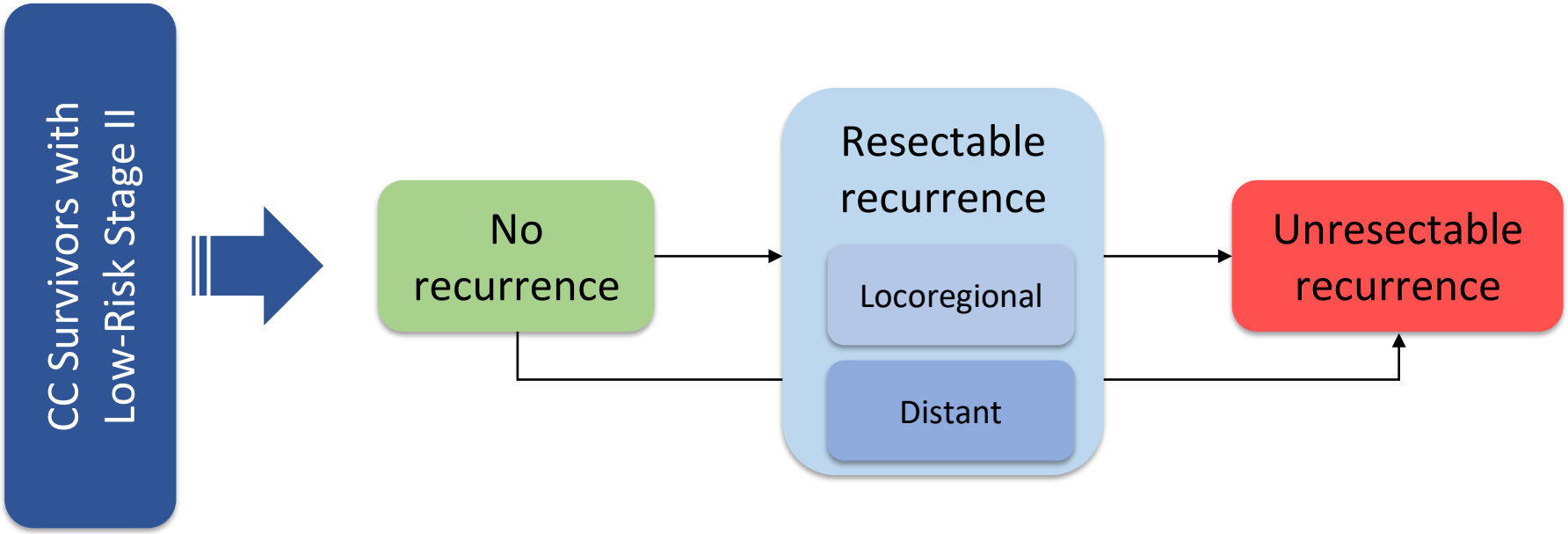
- To develop a microsimulation model mimicking the disease progression, treatment, and surveillance of survivors over a lifetime horizon

Model Framework

- **Target population:** Low-risk stage II* colon cancer (CC) survivors who have undergone curative-intent surgery
- **Baseline age:** 65 years
- **Modeling approach:** A Microsimulation Model
- **Time horizon:** Lifetime
- **Time increments:** Monthly
- **Development environment:** Python
- **Model Validation:** We validated our model using the data from the National Cancer Database following ISPOR validation guidelines

** Low-risk Stage II is defined as the following in the MOSAIC Trial: T1–3, no tumor perforation, and 10 or more lymph nodes examined (Auclin et al., 2019)*

Natural Disease Progression



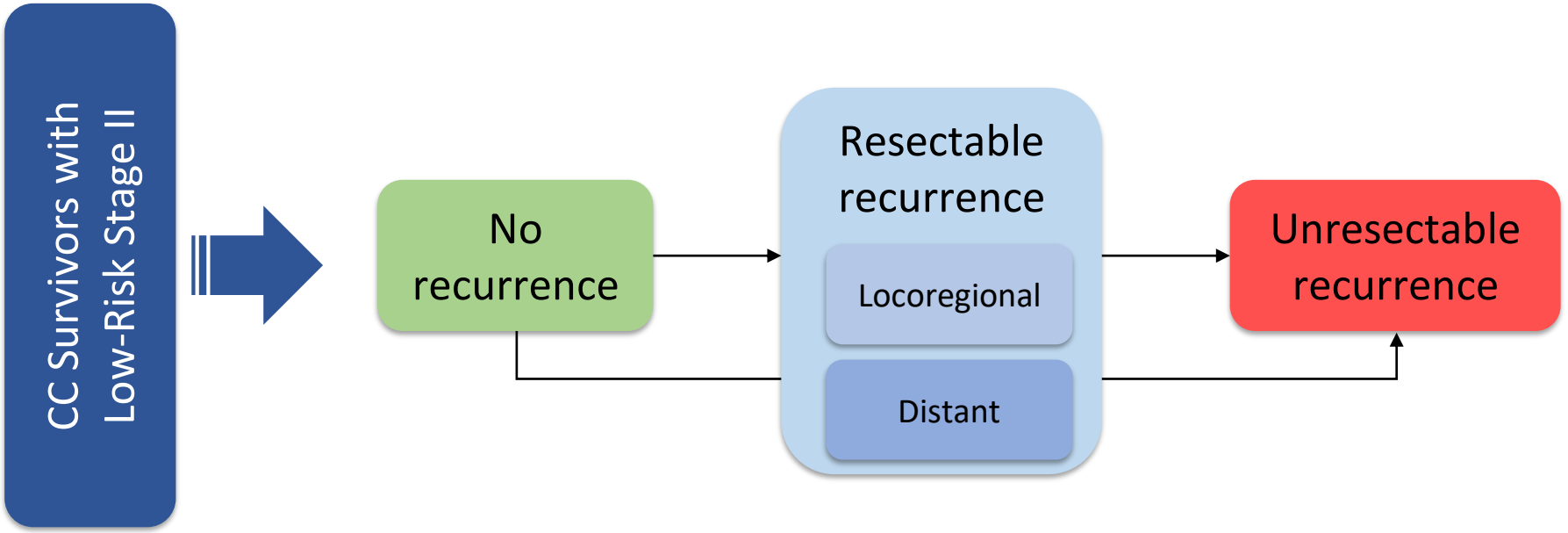
Resectable recurrence

- Locoregional recurrence (e.g., colon/rectum, lymph nodes)
- Distant metastases (e.g., limited lung, liver)

Unresectable recurrence

- Distant metastases (e.g., widespread lung, liver, other)
- When resectable recurrence is not detected/treated and progresses

Natural Disease Progression



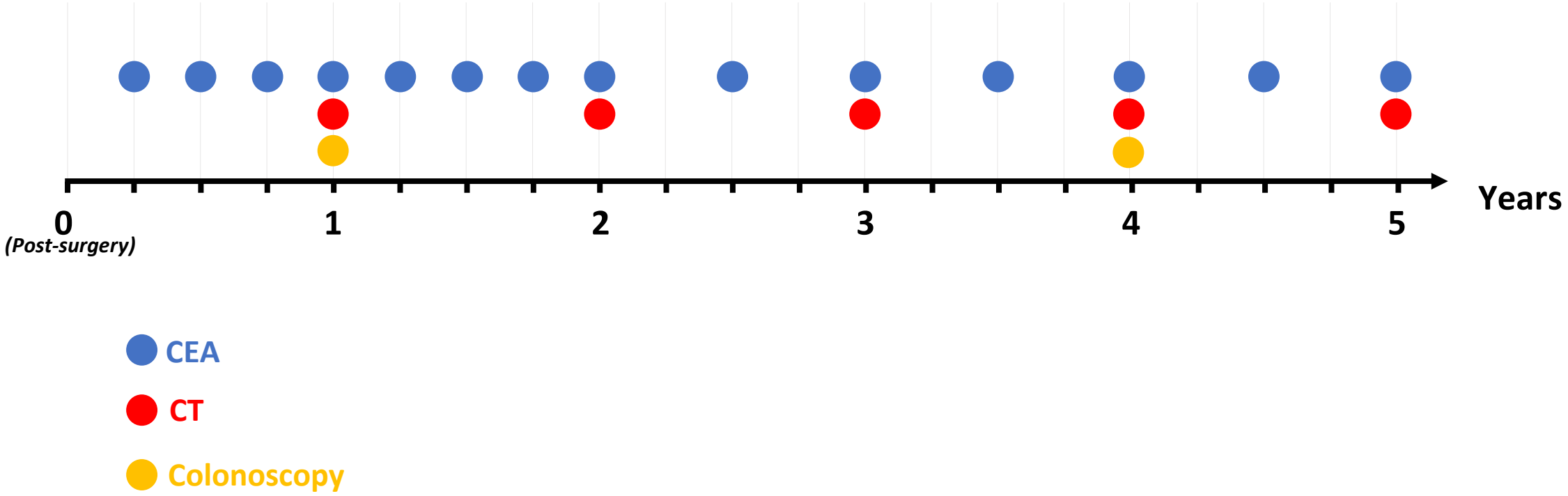
Mortality

- Disease-associated mortality (i.e., excess mortality in unresectable recurrence state)
- Surveillance-related (e.g., colonoscopy-related mortality)
- Treatment-related (e.g., resection-related mortality)
- Background mortality (e.g., age, gender, etc.)

Professional Guidelines

1. NCCN – National Comprehensive Cancer Network (2022)
2. ASCRS – The American Society of Colon and Rectal Surgeons (2021)
3. ASGE – American Society for Gastrointestinal Endoscopy (2016)
4. ACS – American Cancer Society (2015)
5. ASCO – American Society of Clinical Oncology (2013)
6. CCO – Cancer Care Ontario (*Canada*) (2022)

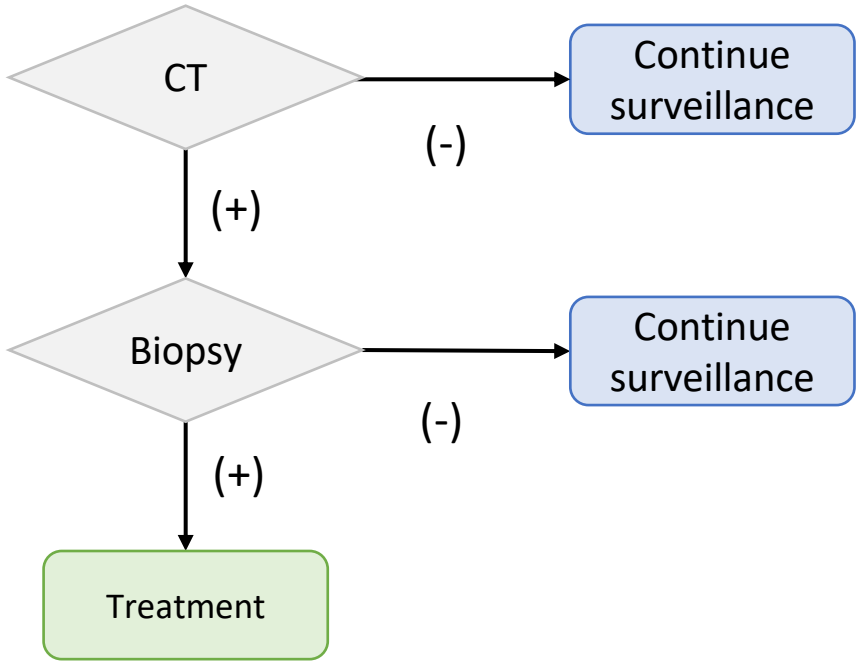
NCCN Surveillance Recommendations



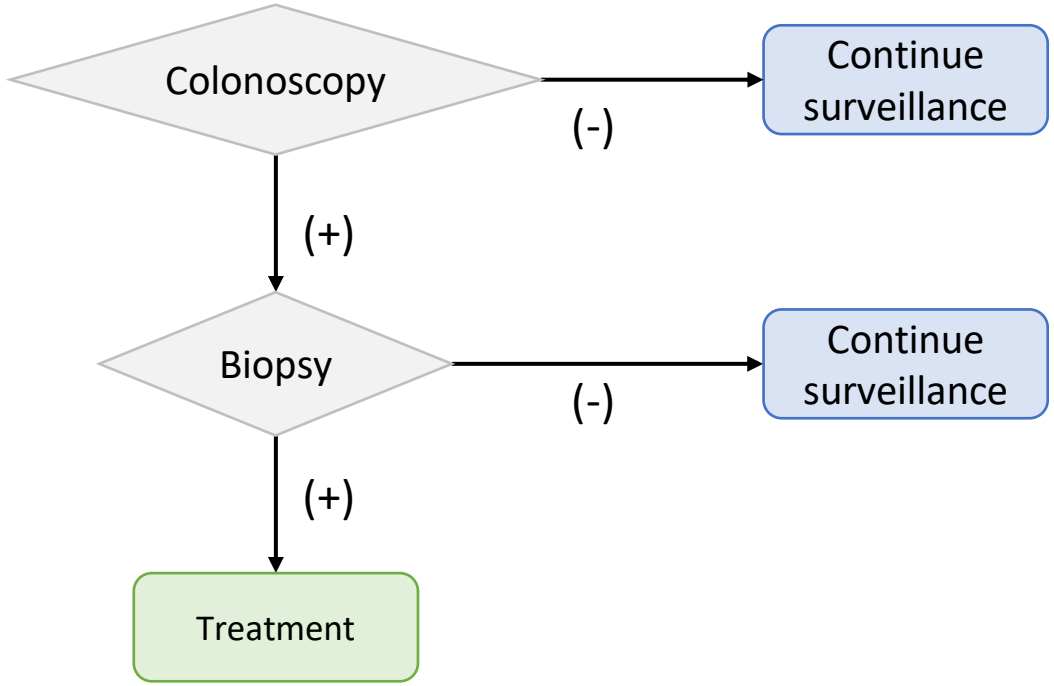
CEA: Carcinoembryonic antigen, CT: Computed tomography
NCCN: National Comprehensive Cancer Network. Available at: www.nccn.org

Surveillance Algorithms

CT

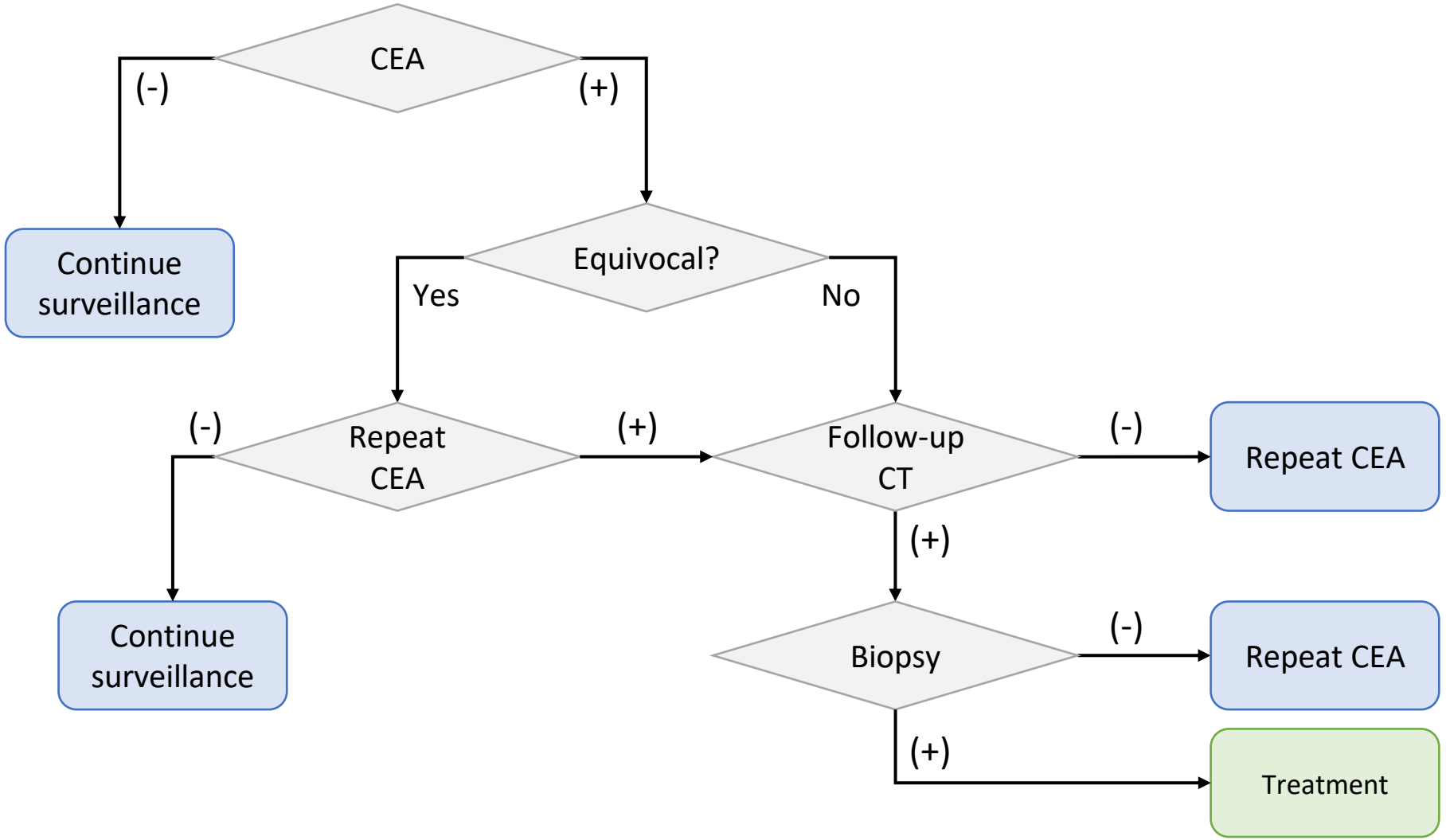


Colonoscopy



Surveillance Algorithms

CEA



Surveillance-associated parameters

Key Test Parameters:

- Sensitivity and specificity
- Lead time* (only for CEA)
- Adherence

Assumptions:

- Adherence for follow-up tests is assumed to be 100%
- Biopsy is assumed to have perfect performance (i.e., 100% sensitivity and specificity)

Lead time is a performance measure that is the ability to detect recurrence before it can be documented. The longer the lead time parameter, the better the diagnostic power
CEA: Carcinoembryonic antigen, CT: Computed tomography

Recurrence Treatment

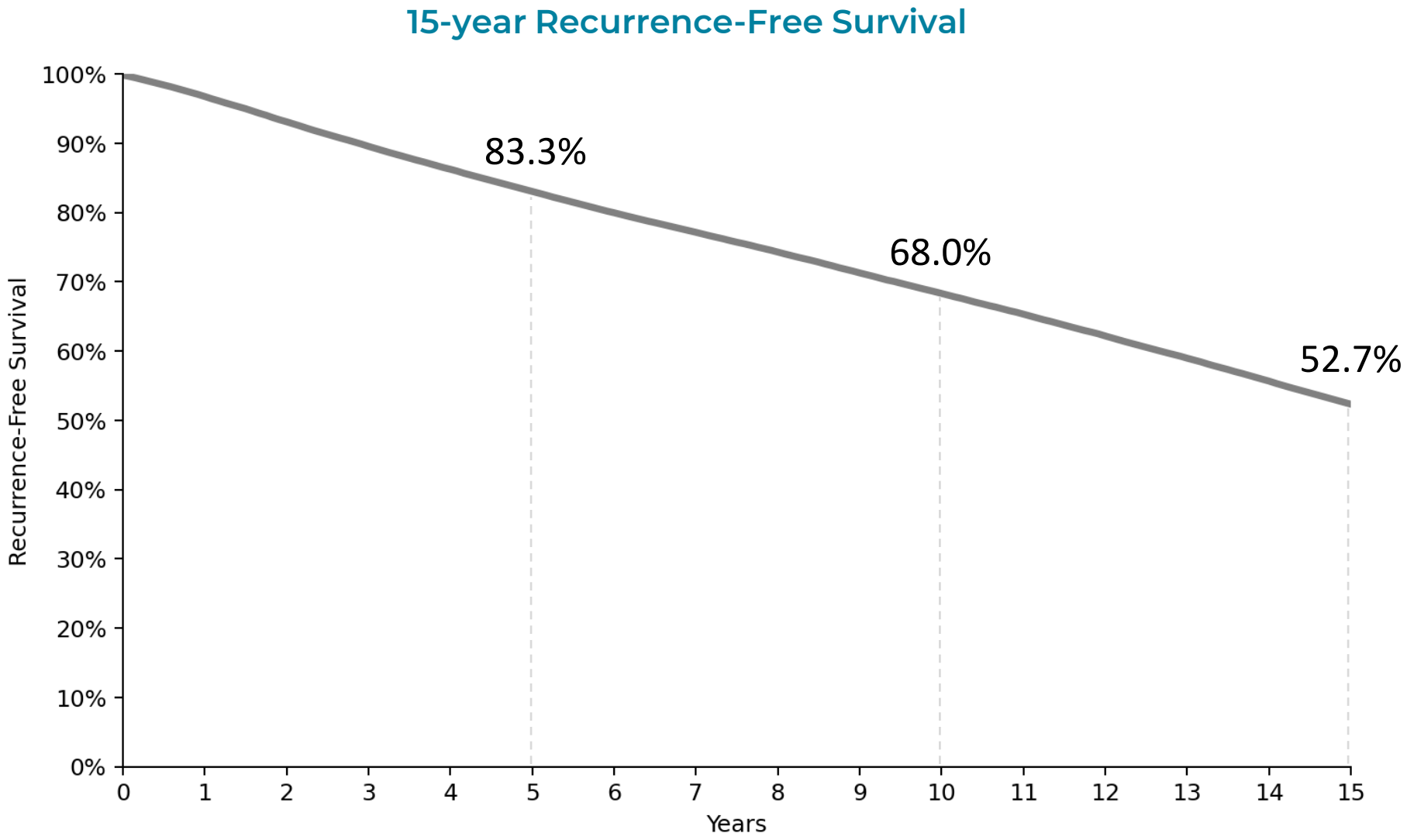
Resectable recurrence

- Surgical treatment

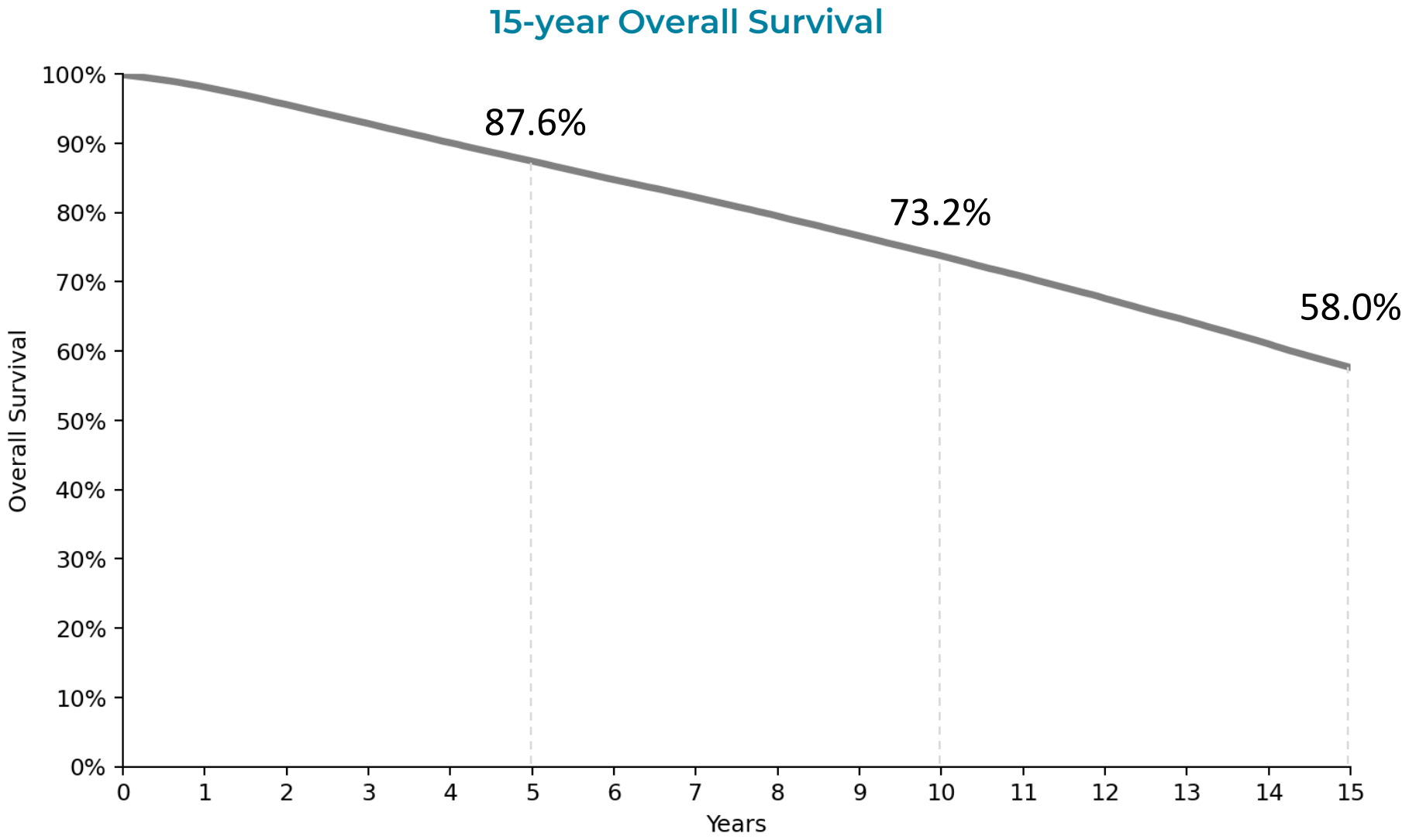
Unresectable recurrence

- Nonsurgical treatment (e.g., chemotherapy, radiotherapy)
- Palliative treatment (due to ineligibility or patient preference)

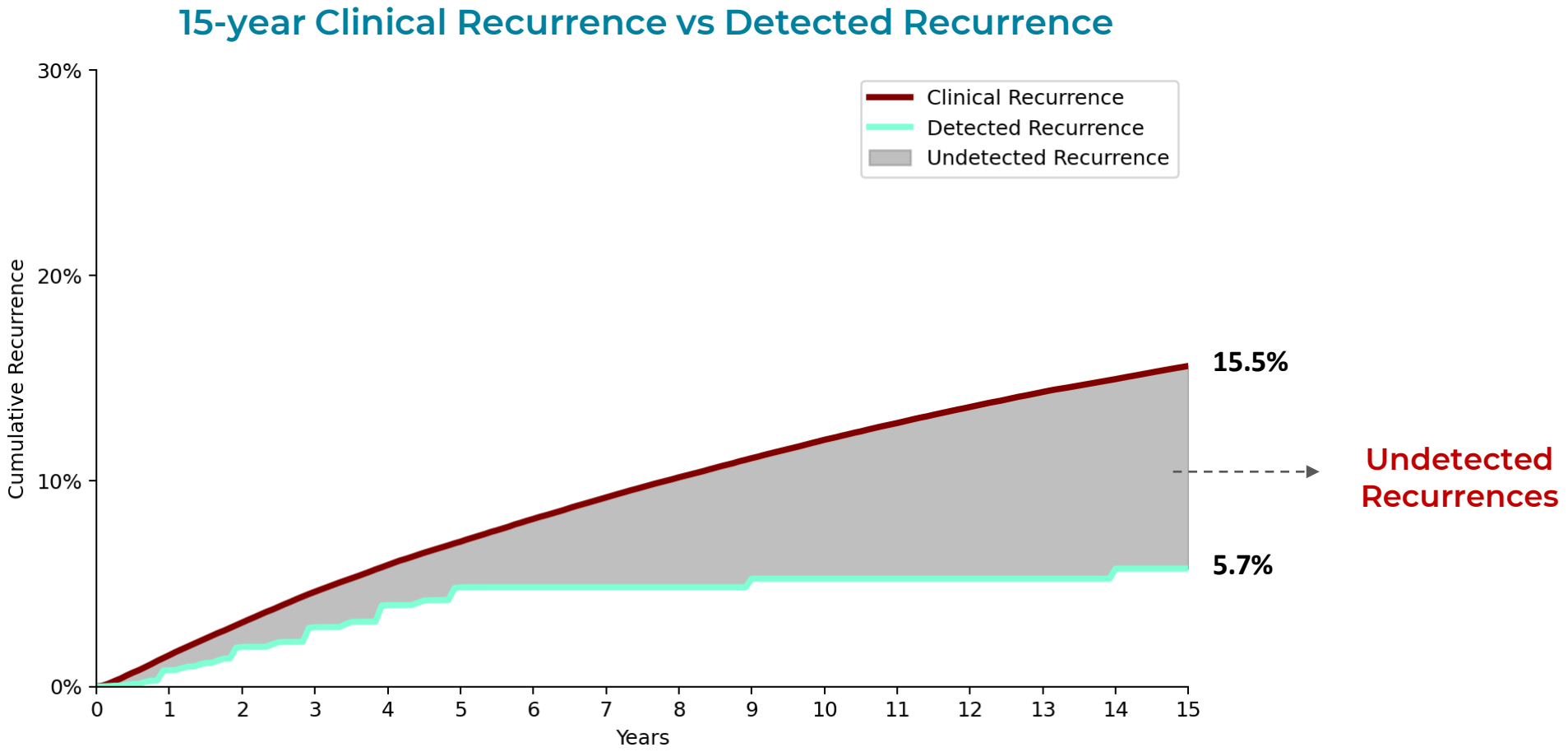
Results – Recurrence-Free Survival



Results – Overall Survival



Results – Recurrence Outcomes



- While the 15-year clinical recurrence rate is 15.5%, the detected recurrence rate is 5.7%, showing a suboptimal performance of current SOC

Results – Recurrence Outcomes

15-year Outcomes	Clinical Recurrences (per 10,000 population)	Detected Recurrences (per 10,000 population)	Detected Recurrence Rate	Undetected Recurrence Rate
Locoregional	480	260	54%	46%
Distant	1,070	310	29%	71%

Conclusions

- Our microsimulation model showcased suboptimal recurrence detection under the current SOC surveillance modalities, particularly for distant recurrences

- This model can be utilized as a tool for evaluating the performance of both the current and emerging test(s) to enhance surveillance for low-risk CC survivors

Thank you!

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