

Further Developments on the Cancer Survival Calculator

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Disclosures

- Nothing to Disclose

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Prognostication

Traditionally estimated **based on tumor stage alone**

- Does not account for prognostic factors beyond TNM
- E.g., medical history, tumor markers, treatment factors

Patients assigned the same stage often have very different survival outcomes

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Objectives

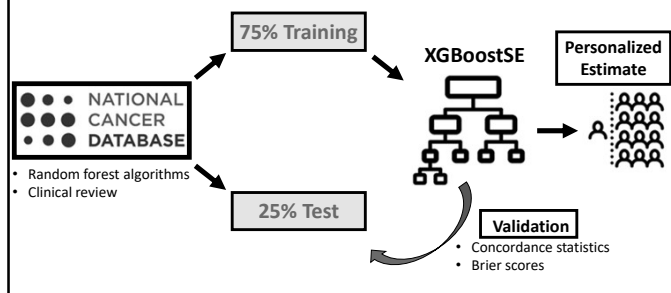
Develop a **National Cancer Survival Calculator**:

1. Utilize a comprehensive, **large national database**
2. Integrates additional prognostic factors through a **data-driven approach**
3. Incorporate **machine learning** techniques



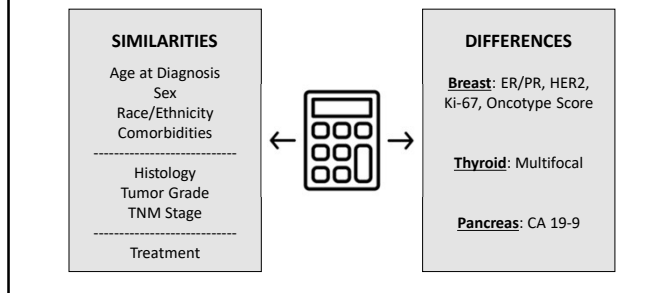
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Machine Learning Methodology



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Calculator Features



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Proof of Concept Sites

Disease Site	C-index	Brier score
Breast	0.82	0.04
Thyroid	0.80	0.12
Pancreas	0.81	0.14

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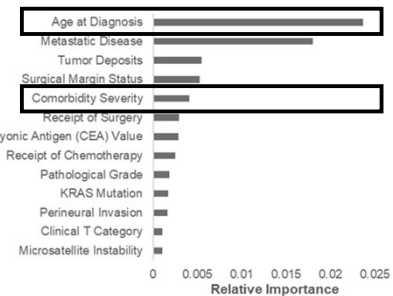
Proof of Concept Sites

Disease Site	C-index	Brier score
Breast	0.82	0.04
Thyroid	0.80	0.12
Pancreas	0.81	0.14
Colon	0.81	0.11
Hepatobiliary	0.72	0.15

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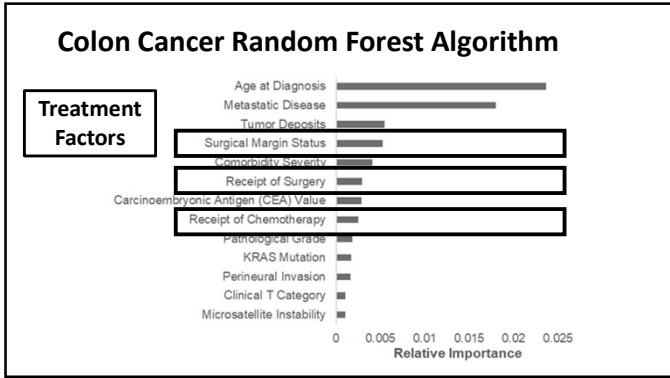
Colon Cancer Random Forest Algorithm

Patient Factors

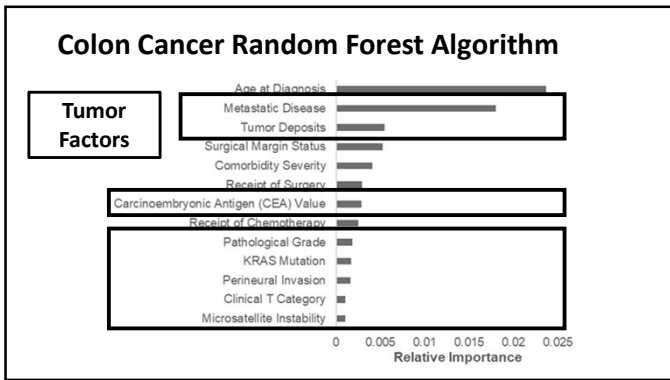


Factor	Relative Importance (approx.)
Age at Diagnosis	0.022
Metastatic Disease	0.018
Tumor Deposits	0.012
Surgical Margin Status	0.010
Comorbidity Severity	0.010
Receipt of Surgery	0.008
Carcinoembryonic Antigen (CEA) Value	0.005
Receipt of Chemotherapy	0.004
Pathological Grade	0.003
KRAS Mutation	0.002
Perineural Invasion	0.002
Clinical T Category	0.001
Microsatellite Instability	0.001

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Sample Cases

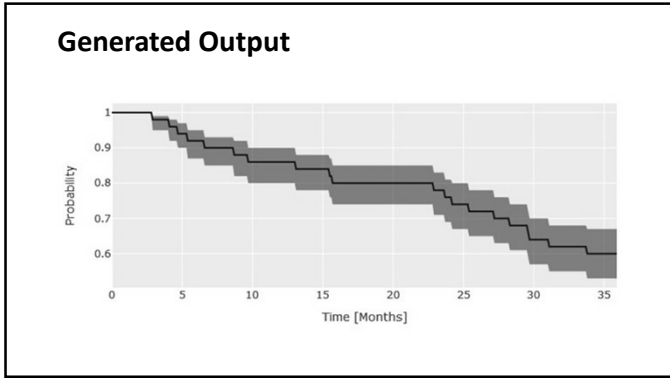
A 65-year-old female, PMH hypertension, found to have T2N0M0 invasive ductal carcinoma.

- ER/PR: positive; Her2: negative; Ki67: 6%
- Treatment: Lumpectomy w/ SLN; followed by adjuvant whole breast radiation and hormone therapy
- Estimated 10-year survival rate: 94.9%

A 42-year-old female found to have T3N1M0 invasive ductal carcinoma.

- ER/PR: negative; Her2: negative; Ki67: 70%
- Treatment: Neoadjuvant chemotherapy; Mastectomy w/ ALND; Adjuvant post-mastectomy radiation
- Estimated 10-year survival rate: 71.8%

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Key Takeaways

- Provides a **comprehensive prognostic tool** for patients with cancer
- A web-based platform will enable clinicians to calculate **personalized survival estimates in real time**

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Moving Forward....

- **Next Disease Site:** Melanoma
- Further develop the web-based platform for pilot testing
- **Pilot testing** across ~10 Commission on Cancer hospitals
 - Breast
 - Thyroid
 - HPB
 - Colon
 - Melanoma

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