

Epidemiological Trends (2010-2021) and Advanced Drug Therapies for HER2-Positive Breast Cancer in the Current US Market

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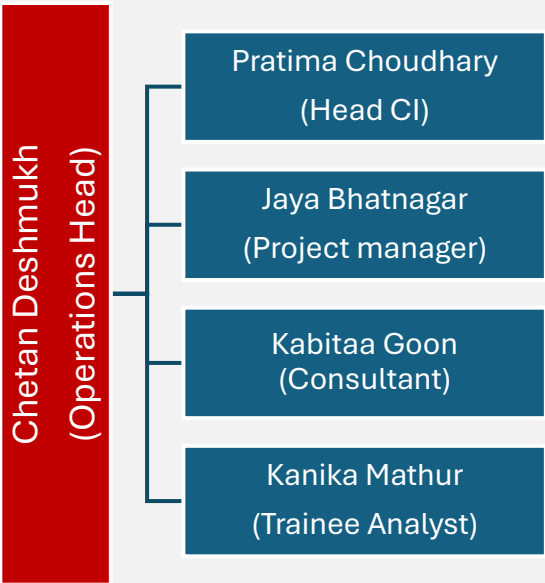
6.5K
projects Till date

>600
employees globally

Analytics : Competitive Intelligence

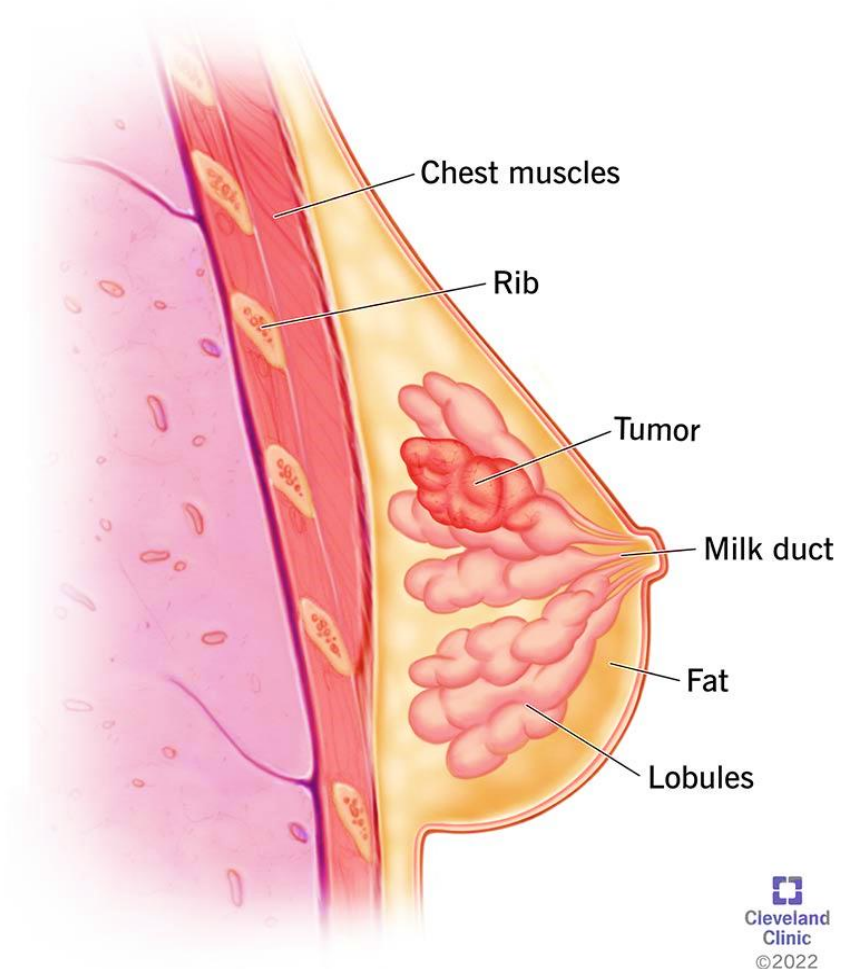
Our proactive approach and evidence-based intelligence will ensure that our clients are always ahead of the competition. Based on the intensive experience in this field, we have built robust processes and validation checks. This enables us to harness the power of vast resources of information to generate tactical and strategic insights for the client. We have the right team of people who are constantly engaged for all of our client’s CI needs across the product life cycle.

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Breast Cancer: A worldwide challenge

Breast cancer



A malignant tumor that starts in the breast's cells is called breast cancer. It happens when these cells start to grow out of control and form a lump or mass. Through the bloodstream and lymphatic system, it can spread to other areas of the body.

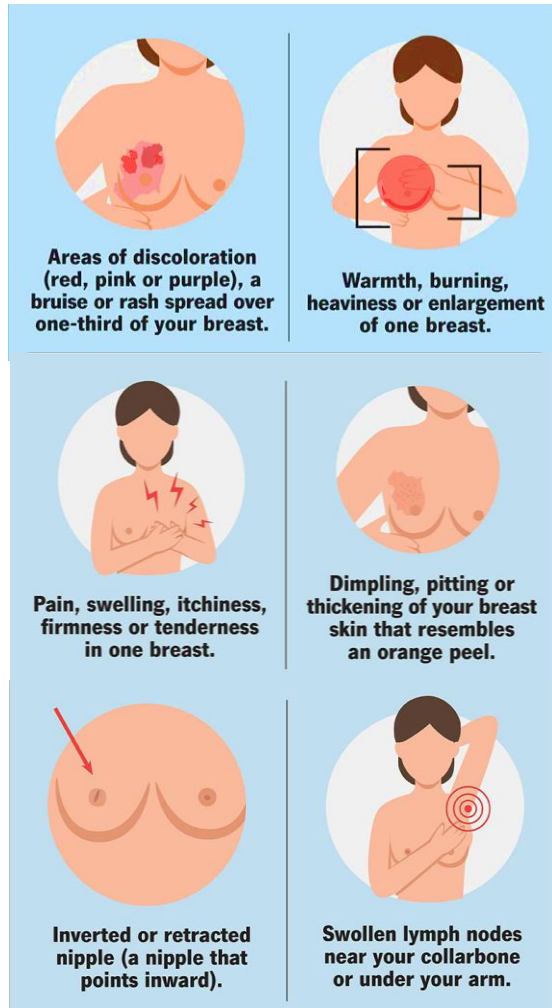
About one-fourth of all new cancer cases in women are breast cancer cases, making it the most common cancer among women globally.

Furthermore, it ranks second among women for cancer-related deaths, after lung cancer. Although rare, breast cancer can also strike men, although it primarily affects women.

The World Health Organization estimates that the cells lining the ducts account for about 85% of breast cancer cases, while the cells lining the lobules account for 15%.

Breast cancer is often asymptomatic and limited to the lobule or duct at stage 0 when the disease first appears. Afterwards, adjacent breast tissue, lymph nodes, and other organs may be affected by breast cancer.

Disease Overview



Types of Breast cancer

- Ductal carcinoma in situ
- Invasive Ductal Carcinoma: Invasive
- Lobular Carcinoma
- Hormone Receptor-Positive
- **HER2-Positive**
- Triple-Negative Breast Cancer

The most common tests used for its screening are:

- Screening Mammogram:
- Clinical Breast Exam (CBE):

Recommended Screening Schedule

- Average Risk Women: Must have mammogram once in a year after 40.
- High Risk Women: Have a mammogram and breast MRI every year, typically starting at age 30.

Who are at risk?



Females



Age



Obesity



Family History

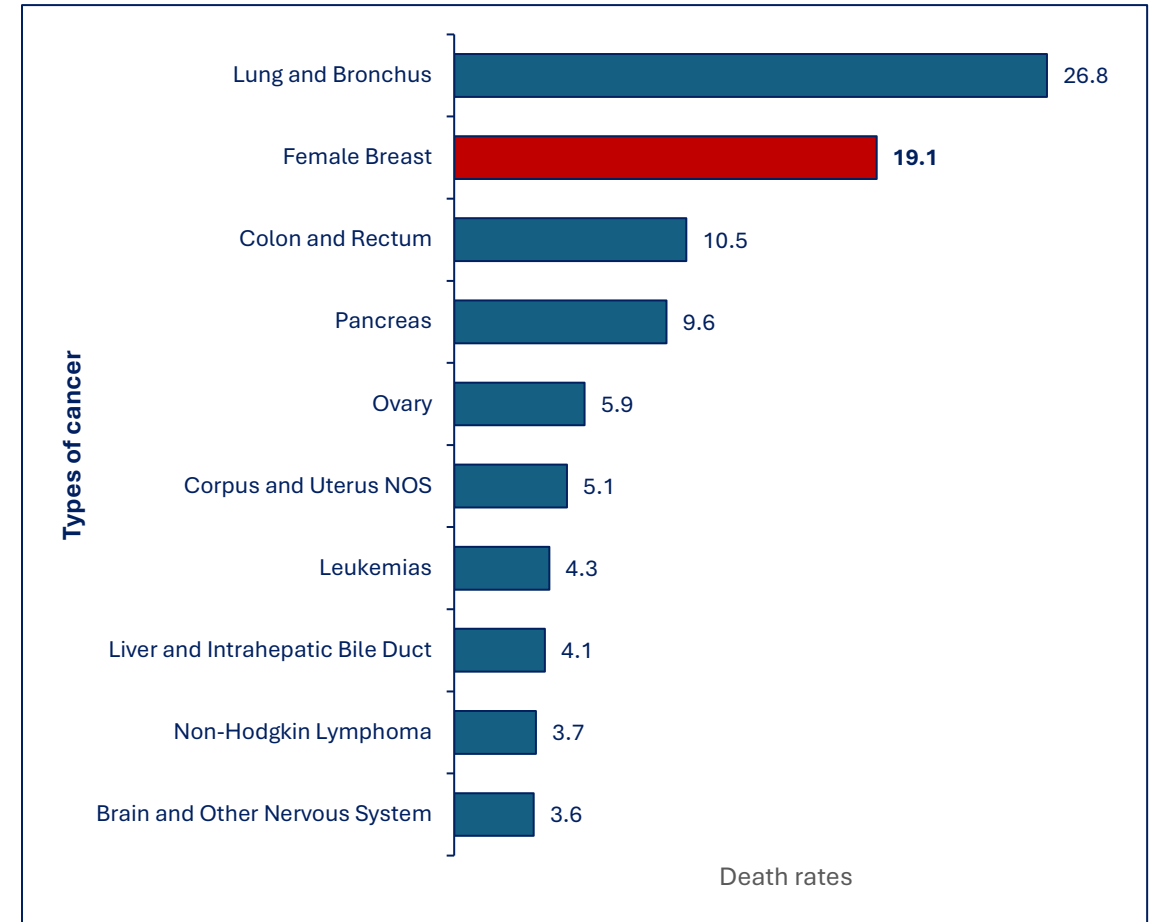
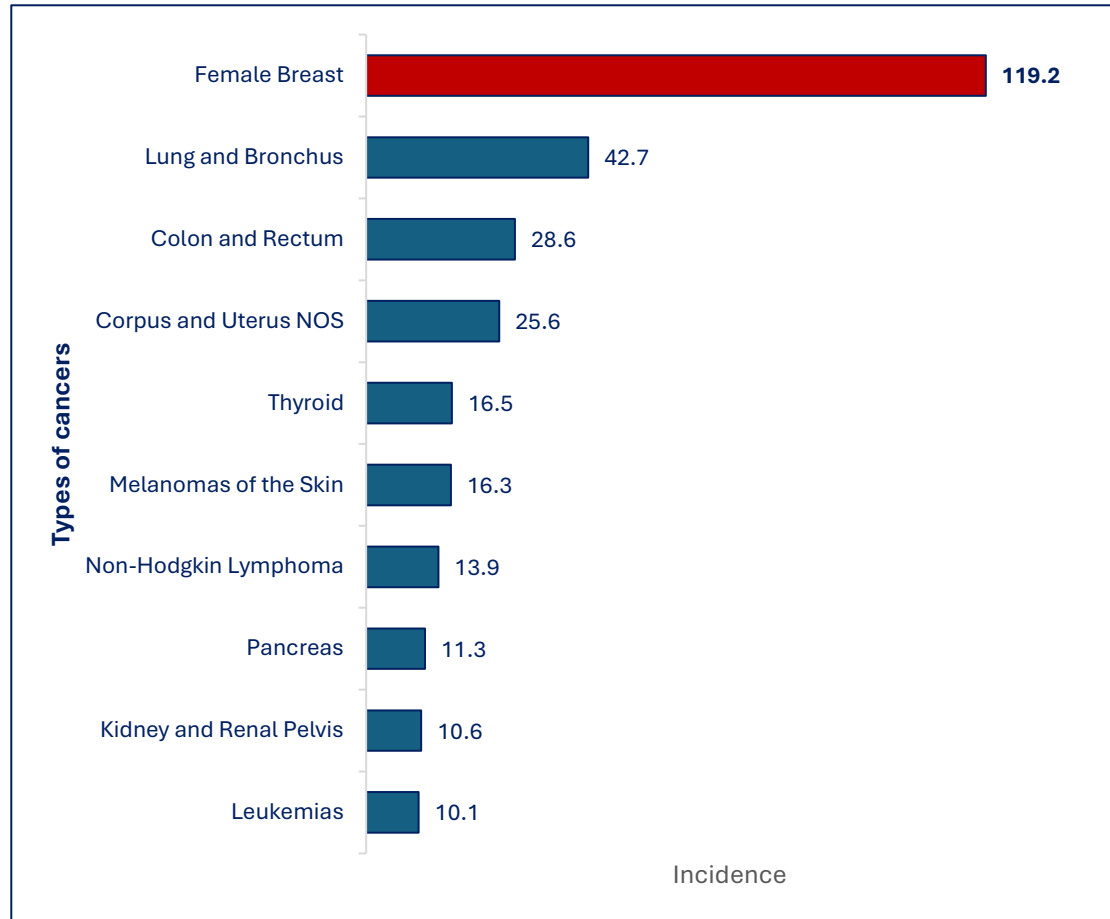


Genetic mutation



Alcohol Consumption

Breast cancer scenario in USA

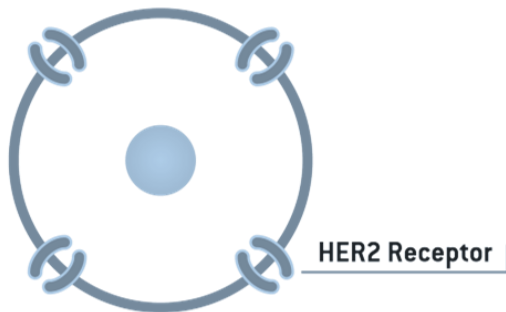


HER2 Positive Breast cancer

Pathophysiology

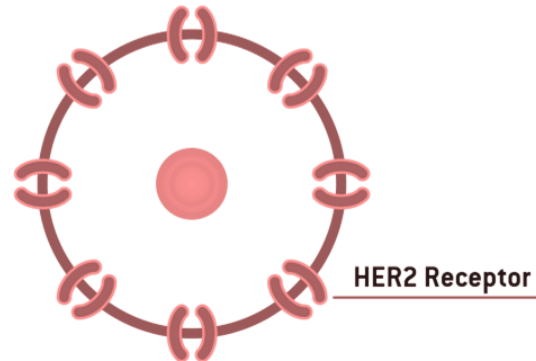
The human epidermal growth factor receptor 2 (HER2) is found in higher amounts in about 20-30% of breast cancers. HER2 is one of four related proteins (along with HER1, HER3, and HER4) that help cells grow. Normally, HER2 helps with regular cell signaling, but when there is too much of it, cells can grow out of control, which is a sign of cancer. Unlike the other HER proteins. This activation leads to a chain of signals that makes cells grow, move, spread, and survive

NORMAL CELL



Normal amount of HER2
Cells grow and divide normally

HER2+ CANCER CELL



Too much HER2
Cells grow and divide faster

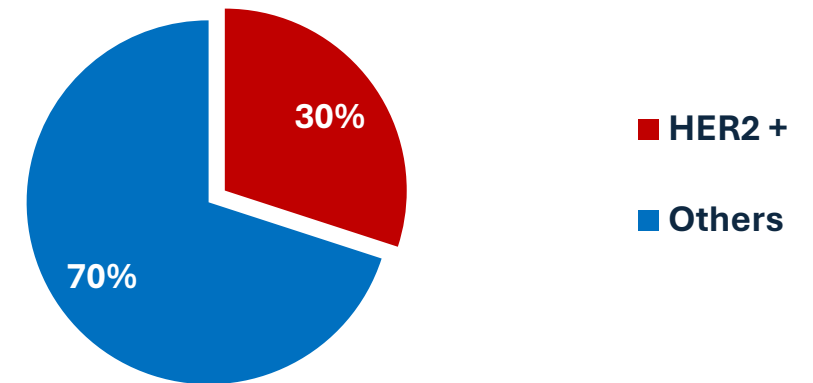
Diagnosis

- Immunohistochemistry (IHC):
- Fluorescence In Situ Hybridization (FISH):
- Inform Dual ISH

Testing Strategy

The American Society of Clinical Oncology (ASCO) recommends a testing strategy that involves IHC as the initial test, followed by FISH confirmation for scores of 2+ or 3+. This strategy ensures accurate determination of HER2 status and reduces the risk of false-positive results.

HER2 prevalence in USA



Review of Literature

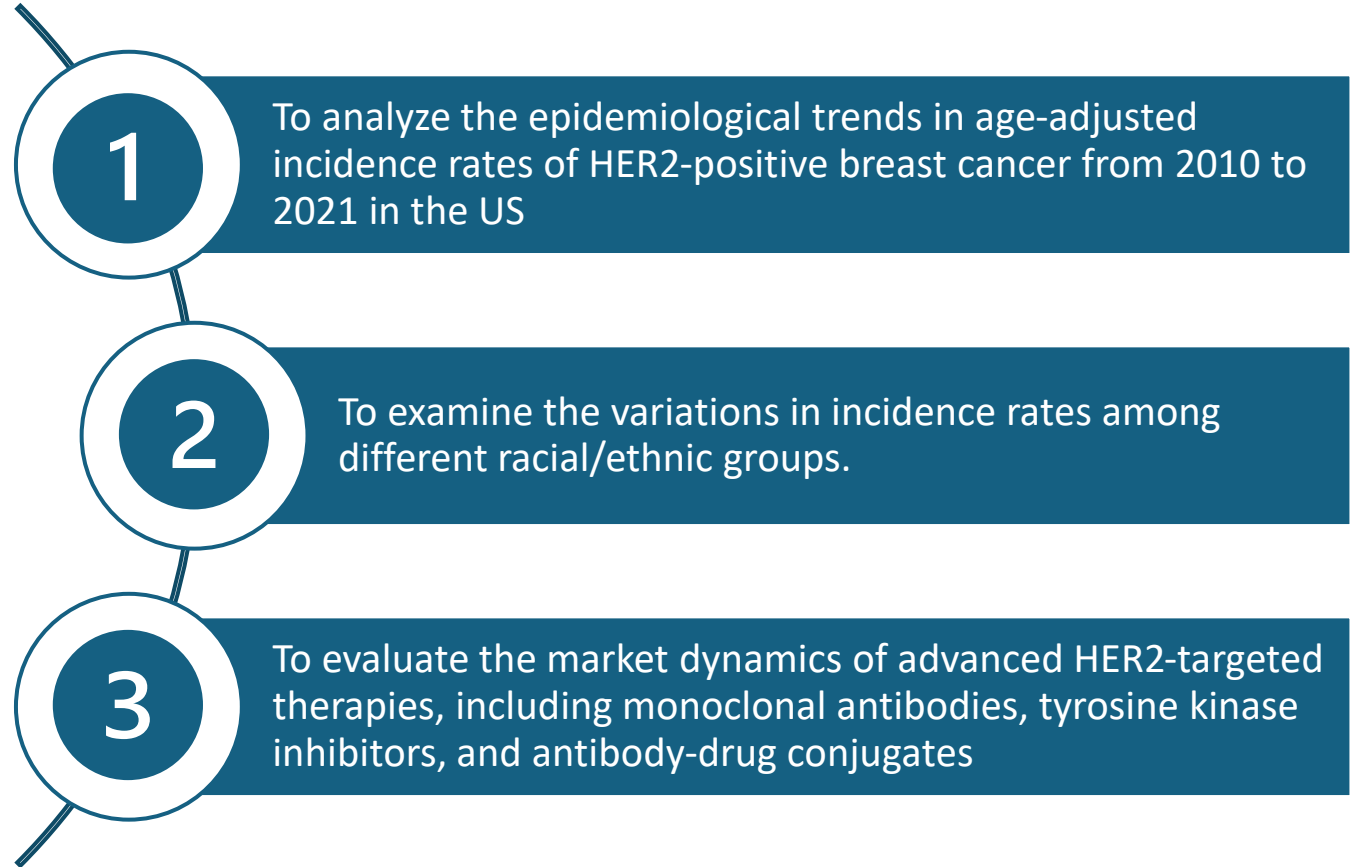
S.no	Year	Title of the paper	Author	Description
1		Breast Cancer in the United States: A Cross-Sectional Overview	Emily C. and Nadeem Bilani rearrangement. Zabor Elizabeth B. Laura Elson. Elimimian along with Zeina Nahle.	As the most common cancer in women to admit a opinion bone cancer varies greatly in terms of pathology clinical features and prognostic. In this study data from 2671549 cases with bone cancer who were diagnosed between 2004 and 2016 were examined retrospectively using the National Cancer Database. Results of the analysis showed that 75 of non-Hispanic White cases had a median age of 61 times at opinion. Ductal melanoma reckoned for 73 of the most common histology. Among the molecular subtypes were HR/ HER2-(58) HR/ HER2(26) HR-/ HER2-(10) and HR-/ HER2(6 point 4 percent). By subtype race and installation type overall survival(zilch's) varied significantly 83 percent of HR/ HER2 and 77 percent of HR-/ HER2 had an zilch's during a 5- time period. The rate of survival was smallest in community cancer programs and loftiest in academic centers. This study highlights the significance of taking race treatment installation and molecular and histologic subtypes into account in any unborn exploration on difference in cancer.
2	2022	Breast Cancer Statistics, 2022	Maria N. Giaquinto, Hyuna Sung, Kimberly D. Miller, Joan L. Kramer, Lisa A. Minihan, Ahmed in Jemal, Rebecca L. Newman, MD, MPH, Seigel.	Even so there was minimal increase (0.5%) in the incidence of breast cancer per year between 2010 and 2019 primarily due to cases that were localized-stage and HR-positive the mortality rate of the disease has been declining since 1989 declining by 43 percent by 2020 or 460000 fewer deaths. Black women have mortality rates that are 40% higher than White women especially for those under 50 despite having lower incidence rates. A better understanding of screening and treatment options is necessary to address the persistent racial disparities that black women experience as evidenced by their lower 5-year relative survival rates across all disease stages and molecular subtypes.
3	2021	Breast Cancer—Epidemiology, Risk Factors, Classification, Prognostic Markers, and Current Treatment Strategies— An Updated Review	Sergiusz Łukasiewicz, Marcin Czeczulewski, Alicja Form, Jacek Baj, Robert Sitarz, Andrzej Stanisławek.	The review article offers a comprehensive analysis of breast cancer, particularly focusing on HER2-positive breast cancer. It likely includes statistics on the prevalence of HER2-positive tumors among breast cancer cases, which typically range from 15% to 20% of all breast cancer diagnoses. The paper would delve into the prognostic significance of HER2 amplification or overexpression, indicating a more aggressive disease course if left untreated. In terms of treatment, the review would discuss the efficacy of HER2-targeted therapies such as trastuzumab, which has shown to improve overall survival in HER2-positive breast cancer patients by approximately 30% when used in combination with chemotherapy. The introduction of Pertuzumab has further enhanced treatment outcomes, leading to reduced recurrence rates. Additionally, the review highlights ongoing research in the field, including the development of novel HER2-targeted agents and the exploration of biomarkers to identify patients who would benefit most from these therapies.

S.no	Year	Title of the paper	Author	Description
4	2019	HER2-positive breast cancer: new therapeutic frontiers and overcoming resistance	Sonia Pernas and Sara M.Tolaney	Both early-stage and advanced HER2-positive breast cancer patient survival rates have significantly improved since the introduction of anti-HER2 therapies. Even with these improvements the majority of HER2-positive metastatic patients eventually become resistant to these treatments. The main goals of research are to comprehend the mechanisms underlying this resistance as well as the functions of the microenvironment and tumor heterogeneity. The creation of sophisticated anti-HER2 treatments such as antibody-drug conjugates (ADCs) fresh anti-HER2 antibodies bispecific antibodies and unique tyrosine kinase inhibitors (TKIs) as well as dual-blockade tactics are examples of new tactics. While new TKIs like neratinib and tucatinib are being tested in combination with capecitabine promising ADCs like SYD985 & DS-8201a may replace T-DM1 or be used after progression on T-DM1. By addressing resistance and increasing treatment efficacy these developments hope to improve patients with HER2-positive breast cancers quality of life and chance of survival.
5	2019	Targeted therapeutic options and future perspectives for HER2-positive breast cancer	Jiani Wang ¹ and Binghe Xu ^{1,2}	Breast cancer is a heterogeneous disease, with HER2-positive subtypes comprising 20-25% of cases. This aggressive cancer poses challenges due to high recurrence rates and risk of metastasis. Anti-HER2 therapy, particularly with drugs like trastuzumab and Pertuzumab, is vital for both early and advanced stages. While one year of trastuzumab is standard, extending treatment offers no added benefit and increases cardiotoxicity risks. Despite advancements, one- fourth patients suffering from the early variants experience recurrence. Ongoing research focuses on improving treatment strategies, exploring new drugs, and refining HER2 detection techniques to enhance prognosis and survival rates. Future efforts aim to personalize treatment and achieve greater survival benefits through molecular biology research and predictive prognostic factors.
6	2020	The Changing Paradigm for the Treatment of HER2-Positive Breast Cancer	Aena Patel ¹ , Nisha Unni ^{1,*} and Yan Peng ² ,	Compared to other breast cancer subtypes HER2-positive breast cancer was long linked to worse prognoses and greater death rates. Nonetheless the paradigm for treating HER2-positive breast cancer has undergone a significant shift since the introduction of trastuzumab (Herceptin). The array of treatment alternatives has been further broadened by the introduction of several HER2-targeted drugs including Pertuzumab (Perjeta). This review puts light on new developments in the treatment of HER2-positive bone cancer similar as immunotherapies and new HER2- targeted curatives that are witnessing clinical trials and are impacting standard care in the neoadjuvant adjuvant and metastatic settings. While numerous cases profit greatly from these treatments some develop resistance or relapse. Though the implicit advantages of incorporating new HER2- targeted specifics or immunotherapy are still unknown, a binary- targeted HER2 strategy is generally employed. Furthermore, many trials did not apply the 2018 ASCO/CAP updated guidelines for HER2 interpretation which reclassified cases with ambiguity as either HER2+ or HER2- thereby preventing overtreatment and lowering expenses.

Methodology: Research Questions & Objectives

Research question:

How have the epidemiological trends of HER2-positive breast cancer incidence in the US evolved from 2010 to 2021, and what are the current advanced drug therapies and market dynamics for HER2-positive breast cancer in the US?



Methodology : Materials and methods

STUDY DESIGN

Secondary Research



STUDY SETTING

Organizational



STUDY DURATION³

3 months



DATA COLLECTION

Data will be collected from the SEER database for incidence rates and demographic information. Market data will be sourced from industry reports, financial statements, and market research databases.



OPERATIONAL DEFINITIONS:

- **HER2-positive breast cancer**

A subtype of breast cancer with overexpression of the HER2 protein.

- **Age-adjusted incidence rates**

Incidence rates standardized to eliminate the effect of age differences in population.

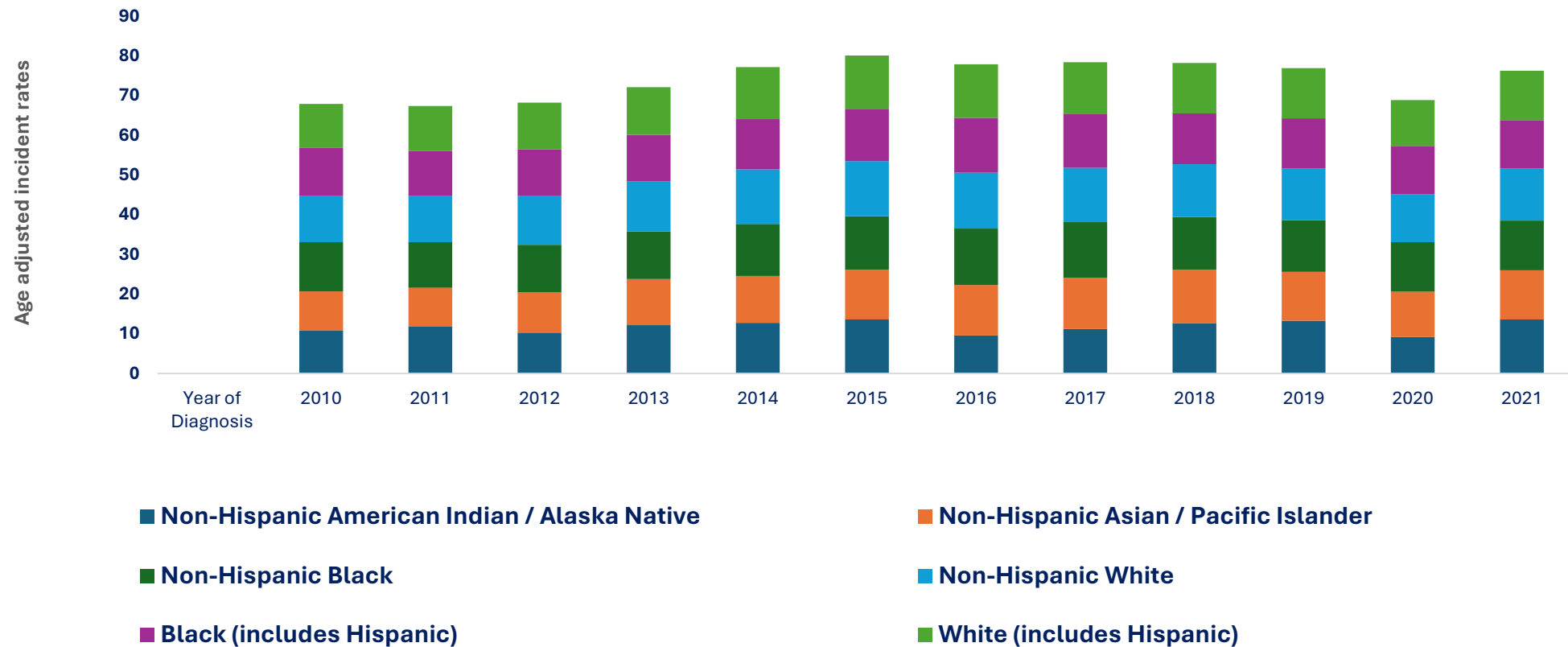
- **Advanced drug therapies**

Targeted therapies including monoclonal antibodies, antibody-drug conjugates and tyrosine kinase inhibitors.

Epidemiological Trends

Race/Ethnicity wise incident rates

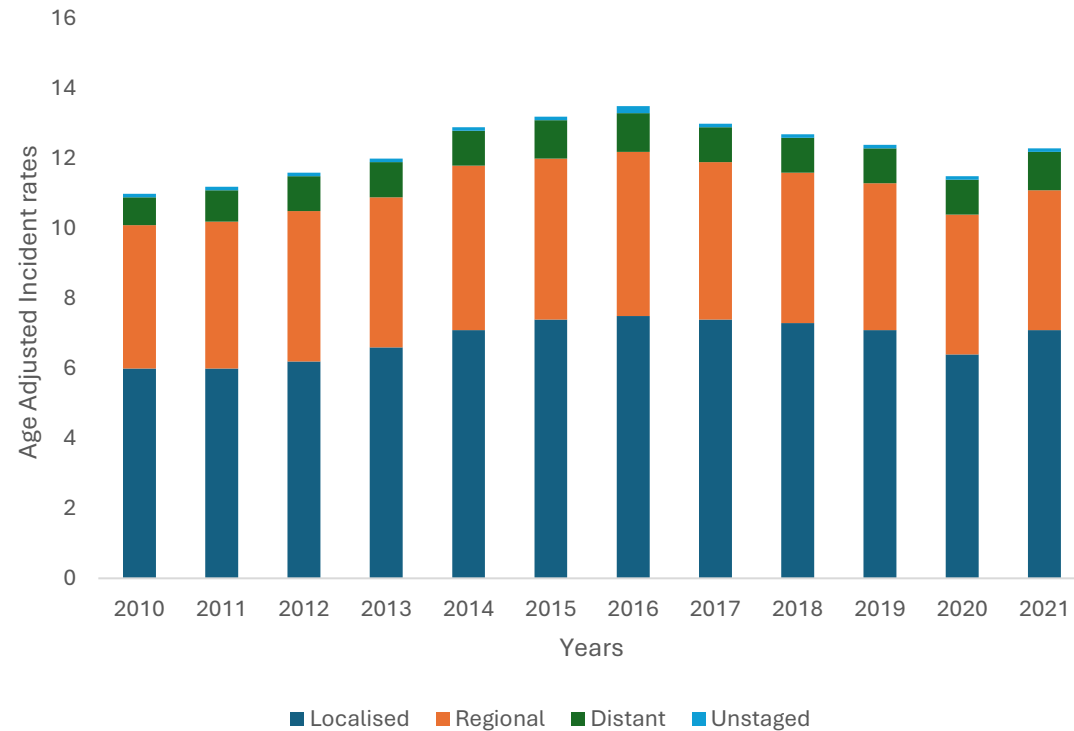
Trends in Age-Adjusted Incidence Rates of HER2-Positive Breast Cancer by Race/Ethnicity (2010-2021)



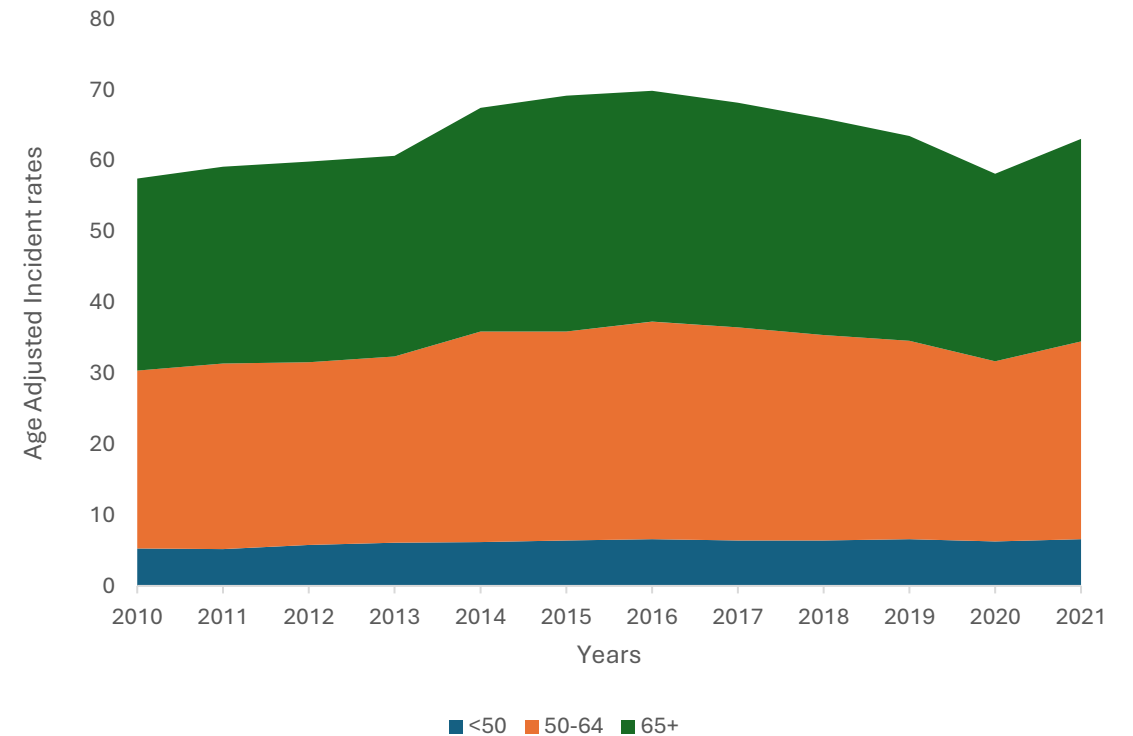
Epidemiological Trends

Age and Stage wise incident rates

Stage-Specific Incidence Trends of HER2-Positive Breast Cancer(2010-2021)



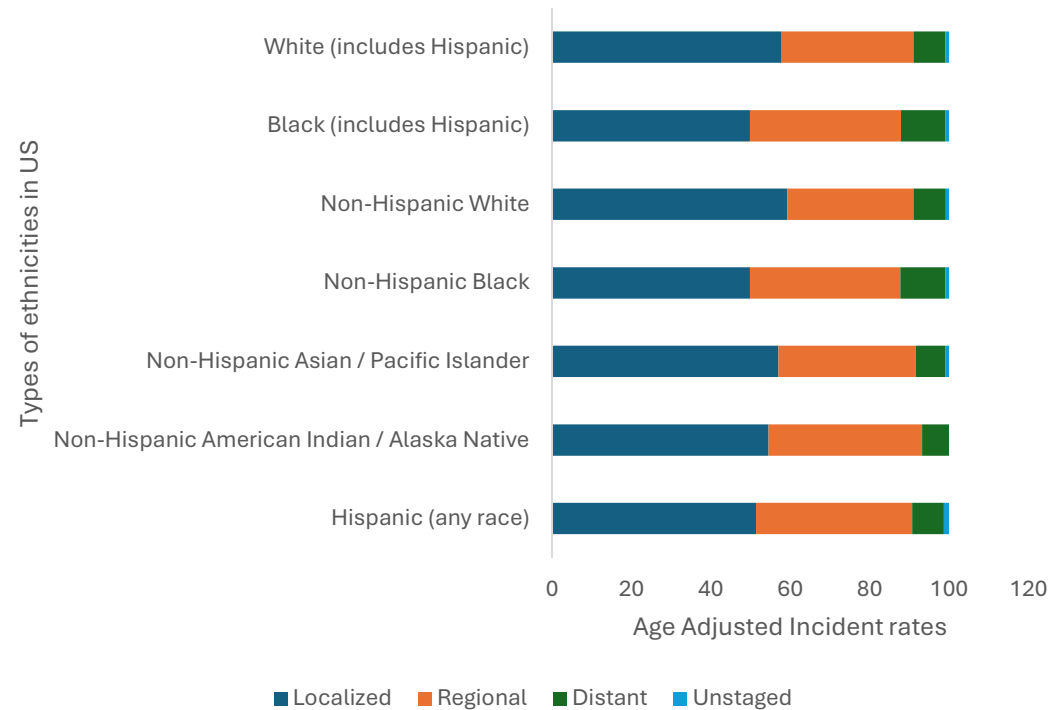
Age-Specific Incidence Trends of HER2-Positive Breast Cancer(2010-2021)



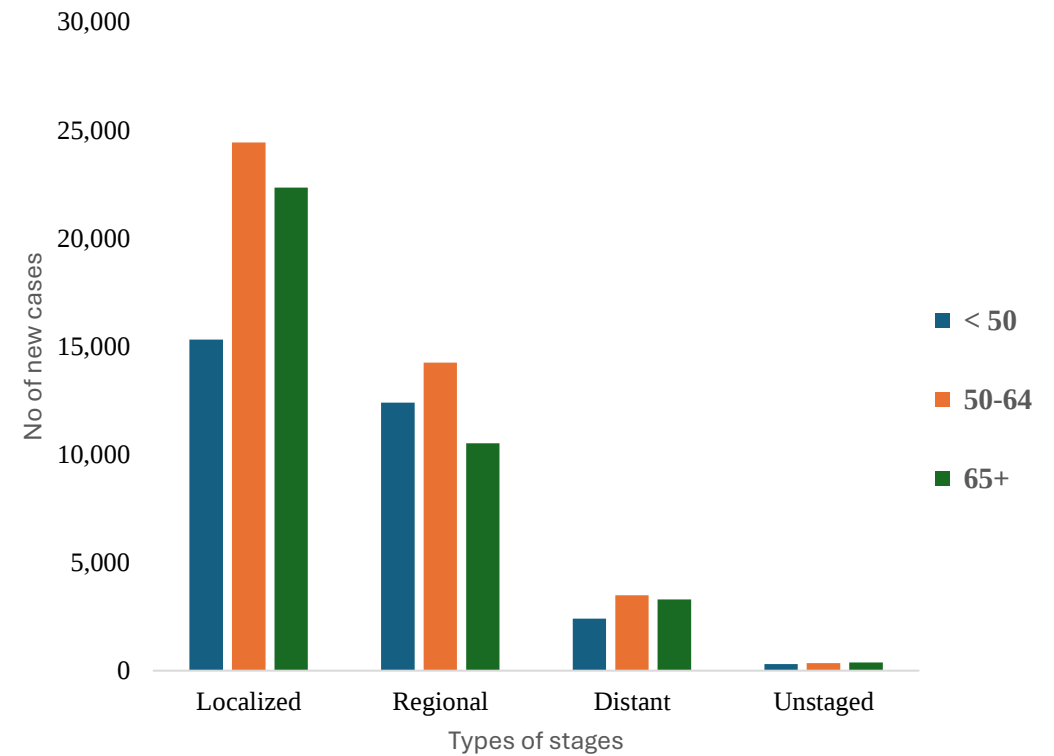
Epidemiological Trends

Inter-relation between Race, age, and stage

Age-Adjusted Incidence Rates of HER2-Positive Breast Cancer by Race/Ethnicity and Stage of the disease (2010-2021)



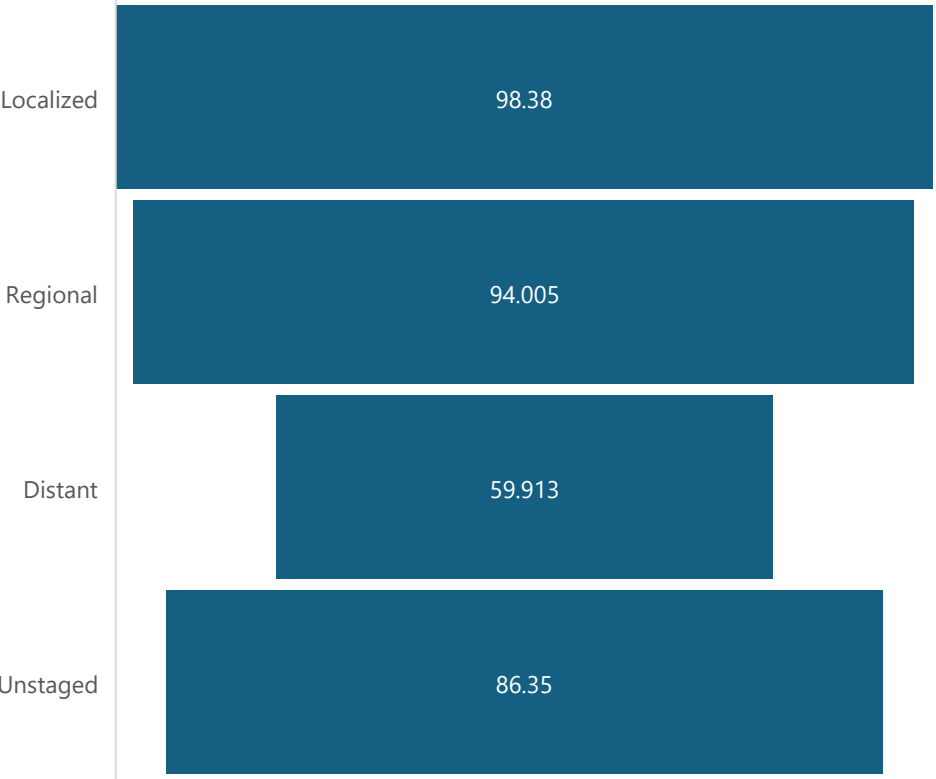
Incident cases of HER2-Positive Breast Cancer by Stage and Age Group (2010-2021)



Epidemiological Trends

Five-year relative survival rates

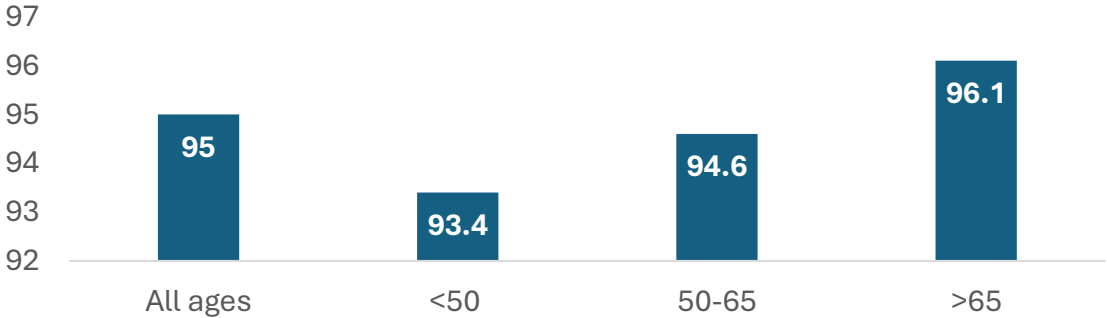
Five-Year Survival Rates of HER2-Positive Breast Cancer by Stage of the disease (2010-2021)



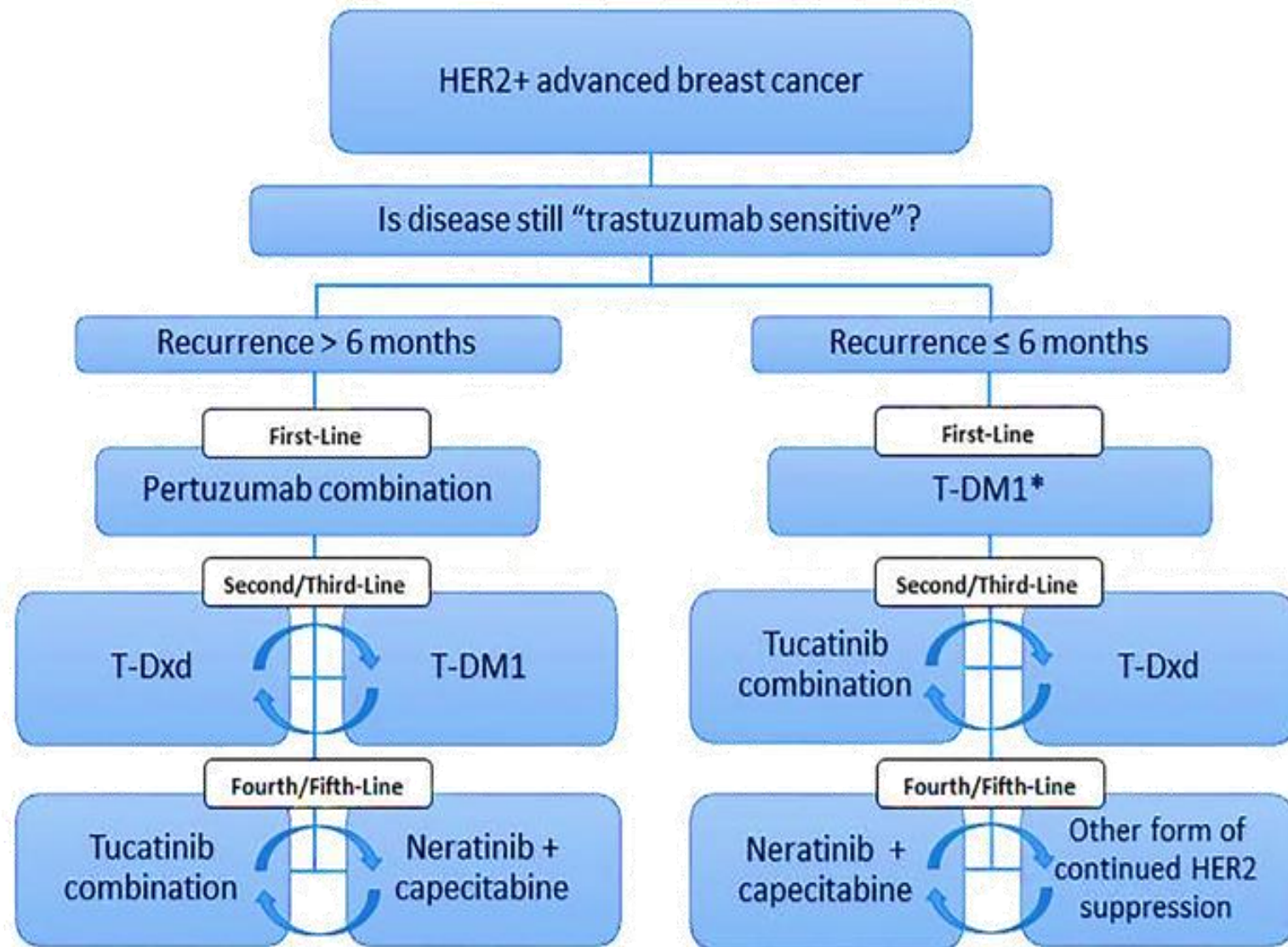
Five-Year Survival Rates of HER2-Positive Breast Cancer by Race (2010-2021)

Year	All races	Blacks	Whites
2017	91.369	87.222	91.925
2018	91.508	87.629	92.035
2019	91.645	88.024	92.143
2020	91.78	88.407	92.25
2021	91.913	88.779	92.356

Age-wise 5 Year Survival rates

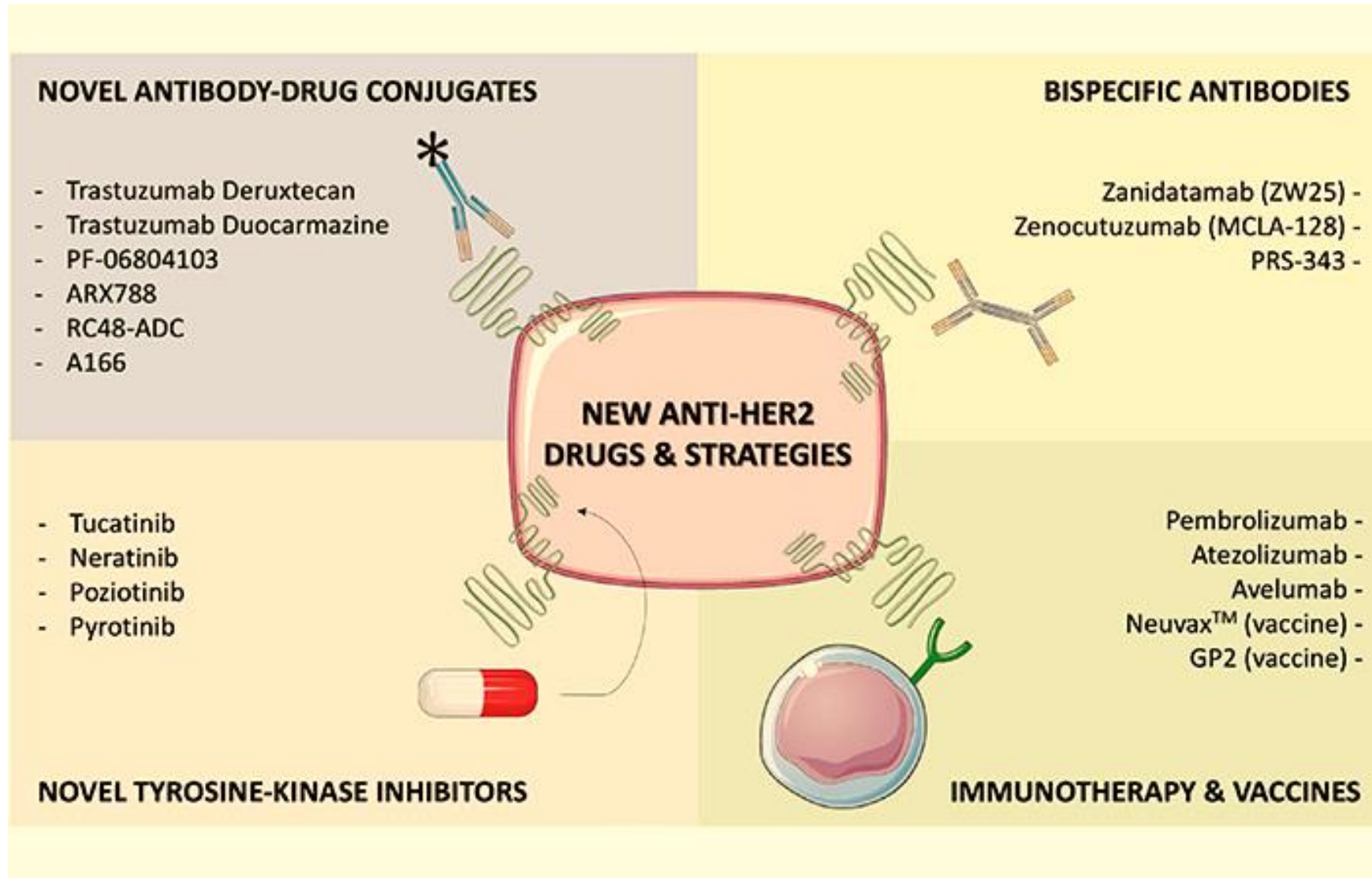


Proposed
treatment
landscape for
HER2 Positive
Breast Cancer



Importance of clinical trial options Should be considered
at all points of disease progression

Advanced drug therapeutics

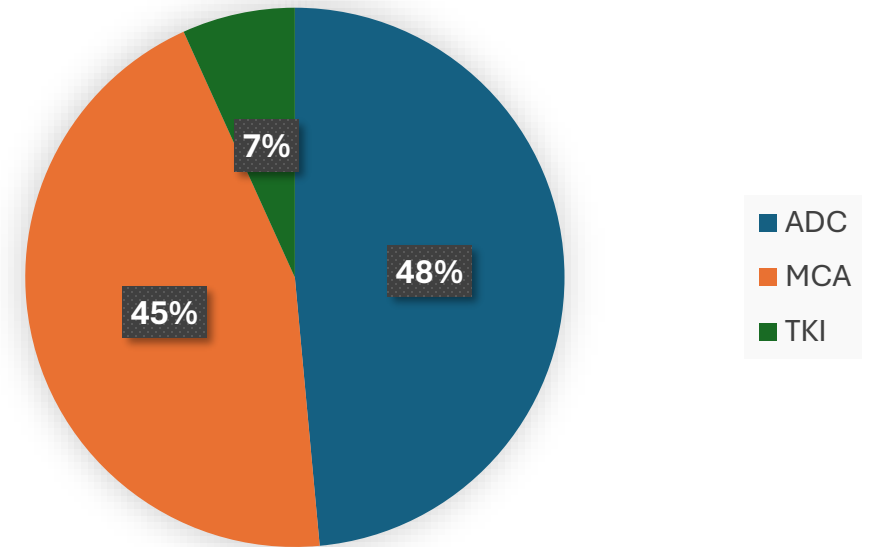


CURRENT MARKET SCENARIO FOR HER2-POSITIVE BREAST CANCER DRUG THERAPIES

S.no	Drug name	Drug brand name	Drug class	Company	Drug dosage Form	FDA approval for HER2 Breast cancer Year	Annual sales (2023)
1.	fam-trastuzumab deruxtecan	Enhertu (Pro)	ADC	AstraZeneca and Daiichi Sankyo Company, Limited	Injectable	2022, 2024	\$2.5 billion
2	Trastuzumab	Herceptin (Pro)	MCA	Genentech, Inc.	Injectable	2006	\$1.7 billion
3	tucatinib	Tukysa	TKI	Seattle Genetics, Inc.	Tablets	2020	\$330 million
4	pertuzumab, trastuzumab, and hyaluronidase-zzxf	Phesgo	MCA combination	Genentech, Inc.	Injectable	2020	\$1.1 billion
5	margetuximab-cmkb	Margenza	MCA	MacroGenics, Inc.	Injectable	2020	N/A
6	ado-trastuzumab emtansine	Kadcyla	(ADC)	Genentech, Inc.	Injectable	2019	\$1.3 billion
7	trastuzumab and hyaluronidase-oyks	Herceptin Hylecta	MCA combination	Genentech, Inc.	Injectable	2019	\$300 million
8	rastuzumab-qyyp	Trazimera	MCA	Pfizer Inc.	Injectable	2019	N/A
9.	neratinib	Nerlynx	TKI	Puma Biotechnology, Inc.	Tablets	2017	\$100 million
10	pertuzumab	Perjeta	MCA	Genentech	Injectable	2012	\$1.5 billion
11	lapatinib ditosylate	Tykerb	TKI	GlaxoSmithKline	Tablets	2007, 2010	\$100 million

Top Market leaders by market share of revenue and drug class

S.no	Brand Name	Company	Annual sales 2023 (In \$ million)
1	Enhertu (Pro)	 	2500
2	Herceptin (Pro)		1700
3	Perjeta		1500
4	Kadcyla		1300
5	Tukysa	Seattle Genetics, Inc.	330



S.no	Drug class	Market share
1	ADC	49%
2	MCA	45%
3	TKI	7%

Current pricing and reimbursement trends of breast cancer therapies

Attribute	Before Biosimilars(2019 and before)	Aster biosimilars(2019-2024)
Wholesale acquisition cost (WAC)	\$4364 per dose	\$3927 per dose.
Average sales price (ASP)	\$89,706	\$63,592 (-29%)
Average treatment cost		-52%

- Medicare Part B, the primary payer for HER2-positive breast cancer therapies, saw a 79% inflation-adjusted increase in biologics spending from 2011 to 2020.
- Medicare beneficiaries with 20% coinsurance could save over \$500 a month by switching from Herceptin to a biosimilar.
- Pharmaceutical companies provide copay cards and patient assistance programs to help commercially insured patients afford costly therapies.
- The Oncology Care Model (OCM) program may encourage providers to use less expensive biosimilar options, potentially reducing overall treatment costs further.

Market Dynamics Shaping the HER2 Drug Therapy Landscape

 DRIVERS	 RESTRAINTS	 OPPORTUNITIES
• Rising global breast cancer incidence • Increased survival rates, early detection • Growing demand in developing countries	• Significant side effects, heart risks • Unsuitable for pregnant individuals • Risks with chemotherapy combination	• Comprehensive AI utilization enhances patient outcomes. • Synergistic opportunities for the breast cancer drugs market. • Precision medicine approaches become more refined. • Targeted therapies gain traction in clinical practice.

Future scope of research



Current therapies are still facing a challenge of addressing brain metastasis associated with HER2 + breast cancer



Prioritising production and promotion ADCs that have extremely promising results in terms of treatment



Promoting combination drug therapies for specific Patient subgroups

Key learnings and takeaways from the assessment



01

HER2-positive breast cancer incidence peaked in 2015-2016, declined in 2020 due to COVID-19 impacts.

02

Non-Hispanic Black females had the highest incidence of distant stage cases, indicating disparities in diagnosis and healthcare access.

03

5-year relative survival rates for HER2-positive breast cancer remained high (91.37% to 91.91%) due to improved treatments and early detection

04

Innovative treatments such as tyrosine kinase inhibitors, monoclonal antibodies, and antibody-drug conjugates have propelled the growth of the HER2-positive breast cancer drug market, offering more effective treatment options and improving patient outcomes.

05

Herceptin, Perjeta, and Enhertu remain top market leaders due to proven efficacy and widespread adoption. Biosimilars and newer therapies have increased competition, diversifying the market and enhancing treatment options

ThankYou

Kanika Mathur

July 2024