Creating Value in Cancer Care Through Research

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Senior Vice President and Chief Medical Officer
American Society of Clinical Oncology

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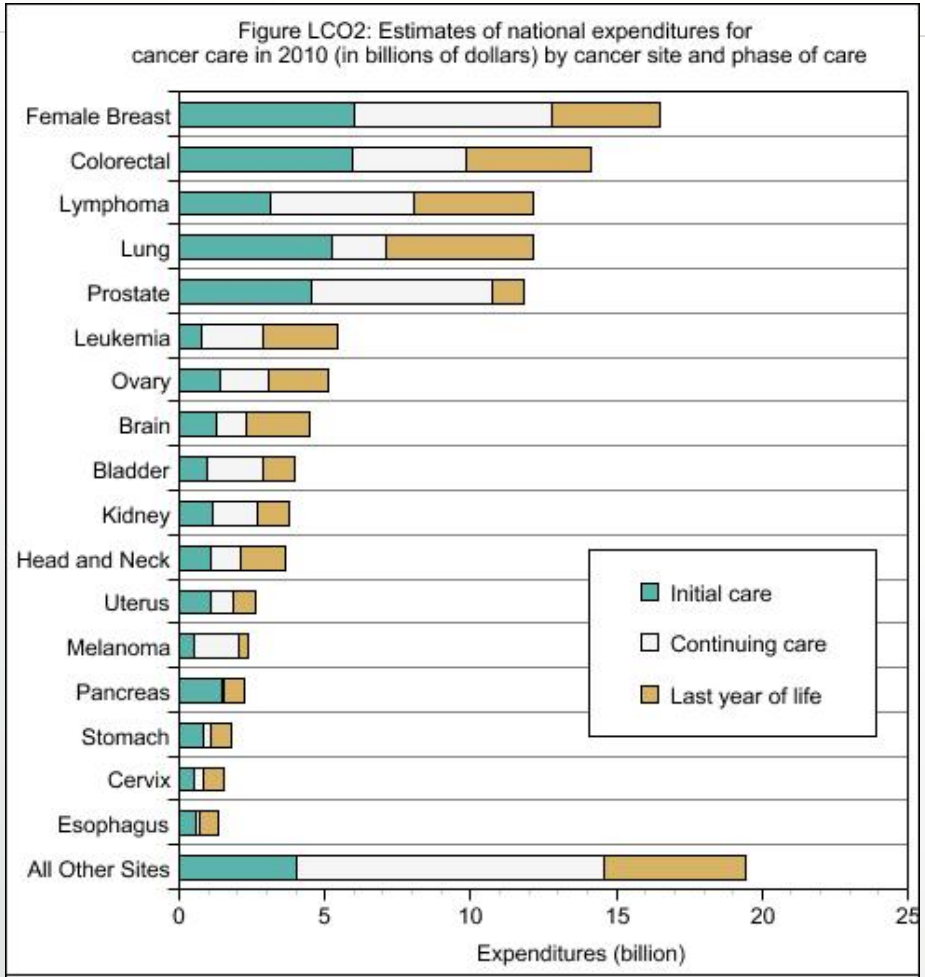
Financial Disclosure

- ASCO receives financial support from the following companies to conduct the TAPUR study:

- Astra-Zeneca
- Bayer
- Bristol Myers Squibb
- Genentech
- Lilly
- Merck
- Pfizer

Cost of Cancer Care is Rising



Source: Mariotto AB, Yabroff KR, Shao Y, Feuer EJ, Brown ML. Projections of the cost of c care in the U.S.: 2010-2020. J Natl Cancer Inst 2011; 103(2):117-28.
Cancer Prevalence and Cost of Care Projections: http://costprojections.cancer.gov/
Cost estimates expressed in 2010 dollars using CMS cost adjusters and adjusted for out- of pocket expenditures, including co-payments and deductibles.
Estimates for the population younger than 65 were developed using ratios of cost in the you than 65 and older 65 populations from studies conducted in managed care populations.

→ $125 billion in **2010**

→ $175 billion in **2020**

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Drivers of Costs Associated with Cancer Care

- Excessive expenditures on treatment near end of life
- New, costly technologies are rapidly emerging-not all fully evidence-based
- Rising cost of specialty drugs
- Complex cancer care not well coordinated
- Payment system is not aligned with the goals of the healthcare system
- No pricing constraints in U.S.

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Cost of Recently Introduced Targeted Therapies for Cancer

Table 1. Cost of Targeted Therapy

Agent	Target	FDA-Approved Indication	Monthly or Per-Cycle Cost
Imatinib	BCR-ABL	CML	$6,982
Dasatinib	BCR-ABL	CML	$9,817
Nilotinib	BCR-ABL	CML	$9,163
Bosutinib	BCR-ABL	CML	$9,817
Sorafenib	VEGF, multikinase	RCC, HCC	$10,555
Sunitinib	VEGF, multikinase	RCC, GIST	$11,957
Everolimus	mTOR	RCC, breast	$8,984
Temsirolimus	mTOR	RCC	$6,355
Pazopanib	VEGF, multikinase	RCC	$7,778
Bevacizumab	VEGF	RCC, colon, lung	$11,684
Erlotinib	EGFR	Pancreatic, NSCLC	$5,756
Cetuximab	EGFR	Colon, head/neck	$24,092
Lapatinib	HER2	Breast	$5,120
Trastuzumab	HER2	Breast	$5,295
Brentuximab	CD30	Hodgkin lymphoma	$16,768*
Crizotinib	ALK1	NSCLC	$11,946
Ipilimumab	CTLA-4	Melanoma	$36,540†
Vemurafenib	BRAF	Melanoma	$12,282
Ruxolitinib	JAK2	Myelofibrosis	$8,400
Lenalidomide	IMID	Myeloma	$10,103

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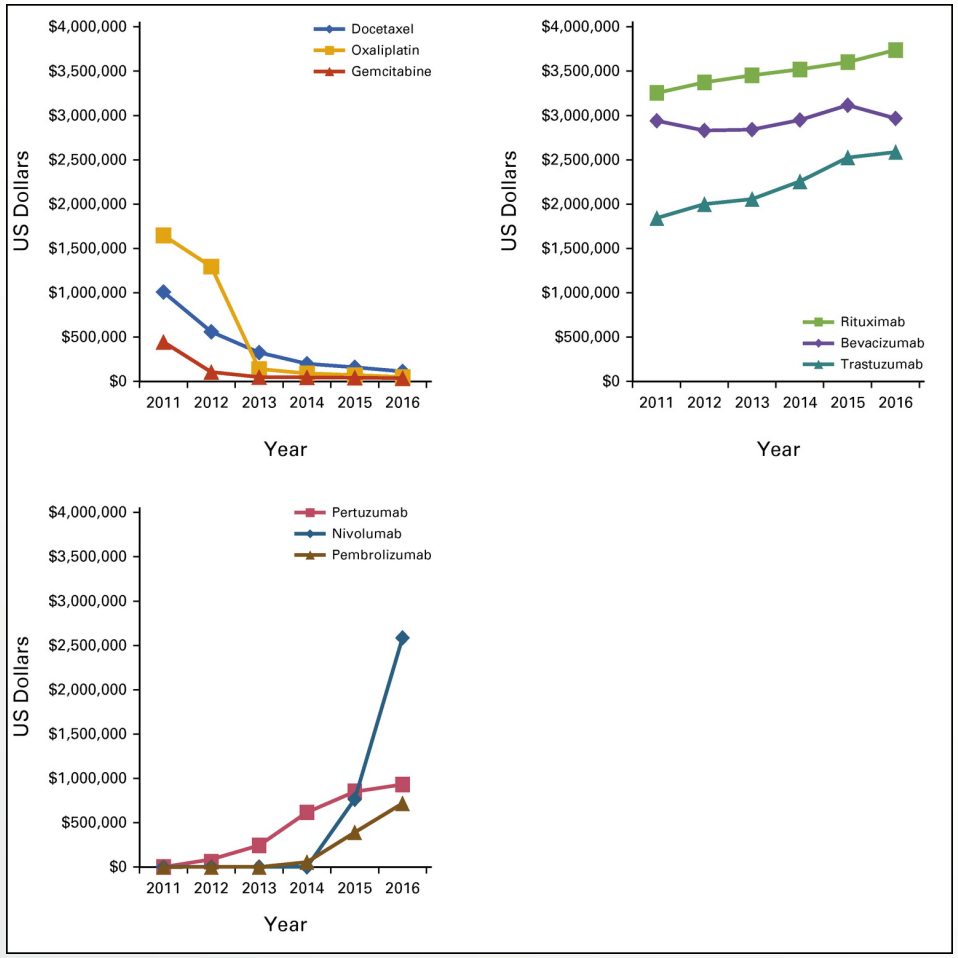
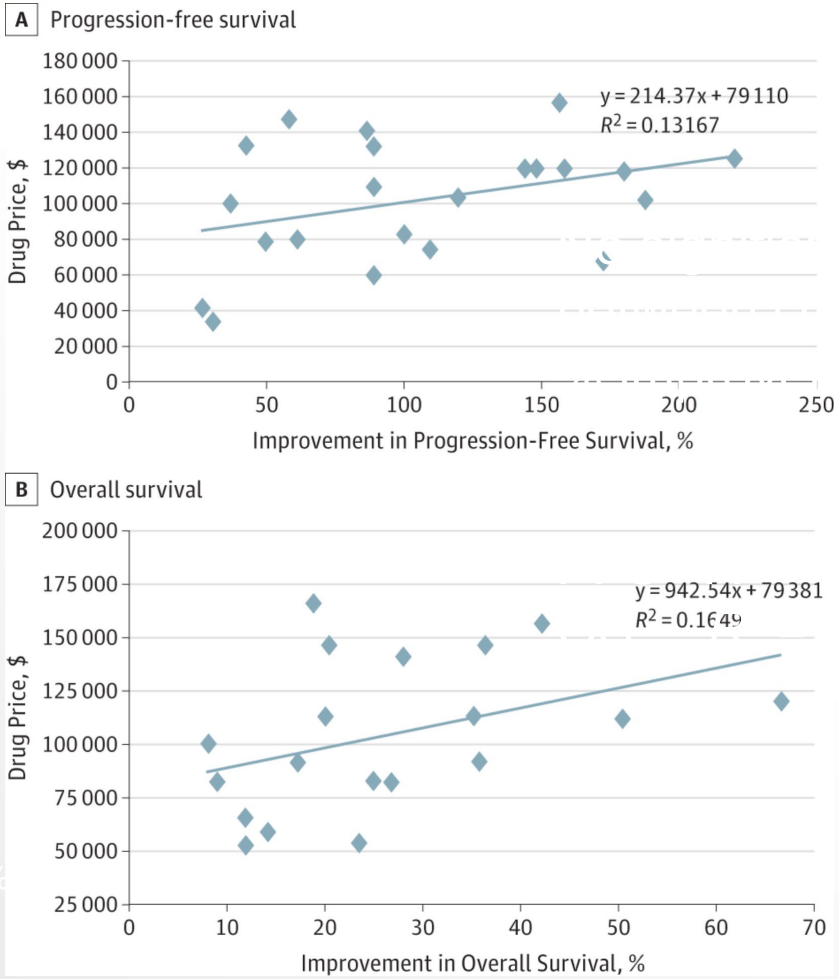
Kantarjian, H, et. al., JCO 31: 3600, 2013.

Spending (in Billions) on Traditional drugs, Older and Newer Biologics, 2011 to 2016



Published in: Samuel J. Hong; Edward C. Li; Linda M. Matusiak; Glen T. Schumock; *Journal of Oncology Practice* Ahead of Print
DOI: 10.1200/JOP.18.00069

Is Cost Related to Efficacy?



Drug Price vs %

"Our results suggest that current pricing models are not rational but simply reflect what the market will bear."

Mailankody S, Prasad V: JAMA Oncol.
Published online April 02, 2015

Is Cost Related to Innovation?

- 51 drugs approved for 63 indications in 2009-2013

  21 (41%) novel mechanisms of action
  30 (59%) next in class

  Median price per year:

Novel mechanism:	$116,100
Next in class:	$119, 765
	(p=.42)

Mailankody, Prasad: JAMA Oncol. Published online April 02, 2015. doi:10.1001/jamaoncol.2015.0373

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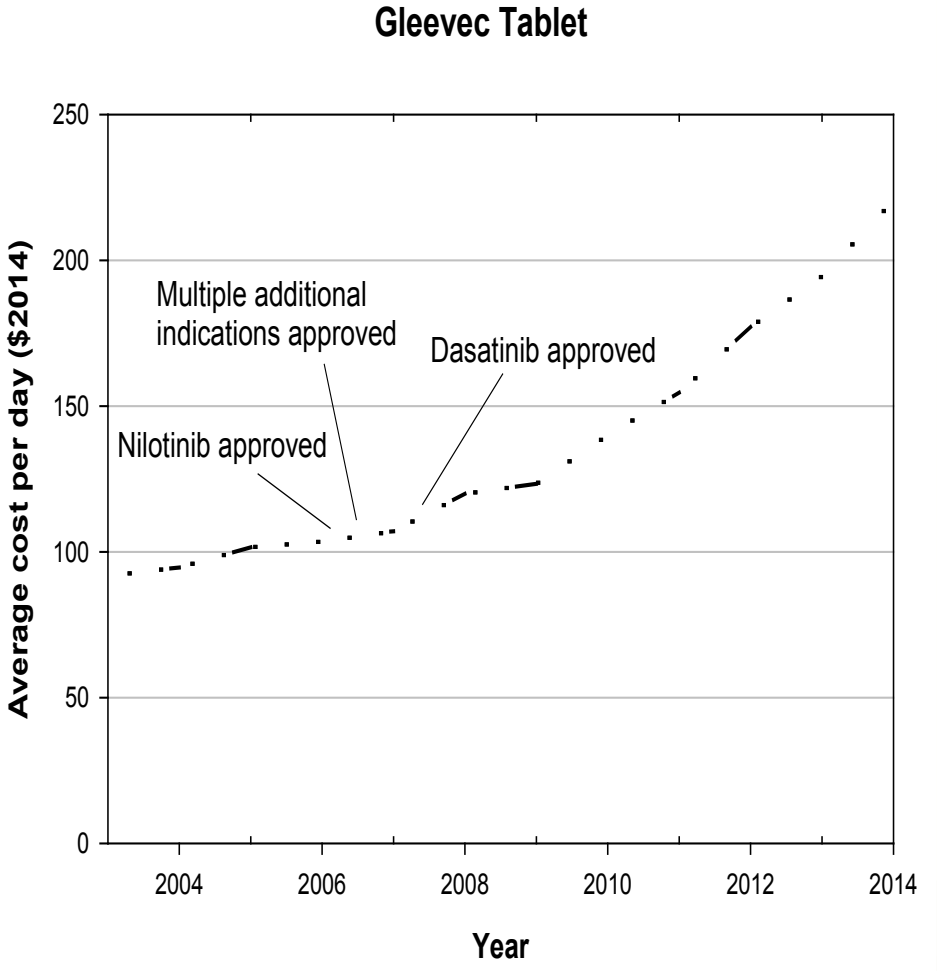
Do prices reflect development costs? Does competition bring down those prices?

Since entering the market, U.S. price has steadily risen and nearly tripled….

…… despite entry of new drugs and an expanding market with new indications



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What Can Oncologists Do to Improve the Value of Cancer Care?

- Use healthcare resources wisely
- Follow evidence-based guidelines/clinical pathways
- Optimize dosing/scheduling of cancer treatments
- Define clinically meaningful endpoints in cancer clinical trials
- Deliver the right treatment to the right person at the right time

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Choosing Wisely: ASCO's 2012 Top Five List for Oncology

Question these things before doing them:

1. Use of chemotherapy for patients with advanced cancers who are unlikely to benefit, and who would gain more from a focus on palliative care and symptom management.

2. For early breast cancer, use of advanced imaging technologies (i.e., CT, PET and radionuclide bone scans) in cancer staging.

3. For early prostate cancer, use of advanced imaging technologies (i.e., CT, PET and radionuclide bone scans) in cancer staging.

4. Routine use of advanced imaging and blood biomarker tests for women treated with curative therapy for breast cancer and who have no symptoms of recurrence.

5. Use of white cell stimulating factors for patients who are at low risk for febrile neutropenia.

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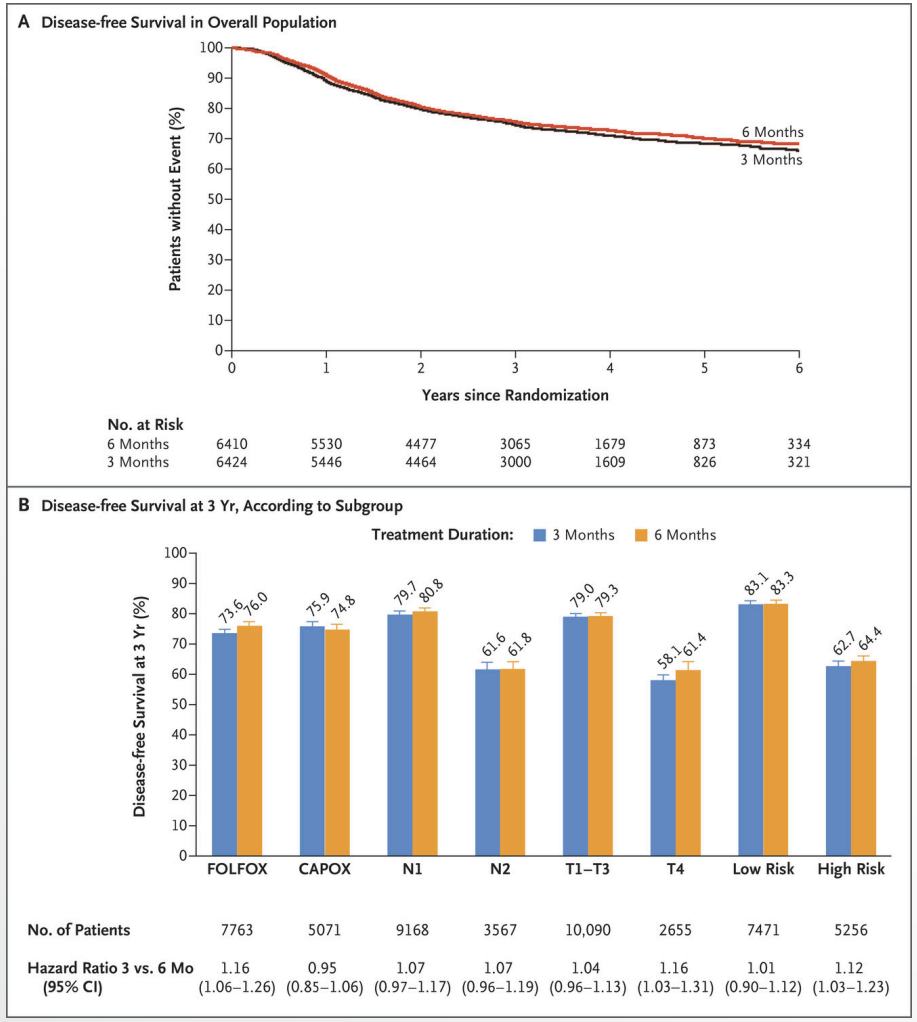
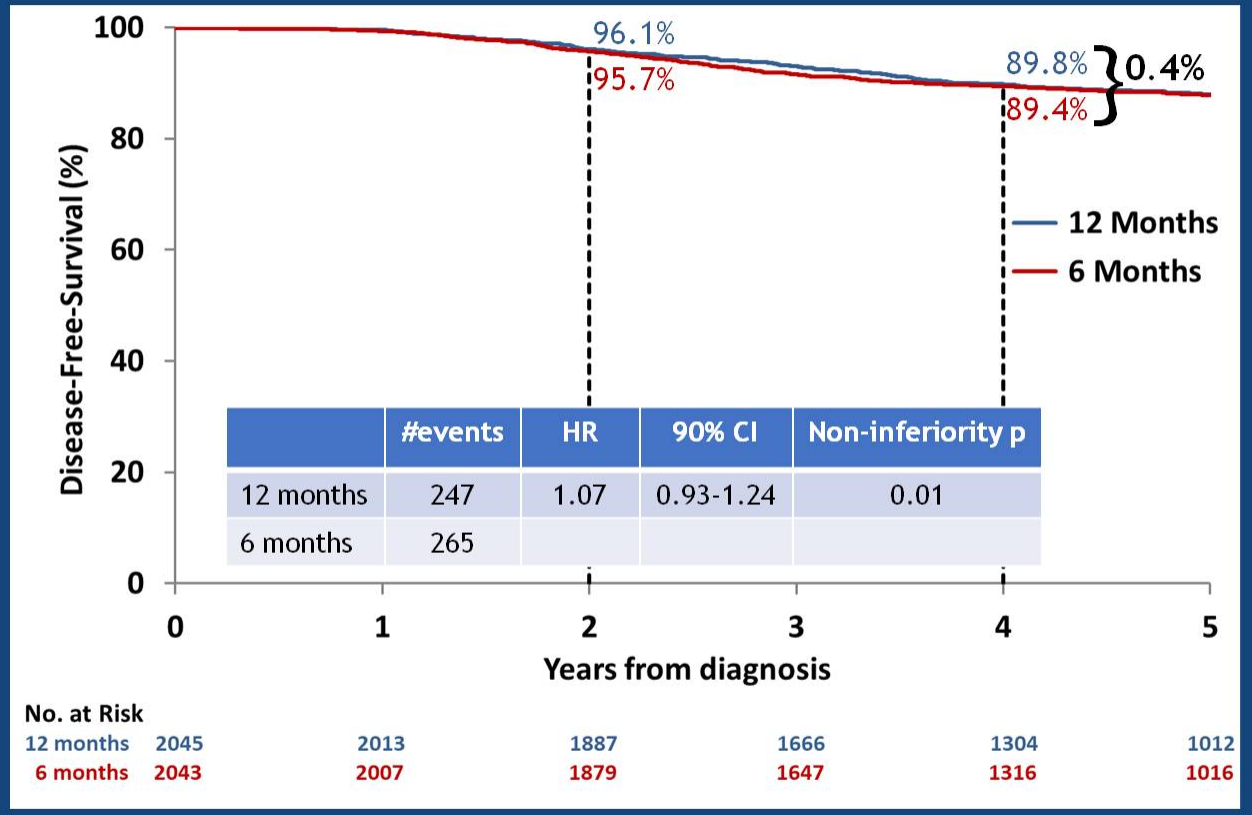
IDEA: Disease-free Survival with 3 Months versus 6 Months of Adjuvant Therapy for Stage III Colon Cancer



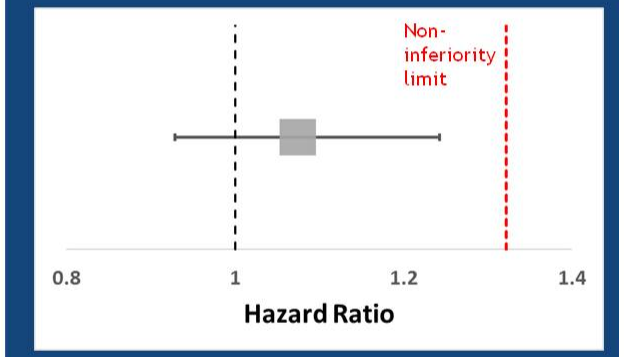
A Grothey et al. N Engl J Med 2018;378:1177-1188.

PERSEPHONE: 6 vs. 12 months Adjuvant Trastuzumab in HER2+ Breast Cancer

Disease-free survival



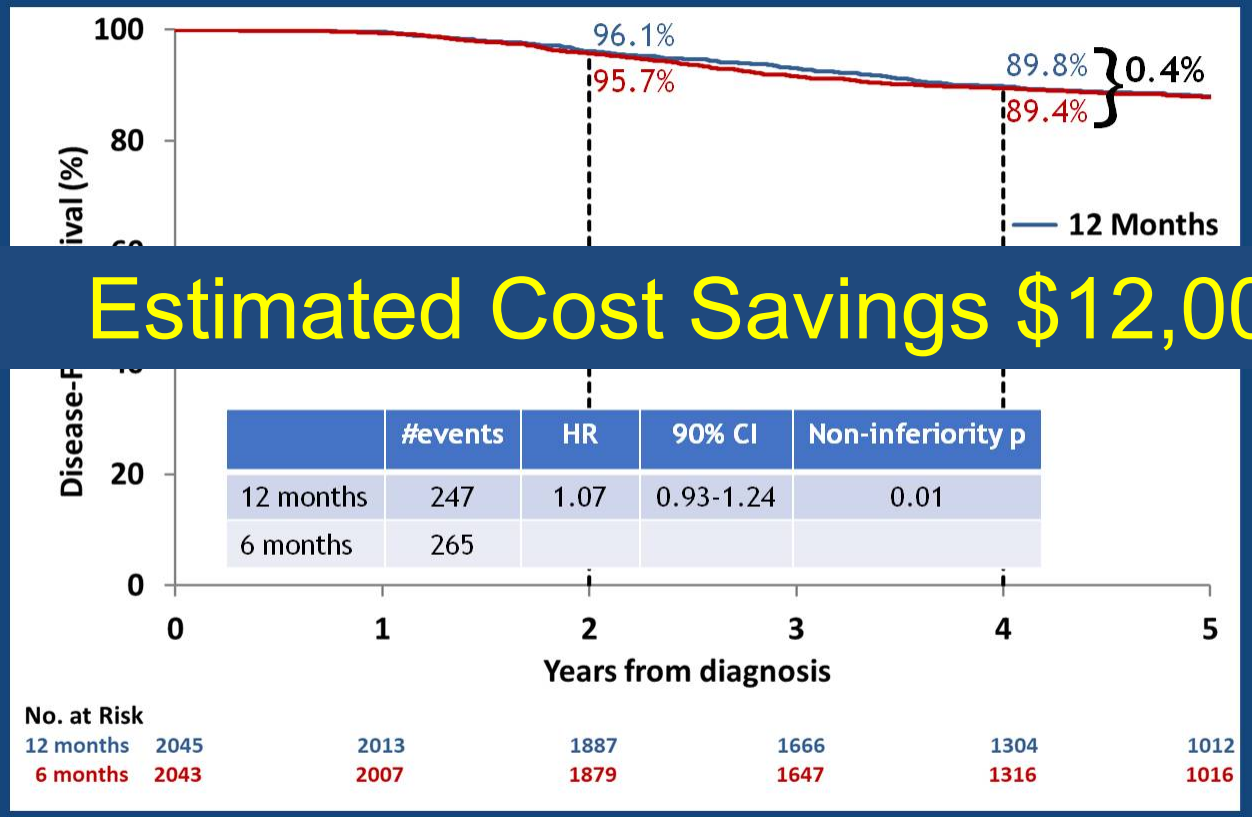
	#events	HR	90% CI	Non-inferiority p
12 months	247	1.07	0.93-1.24	0.01
6 months	265			



Presented By Helena Earl at 2018 ASCO Annual Meeting

PERSEPHONE: 6 vs. 12 months Adjuvant Trastuzumab in HER2+ Breast Cancer

Disease-free survival



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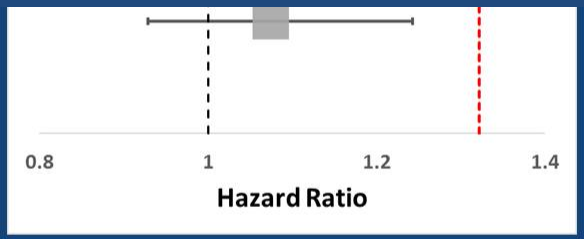
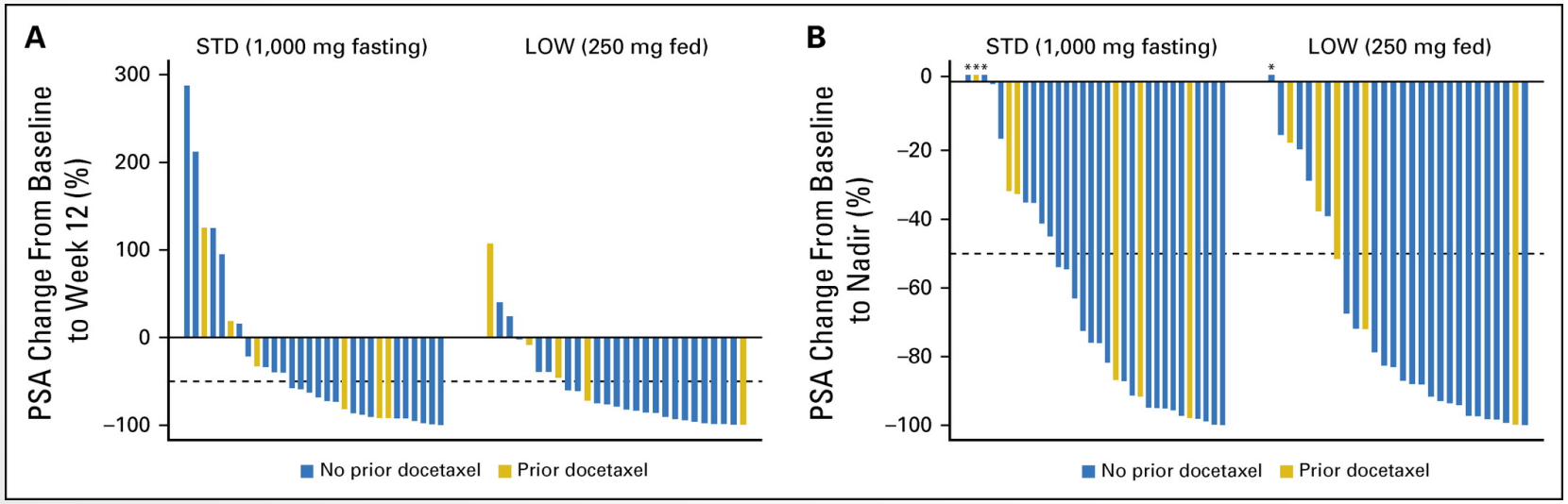


Estimated Cost Savings $12,000/individual

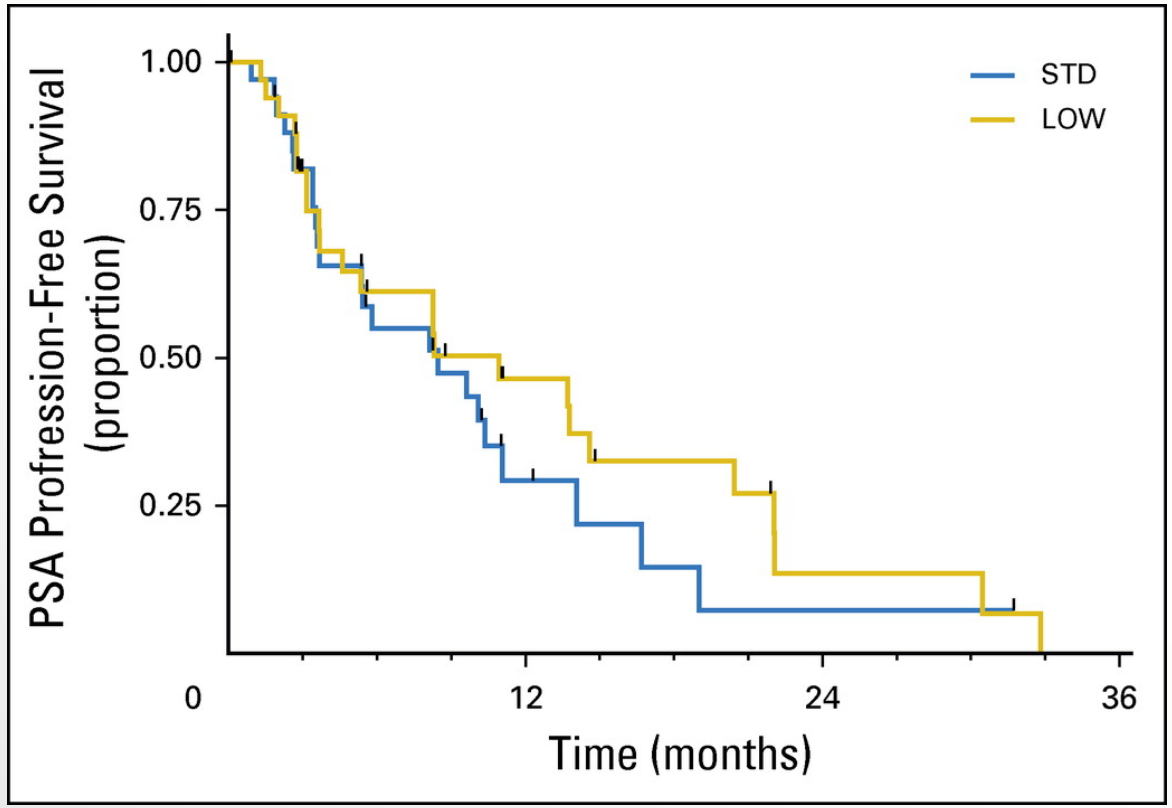
Presented By Helena Earl at 2018 ASCO Annual Meeting

Low Dose Abiraterone (250 mg) with Food vs. Standard Dose (1000 mg) Fasting



Published in: Russell Z. Szmulewitz; Cody J. Peer; Abiola Ibraheem; Elia Martinez; Mark F. Kozloff; Bradley Carthon; R. Donald Harvey; Paul Fishkin; Wei Peng Yong; Edmund Chiong; Chadi Nabhan; Theodore Karrison; William D. Figg; Walter M. Stadler; Mark J. Ratain; *Journal of Clinical Oncology* **2018,** 36, 1389-1395.
DOI: 10.1200/JCO.2017.76.4381

PSA Progression on 250 mg Abiraterone with Food or 1,000 mg Fasting



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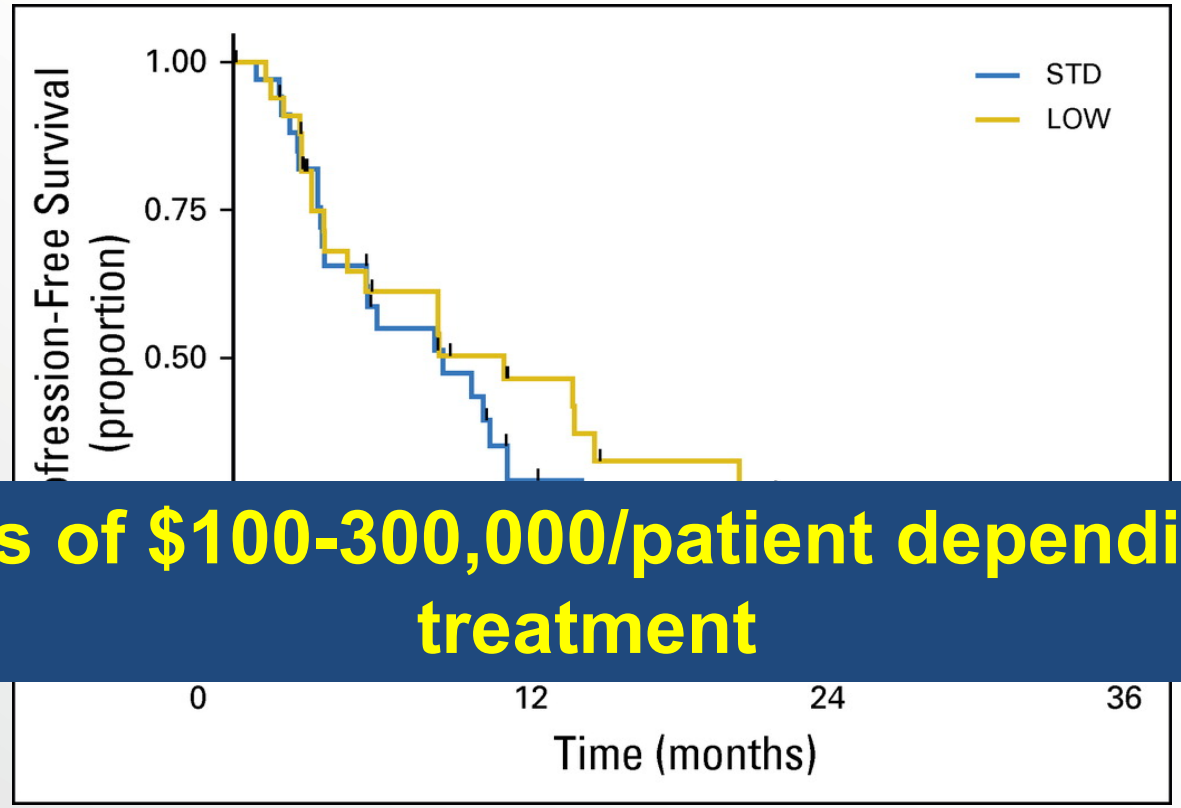

Estimated savings of $100-300,000/patient depending on duration of treatment

Published in: Russell Z. Szmulewitz; Cody J. Peer; Abiola Ibraheem; Elia Martinez; Mark F. Kozloff; Bradley Carthon; R. Donald Harvey; Paul Fishkin; Wei Peng Yong; Edmund Chiong; Chadi Nabhan; Theodore Karrison; William D. Figg; Walter M. Stadler; Mark J. Ratain; *Journal of Clinical Oncology* **2018,** 36, 1389-1395.
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JOURNAL OF CLINICAL ONCOLOGY | ASCO SPECIAL ARTICLE

American Society of Clinical Oncology Perspective: Raising the Bar for Clinical Trials by Defining Clinically Meaningful Outcomes

Lee M. Ellis, David S. Bernstein, Emile E. Voest, Jordan D. Berlin, Daniel Sargent, Patricia Cortazar, Elizabeth Garrett-Mayer, Roy S. Herbst, Rogerio C. Lilenbaum, Camelia Sima, Alan P. Venook, Mithat Gonen, Richard L. Schilsky, Neal J. Meropol, and Lowell E. Schnipper

Published Ahead of Print on March 17, 2014 as 10.1200/JCO.2013.53.8009
The latest version is at http://jco.ascopubs.org/cgi/doi/10.1200/JCO.2013.53.8009

- OS should be the primary endpoint to assess clinically meaningful outcomes
- An HR of 0.8, corresponding to an improvement in median OS of 2.5 to 6 months for the scenarios chosen, is the minimum incremental improvement over standard therapy to define a clinically meaningful improvement
- Incremental gains should be accompanied by little to no increase in toxicity
- New regimens that are substantially more toxic than current standards should also produce the greatest increments in OS

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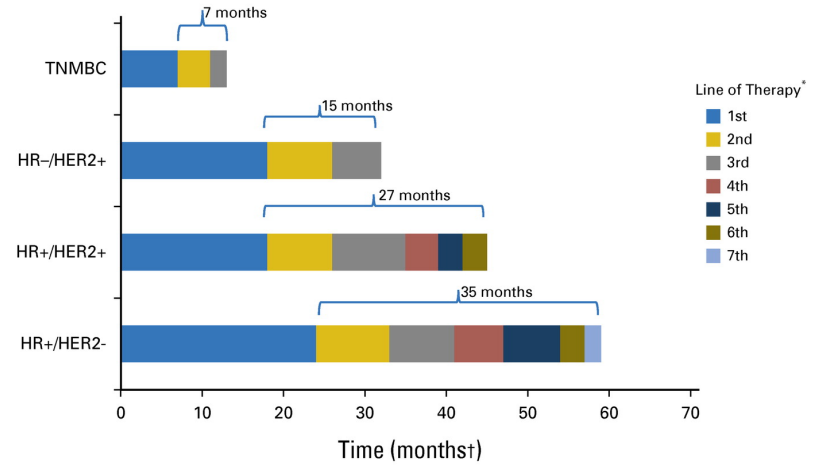
NCI Breast Cancer SG Recommendations on Meaningful Endpoints for Metastatic Breast Cancer Clinical Trials

A

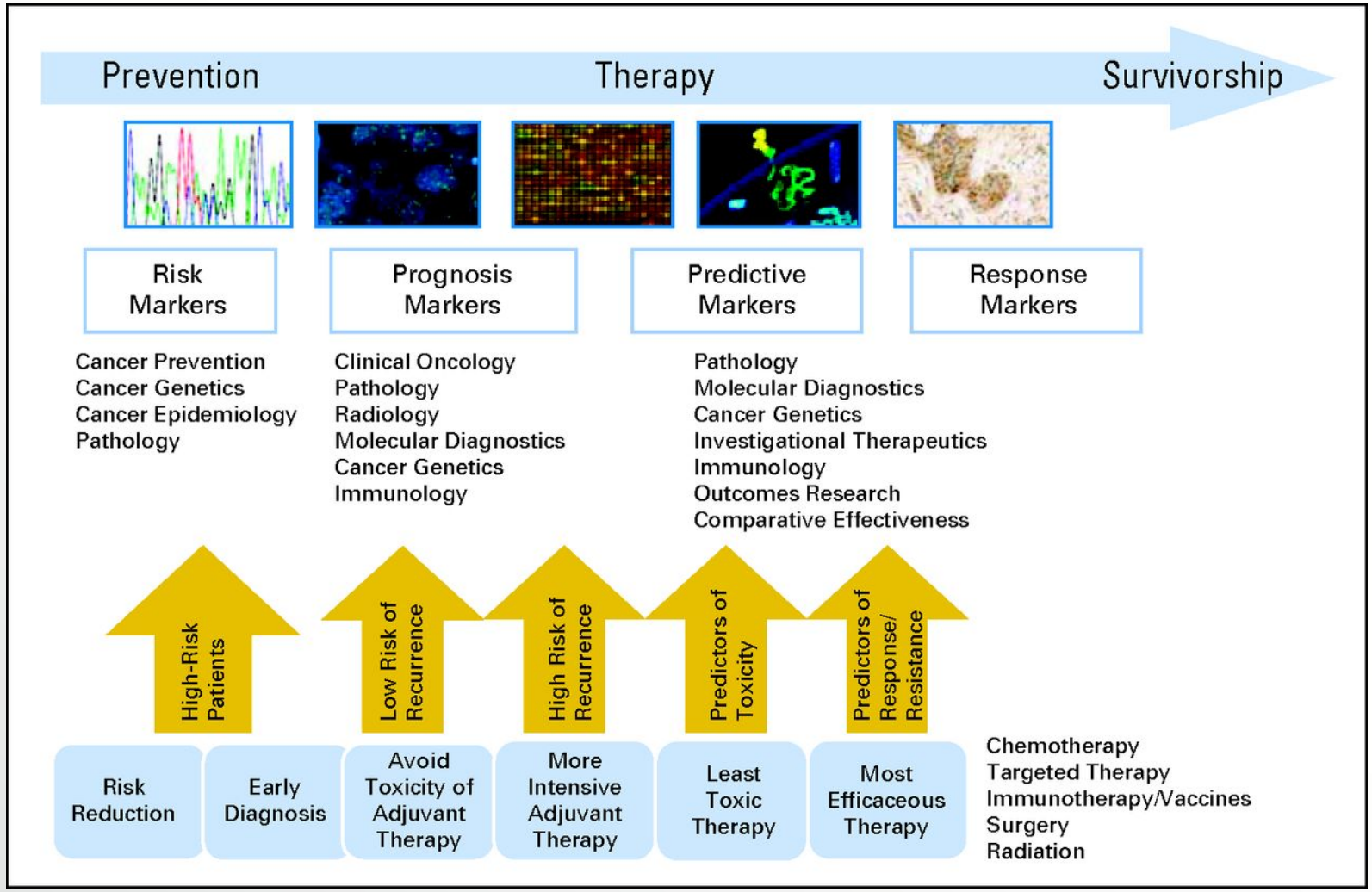
Line of Therapy	TNMBC	HR–/HER2+	HR+/HER2+	HR+/HER2–
First	1^0: OS 2^0: RR, PRO	1^0: PFS, OS 2^0: RR, PRO	1^0: PFS, OS 2^0: RR, PRO	1^0: PFS 2^0: OS, RR, PRO
Second	1^0: OS 2^0: RR, PRO	1^0: PFS, OS 2^0: RR, PRO	1^0: PFS, OS 2^0: RR, PRO	1^0: PFS 2^0: OS, RR, PRO
Third or more	1^0: OS 2^0: RR, PRO	1^0: PFS, OS 2^0: RR, PRO	1^0: PFS, OS 2^0: RR, PRO	1^0: PFS, OS 2^0: RR, PRO

B



Published in: Andrew D. Seidman; Louise Bordeleau; Louis Fehrenbacher; William E. Barlow; Jane Perlmutter; Lawrence Rubinstein; Suparna B. Wedam; Dawn L. Hershman; Jennifer Fallas Hayes; Lynn Pearson Butler; Mary Lou Smith; Meredith M. Regan; Julia A. Beaver; Laleh Amiri-Kordestani; Priya Rastogi; Jo Anne Zujewski; Larissa A. Korde; *Journal of Clinical Oncology* **2018,** 36, 3259-3268.
DOI: 10.1200/JCO.18.00242

Precision Medicine Impacts All Aspects of Cancer Care



Meric-Bernstam F et al. JCO 2013;31:1849-1857

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Creating Value with Precision Medicine

- Limit cancer screening to high risk individuals
- Omit care in those unlikely to benefit (OncotypeDx, Mammaprint in breast cancer)
- Identify patient populations most (least) likely to benefit (*EGFR, ALK, ROS1, BRAF, KRAS* testing in NSCLC; *BRAF* testing in melanoma; *HER2* testing in breast cancer; *RAS, MSI* testing in mCRC)
- Reduce risk and complications of tissue biopsy (plasma genotyping of ctDNA)
- Stop ineffective treatment early (PET, CTCs)
- Guide dosing and reduce toxicity (pharmacogenetics)

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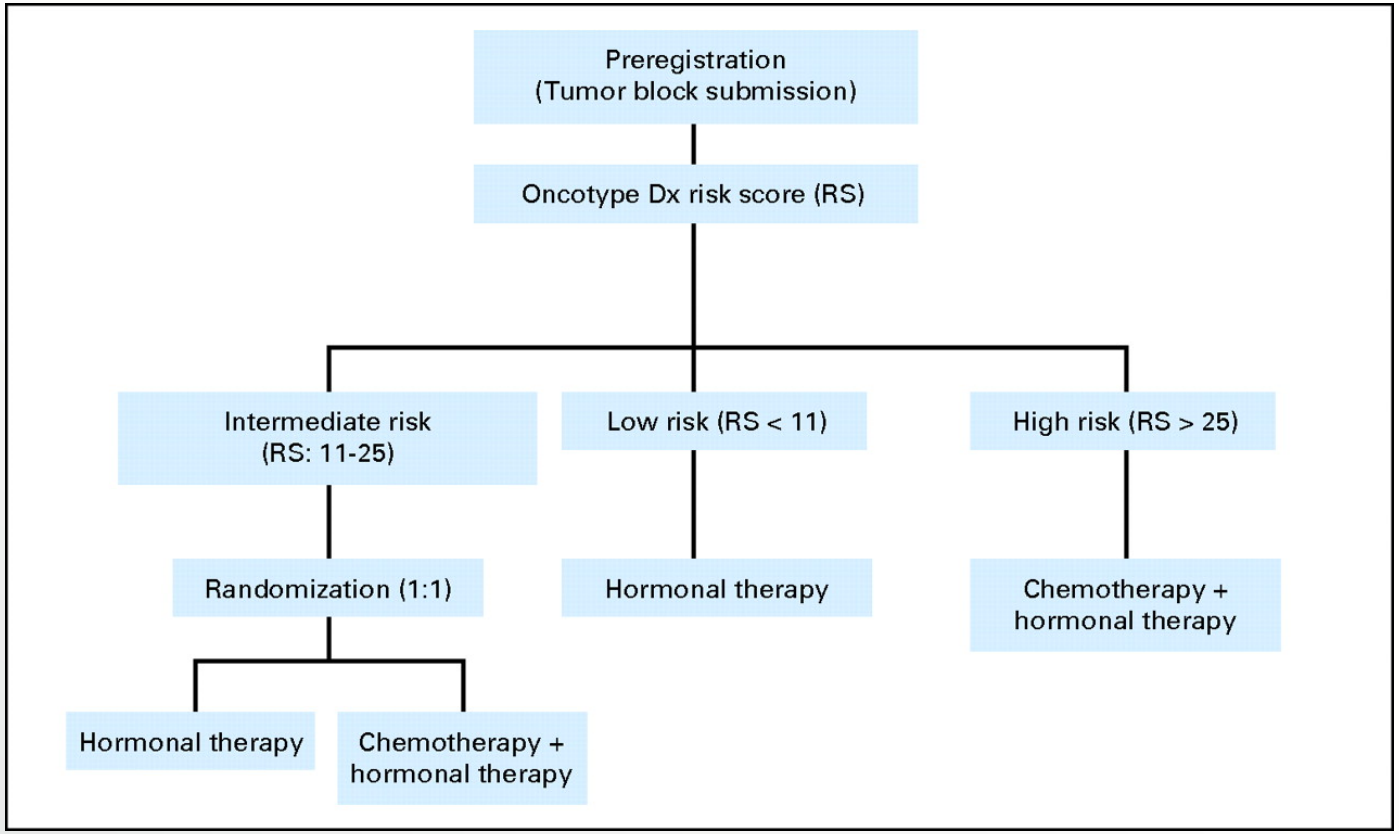
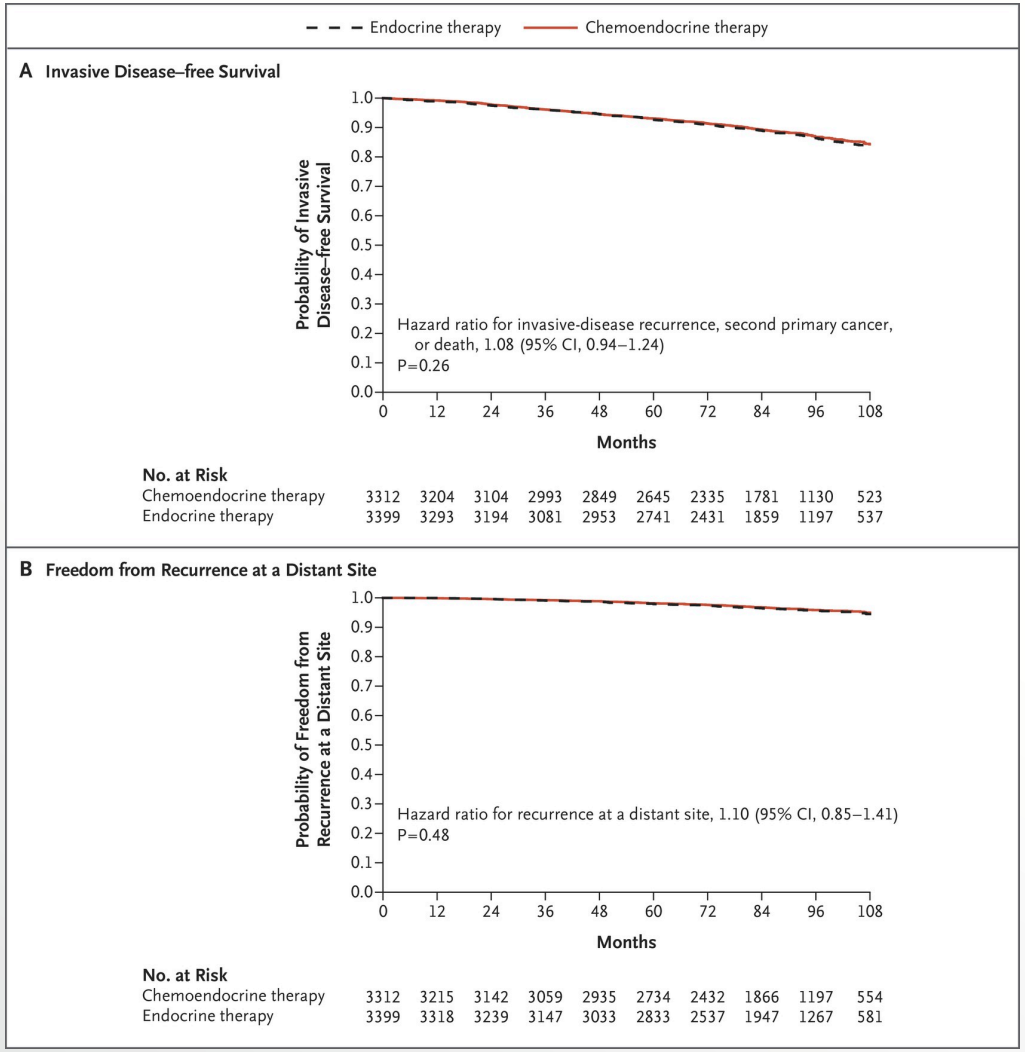
TAILORx Trial Design



Mandrekar, S. J. et al. J Clin Oncol; 27:4027-4034 2009

TAILORx: Clinical Outcomes among Patients with a Recurrence Score of 11 to 25



Sparano JA et al. N Engl J Med 2018;379:111-121

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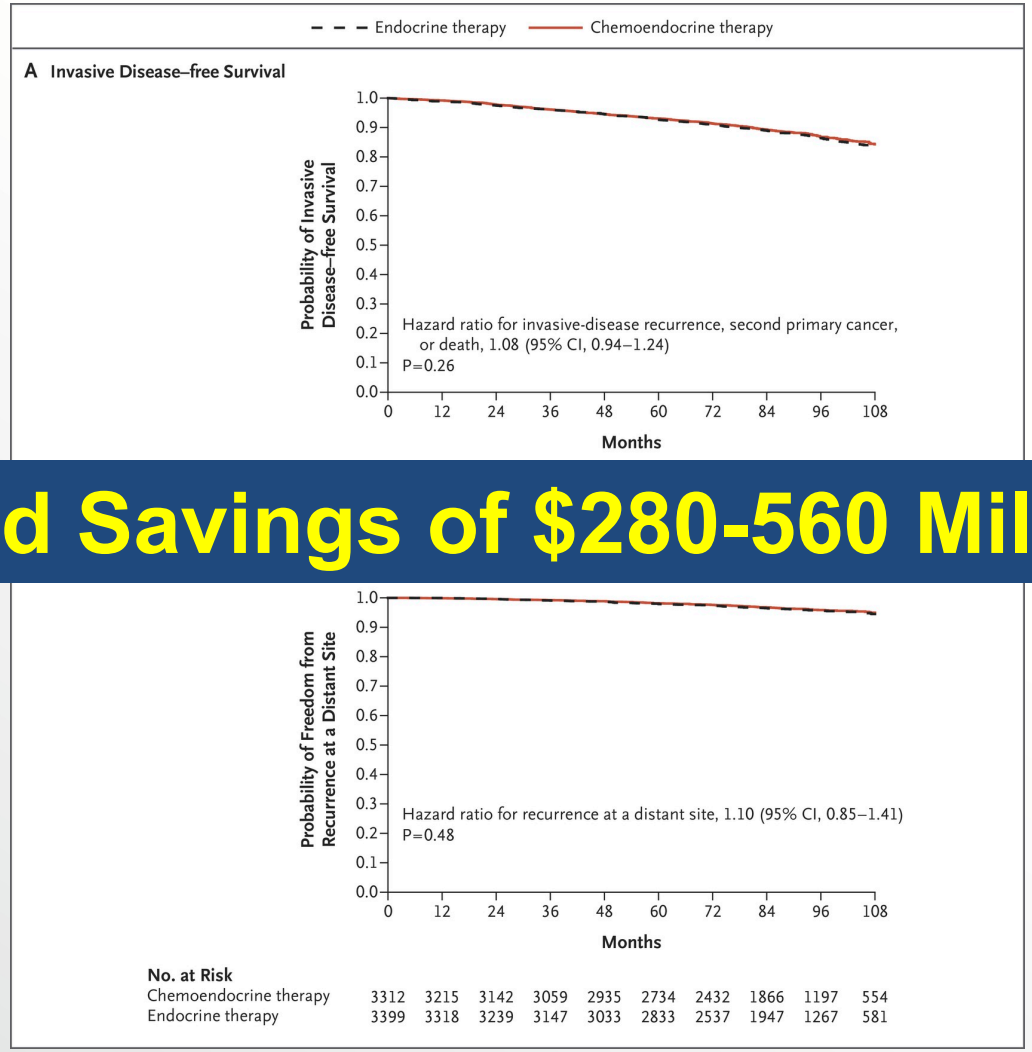

Estimated Savings of $280-560 Million/Year

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Sparano JA et al. N Engl J Med 2018;379:111-121

RAS Mutation Testing to Direct Anti-EGFR MAb Therapy

VOLUME 34 · NUMBER 2 · JANUARY 10, 2016

JOURNAL OF CLINICAL ONCOLOGY

ASCO SPECIAL ARTICLE

Extended *RAS* Gene Mutation Testing in Metastatic Colorectal Carcinoma to Predict Response to Anti–Epidermal Growth Factor Receptor Monoclonal Antibody Therapy: American Society of Clinical Oncology Provisional Clinical Opinion Update 2015

Carmen J. Allegra, R. Bryan Rumble, Stanley R. Hamilton, Pamela B. Mangu, Nancy Roach, Alexander Hantel, and Richard L. Schilsky

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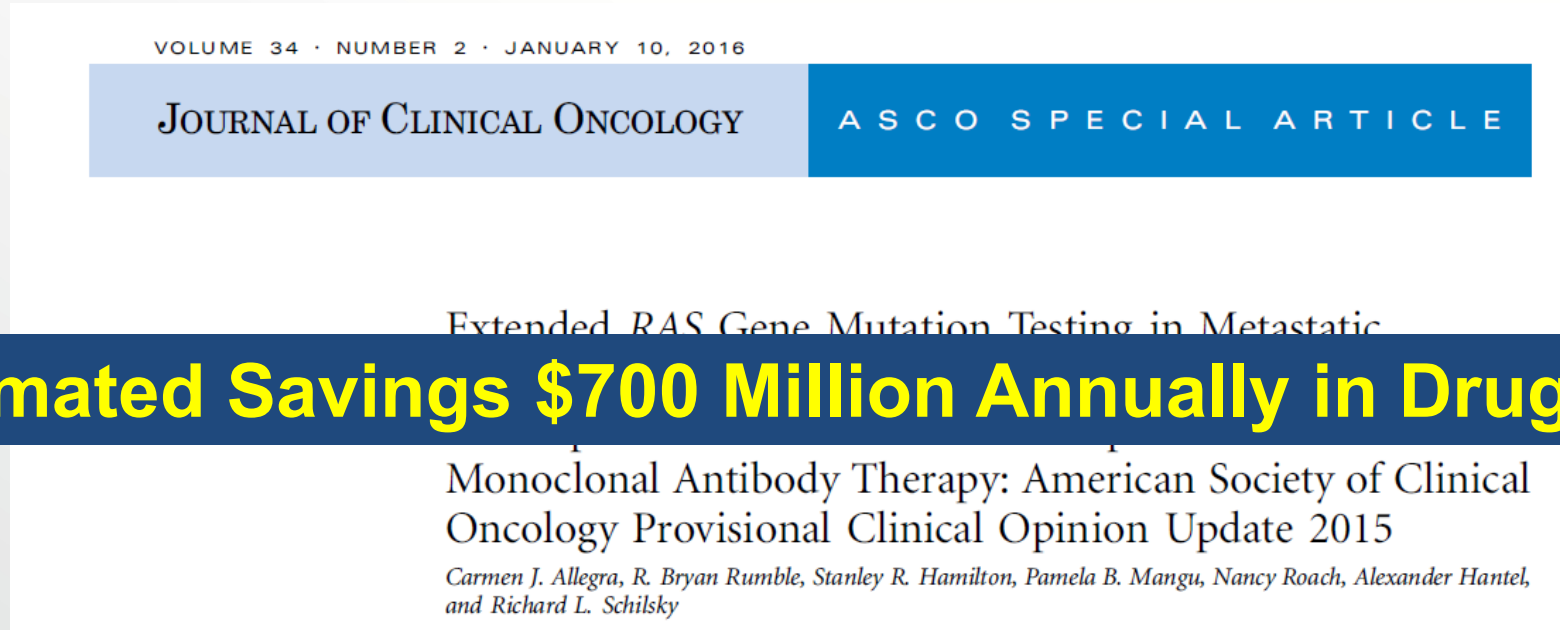

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Estimated Savings $700 Million Annually in Drug Costs

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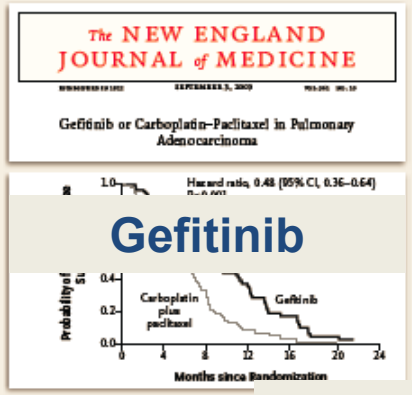
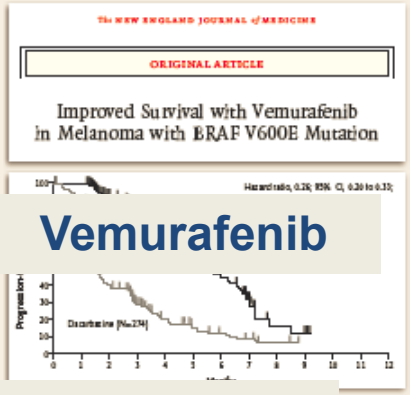
Targeted Therapy Superior to Chemotherapy



Gefitinib

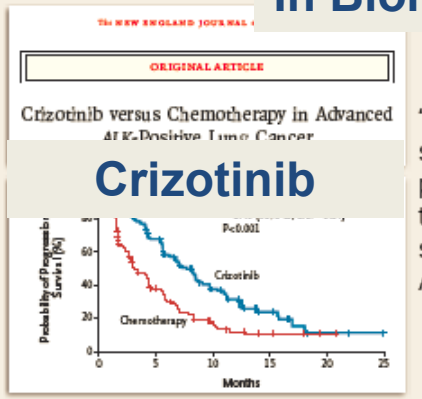
"The presence in the tumor of a mutation of the EGFR gene is a strong predictor of a better outcome with gefitinib."



Vemurafenib

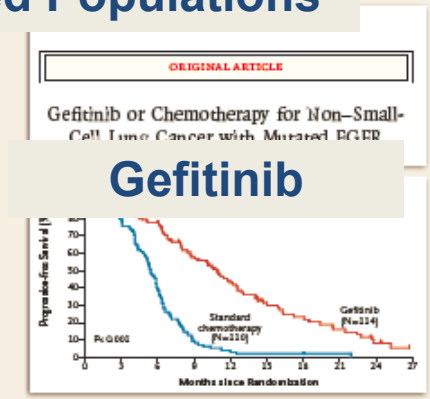
"Vemurafenib produced improved rates of overall and progression-free survival in patients with previously untreated melanoma with the BRAF V600E mutation."

In Biomarker Selected Populations



Crizotinib

"Crizotinib is superior to standard chemotherapy in patients with previously treated, advanced non–small-cell lung cancer with ALK rearrangement."



Gefitinib

"First-line gefitinib for patients with advanced non–small-cell lung cancer who were selected on the basis of EGFR mutations improved progression-free survival, with acceptable toxicity, as compared with standard chemotherapy."

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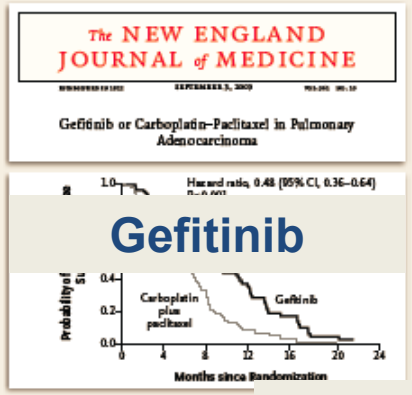
Targeted Therapy Superior to Chemotherapy



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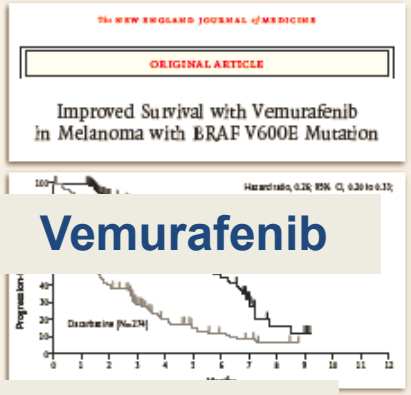

Vemurafenib

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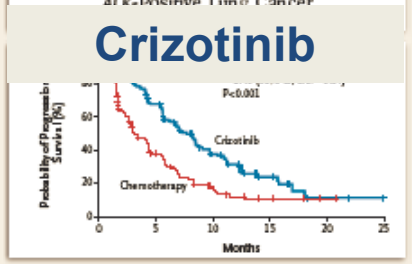
In Biomarker Selected Populations

Drugs More Expensive but Benefit Greater and Toxicity Less



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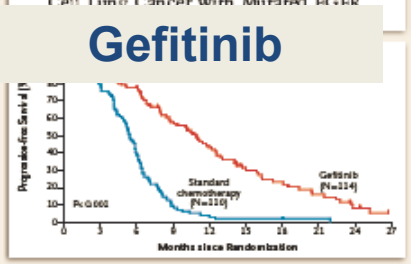

Gefitinib

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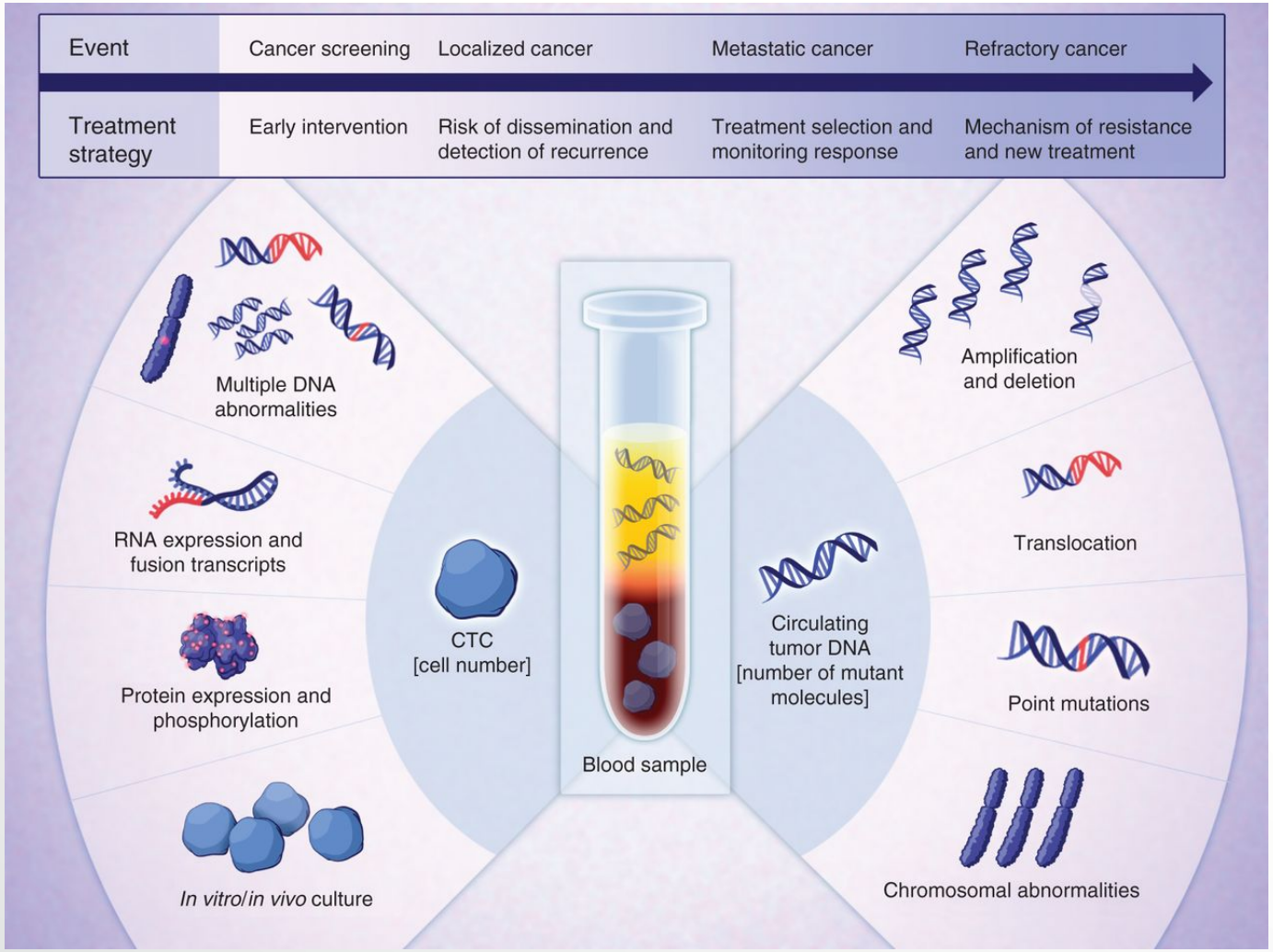
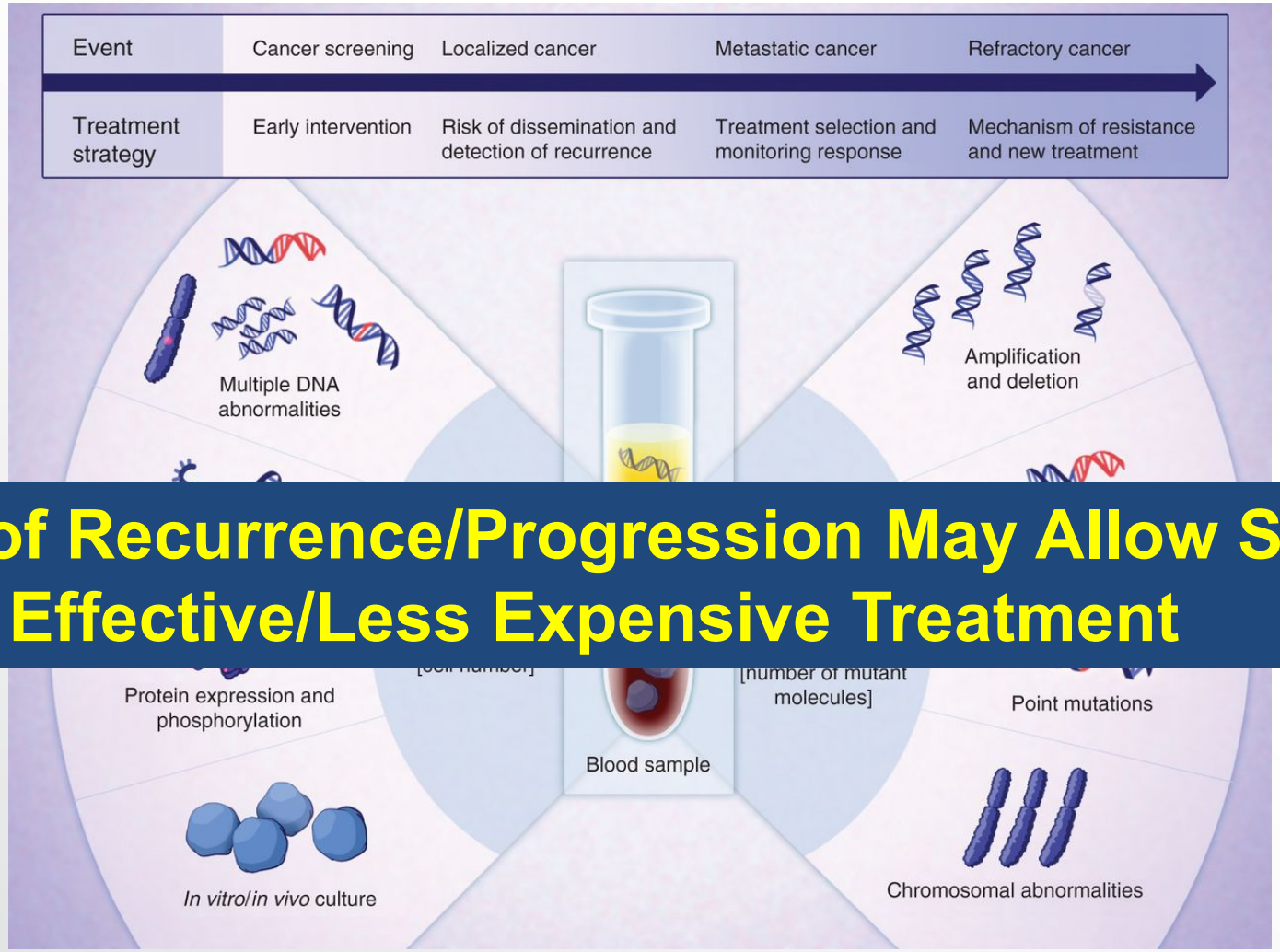
Clinical Applications of CTC and ctDNA Analyses in Cancer Care



Haber D A , and Velculescu V E Cancer Discovery 2014;4:650-661

Clinical Applications of CTC and ctDNA Analyses in Cancer Care



Early Detection of Recurrence/Progression May Allow Switch to More Effective/Less Expensive Treatment

Haber D A , and Velculescu V E Cancer Discovery 2014;4:650-661

Bending the Cost Curve

- Patient-centered discussion of options
- Improved efficiency in care delivery
- Better care coordination
- Physician payment reform
- Price negotiation by payers/health systems
- Value-based reimbursement
- Indication-specific pricing
- Earlier introduction of generics and biosimilars

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Summary

- Cancer drug costs are the most rapidly rising component of cancer care
- Controlling the costs of cancer care will require concerted efforts by patients, doctors, manufacturers, payers, governments
- We need innovation that creates value for patients and health systems
- Oncologists have a key role to play by:
- practicing evidence-based medicine
- using resources wisely
- adopting precision medicine approaches
- supporting research that delivers meaningful clinical outcomes

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