

PATENT STUDY

ON

IMMUNOTHERAPY

FOR

BREAST CANCER



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PREFACE

TITLE	SLIDE No.
Breast Cancer	02
Facts about Breast Cancer	03
Breast Cancer – Signs/ Symptoms	04
Treatment Options – Breast Cancer	05
Immunotherapy	06
Why immunotherapy	07
Types of Immunotherapy	08
Immunotherapy options – Breast Cancer	09
Immunotherapy (Approved) Molecules – Breast Cancer	10
Patent Study – Breast Cancer Immunotherapy Treatment	11
Top Players	12
Top Inventors	13
Publication Trend	14
Country wise – Patent Distribution	15
Most Cited Patents	16

BREAST CANCER

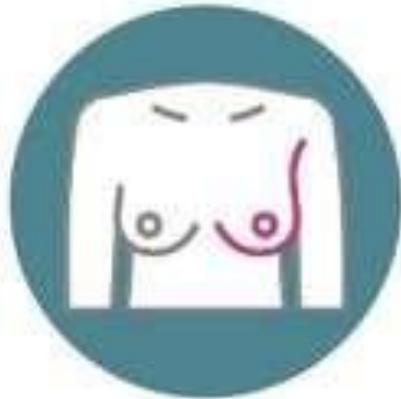


- 1 Breast cancer is cancer that forms in the cells of the breasts
- 2 Breast cancer is the most common invasive cancer in women
- 3 Breast cancer can occur in both men and women, but it's far more common in women
- 4 cancer death in women after lung cancer

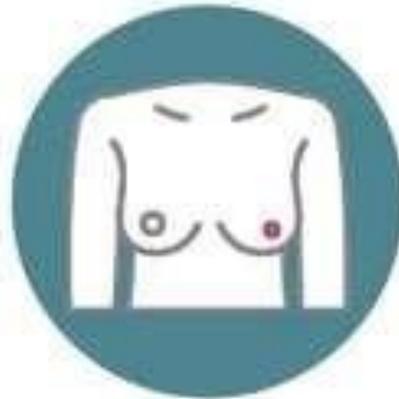
FACTS ABOUT BREAST CANCER

- ❖ A **Global Burden**: According to the World Health Organization, breast cancer is the most common cancer among women worldwide, claiming the lives of hundreds of thousands of women each year and affecting countries at all levels of modernization
- ❖ **1 in 8 Women** in the United States will develop breast cancer in her lifetime
- ❖ On average, **every 2 minutes** a woman is diagnosed with breast cancer in the United States
- ❖ Female breast cancer represents **15.2%** of all new cancer cases in the U.S
- ❖ Types of breast cancer include **ductal carcinoma in situ, invasive ductal carcinoma, inflammatory breast cancer,** and **metastatic breast cancer**
- ❖ In **2019**, an estimated 268,600 new cases of invasive breast cancer will be diagnosed in women in the U.S. as well as 62,930 new cases of non-invasive (in situ) breast cancer.
- ❖ An estimated **2,670 men** will be diagnosed with breast cancer this year in the United States and approximately 500 will die

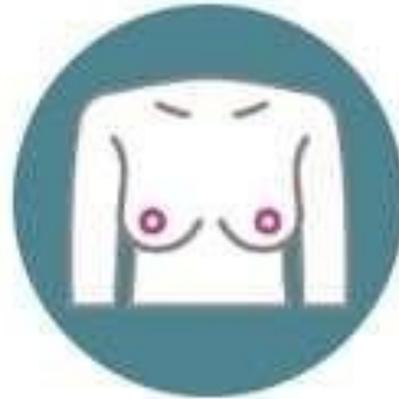
BREAST CANCER – SIGNS/ SYMPTOMS



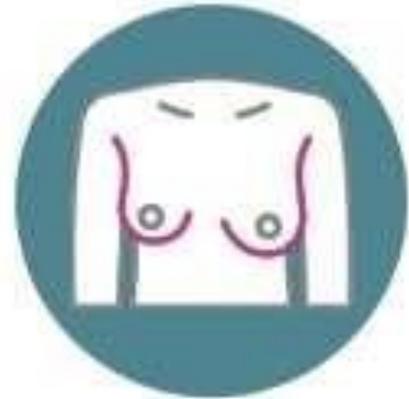
Constant breast or nipple **pain**



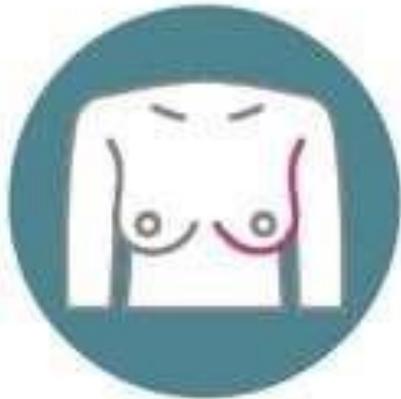
Nipple is **inverted** (turning inward)



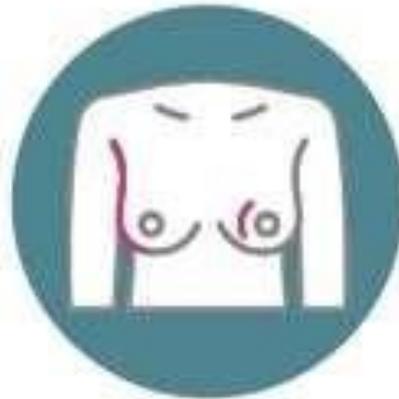
Rash or **color** on skin around nipple



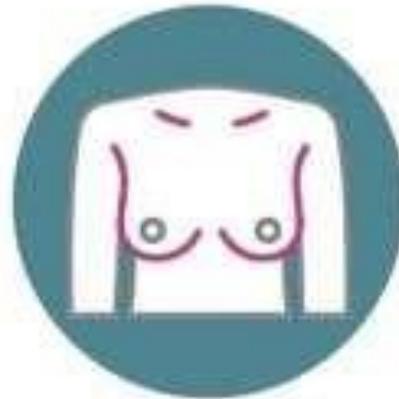
Change in **size** or **shape** of breast



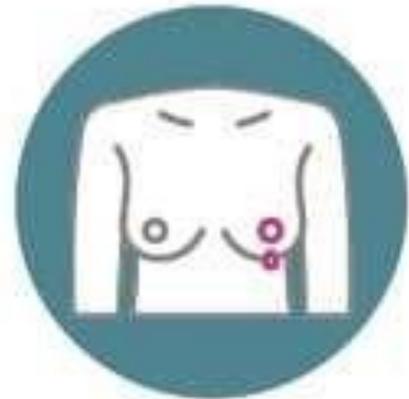
Dimpling or change in skin texture



Lump or **thickening** in breast or underarm



Swelling of all or part of breast area



Unusual **discharge** from nipple

TREATMENT OPTIONS – BREAST CANCER



 **Chemotherapy**

Treatment of cancer by the use of Chemical Substances as an infusion Into the Vein or in pill/capsule Forms

 **Surgery**

A Surgery to remove cancer or other Abnormal tissues from the breast. It could be either Mastectomy (complete removal of the Breast) or Lumpectomy (Removal of a portion of the Breast)

 **Radiotherapy**

Radiotherapy makes use of Radiation, Such as high – energy X-rays, Gamma rays, Electron beams or Protons to kill or damage Cancer cells and stop them from growing and multiplying

 **Hormonal therapy**

Hormonal therapy is a treatment that adds, blocks or removes hormones to slow or stop the growth of cancer cells that need hormones to grow.

 **Immunotherapy**

Immunotherapy enhances the immune system’s ability to recognize, target, and eliminate cancer cells, wherever they are in the body, making it a potential universal answer to cancer

IMMUNOTHERAPY

Cancer immunotherapy, also known as immuno-oncology, is a form of cancer treatment that uses the power of the body's own immune system to prevent, control, and eliminate cancer

WHY IMMUNOTHERAPY

Immunotherapy has potential to treat all cancers

Cancer immunotherapy offers the possibility for long-term cancer remission

Cancer immunotherapy may not cause the same side effects as chemotherapy and radiation

Cancer immunotherapy can work on many different types of cancer

Educate the immune system to recognize and attack specific cancer cells

WHY



*IMMUNO-
THERAPY*

❖ Immunotherapy for breast cancer is developing rapidly as new studies demonstrate improved outcomes in subsets of breast cancer

TYPES OF IMMUNOTHERAPY

Cancer vaccines are a form of immunotherapy that can help educate the immune system about what cancer cells “look like” so that it can recognize and eliminate them.

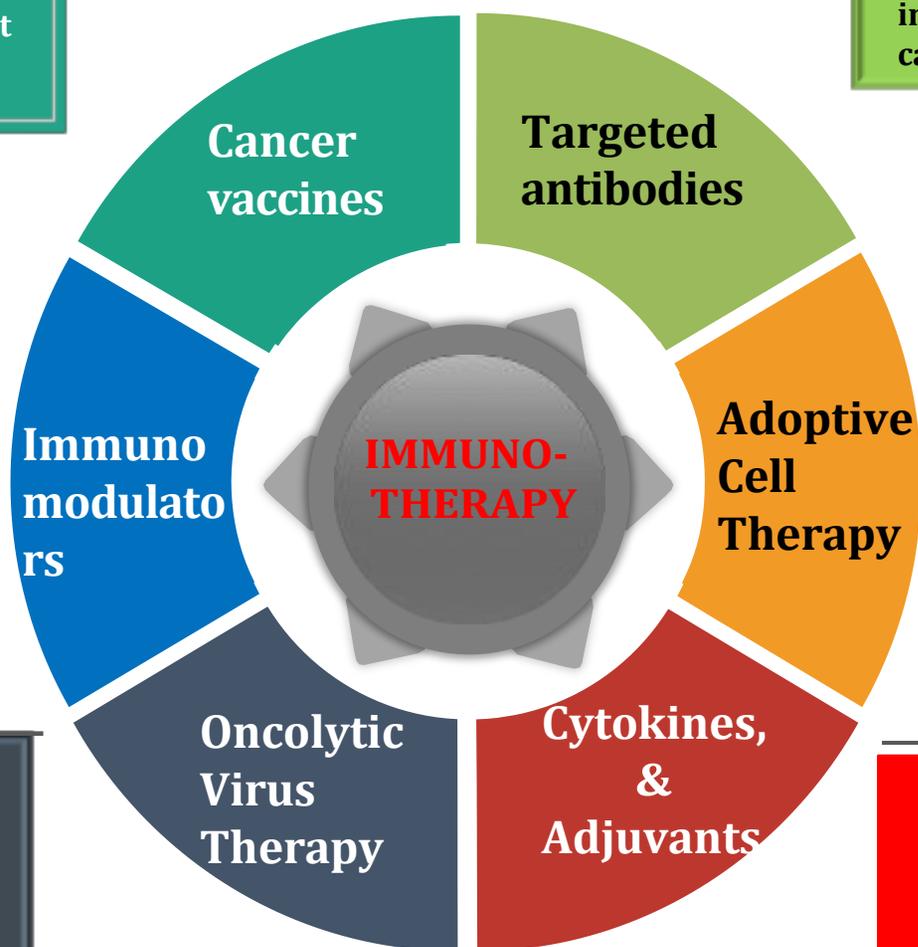
Targeted Antibodies are a type of Immunotherapy that can disrupt cancer cell activity and alert the immune system to attack cancer

Immunomodulators are a form of immunotherapy that manipulate the “gas pedals” and “brakes” of the immune system to fight cancer

Adoptive cell therapy, also known as cellular immunotherapy, is a form of treatment that uses the cells of our immune system to eliminate cancer

Oncolytic Virus Therapy uses modified viruses that can infect and destroy tumour cells

Pro-inflammatory cytokines can contribute to cancer immunotherapy, acting on every phase of the cancer immunity cycle.



IMMUNOTHERAPY OPTIONS FOR BREAST CANCER

- ❖ There are currently *two approved* (by FDA) *Immunotherapy* options for patients with tumours that overexpress a protein receptor called *HER2* (HER2 3+, or FISH-positive)

IMMUNOTHERAPY OPTIONS

Targeted Antibodies

- ❖ Pertuzumab (Perjeta®)
- ❖ Trastuzumab (Herceptin®)
- ❖ Trastuzumab deruxtecan (Enhertu™)
- ❖ Trastuzumab emtansine (Kadcyla®)
- ❖ Lapatinib (Tykerb)

Immunomodulators /Checkpoint Inhibitors

- ❖ Atezolizumab (Tecentriq®)

IMMUNOTHERAPY MOLECULES FOR BREAST CANCER

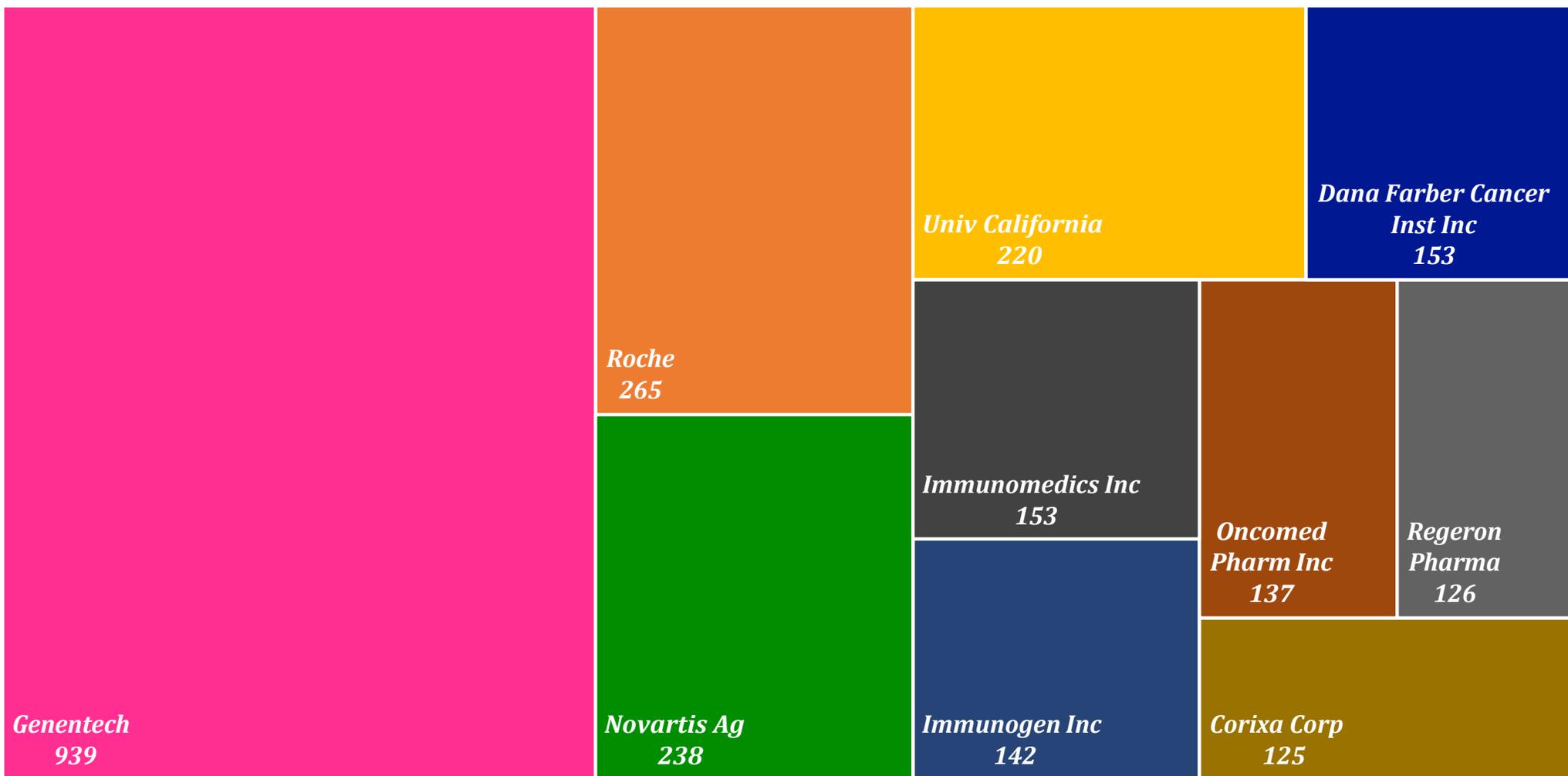
Molecule	Use	Company
Targeted Antibody		
Pertuzumab (Perjeta®)	A monoclonal antibody that targets the HER2 pathway; approved for early-stage, HER2-positive breast cancer after surgery	Roche/ Genentech
Trastuzumab (Herceptin®)	A monoclonal antibody that targets the HER2 pathway; approved for early-stage, HER2-positive breast cancer after surgery	Roche/ Genentech
Trastuzumab deruxtecan (Enhertu™)	An antibody-drug conjugate that targets the HER2 pathway and delivers toxic drugs to tumors; approved for subsets of patients with advanced, HER2-positive breast cancer	Daiichi Sankyo
Trastuzumab emtansine (Kadcyla®)	An antibody-drug conjugate that targets the HER2 pathway and delivers toxic drugs to tumors; approved for subsets of patients with HER2-positive breast cancer	Roche/ Genentech
Immunomodulators		
Atezolizumab (Tecentriq®)	A checkpoint inhibitor that targets the PD-1/PD-L1 pathway; approved in combination with the chemotherapy Abraxane® (nab-paclitaxel) for subsets of patients with advanced triple-negative breast cancer (TNBC)	Roche/Genentech

IMMUNOTHERAPY TREATMENT

In this Patent Study, we aimed at

- **Top players** in Breast Cancer - Immunotherapy treatment
- **Top Inventors**
- **Patent Publication trends** till 2019
- Which are the **Jurisdictions top players** aimed at
- Which are **the most cited patent references**

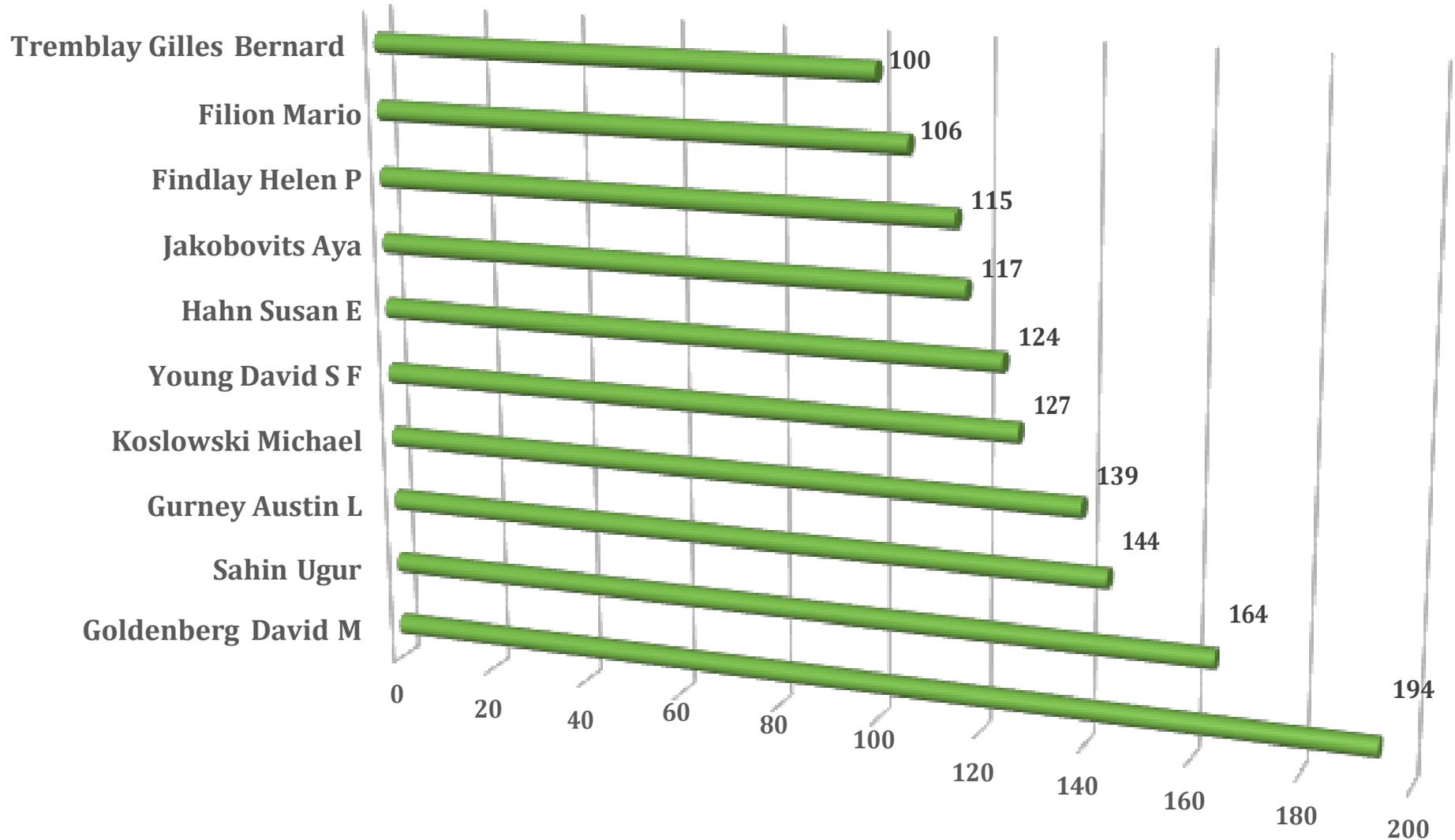
TOP PLAYERS



Genentech (Acquired by Roche) is the innovator company in generating Immunotherapy molecules for Breast Cancer

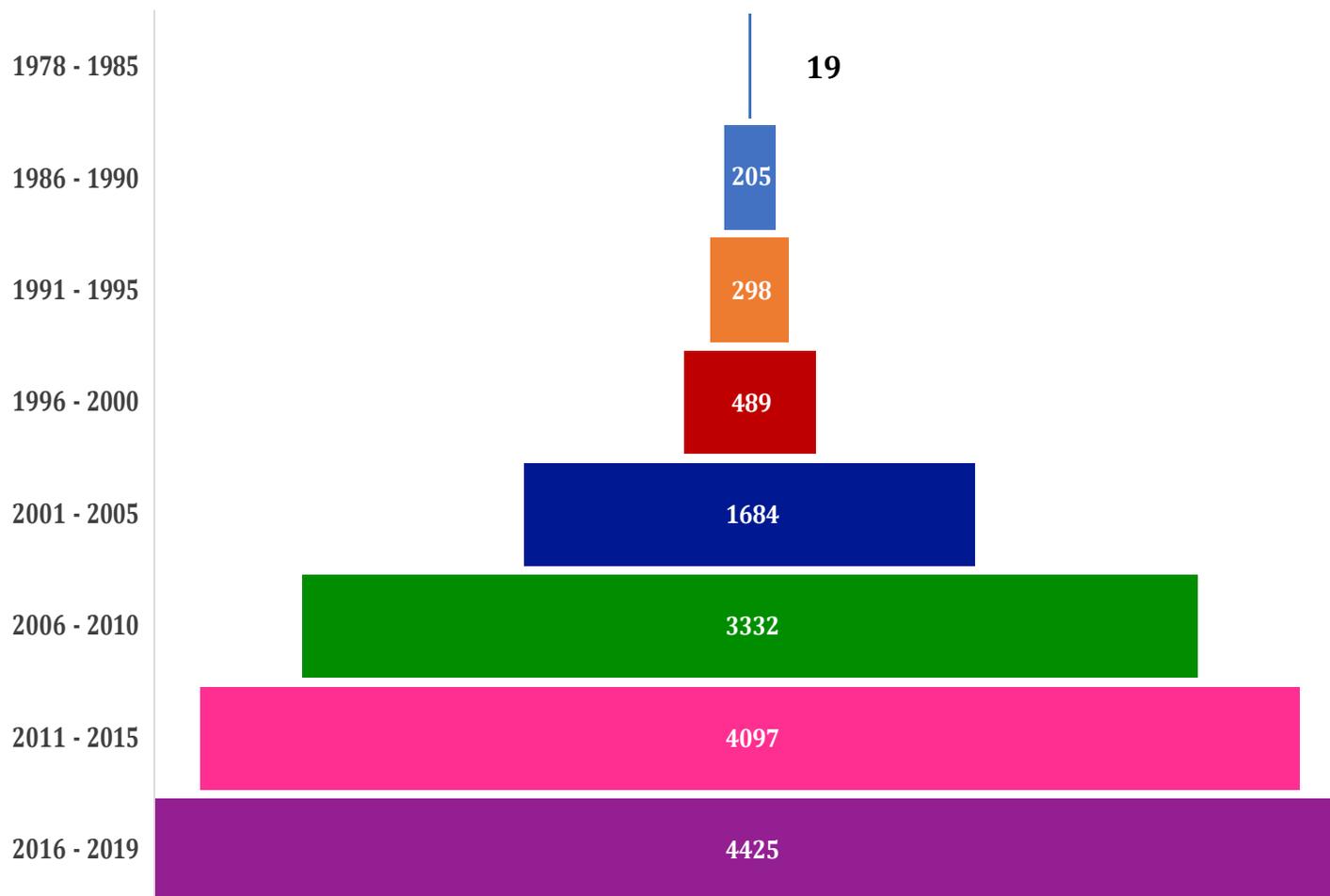
- ❖ Novartis Ag is also possess considerable amount of Patents filings in this domain
- ❖ Univ California, Dana, Immunomedics are also actively filing patent applications

TOP INVENTOR



Goldenberg seen as most active inventor in this domain followed by Sahin Ugur and Gurney Austin

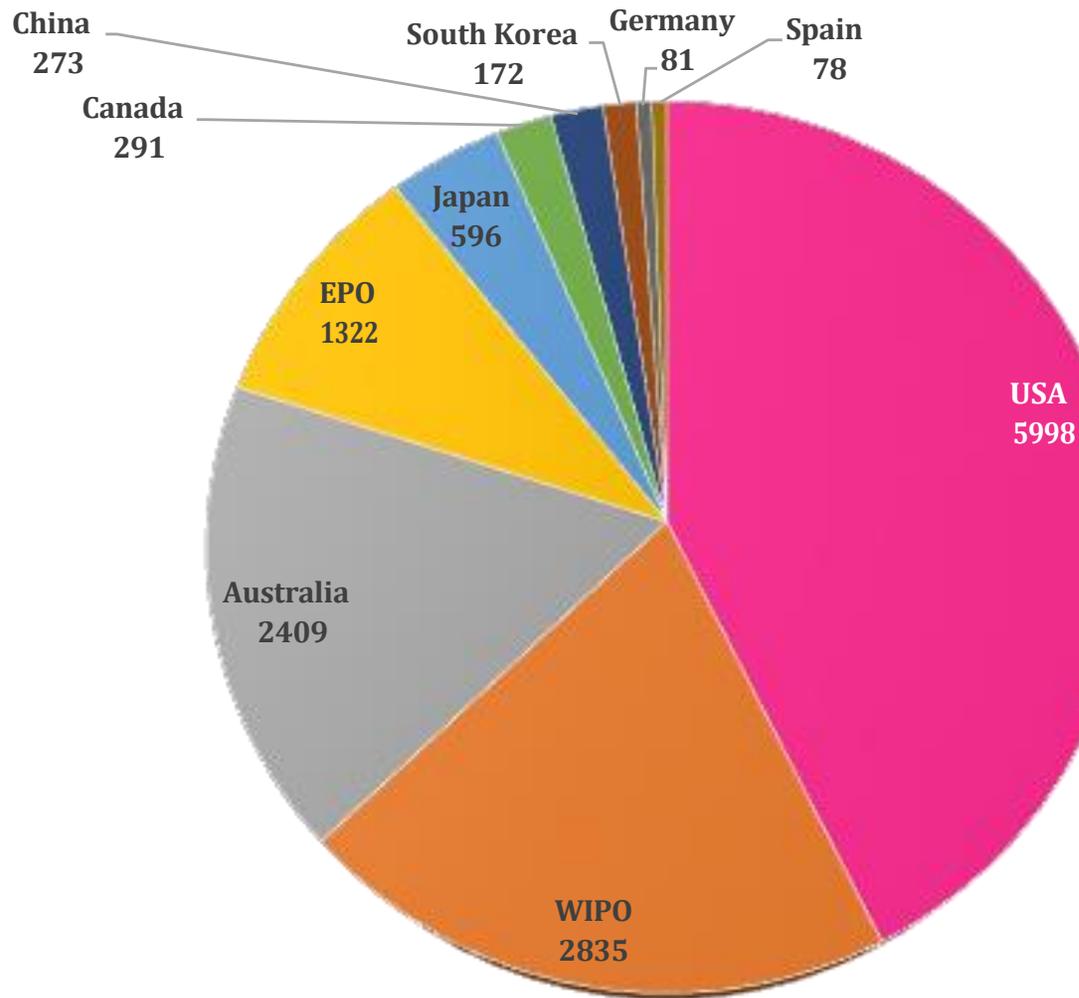
PUBLICATION TREND



Study growth been observed in Number of Patent publications from 1978 to 2019

- ❖ This trends indicates most of the competitors considering Immunotherapy as one of the best medicine to treat Breast Cancer

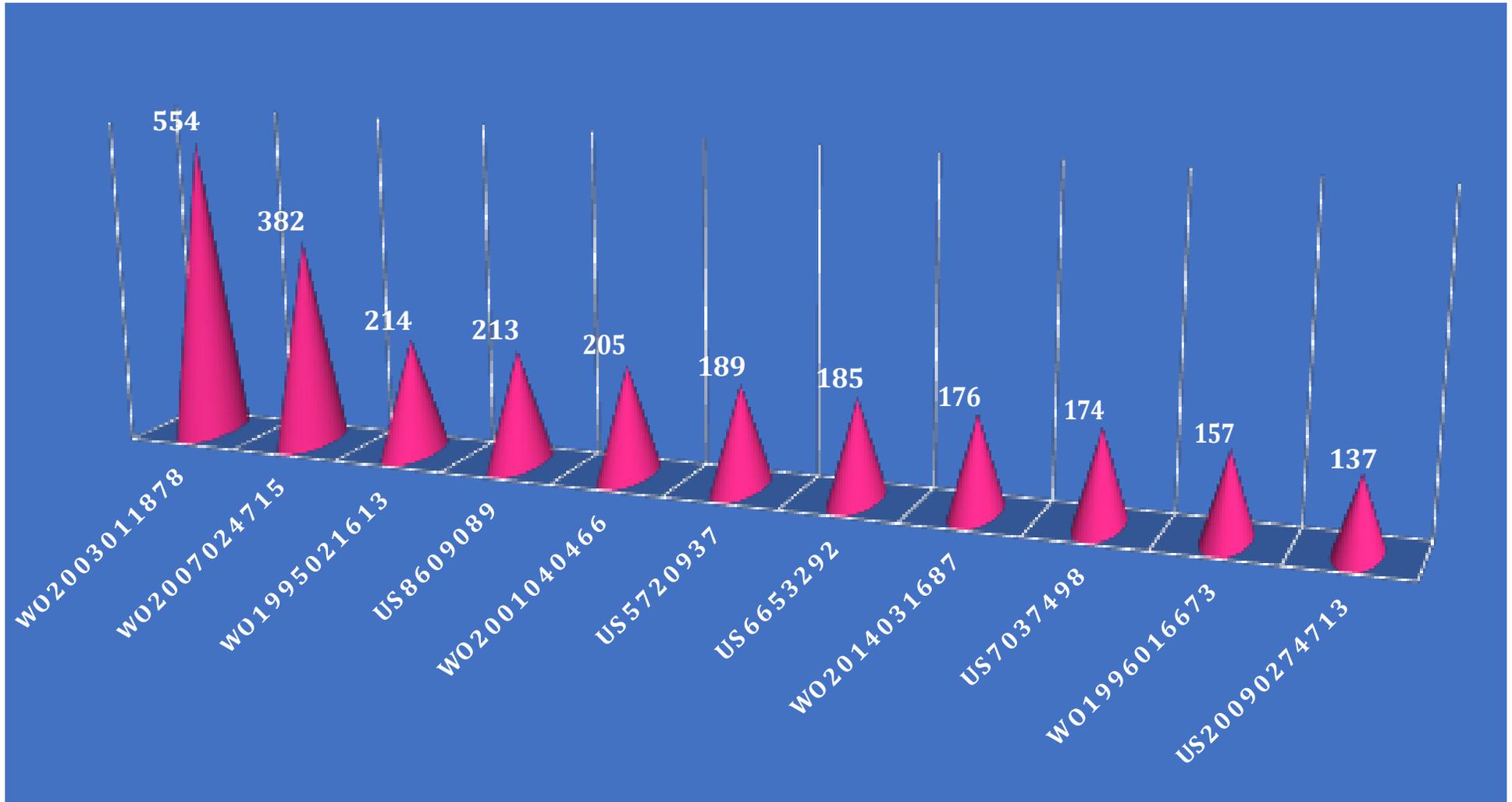
COUNTRY WISE – PATENT FILING



USA appears to be the potential market where most of the filed activity observed

❖ Australia and Europe followed USA.

MOST CITED PATENTS



WO2003011878 of GLYCART BIOTECHNOLOGY AG appears to be the most cited patent application

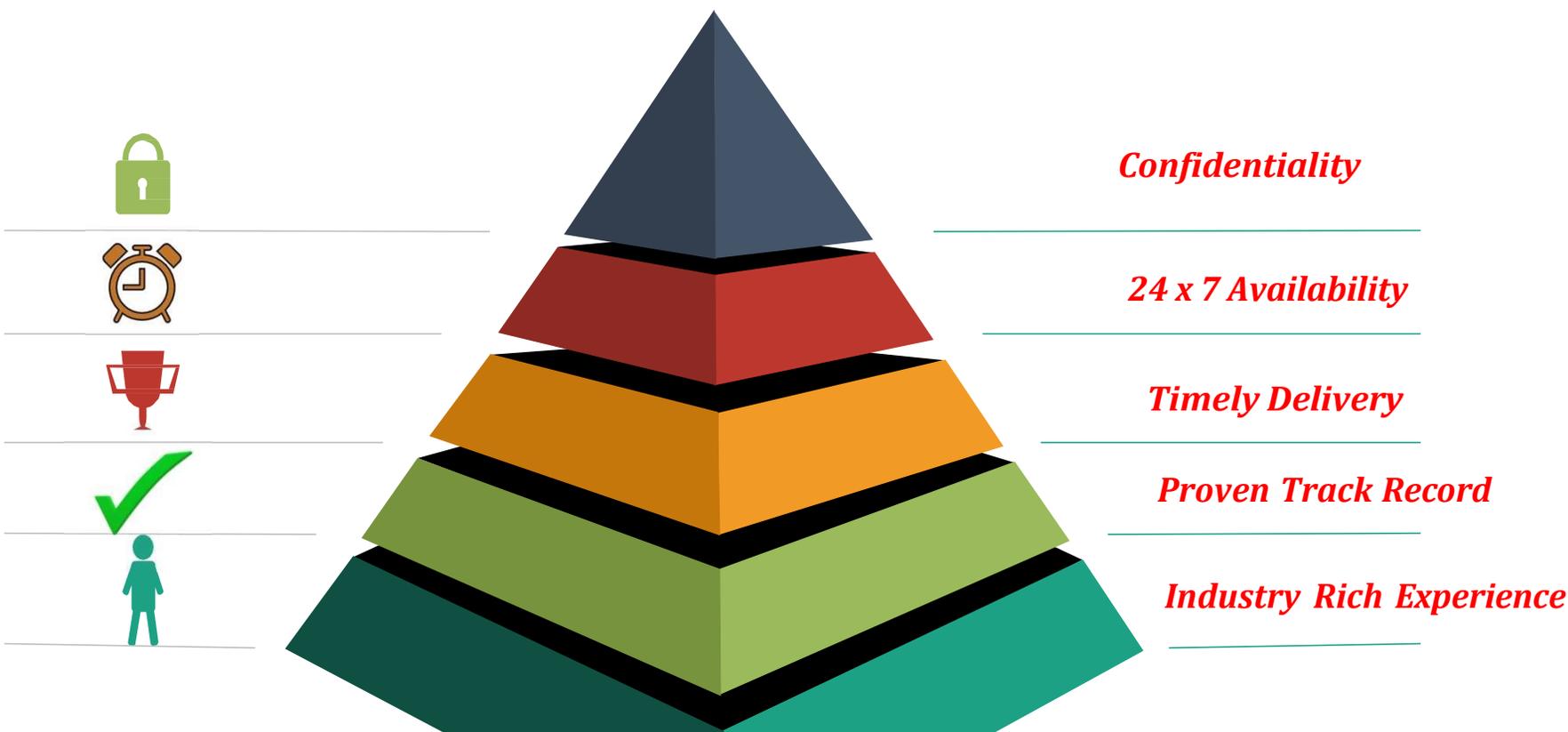
- ❖ '878 application teaches on glycosylation engineering to generate proteins with improved therapeutic properties, including antibodies with increased antibody-dependent cellular cytotoxicity.

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