



IMDC Criteria How to Create 2.0

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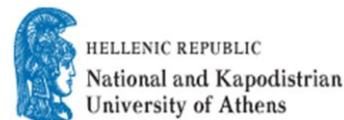
Medical Director, Clinical Research Unit, TBCC



UNIVERSITY OF
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International mRCC Database Consortium (IMDC)

10,007 patients from 40 international institutions



Risk Stratification

International mRCC Database Consortium (IMDC) Prognostic Factors

a.k.a. Heng Criteria

Clinical

- Low Karnofsky performance (<80%)
- Time from diagnosis to treatment <1 year

Laboratory

- Low hemoglobin (< LLN)
- High “corrected” serum calcium (> ULN)
- High neutrophils (> ULN)
- High levels of platelets (> ULN)

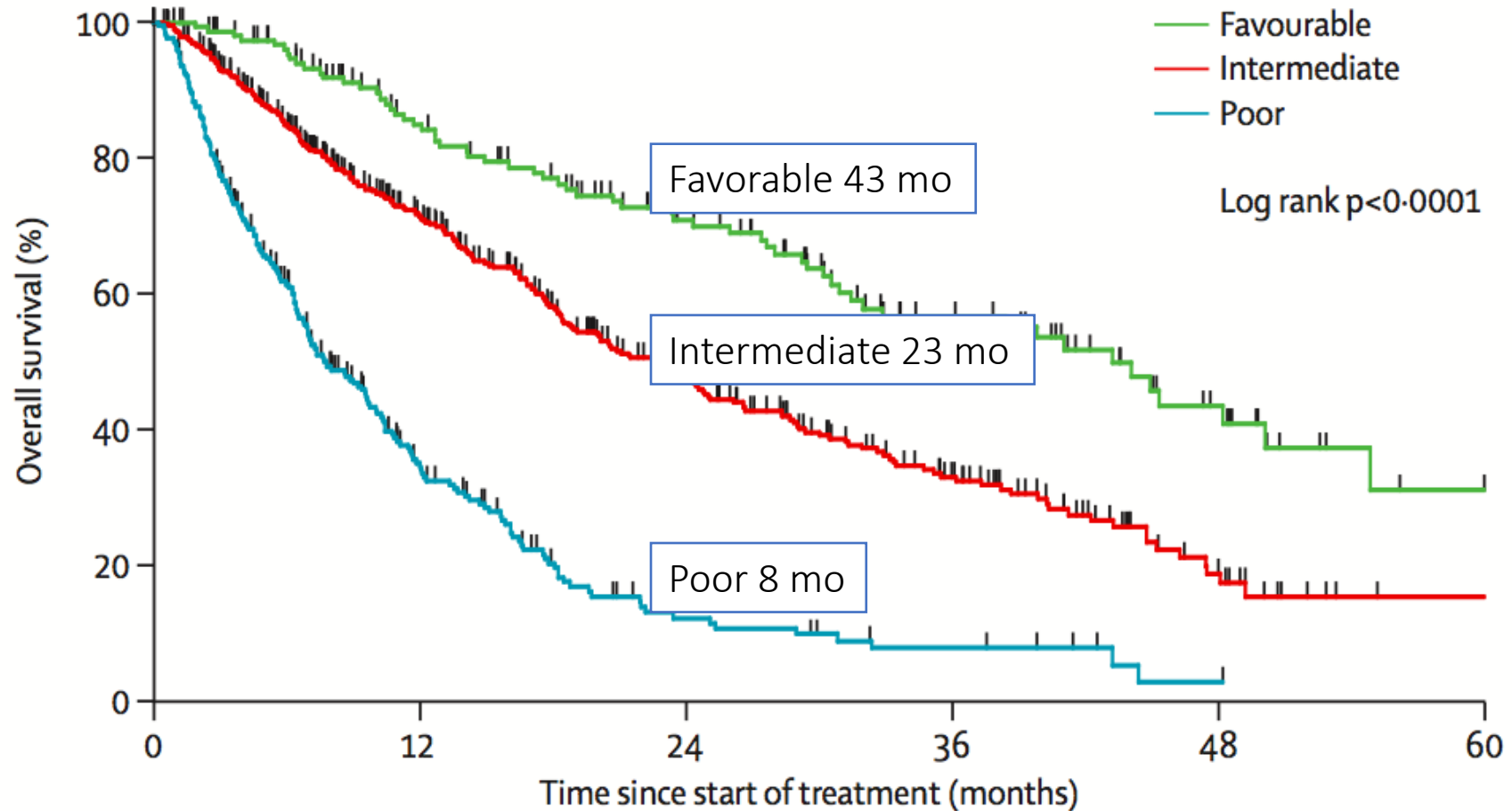
**Categorized into 3 risk groups
with decreasing associated
survival time**

Favorable (0 factors)

Intermediate (1–2 factors)

Poor (3+ factors)

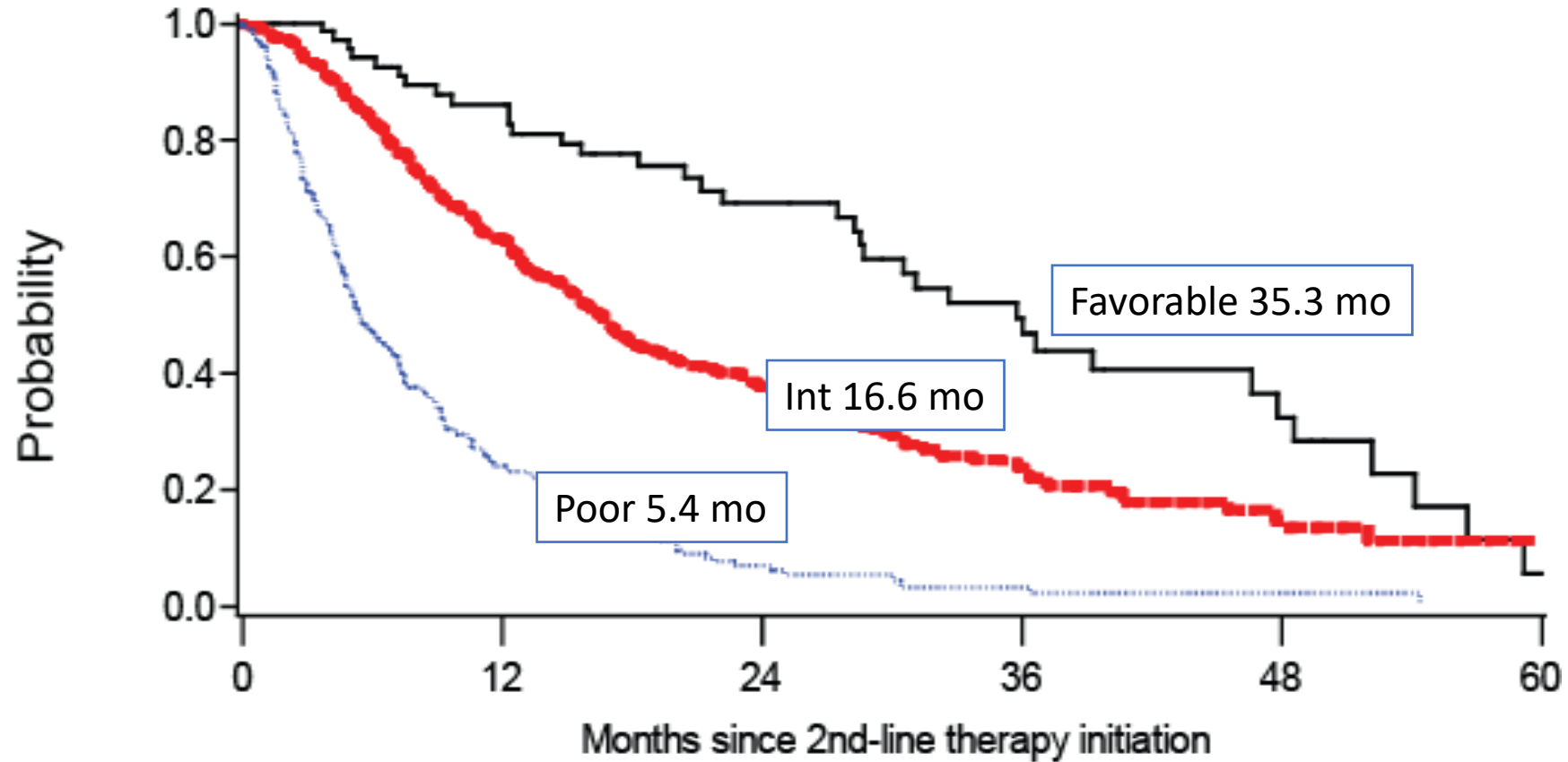
IMDC Prognostic Factors



Number at risk

Favourable	157	109	74	40	17	3
Intermediate	440	247	122	59	15	1
Poor	252	65	15	7	1	0

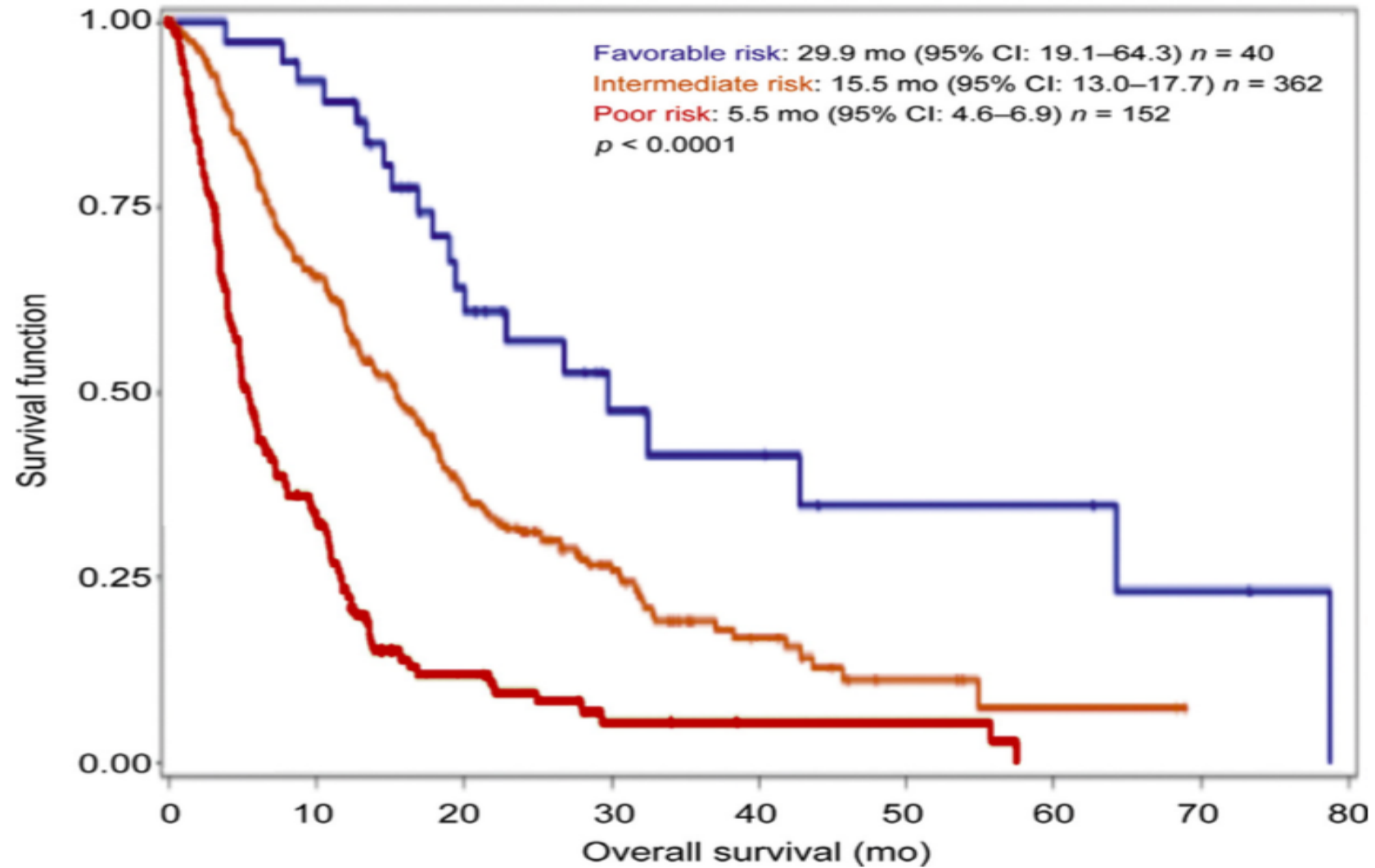
IMDC in Second-Line Targeted Therapy

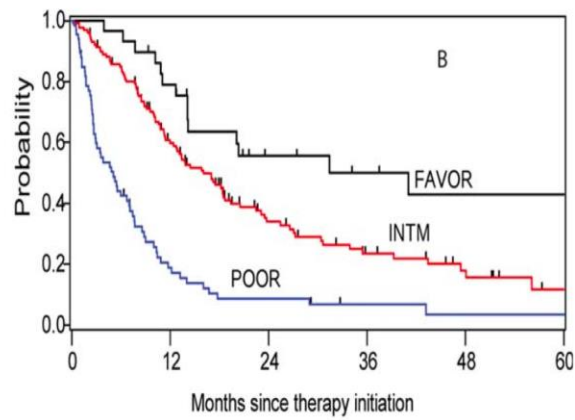


No. of patients at risk

FAVOR	76	52	31	19	8	1
INTM	529	257	97	37	9	4
POOR	261	49	9	3	1	0

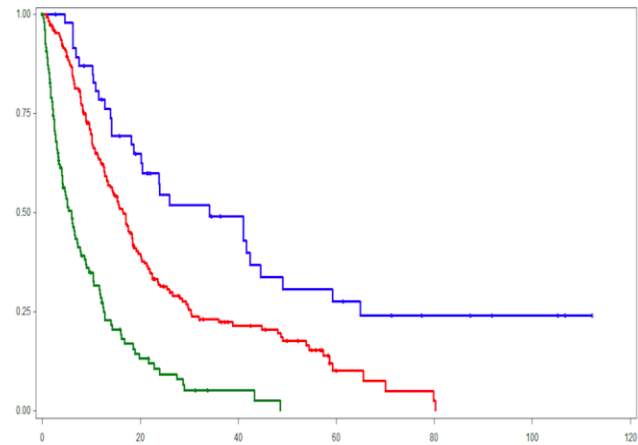
IMDC in Third-Line Targeted Therapy





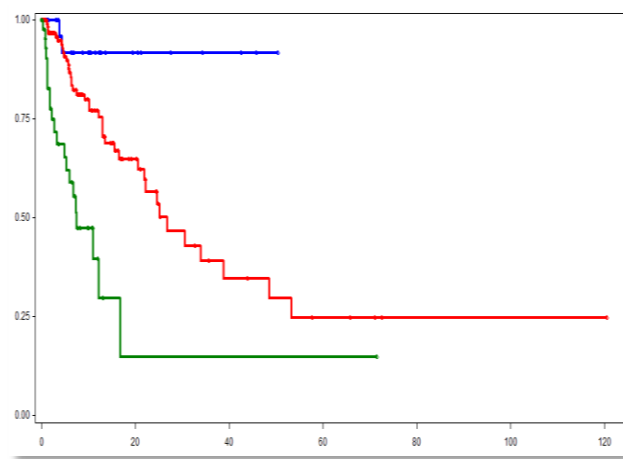
IMDC in Non-clear Cell RCC

Kroeger N, et al. *Cancer*. 2013;119:2999-3006.



IMDC in Papillary RCC TKI First Line

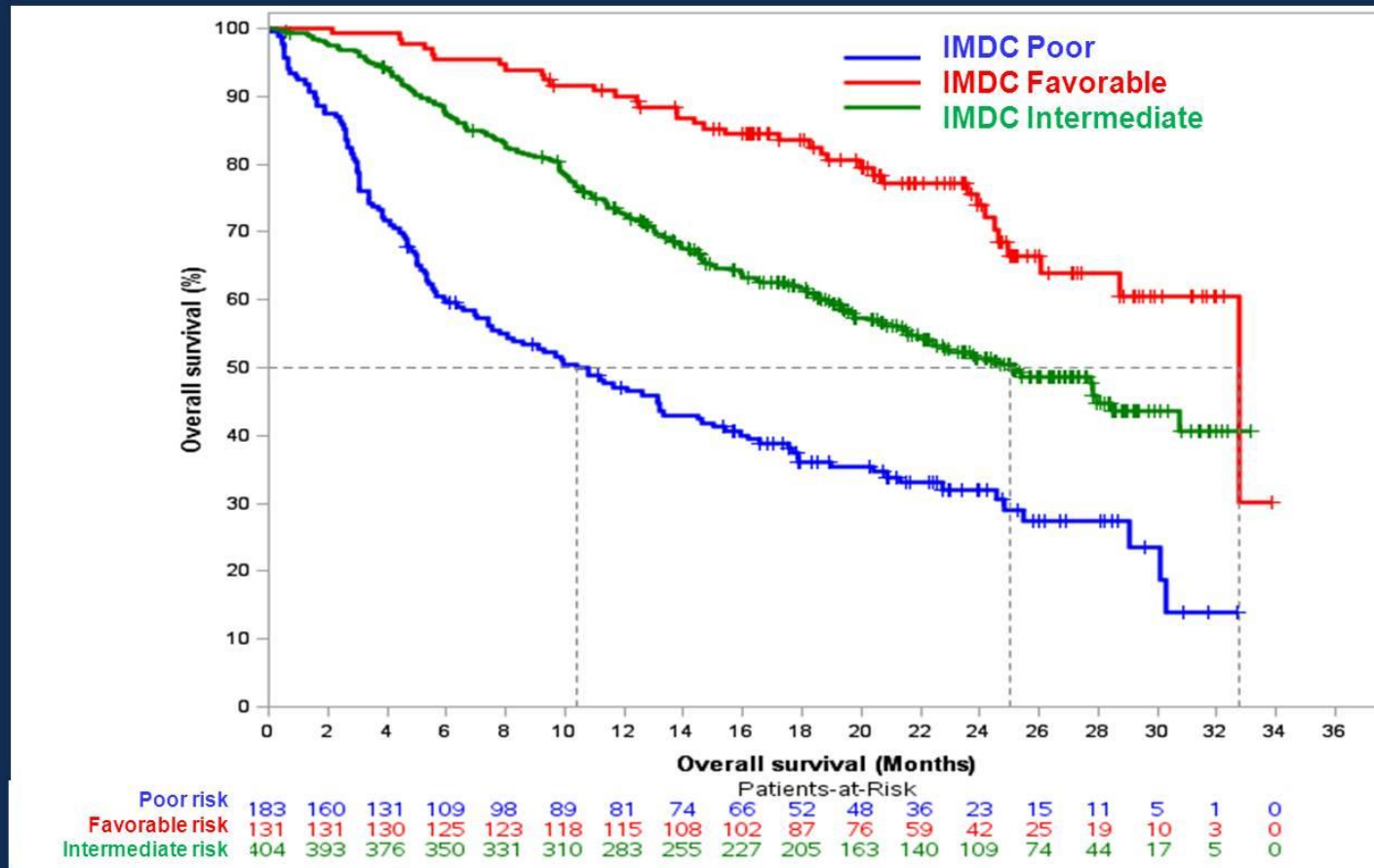
Wells JC, et al. *Cancer Med*. 2017;6:902-909.



IMDC in Nivolumab Second Line

Yip S, et al. *Cancer* 2018

OS according to IMDC prognostic risk groups



IMDC	Median OS (95% CI)	HR (95% CI)
Favorable	32.8 (28.7-NE)	-
Intermed.	25.0 (21.5-30.7)	2.04 (1.43-2.92)
Poor	10.4 (7.0-14.5)	4.36 (3.00-6.33)

p<.0001

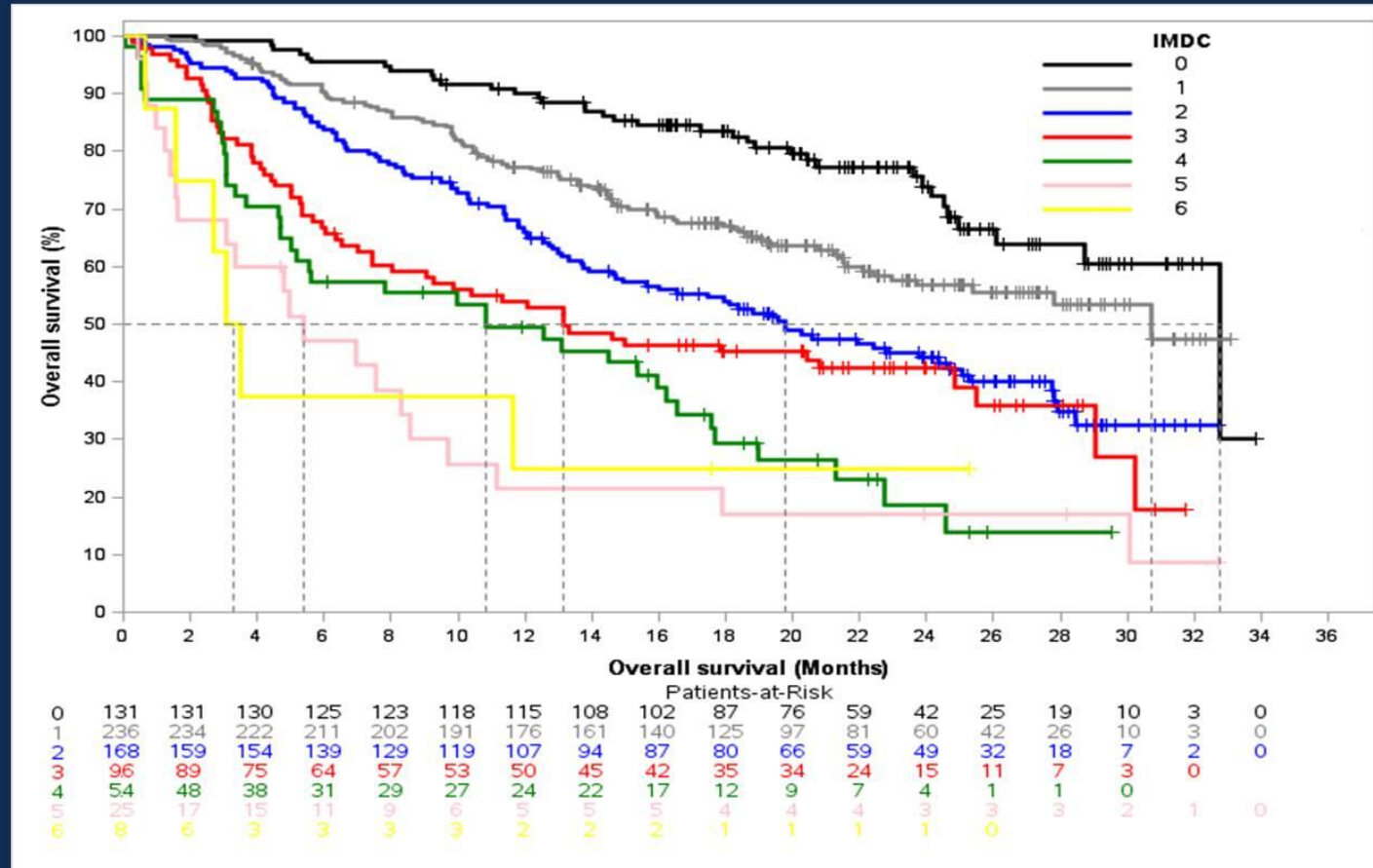
PRESENTED AT: **2019 Genitourinary Cancers Symposium | #GU19**

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NIVOREN Trial: Second-line Nivolumab

Albiges et al GU ASCO 2019

OS according to IMDC risk factor number



IMDC	Median OS (95% CI)	HR (95% CI)
0	32.8 (28.7-NE)	1
1	30.7 (23.7-NE)	1.67 (1.14-2.46)
2	19.8 (14.7-25.0)	2.62 (1.78-3.84)
3	13.2 (7.4-25.5)	3.39 (2.24-5.15)
4	10.8 (5.0-16.2)	5.14 (3.27-8.09)
5	5.4 (1.6-8.6)	7.29 (4.24-12.52)
6	3.3 (0.7-NE)	7.07 (2.97-16.82)

p<.0001

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NIVOREN Trial: Second-line Nivolumab

Albiges et al GU ASCO 2019

How Do We Use IMDC Criteria?

Patient Counselling

- Prognosis

Research

- Clinical Trials
- Adjustment

Treatment Selection

- 1st line
- Cytoreductive
Nephrectomy

Online IMDC Criteria Calculator mdcalc.com

Google:
“Heng Criteria”

IMDC (International Metastatic RCC Database Consortium) Risk Score for RCC



Determines overall survival in patients treated with systemic therapy.

INSTRUCTIONS

Note: this calculator was formerly referred to as the Heng Score for Metastatic Renal Cell Carcinoma Prognosis.

When to Use ▾

Pearls/Pitfalls ▾

Why Use ▾

Less than one year from time of diagnosis to systemic therapy

No 0

Yes +1

Performance status <80% (Karnofsky)

No 0

Yes +1

Hemoglobin < lower limit of normal
Normal: 120 g/L or 12 g/dL

No 0

Yes +1

Calcium > upper limit of normal
Normal: 8.5-10.2 mg/dL

No 0

Yes +1

Neutrophil > upper limit of normal
Normal: $2.0-7.0 \times 10^9/L$

No 0

Yes +1

0 points

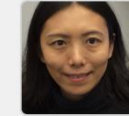
Favorable risk

Median survival: 43.2 months

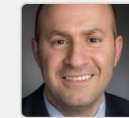
About the Creator



Dr. Daniel Heng



Wanling Xie



Dr. Toni Choueiri

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IMDC Graphical Interface Courtesy Anobel Odisho

Predicting Outcomes in Metastatic Kidney Cancer

This interactive tool is designed to estimate outcomes in metastatic kidney cancer, based on clinical data derived from the International Metastatic Renal Cell Carcinoma Database Consortium. By entering known patient data, this tool can show outcomes from patients with similar characteristics. This platform can help better understand possible outcomes and aid in the treatment decision process for each individual.

To begin using the tool, you can begin entering values in the fields below or by selecting ranges of values in the figure.

Patient Characteristics

Prior Nephrectomy

Yes No

Histology

Clear Cell Non-clear Cell

Performance Status

to

Years from Diagnosis

to

Calcium (corrected)

to

Hemoglobin

to

Neutrophil Count

to

Platelet Count

to

[Reset Filters](#)

Results

Survival Plot

Number of Patients Shown:	523
Median Survival Time (Months):	13.3 (11.8 - 14.6)
1 Year Survival Rate:	53% (49% - 58%)
2 Year Survival Rate:	30% (26% - 34%)
3 Year survival Rate:	22% (18% - 26%)

IMDC Graphical Interface Courtesy Anobel Odisho

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To begin using the tool, you can begin entering values in the fields below or by selecting ranges of values in the figure.

Patient Characteristics

Prior Nephrectomy

Yes No

Histology

Clear Cell Non-clear Cell

Performance Status

20 to 100

Years from Diagnosis

0 to 5

Calcium (corrected)

0.05 to 6.64

Hemoglobin

79 to 116

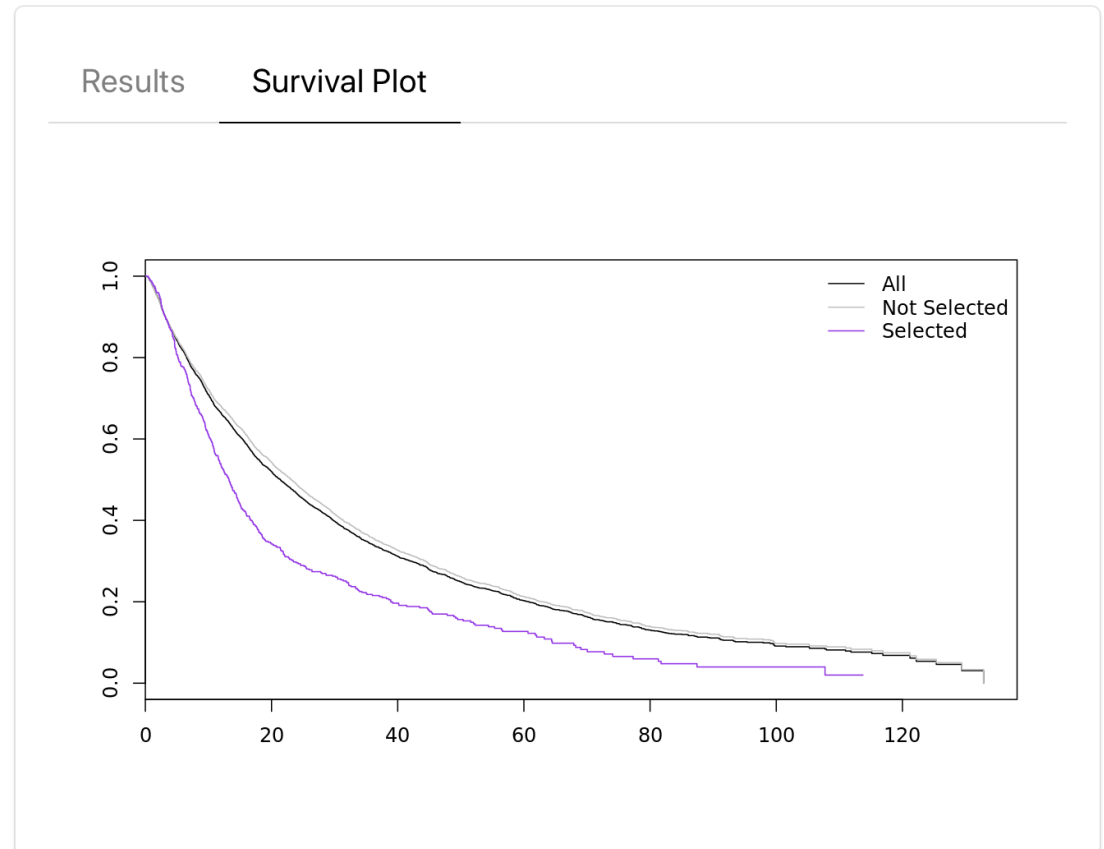
Neutrophil Count

1 to 6

Platelet Count

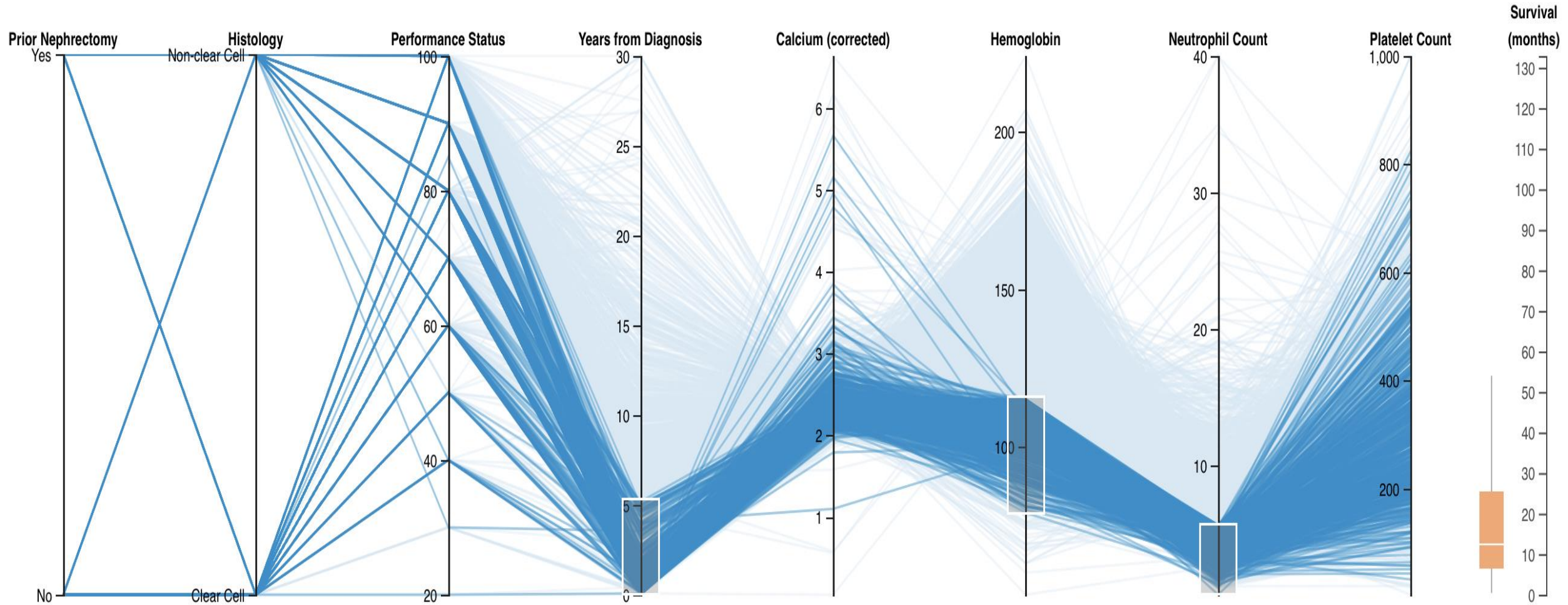
3.79 to 1000

[Reset Filters](#)



IMDC Graphical Interface

Courtesy Anobel Odisho

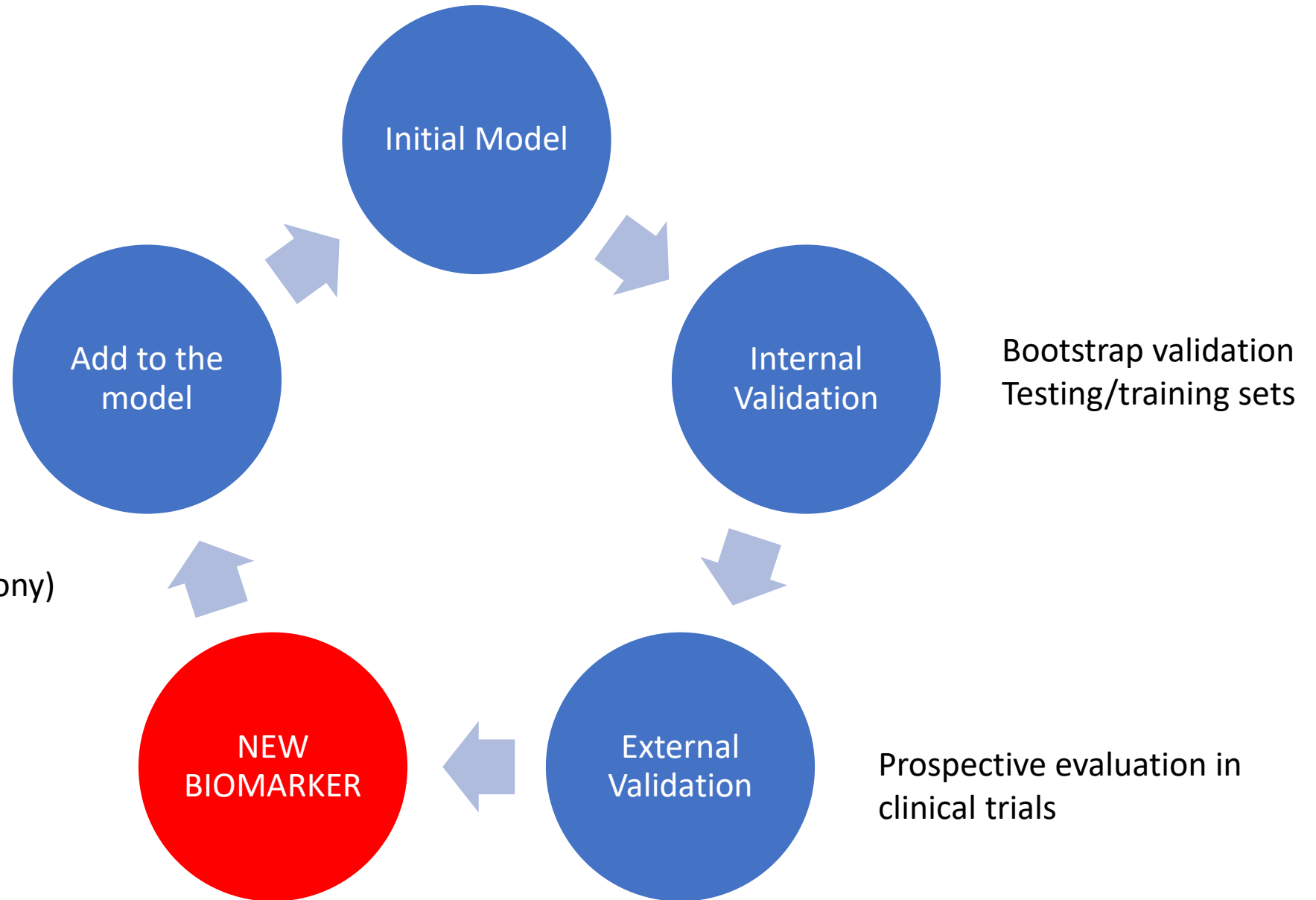


Building the next IMDC Model

Test to see if helpful:

- c index
- Net reclassification index
- Likelihood ratio

IS IT MORE ACCURATE?
IS IT WORTH THE COST?
IS IT REPRODUCIBLE?
IS IT FEASIBLE (e.g. parsimony)



Examples

IMDC + new biomarker	Additive Accuracy (c-index before → after)	Cost	Does it make sense?
+history (e.g. gender)	0.76 → 0.77	Free	No
+lab test (e.g. creat)	0.76 → 0.77	Almost free	No
+IHC (e.g. BAP1)	0.76 → 0.79	More expensive	Maybe
+Genomic composite	0.76 → 0.79	Expensive	No
+Genomic composite	0.76 → 0.95	Expensive	YES!

All additions increase complexity. The more complex the model, the less likely it will be used

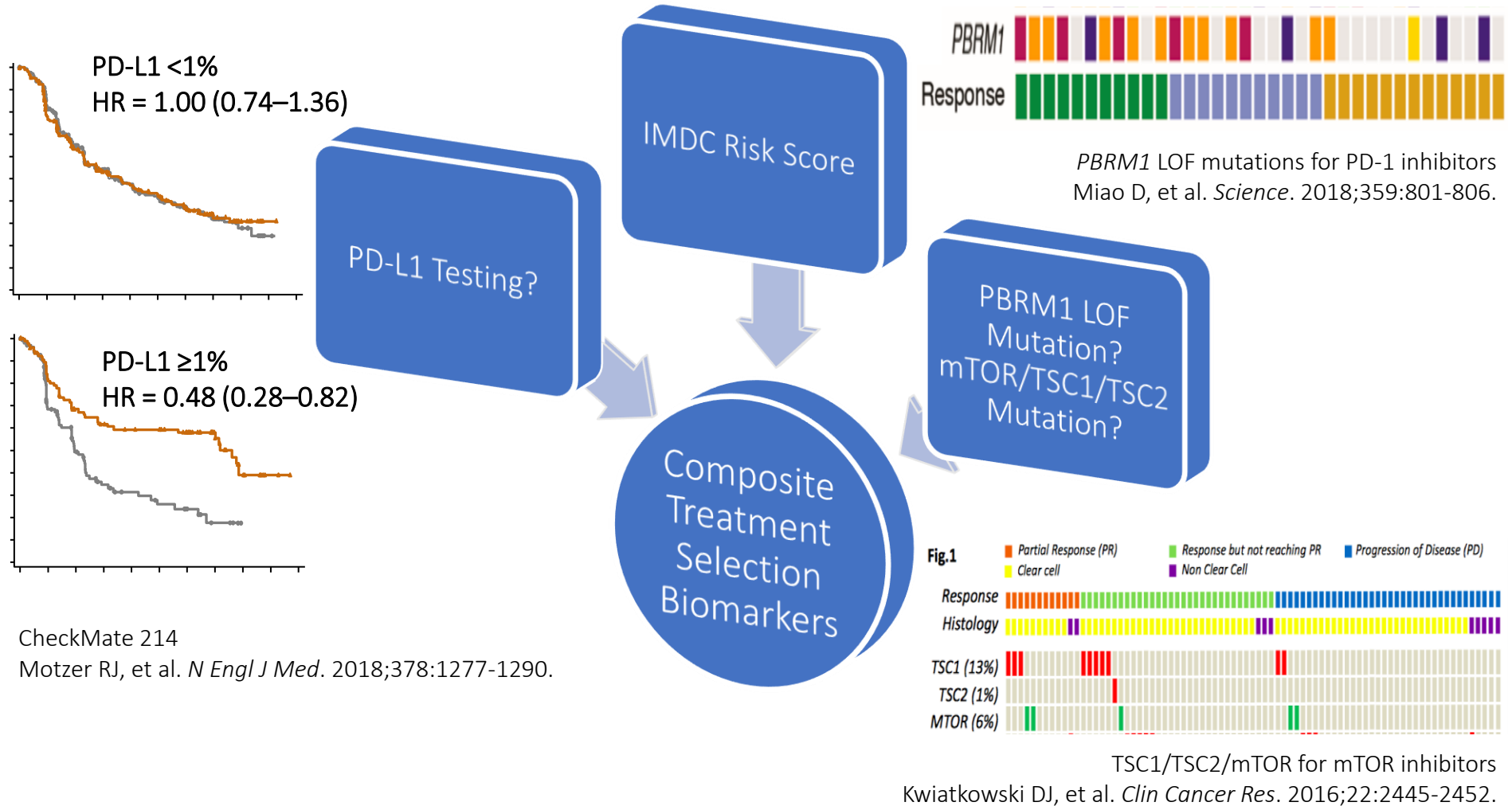
Potential Additional Prognostic Factors

Population	Adjusted HR*	P	OS With v Without Prognostic Factor (months)	Prevalence (%)
Bone metastases ⁵³	1.38	< .001	14.9 v 25.1	34
Liver metastases ⁵³	1.37	< .001	14.3 v 22.2	19
Not clinical-trial eligible ⁵⁴	1.55	< .001	12.5 v 28.4	35
Elevated NLR ⁵⁵	1.69†	< .001	NR	NR
Elevated CRP ⁵⁶ (> 5 mg/L)	1.29‡	< .001	12.0 v 50.0	65.5
Nonclear cell RCC ⁵⁷	1.41	< .001	12.8 v 22.3	11.4
Papillary RCC ⁵⁸	1.40	< .001	13.8 v 21.9	9.3
High body mass index ⁵⁷	0.84	NR	25.6 v 17.1	60
Brain metastases ⁵⁸	1.24	.103	14.4 v 19.0	15
Advanced age ⁵⁹ (> 75 years)	1.002	.332	16.8 v 19.7	10.4
Renal dysfunction ⁶⁰ (GFR < 60 mL/min/1.73 m ²)	0.90	.439	27.5 v 19.2	49.5

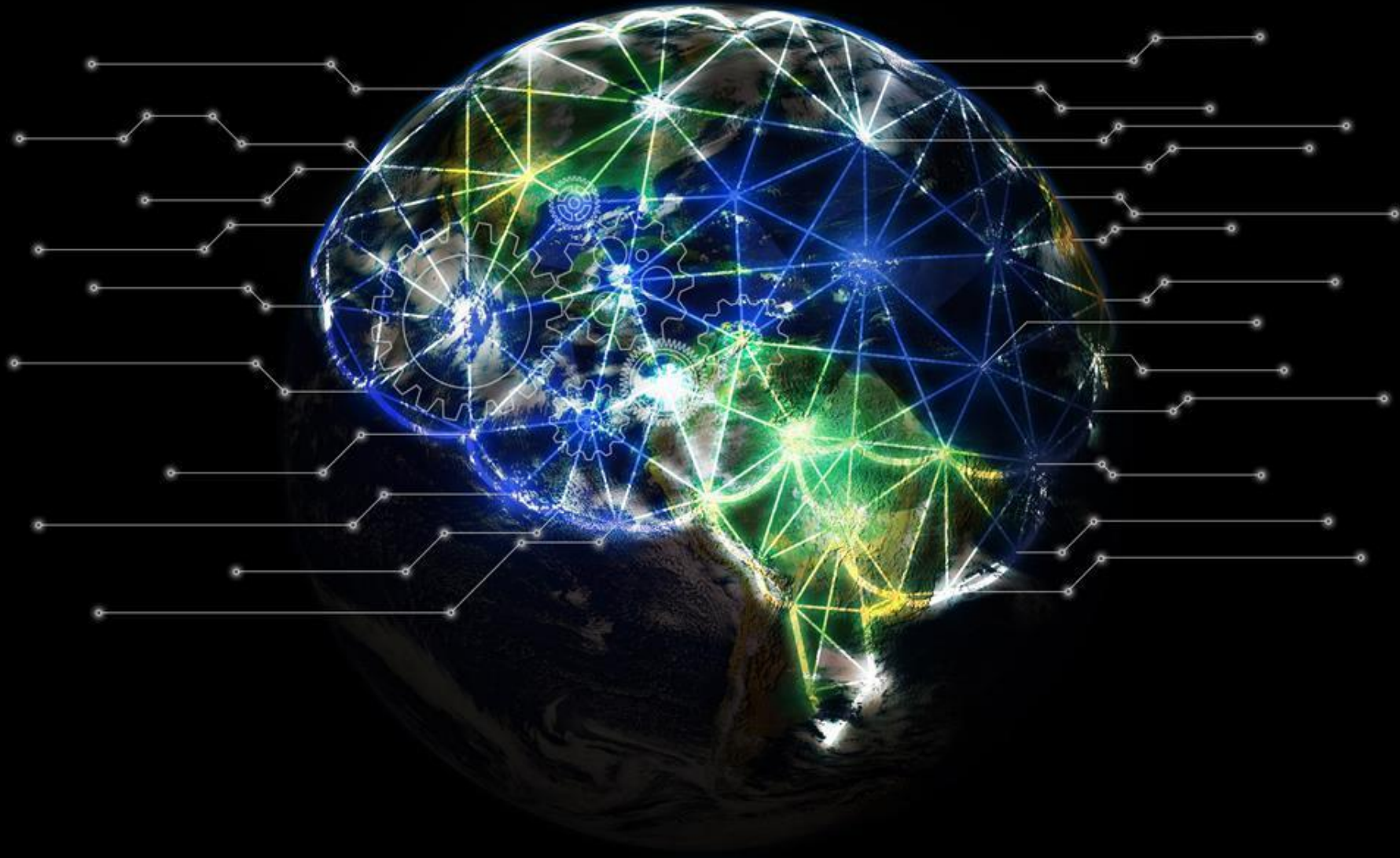
Prognostic

Predictive

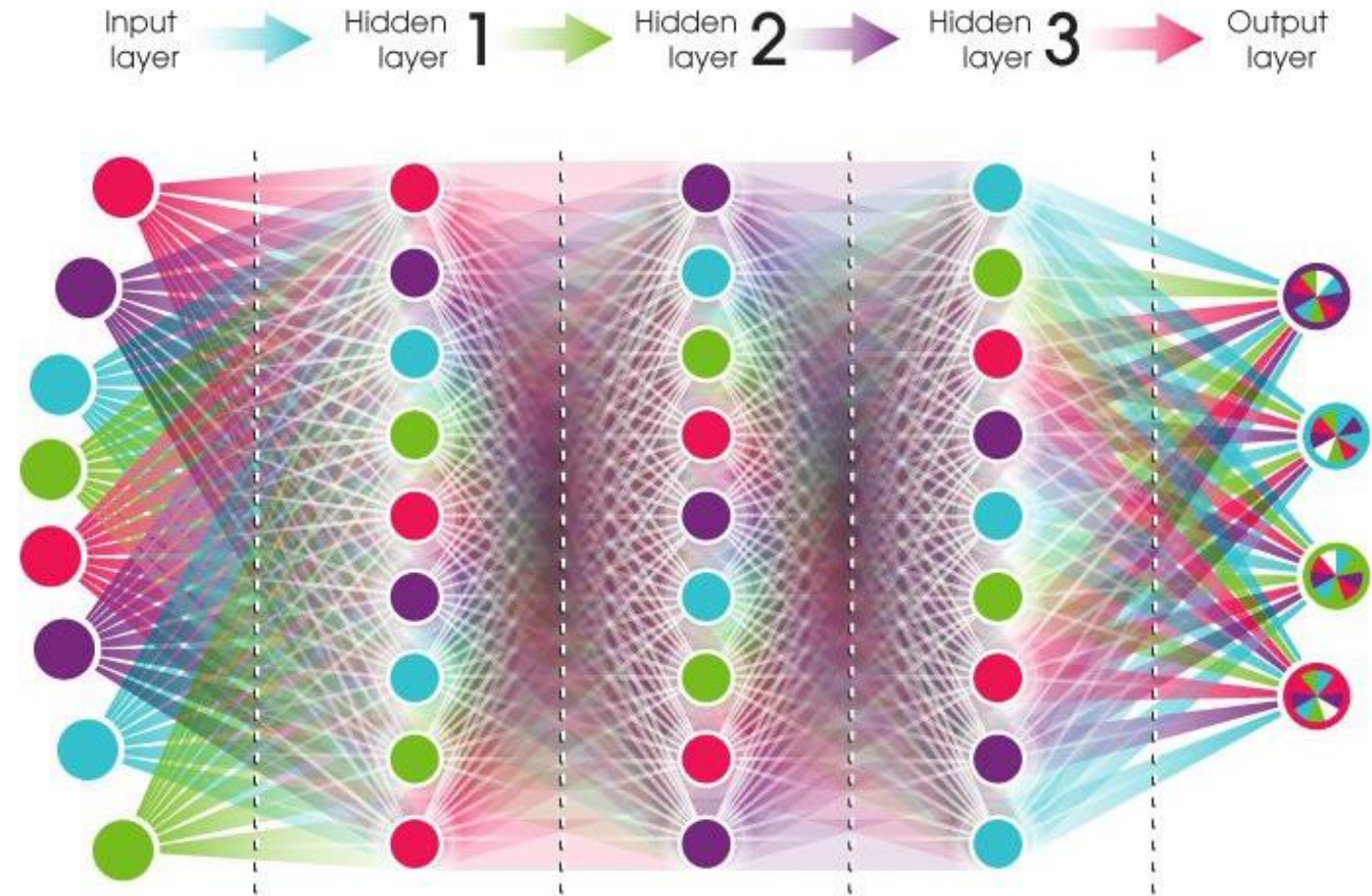
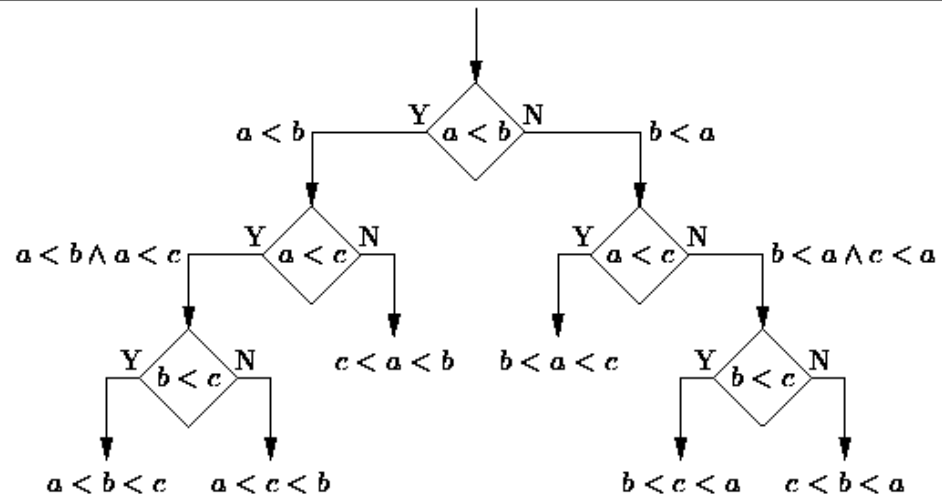
The Future of Prediction



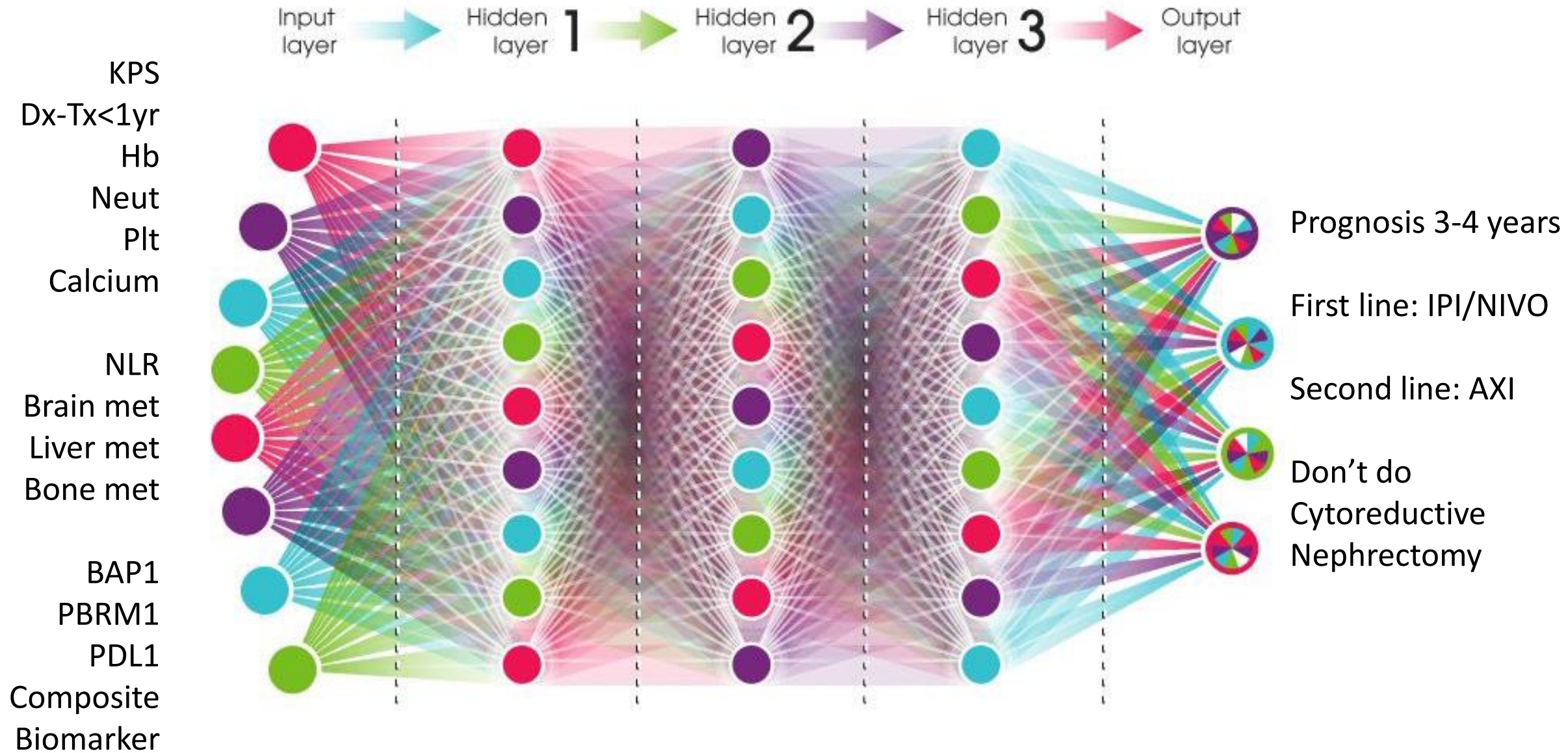
The Role of Machine Learning in Prognostication and Prediction



From Decision Trees to Neural Networks



Example Kidney Cancer Neural Network



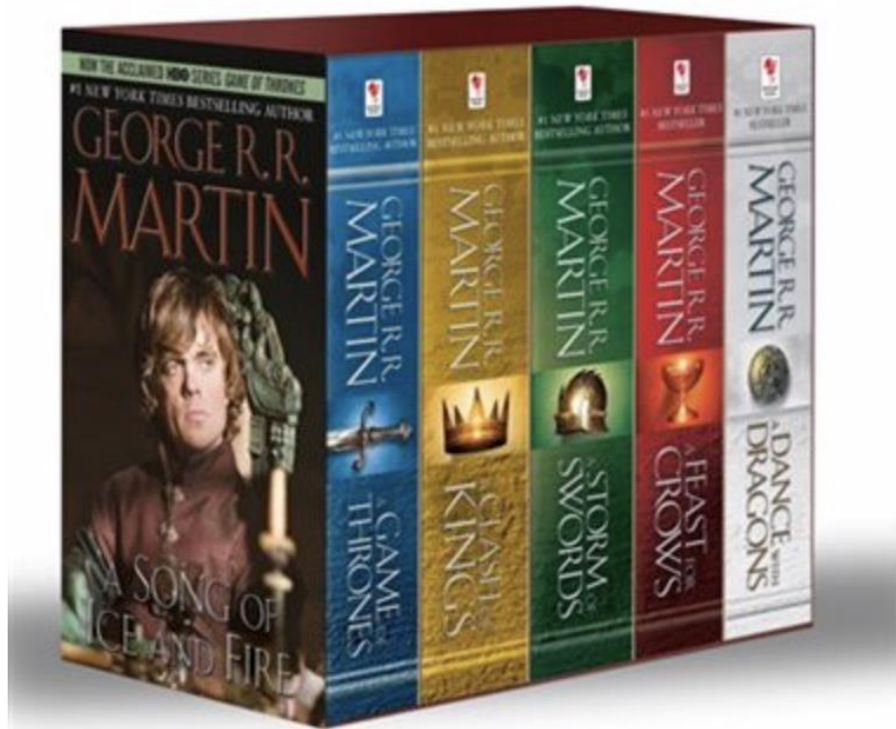


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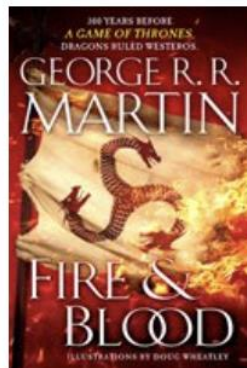
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ABOUT THE AUTHOR

George R. R. Martin is the #1 New York Times bestselling author of many novels, including the acclaimed series A Song of Ice and Fire—A Game of Thrones, A Clash of Kings, A Storm of Swords, A Feast for Crows, and A Dance with Dragons. As a writer-producer, he has worked on The Twilight Zone, Beauty and the Beast, and various feature fi...[READ MORE +](#)

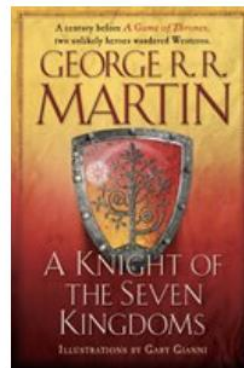


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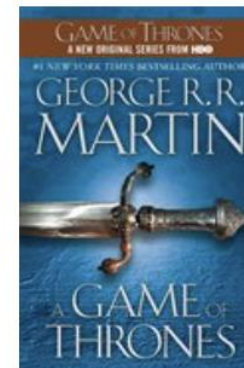


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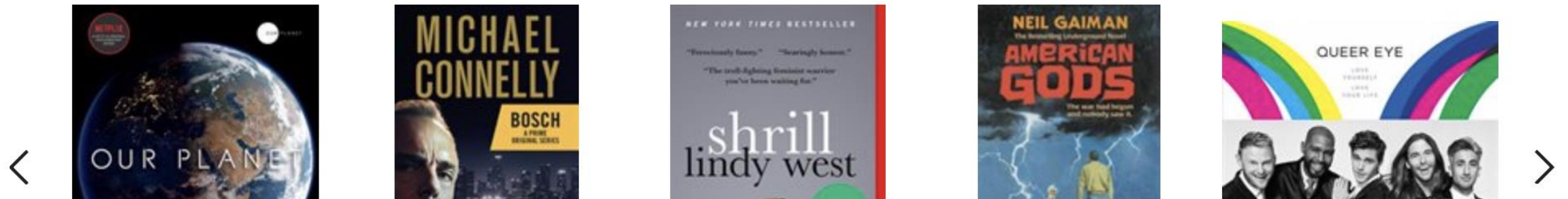
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★★★★★ (298)

Limitations

- Need huge data sets, huge computing power
- Neural networks are a black box
 - Cannot explain how you got to that answer
- Do patients and physicians believe the black box?
- The cost of being wrong is much higher in medicine than in the bookstore

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Conclusions

Use IMDC
Criteria

Biomarkers
need to be
tested
properly

Excited
about the
future



THANK YOU!

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