ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26aug244

Margetuximab: An Updated Review of its Clinical Pharmacology and Therapeutic Advances

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Publication Date: 2026/08/17

Abstract: Margetuximab is a new chimeric IgG1 monoclonal antibody designed to enhance antitumor activity in the immune system and treat patients with HER2-positive malignant disease. Margetuximab selectively binds to activate the Fcγ receptor CD16A and shows reduced binding to inhibitory Fcγ receptor CD32B, thereby enhancing antibody-dependent cellular cytotoxicity (ADCC) and providing greater therapeutic potential than conventional HER2-targeted antibodies. This review covers the discovery, physicochemical properties, pharmacokinetic properties, mechanism of action, synthesis, and clinical applications of margetuximab. Furthermore, this review covers evidence of its efficacy, safety profile, adverse effects, drug interactions, contraindications, conventional formulations, emerging formulations, and patents. The efficacy of margetuximab in combination with chemotherapy in clinical studies suggests it is a useful treatment option in the metastatic setting for patients with HER2-positive breast cancer who have failed previous anti-HER2 treatment, have a manageable toxicity profile, and have improved immune-mediated antitumor responses. Moreover, continuous clinical research and formulation strategy development are ongoing to further advance its therapeutic applications. Overall, margetuximab represents a significant improvement in HER2-targeted therapy, and further studies are likely to enhance its clinical effectiveness and expand its potential applications in precision oncology.

Keywords: *Margetuximab, HER2-Positive Breast Cancer, Fc-Engineered Antibody, Antibody-Dependent Cellular Cytotoxicity (ADCC), Pharmacokinetics, Clinical Applications, Targeted Therapy, Monoclonal Antibody, Immunotherapy, Metastatic Breast Cancer.*

How to Cite: Deepika A.; Ariharasivakumar G. (2026) Margetuximab: An Updated Review of its Clinical Pharmacology and Therapeutic Advances. *International Journal of Innovative Science and Research Technology*, 11(8), 565-571. https://doi.org/10.38124/ijisrt/26aug244

I. INTRODUCTION

One of the most prevalent cancers worldwide is breast cancer, and it contributes significantly to morbidity and mortality in females. Breast cancer is a clinically relevant cancer type characterised by the presence of human epidermal growth factor receptor 2 (HER2). It is characterised by overexpression or amplification of the HER2 receptor and is frequently associated with aggressive tumour behaviour and poor prognosis if left untreated. Despite the availability of HER2-directed therapies, therapeutic resistance and disease progression remain important clinical challenges, as patients who have HER2-positive breast cancer have much better outcomes today. [1,2]

HER2 is a member of the epidermal growth factor receptor family of transmembrane receptor tyrosine kinases. By targeting HER2, tumour cell proliferation may be inhibited through receptor-dependent mechanisms, while the elimination of HER2-expressing tumour cells through immune system-mediated mechanisms may also be enhanced. While monoclonal antibodies such as trastuzumab have demonstrated the importance of using HER2-directed therapy, there have been differences in immune effector function and resistance, which led to the development of novel therapeutics. Therapeutic antibodies' interaction with Fcγ receptors that reside on immune cells plays a significant role in antibody-dependent cellular cytotoxicity (ADCC). [2,14]

Margetuximab (MGAH22) is a chimeric Fc-engineered IgG1 monoclonal antibody designed as an alternative treatment strategy to target HER2. It targets an extracellular HER2 epitope that is the same as that targeted by trastuzumab but has different modifications in its Fc domain. These modifications enhance binding to the activating Fcγ receptor CD16A (FcγRIIIa) and reduce contact with the inhibitory Fcγ receptor CD32B (FcγRIIb). This means that in addition to its HER2-dependent anticancer activity, margetuximab is also designed to enhance immune effector function, notably through the activation of natural killer cells in an antibody-dependent cell-mediated cytotoxicity (ADCC). [2,12,14]

Margetuximab's first-in-human clinical development started with patients with advanced solid tumours who were HER2-positive. Initial clinical studies have shown its

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26aug244

therapeutic promise; however, it is still being pursued in HER2-positive breast cancer. Subsequently, critical SOPHIA clinical trial evaluated margetuximab when combined with chemotherapy in patients with advanced or metastatic HER2-positive breast cancer who had previously been on multiple anti-HER2 medications. These trials have aided in the clinical development and regulatory approval of margetuximab for select patients with metastatic HER2-positive breast cancer. [3,12,15]

Clinical effectiveness of margetuximab cannot be overlooked, and studying its drug properties is essential for determining its role in therapy. It has a dose-related exposure, delayed elimination, and a long terminal half-life, allowing for a dose every five to six hours intravenously. The mechanism of action, Fc receptor interactions, clinical efficacy, safety profile, adverse responses, and potential drug interactions are all important points that should be considered when using this medication clinically. [12,13]

Recent research has also focused on targeted nanocomplex formulations and margetuximab-based combination therapy, demonstrating the potential for improving tumour targeting and therapeutic delivery. For instance, PEG-PAMAM G4 nanocomplexes conjugated with margetuximab have been investigated for breast cancer. These advances demonstrate the ongoing interest in developing better treatments with margetuximab.

This review provides an up-to-date overview of margetuximab, focusing on its discovery and development, physicochemical and pharmacokinetic properties, mechanism of action, synthesis, clinical applications, efficacy, safety, adverse effects, contraindications, drug interactions, formulations, emerging drug delivery approaches, and patent landscape. This review provides a comprehensive overview of the pharmacological and therapeutic advancements associated with this Fc-engineered HER2-targeted monoclonal antibody.

II. DISCOVERY & FURTHER HISTORY

A monoclonal antibody called margetuximab was created from the parent antibody 4D5[1]. Different affinities of margetuximab bind to the same HER2 receptor epitope. A five-amino-acid change in the IgG1 Fc domain is the primary distinction between these medications [2]. IgG1 kappa monoclonal antibody margetuximab is a chimeric Fc-engineered HER2/neu receptor antagonist. For the treatment of adult patients with metastatic HER2-positive breast cancer who have received two or more prior anti-HER2 regimens, at least one of which was for metastatic disease, MARGENZA is recommended conjunction with chemotherapy.

For the research and marketing margetuximab in South Korea, MacroGenics and GC Pharma (formerly Green Cross) entered into a partnership agreement in June 2010. Beginning in 2010, the MacroGenics-sponsored first-human phase I trial marked the beginning of margetuximab's clinical development [3]. In 2013, enrolment in a phase II trial (ClinicalTrials.gov ID NCT01828021) to examine the efficacy of margetuximab in HER2-low patients exhibiting 2+ by immunohistochemistry without amplification in the FISH test was initiated [4].

Furthermore, Phase I and Phase II investigations on the safety and efficacy of Margetuximab in Chinese HER2-positive BC patients are currently being conducted. These studies further validate the growing global awareness of this unique anti-HER2 molecule's potential [3]. To perform clinical research evaluating the combination of margetuximab and pembrolizumab in patients with HER2-positive gastric cancer, MacroGenics and Merck joined forces in October 2015. A confirmatory phase III trial was initiated in 2015 in light of the antibody's encouraging efficacy observed in early trials with BC patients [3].

To develop and market margetuximab in China, Hong Kong, Macau, and Taiwan, MacroGenics and Shanghai, China-based Zai Lab entered into an exclusive collaboration and licensing agreement in November 2018. Both businesses plan to start global research using combination regimens comprising margetuximab for the treatment of gastric cancer, and Zai Lab will oversee clinical development in the permitted regions [3].

Margetuximab was approved in the USA on December 16, 2020, as a treatment for adult patients with metastatic HER2-positive breast cancer who have received two or more prior anti-HER2 regimens, at least one of which was for metastatic illness. It can be used in conjunction with chemotherapy [3]. To launch the sale of margetuximab in the USA in November 2020, MacroGenics collaborated with the commercial services provider EVERSANA. According to the terms of the contract, MacroGenics is given co-exclusive rights to carry out authorised commercialisation activities while also maintaining ownership of margetuximab, including all manufacturing, regulatory, and development duties [3]

III. PHYSICOCHEMICAL PROPERTIES

- *TG Analysis and Drug Loading:*

Using a TG apparatus based on a heating-cooling process, thermal stability, physical state, and drug loading capability of the P-P-Ab and Ab-P-P-D samples were assessed.

P-P-Ab is demonstrated in three weight-loss phases:

- The weight loss phase at around 80 to 90 °C (approximately 3% weight loss) is due to water evaporation from the P-P-Ab nano-complex.
- The second phase of weight loss was recorded at approximately 190–250 °C (approximately 12% weight loss).
- The third weight loss is observed at 380–420 °C (approximately 7% weight loss) [5].

Two notable weight losses for the Ab-PP-D nanocomplex were observed at temperatures between 70 and 140 °C (almost 5% weight loss) and 280 and 370 °C (approximately 13% weight loss) [6]. One of the most

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26aug244

important challenges at the industrial level is the proper thermal stability of nanocomplexes, as illustrated in these studies. In contrast, by comparing the weight loss rates of the P-P-Ab and Ab-P-P-D samples, the drug-loading capacity of Ab-P-P-D was estimated to be approximately 21.48%. This high degree of drug content demonstrates that polymeric nanoparticles can effectively deliver bioactive cells to cancer cells, making them suitable candidates for drug delivery [7].

➢ *DLS and TEM Analyses:*

The size, shape, and zeta potential of the dendrimer derivatives, assessed using DLS and TEM. The hydrodynamic average size and surface charges of the P, P-P, P-P-Ab, and Ab-P-P-D nanocomplexes were determined using DLS. These results show that the diameters of pure P and P-P were 4.49 and 66.9 nm, respectively. In contrast, the P-P-Ab formulation had a hydrodynamic size of 101.0 nm, whereas the drug-loaded nanocomplex had a slightly larger size of 121.0 nm [5].

The observation that PEG and Ab are visible gelatinous layers surrounding the particle core further supports the successful conjugation of these two molecules. Owing to their ability to penetrate and disperse in cancer tissues and cells, a size range from 10–100 nm is reportedly preferred for optimal drug delivery to cancer tissues [8]. In reality, cancer tissue vasculature ranges in size from 200 to 700 nm, and anything smaller than 200 nm can be successfully internalised into the cancer site. Additionally, P, P-P, P-P-Ab, and AbP-P-D nanocomplexes had zeta potential values of +25.3, +7.3, -3.7, and-18.8 mV, respectively. Because the amino functional groups on the surface of pure P give it a positive surface charge, PEGylation eliminates surface positive charges, which is suitable for drug delivery systems. As a result, the medication and antibody work together to neutralise the positive charge of the nanocomplex. The literature claims that the positive surface charge of nanocarriers causes cytotoxicity in healthy human body cells because they can connect with negatively charged proteoglycans on their surfaces, internalise into healthy cells, and trigger apoptosis pathways. Therefore, for efficient drug delivery, negative and neutral charges are safer than positive charges. [9].

➢ *FT-IR Analysis:*

The quality of the conjugates, including pure P, P-P, P-P-Ab, and Ab-P-P-D samples, was examined using the FT-IR approach. The characteristic peaks of pure P are observed at approximately 1112 cm-1 and 1252 cm-1 due to the C-C bending and C-O stretching vibrations, respectively. According to a previous study [5], peaks at approximately 1574 cm-1, 1485 cm-1, and 1326 cm-1 are a result of N-substituted amide bending in pure P. The distinctive peaks at approximately 3306 cm-1 and 3180 cm-1 are further indications of the N-H stretch of amines and the antisymmetric N-H stretch of substituted primary amines in the structure of PAMAM G4, respectively. The P-P sample exhibited absorption peaks at approximately 1317 cm-1, 1407 cm-1, 3150 cm-1, and 3272 cm-1, which correspond to the -C=O stretch, C=O stretch of the carbonyl group, C-H stretch, and N-H stretch of the amide, respectively [10]. Additionally, the formation of the covalent link is responsible for the upshift of the conjugated 's C=O stretch (amide bond) in the structure of the P-P formulation. The bonds in the P-P-Ab formulation were observed at 3502 cm-1 to 3394 cm-1 due to amide N-H and C=O stretching, 1643 cm-1 due to -C=O stretching, and 1460 cm-1 due to the conjugation of margetuximab Ab to PAMAM G4.In addition, the signature peaks at approximately 1241 cm-1 and 1396 cm-1 (stretching vibrations of the C=O), 1460 cm-1 1496 cm-1 (bending of CH-NH-C=O amides), and at approximately 1651 cm-1 and 3370 cm-1 (stretching vibrations of the C-O and amide, respectively) are indicative of Ab in a nanocomposite structure. The main Ab-P-P-D conjugate absorption peaks, on the other hand, are found at around 1639–1660 cm-1 (aromatic–ketonic carbonyl stretching) and 1130–1168 cm-1, which are connected to the vibrational stretching of the ether bond (C–O–C) in the carbon ring. Additionally, the 1687 cm-1 absorption peak was connected to the C=O aryl ketonic stretch in the drug-loaded formulation, and the distinctive bands at approximately 3400 cm-1 to 3280 cm-1 were caused by the OH group stretching. C=C aromatic stretch bands can be observed at 1548 cm-1 and 1517 cm-1, while the C-H stretch bands of aromatic hydrocarbons can be observed at 937 cm-1, 667 cm-1, and 593 cm-1[11].

➢ *Pharmacokinetic Properties:*

In Phase 1 clinical trials, the pharmacokinetics of this drug were carefully examined using compartmental pharmacokinetic models with parallel linear and Michaelis-Menten elimination [12]. Pharmacokinetic parameters of margetuximab were identified in cynomolgus monkeys. The exposure to margetuximab increased with dosage. Slow elimination and minimal extravascular spread are characteristic of PK. Male and female exposure disparities across doses and dose cycles were considered negligible. For males and females, the weekly dosage produced accumulation ratios of 2.3 and 2.1, respectively. However, in pregnant women, the dosage at 3-week intervals led to accumulation ratios ranging from 1 to 1.09. Male and female monkeys in various trials had serum half-lives of margetuximab that ranged from 127 to 233 h (5.3 to 9.7 d) for males and 137 to 205 h (5.7 to 8.5 d) for females. Infants with detectable serum margetuximab showed placental transfer from maternal to fetal circulation [12].

Both linear and nonlinear elimination processes exist for margetuximab-cmkb. Margetuximab-cmkbCmax and AUC0-21d increased from 10 to 18 mg/kg (0.67 to 1.2 times the approved recommended dose) after a single dose, almost dose proportionally. The time to steady state at the approved recommended dosage was 2 months, and the accumulation ratio according to AUC0-21d was 1.65. Exposure to margetuximab-cmkb did not alter clinically when the infusion time was shortened from 120 to 30 min.

Margetuximab's steady-state volume of distribution had a geometric mean (%CV) of 5.47 L (22%).

- Elimination: Margetuximab's geometric mean (%CV) terminal half-life was 19.2 days (28%), with clearance of 0.22 L/day (24%). Four months after discontinuing

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26aug244

margetuximab, serum concentrations dropped to about 3% of the steady-state trough concentration.

Margetuximab is expected to be converted into tiny peptides via catabolic mechanisms.

There were no clinically significant differences in margetuximab PK based on the following factors: age (29 to 83 years), sex, race (Caucasian, Black, Asian), mild to moderate renal impairment (CLcr 30 to 89 mL/min estimated using the Cockcroft-Gault equation), mild hepatic impairment, HER2 expression level (0 to 3 by IHC), tumour burden (2-317 mm), ECOG score (0 to 2), album effects of end-stage renal disease with or without haemodialysis, severe renal.

IV. MECHANISM OF ACTION

Margetixumab has similar specificity and affinity when it binds to the Fab epitope of the HER2 receptor and demonstrates Fc-independent antiproliferative effects. It has a high relative affinity for both allelic forms of CD16A. Compared to wild-type IgG1, the Fc-engineered domain of margetuximab has been specially optimised to improve its binding to all FcRIIIAV158F allelic variations. The higher ADCC activity of human NK cells is linked to their greater binding to FcRIIIA, which inhibits cell growth. The Fc-engineered domain of margetuximab also reduces the drug's affinity for or binding to the inhibitory receptor CD32B (FcRIIB). Increased ADCC and improved anti-tumour effects are the result of margetuximab's changed binding properties, which are most noticeable in cells with lower levels of HER2, cells resistant to trastuzumab, and patients with the FcRIIIA-V158F mutation [13].

Margetuximab interacts with the extracellular domain of the human epidermal growth factor receptor 2 protein (HER2). Margetuximab decreases tumour cell growth after attaching to HER2-expressing tumor cells, as well as HER2 extracellular domain shedding and antibody-dependent cellular cytotoxicity (ADCC). In vitro, the modified Fc region of margetuximab increases binding to the Fc receptor that activates cells, FCGR3A (CD16A), and lowers binding to the Fc receptor that inhibits cells, FCGR2B (CD32B). These modifications lead to increase in vitro ADCC and NK cell activation.

The adaptive immune responses linked to margetuximab and those linked to trastuzumab and pertuzumab cannot be directly compared. Comparisons across various independent studies that employed identical test techniques revealed increases in circulating HER2-specific antibody levels (mediated by B cells) in 42%–69% of patients receiving trastuzumab treatment and in 94% of those receiving margetuximab treatment.125 Patients who received trastuzumab (50–78%) plus margetuximab (98–98%) showed an increase in T cell-mediated responses [14].

➢ *Synthesis:*

Margetuximab (MGAH22) is an IgG1 kappa monoclonal antibody that originated from Chinese hamster ovary cells and is purified using standard bioprocessing technologies. It is human/mouse chimeric Fc-engineered molecule. Variable domains of margetuximab, which bind to extracellular domain IV of HER2 [15], were generated from the same murine precursor as trastuzumab (4D5).

The difference between margetuximab and trastuzumab is that the Fc region of the former has been modified to promote increased binding to both types (158F or V) of the activating FcRIIIa receptor (CD16A) and decreased binding to the inhibitory FcRIIb receptor (CD32B), which mediates increased antibody-dependent cellular cytotoxicity and immune function.

Several manufacturing-related post-marketing commitments (PMCs) relevant drug manufacture and control were included in the licensing of margetuximab, including the optimisation of the IC50 and EC50 potency assays, drug product (DP) leachable, and DP shipping validation studies [15].

➢ *Medicinal Uses:*

To treat HER2-positive breast cancer that has metastasised (spread to other parts of the body), margetuximab is used in conjunction with other cancer medications.

Patients who have at least two rounds of chemotherapy for HER2-positive breast cancer are eligible to utilise margetuximab [13].

➢ *Adverse Reactions:*

Other portions of the label provide more information about the following adverse reactions:

- Left ventricular dysfunction.
- Embryo-fetal Toxicity.
- Infusion-related reactions

➢ *Left Ventricular Dysfunction:*

With MARGENZA, there may be cardiac dysfunction in the left ventricle. In SOPHIA, 1.9% of patients receiving MARGENZA developed left ventricular dysfunction. Patients having a baseline LVEF value of less than 50%, a prior history of myocardial infarction or unstable angina within six months, or congestive heart failure classified as NYHA classes II–IV have not been investigated with MARGENZA.

➢ *Cardiovascular Monitoring:*

Thorough cardiac assessment, including history, physical examination, and LVEF determination using an echocardiography or MUGA scan. The recommended schedule is as follows:

- Baseline LVEF assessment within 4 weeks before starting MARGENZA.
- Obtain LVEF measures (MUGA/echocardiogram) every 3 months during and after MARGENZA.
- Repeat LVEF measurements every 4 weeks if MARGENZA is withheld due to substantial left ventricular cardiac failure.[14].

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26aug244

➢ *Embryo-Fetal Toxicity:*

According to research on animals, the drug's mechanism of action, MARGENZA can harm the fetus if it is given to a pregnant woman. No information is available on the usage of MARGENZA in pregnant women to determine the risk associated with the medication. According to post-marketing reports, using a HER2-directed antibody during pregnancy led to cases of oligohydramnios and oligohydramnios sequence, which can cause skeletal deformities, infant mortality, and pulmonary hypoplasia. In research on animal reproduction, margetuximab-cmkb was administered intravenously to pregnant cynomolgus monkeys once every three weeks beginning at gestational day (GD) 20 until delivery. This caused oligohydramnios and postponed the development of the baby's kidneys. Based on Cmax, animal exposures at the recommended dose were roughly three times higher than human exposures.

➢ *Infusion-Related Reactions:*

IRRs, or infusion-related reactions, can be brought on by MARGENZA. Fever, chills, arthralgia, tiredness, nausea, vomiting, headache, diaphoresis, tachycardia, hypotension, pruritus, rash, urticaria, and dyspnea are only a few possible symptoms. In SOPHIA, 13% of patients receiving MARGENZA with chemotherapy developed IRRs. The majority of IRRs happen in Cycle 1. 1.5% of patients on MARGENZA suffered grade 3 IRRs. Regardless of severity, all IRRs were resolved in under a day. In SOPHIA, 9% of patients receiving MARGENZA and chemotherapy experienced IRRs that resulted in treatment cessation. Due to an IRR, one patient on MARGENZA (0.4%) stopped receiving medication.

Consider pre-medications such as antihistamines, corticosteroids, and antipyretics in patients with mild or moderate IRRs. Reduce the rate of infusion for IRRs that are mild or moderate. Patients with dyspnea or clinically severe hypotension should have their MARGENZA infusion stopped and should instead receive medical therapy, which may include epinephrine, corticosteroids, diphenhydramine, bronchodilators, and oxygen. Patients need to be assessed and closely watched until all signs and symptoms have completely disappeared. All patients with severe or life-threatening IRRs must have their MARGENZA treatment permanently stopped [15].

➢ *Treatment of Overdose:*

An overdose is not documented since margetuximab is administered by a healthcare provider in a medical setting.

➢ *Contraindication:*

- *HER2 Inhibitors (Applies to Margetuximab) CHF:*

Agents that impede HER2 activity have been observed to lower left ventricular ejection fraction (LVEF). Patients who have previously taken anthracyclines, those who did so after terminating treatment with drugs that suppress HER2 activity, or those who have previously undergone chest radiation therapy may be more likely to see a decline in LVEF. Patients with a prior history of heart problems should receive therapy with these medicines with caution. Analyse the condition of the heart before, during, and after treatment. Withhold or stop treatment with drugs that inhibit HER2 activity if necessary, including in cases where a clinically significant reduction in left ventricular function has been found, or if the LVEF has not improved or has worsened. It is advised to monitor LVEF and overall heart function with an echocardiography or MUGA scan, if necessary [16][20].

- *HER2 Inhibitors (Applies to Margetuximab) Thrombocytopenia:*

Agents that stop HER2 activity have been linked to thrombocytopenia. Check platelet levels before starting treatment and before each dosage. If necessary, adjust the dose in accordance with clinical recommendations. During treatment with these drugs, patients with low platelet counts and those on anticoagulants need to be closely watched [16][20].

V. INTERACTION

Fatigue/asthenia, nausea, vomiting, diarrhoea, constipation, abdominal pain, peripheral neuropathy, arthralgia/myalgia, cough, decreased appetite, dyspnea, infusion-related reactions, palmar-plantar erythrodysesthesia, and extremity pain are the most frequent adverse drug reactions (>10%) with margetuximab in combination with chemotherapy. For patients who use anthracyclines fewer than 4 months after discontinuing MARGENZA, although MARGENZA has not been tested for this interaction, clinical evidence from other HER2-directed antibodies calls for attention. After finishing MARGENZA, refrain from receiving anthracycline-based medication for up to 4 months. If simultaneous use inevitable, keep a tight eye on the patient's cardiac health.

- Paclitaxel: Margetuximab and Anthracyclines: Co-administration of margetuximab with anthracycline-based chemotherapy regimens may increase the risk of cardiac toxicity. Close monitoring of cardiac function is recommended when using these drugs together.

- Enhances the exposure to paclitaxel, a commonly used chemotherapy agent. Close monitoring for increased paclitaxel-related toxicities, such as myelosuppression and peripheral neuropathy, is advised.

- Tyrosine Kinase Inhibitors (TKIs): Concomitant use of margetuximab with certain TKIs, such as lapatinib or neratinib, may lead to increased toxicity. Close monitoring for adverse effects is important when these drugs are used together.[17]

➢ *Daunorubicin Margetuximab:*

The heart may be harmed by this. Blood tests can be used during therapy to check on both heart function and drug levels in the blood. An anthracycline antibiotic and anti-cancer drug, dunorubicin. It works by preventing DNA replication, hence preventing cellular reproduction. However, because it increases oxidative stress by producing reactive oxygen species and free radicals, it may also contribute to the induction of cell death.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26aug244

Daunorubicin has serious side effects as an antineoplastic drug, including cytopenias, hepatotoxicity, and extravasation responses.
Daunorubicin exhibits cardiotoxicity in proportion to cumulative dose over time, just like other anthracyclines do.

- *Doxorubicin Margetuximab:*

When Margetuximab and Doxorubicin are used together, the risk or severity of cardiotoxicity may rise. When Dulaglutide and Margetuximab are taken together, the risk or severity of side effects may increase.

- *Margetuximab Efgartigimod Alfa:*

Margetuximab's blood levels and effects could be lessened by efgartigimod alfa.

- *Epirubicin Margetuximab:*

Margetuximab with Epirubicin together. The heart may be harmed by this. Blood tests can be used during therapy to check on both heart function and drug levels in the blood.[18]

- *Conventional Marketed Formulation:*

(Table 1) A Conventional Drug Delivery System is the Classical Method for the Delivery of Drugs into the Body. [19]

Type	Brand name	Company name	Dose	NDC	Prize	Country of Registration
Injection	Margenza	Macrogenics	250mg/10ml(25 mg/ml)or 15 mg/kg	74527-022-02	Rs.2377	USA

- *Patent:*

(Table 2) Patent details of Margetuximab [20]

Inventor	Invention	Year of Grant	Year of Expiry
Leslie S.Johnson,Ling Huang,Nadine Tuaillon & Ezio Bonvini	HER2/NEU - Specific Antibodies & methods of using the same.	August 12,2014	-
Luren K.Roth	Determination of regulatory review period for purposes of patent extension,Margenza	June 24,2022	Sep 7,2022

VI. CONCLUSION

Margetuximab is approved in the USA for patients with HER2-positive MBC, after receipt of two or more prior anti-HER2 therapies, based on data from the pivotal clinical trial SOPHIA. In this study, discuss with the details involved in the margetuximab drug, such as discovery & history, physicochemical properties, pharmacokinetic properties, mechanism of action, synthesis, medicinal uses, adverse effects, treatment of overdoses, contraindications, interactions, conventional marketed formulations & patents. The same will be very effective for the treatment of cancer. The above studies have substantially confirmed the breast cancer cell growth suppression ability of targeted nano-complexes.

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