

# **Cancer Immunotherapy and Halal Products: Integrating Advanced Medical Treatments with Halal Compliance**

Bridging Advanced Medical Treatments with Halal Compliance

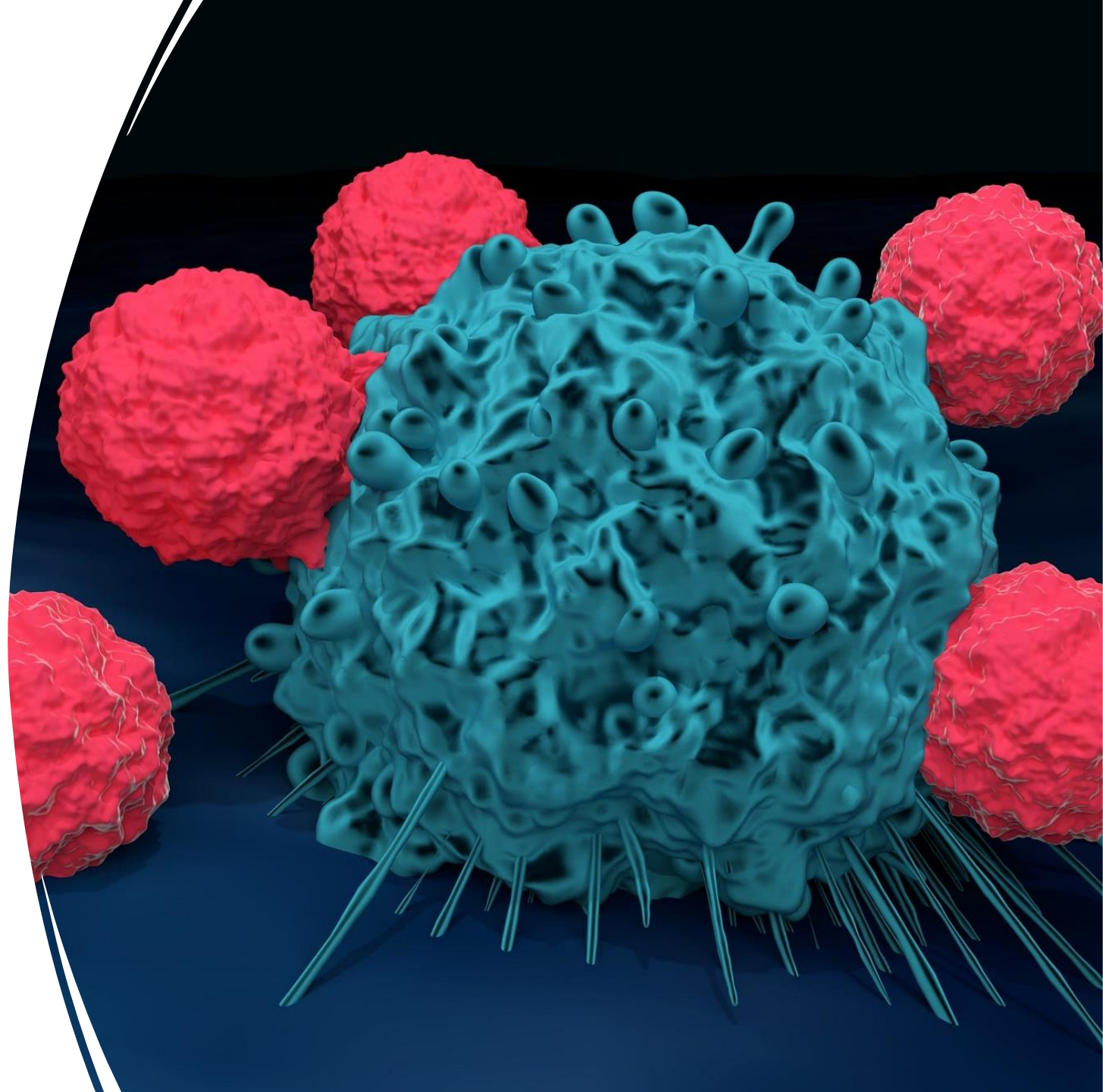
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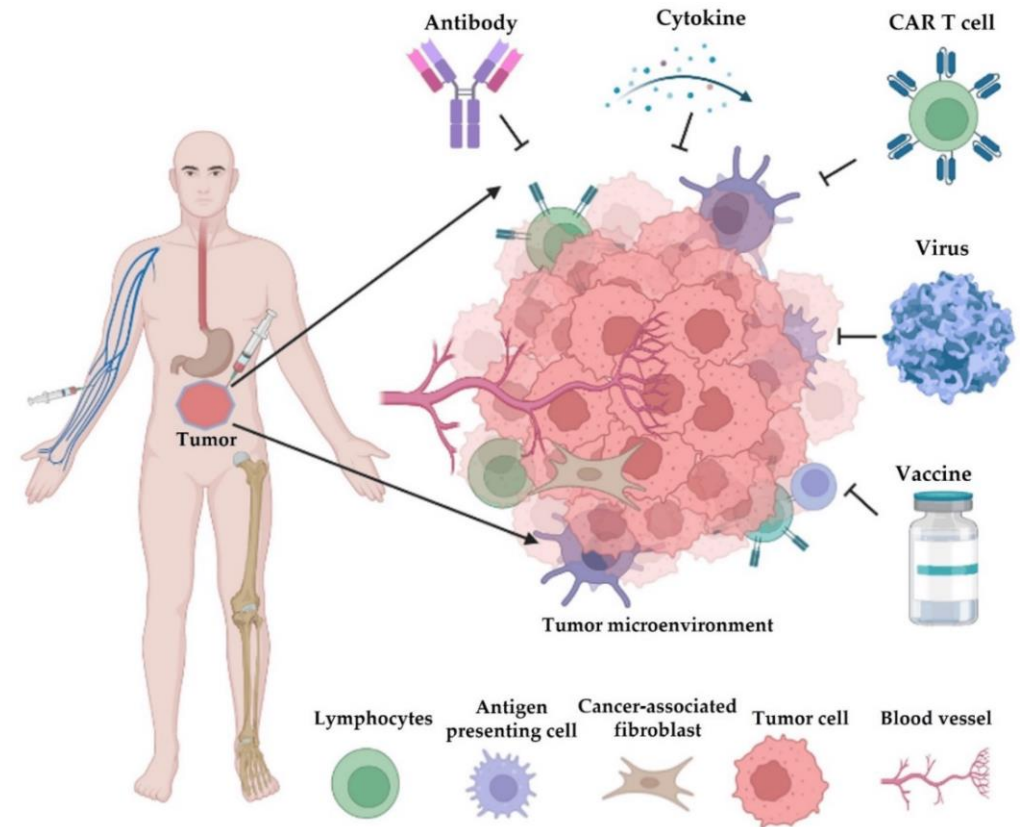
- **What is Cancer Immunotherapy?**

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- Utilizes the immune system to fight cancer
  - More effective with fewer side effects compared to traditional treatments

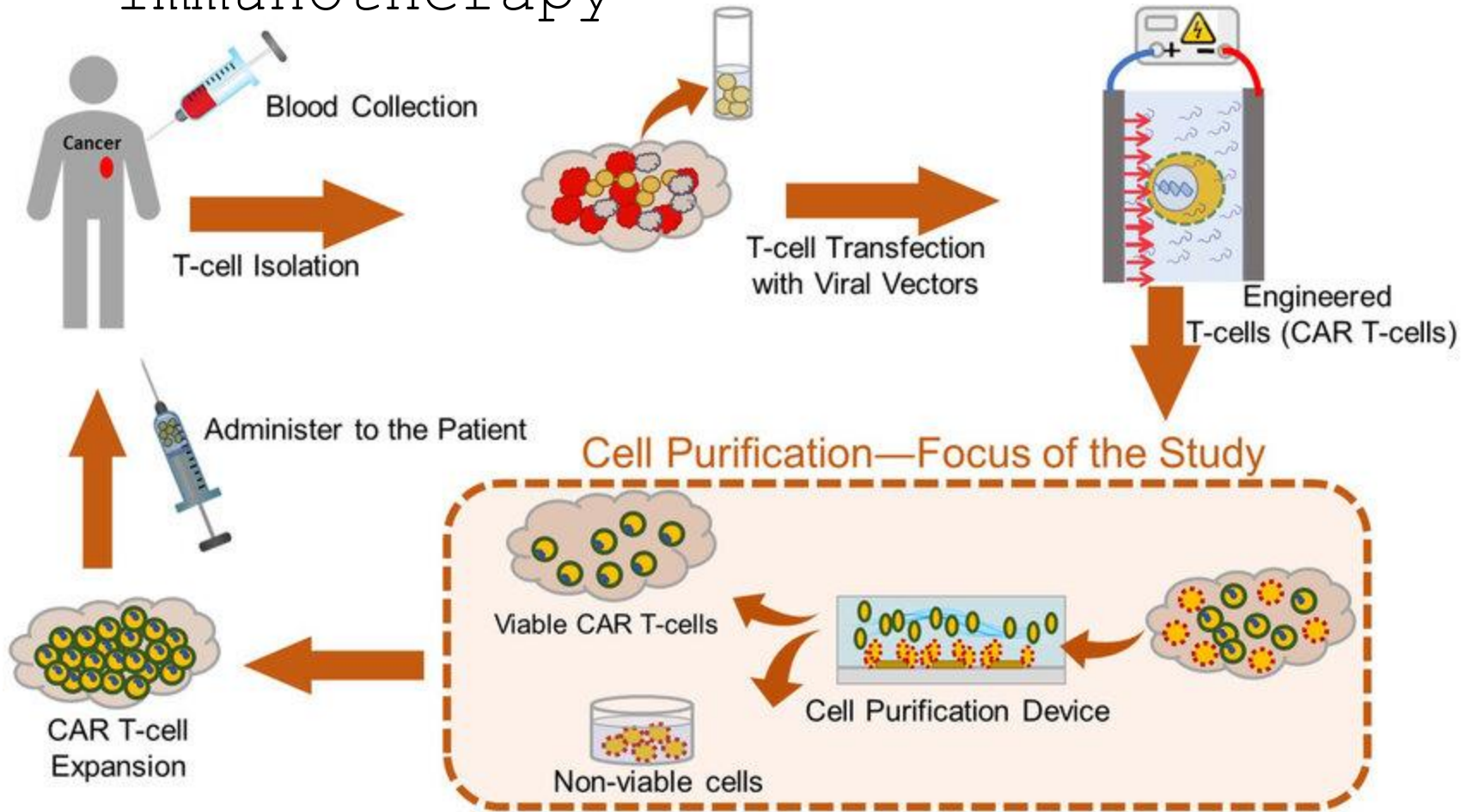


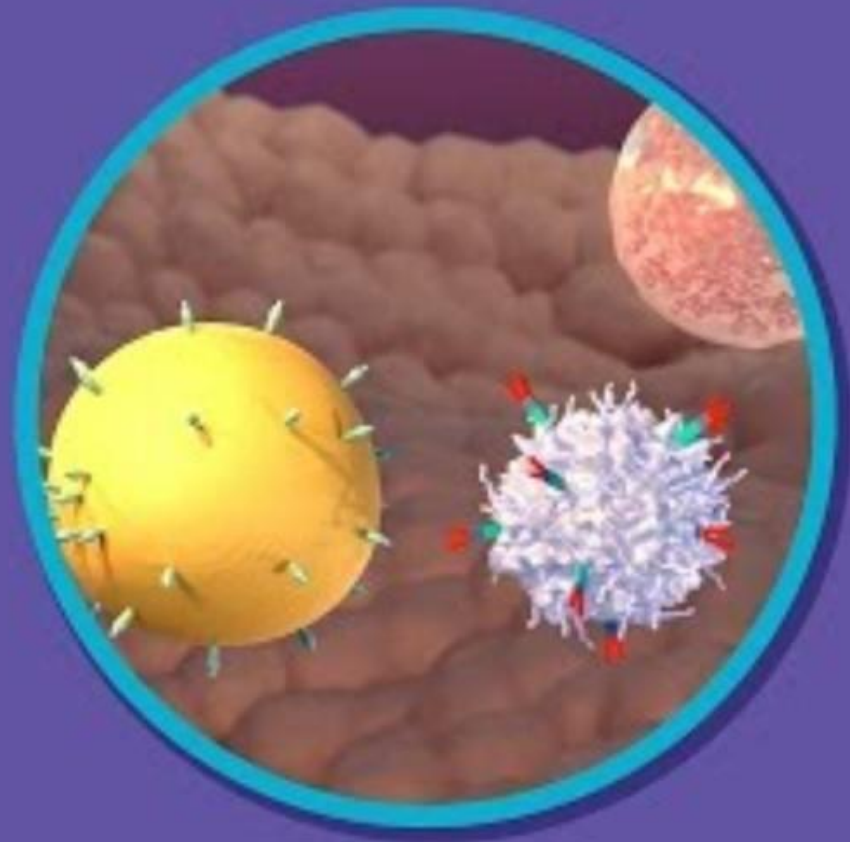
- **Types of Cancer Immunotherapy**


- Monoclonal Antibodies: Target specific proteins on cancer cells
- Immune Checkpoint Inhibitors: Enhance immune response
- Cancer Vaccines: Stimulate the immune system
- CAR T-Cell Therapy: Genetically engineered T-cells



# Procedures for cancer Immunotherapy





 NATIONAL CANCER INSTITUTE

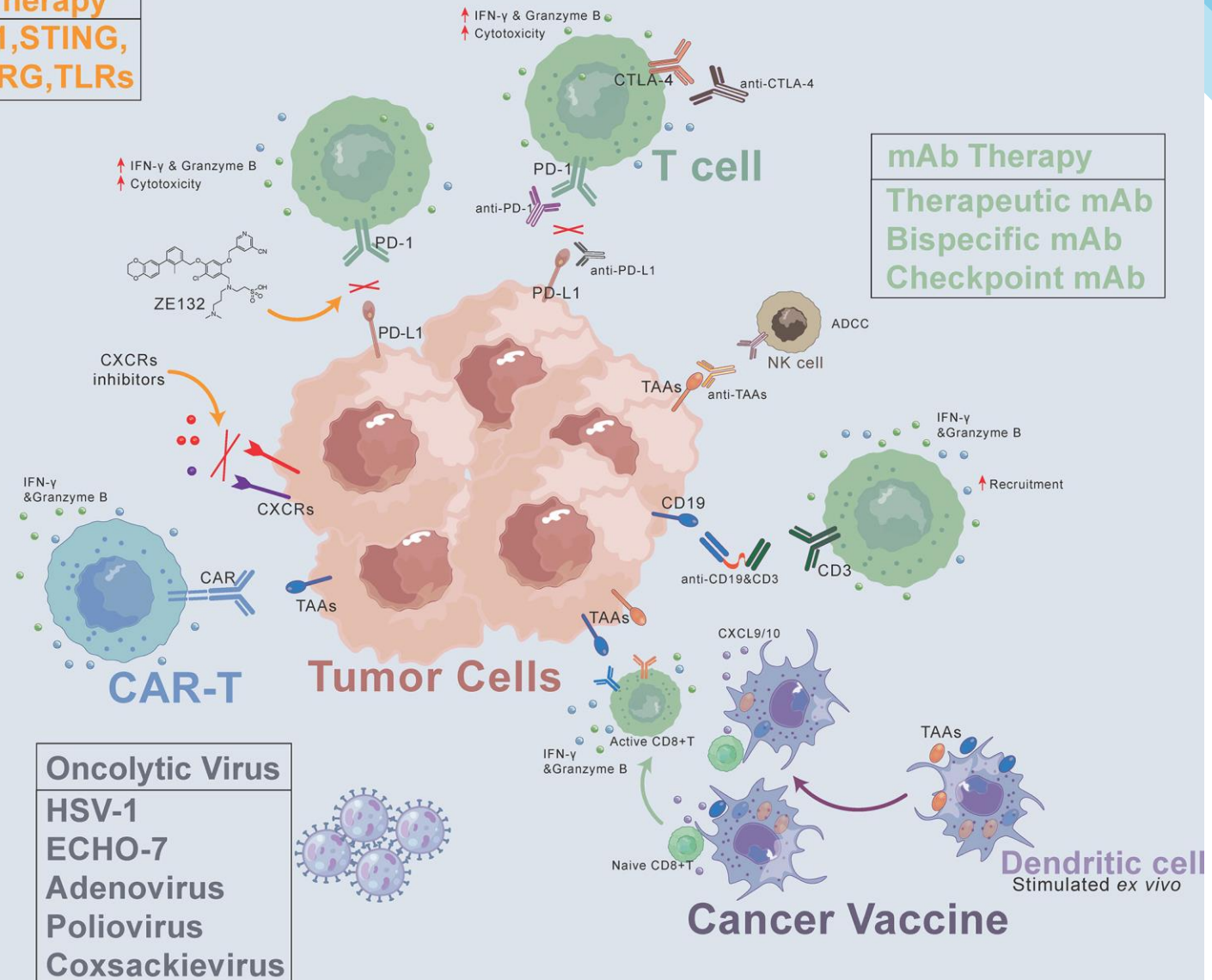
## Immunotherapy: How the Immune System Fights Cancer

**Small Molecule Therapy**  
**PD-1/PD-L1, IDO1, STING,**  
**A2AR, CXCRs, ARG, TLRs**

**mAb Therapy**  
**Therapeutic mAb**  
**Bispecific mAb**  
**Checkpoint mAb**

**Adoptive Cell Therapy**  
**CAR-T**  
**TCR-T**  
**TILs**  
**CAR-NK**

**Oncolytic Virus**  
**HSV-1**  
**ECHO-7**  
**Adenovirus**  
**Poliovirus**  
**Coxsackievirus**



## What Makes a Product Halal?

- Definition of halal products
- Importance of halal certification for Muslims
- Halal in pharmaceuticals

# Biologics manufacturing Process

## Preclinical and Development

Biologics are usually made by growing cultures of the target v these cultures may contain animal products:

- Animal cell lines
- Human cell lines
- Animal products; trypsin, serum

Final biologics product may contain animal products, e.g.  
Gelatin derived from Pigs

# Animal Ingredients in Vaccines

Ingredient	What is it?	Used in...
<b>Squalene Oil</b>	An oil that occurs naturally in humans, plants and animals, for a particular flu vaccine the oil is obtained from purified fish oil	MF59 flu vaccine
<b>Gelatine</b>	Derived from the collagen from pigs and is used as a stabiliser for some vaccines	MMR vaccine; children's nasal flu vaccines; shingles vaccine
<b>Human Serum Albumin</b>	A protein obtained from (donated) human blood that is used as a stabiliser in some vaccines	Chickenpox vaccine
<b>Lactose</b>	Derived from milk whey, this sugar acts as a stabiliser in some vaccines	Various
<b>Egg Protein</b>	Flu virus can be grown on egg protein	Children's nasal flu vaccine; yellow fever vaccine
<b>Animal Cell Strains</b>	Cultures containing cells from animals that may include chick embryos, kidney cells from African green monkeys, various cells from cows or other animals	MMR vaccine; 4-in-1 pre-school booster vaccine; teenage booster vaccine; Rotavirus vaccine
<b>Human Cell Strains</b>	Cultures containing human cells are used to grow active ingredients for a number of vaccines	MMR vaccine; shingles vaccine; chickenpox vaccine

# Halal biologics from the Islam view point

Animal source in the vaccine process and development:

## Source of animal products

- Animal cell lines
- Human cell lines

## Animal products:

- Halal slaughter animals
- Animal that are halal to eat or haram e.g. pigs

# Why Halal biologics are important?

**Addressing the needs of diverse communities in health care globally;**

Global Muslim population 1.8 billion, which account of 24% of the world total population

55 countries considered to have a Muslim-majority

## **What is Halal?**

- Halal refers what is permissible or lawful according to Islamic law (Sharia)
- Halal are required for food, pharmaceuticals, and healthcare products
- Halal certification: absence of forbidden substances, processing in compliance with Islamic guidelines, and ethical sourcing
- Halal vaccines: vaccines that comply with Islamic dietary

# **Significance of Halal biologics for Muslim communities**

- **Religious obligation to seek halal products**

*“O mankind, eat from whatever is on earth [that is] lawful and good and do not follow the footsteps of Satan.*

*Indeed, he is to you a clear enemy” Quran.*

- **Overcoming hesitancy and increasing vaccine acceptance**

- **Respecting cultural and religious sensitivities**

# Halal certification process

- Thorough assessment of ingredients and manufacturing process
- Compliance with strict quality control standards
- Certification by recognized Halal certification bodies
- Regular audits and inspections to maintain compliance

# Ensuring Halal Compliance in Biologics Production

- Sourcing ingredients from Halal-certified suppliers
- Separation and traceability of Halal and non-Halal materials
- Use of Halal approved Halal processing aids
- Adherence to hygiene and ethics

# Addressing Controversial Ingredients in biolo

- Gelatin-derived from non-Halal
- Porcine-derived ingredients, e.g trypsin
- Alternative ingredients
- Development of synthetic substitutes

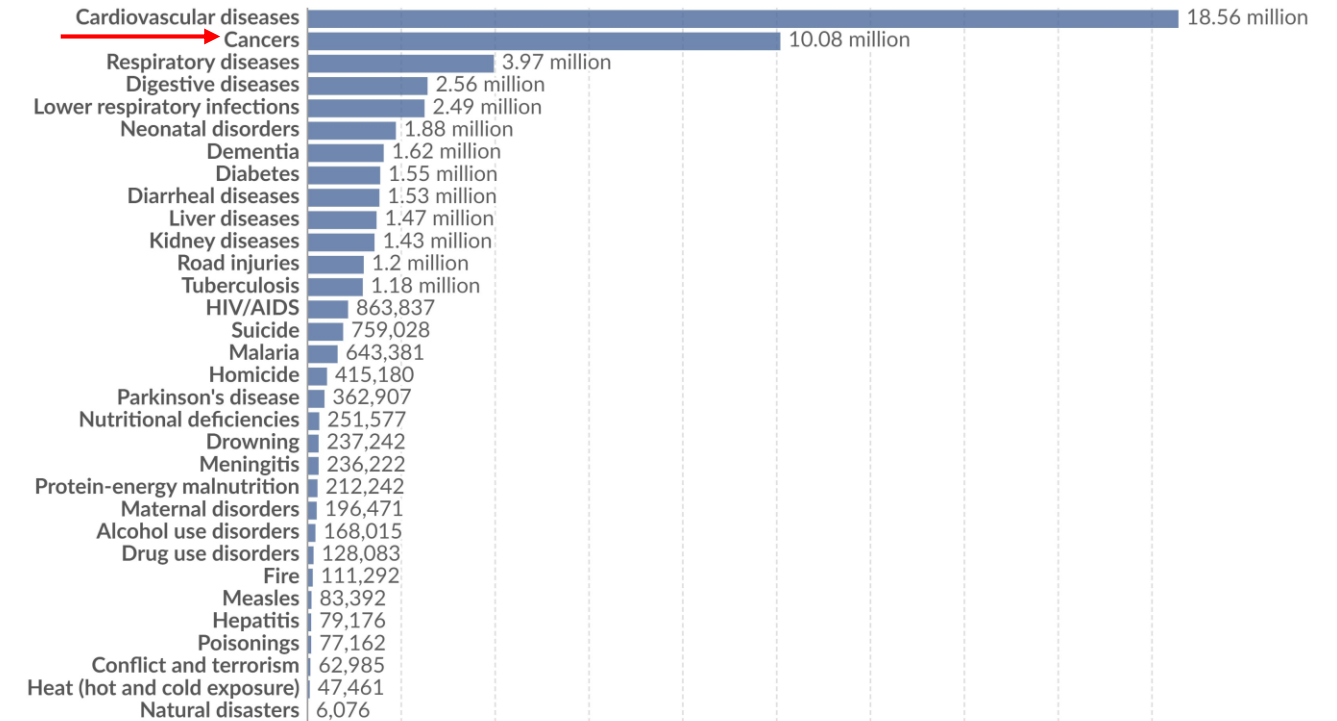
## Key Drivers and Trends in Cancer Immunotherapy

- Increasing Cancer Incidence
- Advancements in Immunotherapy
- Rising Investment in Research
- Growing Awareness and Adoption

## Causes of death, World, 2019

Our World  
in Data

The estimated annual number of deaths from each cause. Estimates come with wide uncertainties, especially for countries with poor vital registration<sup>1</sup>.



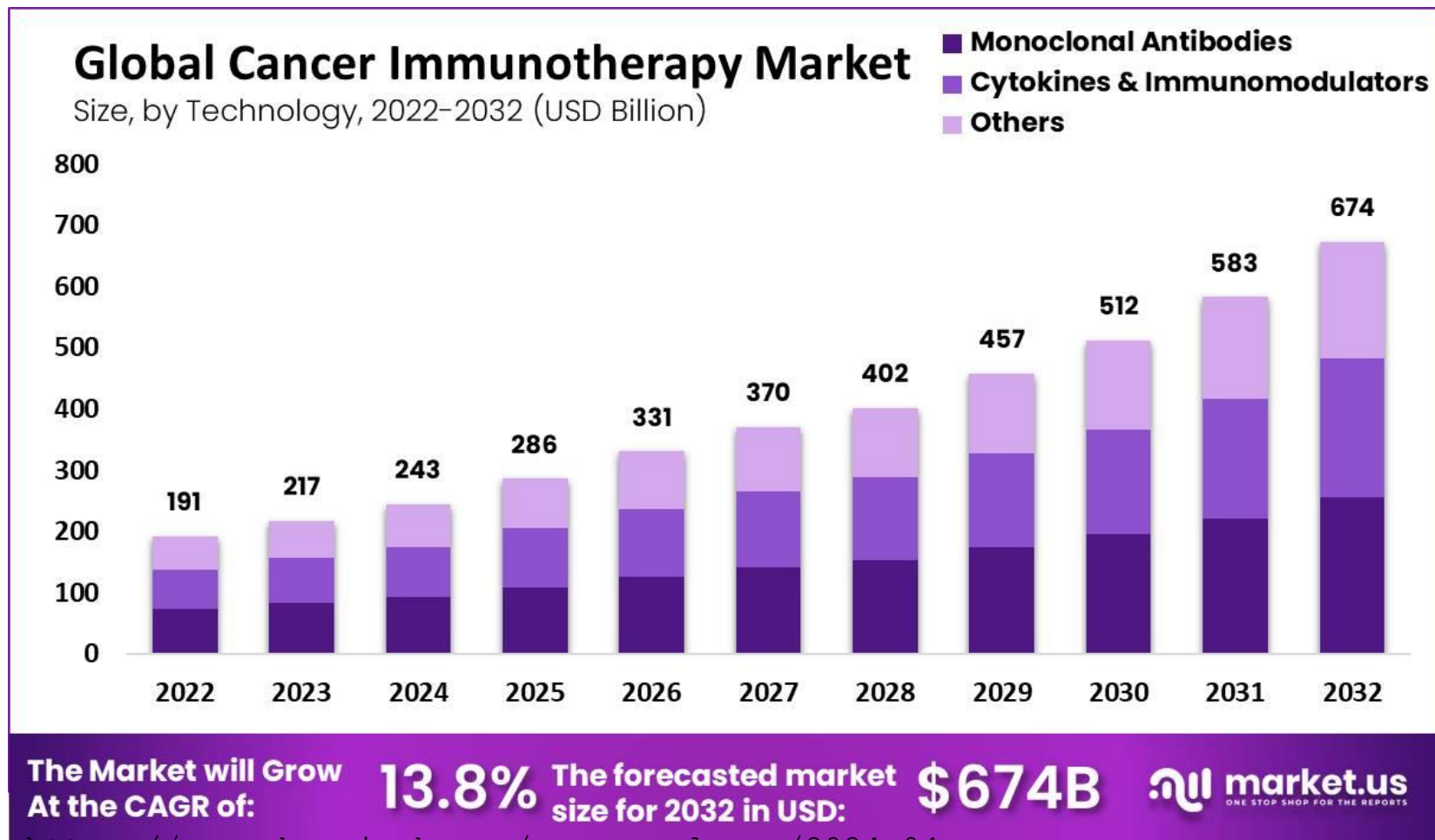
Data source: IHME, Global Burden of Disease (2019)

OurWorldInData.org/causes-of-death | CC BY

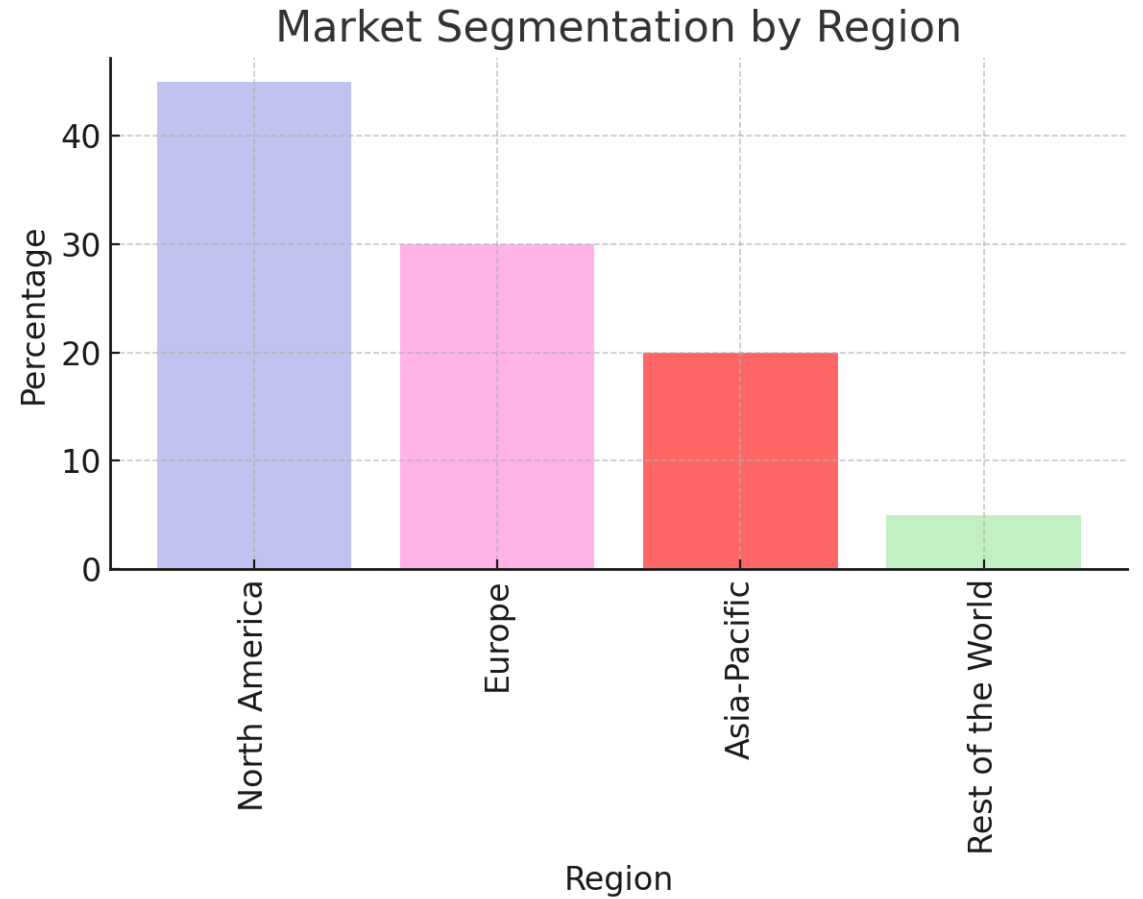
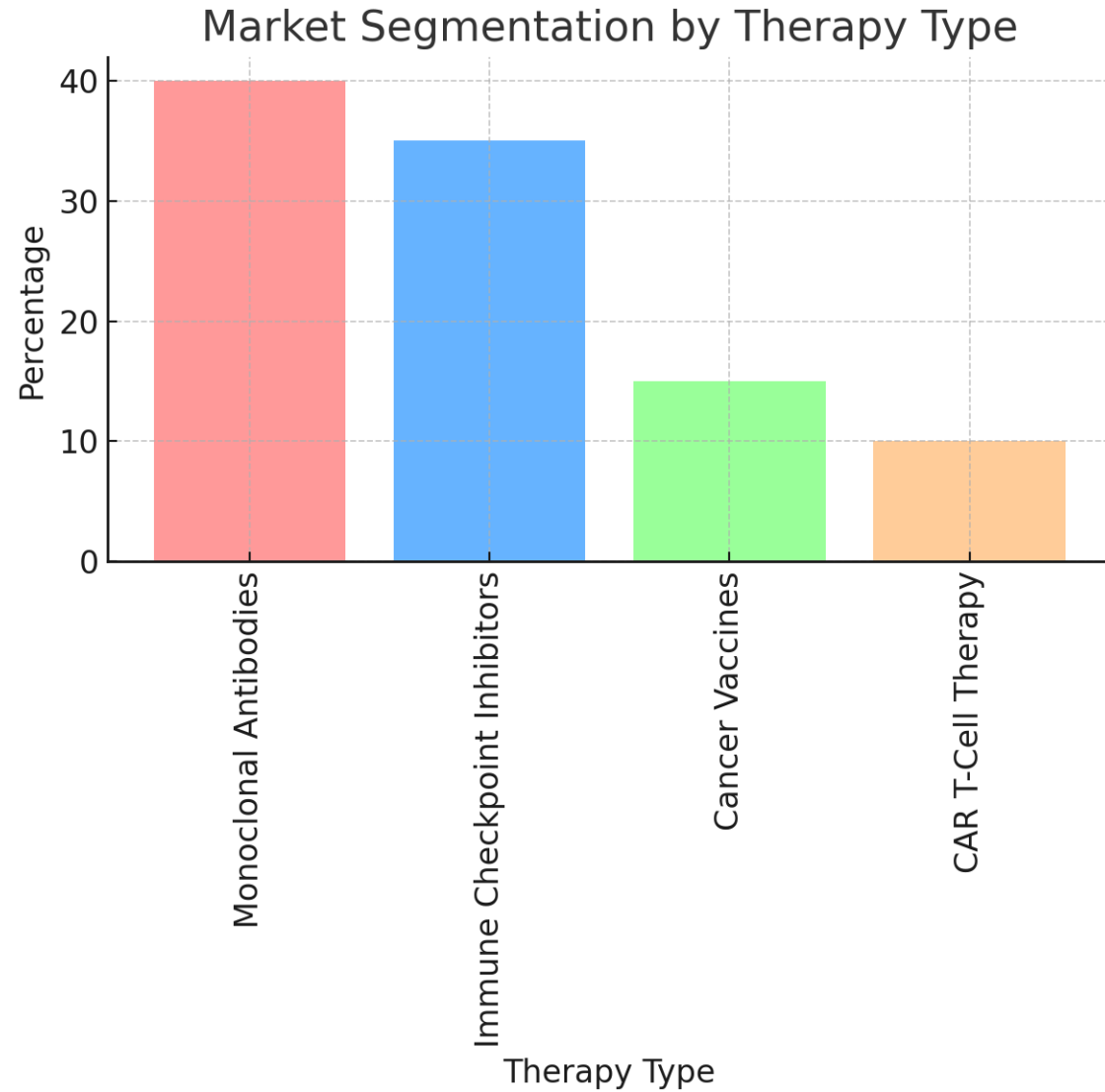
1. **Civil Registration and Vital Statistics system:** A Civil Registration and Vital Statistics system (CRVS) is an administrative system in a country that manages information on births, marriages, deaths and divorces. It generates and stores 'vital records' and legal documents such as birth certificates and death certificates. You can read more about how deaths are registered around the world in our article: How are causes of death registered around the world?

# The Current Market for Cancer Immunotherapy

- Global Market Size: \$100 billion (2023)
- Growth Rate: 13.3% CAGR (Compound Annual Growth Rate)
- Key Players: Merck, Bristol-Myers Squibb, Roche, Novartis



# Market Segmentation of Cancer Immunotherapy



## **Potential Value of Halal Immunotherapy**

- Access to a New Market Segment:  
Muslim population of 1.8 billion
- Increased Patient Trust and  
Compliance
- Ethical and Inclusive Healthcare
- Potential Market Size: \$10 billion

## **Benefits of Halal Immunotherapy**

- Enhanced Market Reach
- Increased Patient Satisfaction
- Compliance with Religious Beliefs
- Competitive Advantage

## **Future Prospects**

- Advancements in cancer immunotherapy
- Expanding halal certification in medical treatments
- Increasing global access to halal-compliant healthcare

*Thank you*