

# Johns Hopkins Engineering

## Immunoengineering

### Immunoengineering Cancer: Introduction

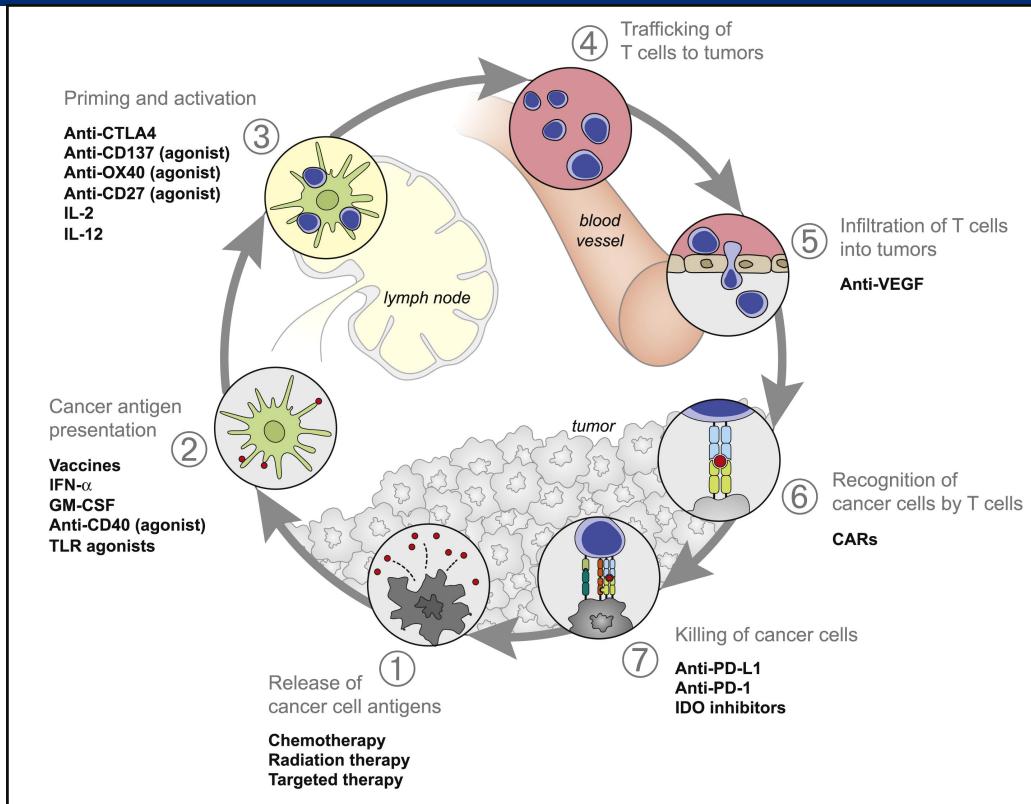


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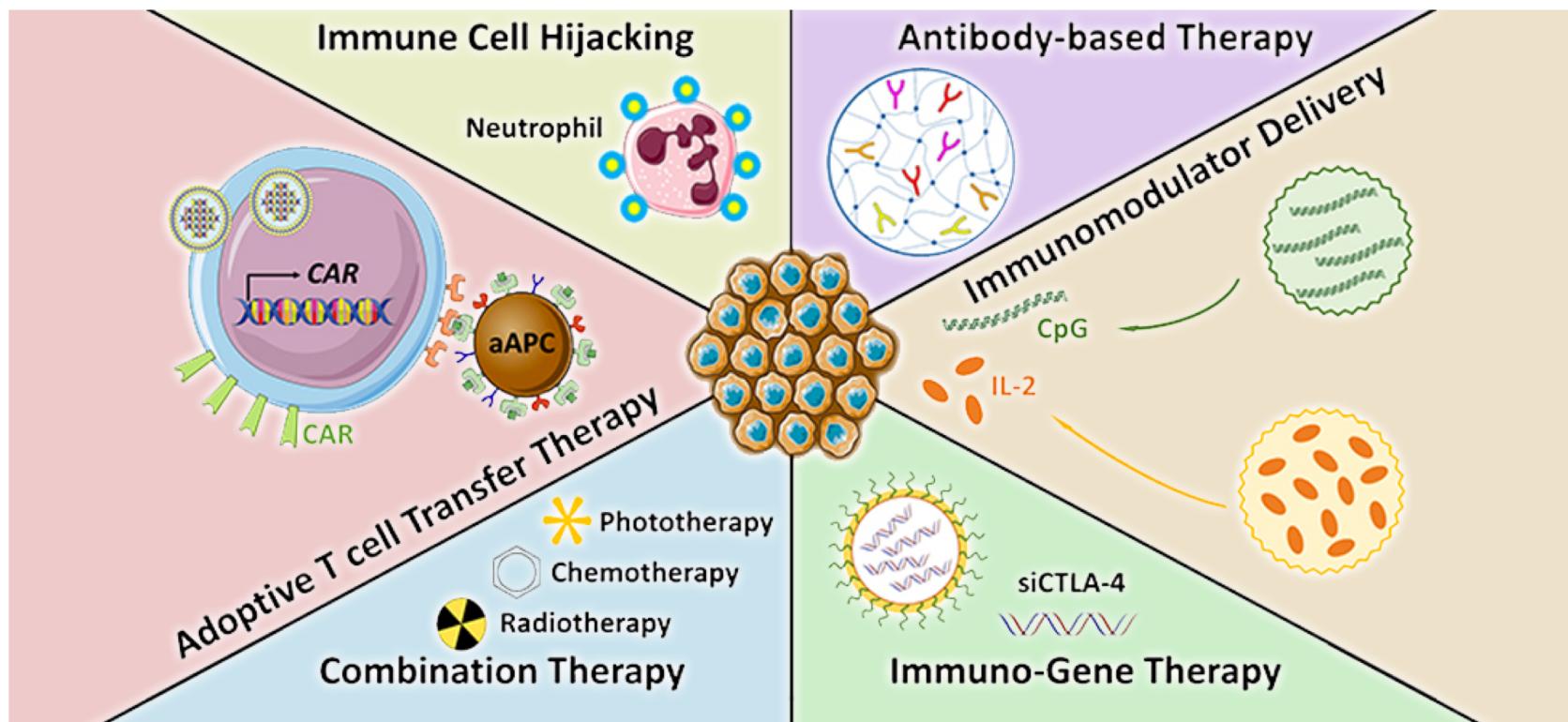
# Objectives

- Describe the different ways antibodies are utilized in cancer immunotherapy.
- Define the different types of cancer vaccine delivery approaches and their advantages and disadvantages.
- Explain how T cells can be modulated both *ex vivo* and *in vivo* to augment the immune response to cancer.
- Identify biomaterial properties that are important in cancer immunoengineering and their effects on responses to immunotherapies.
- Describe how immune cells can be modulated with engineering approaches to enhance cancer immunotherapy.

# Enhancing the Cancer Immunity Cycle



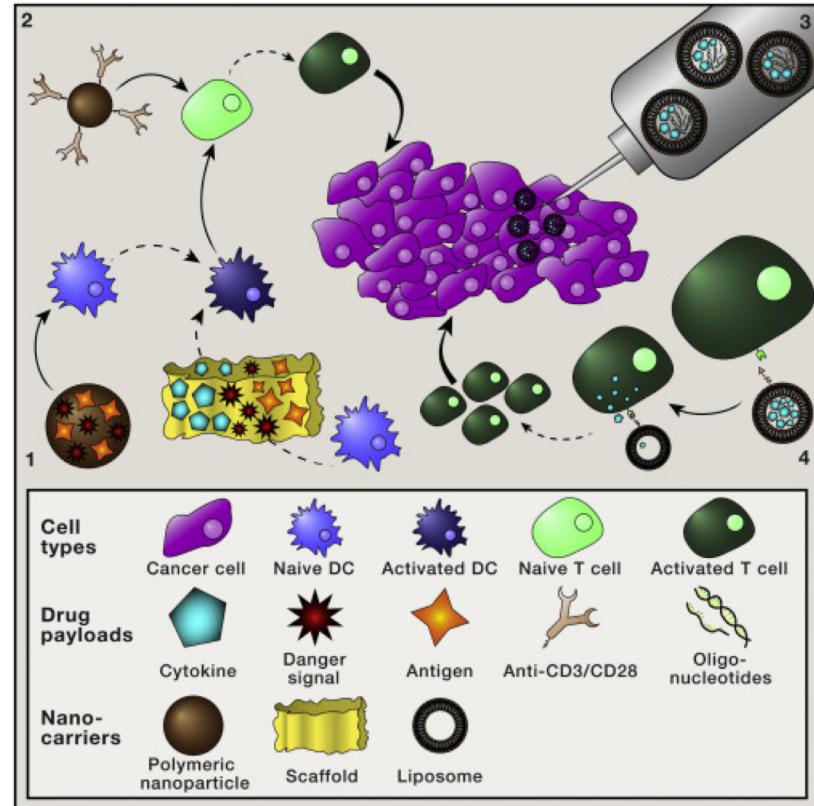
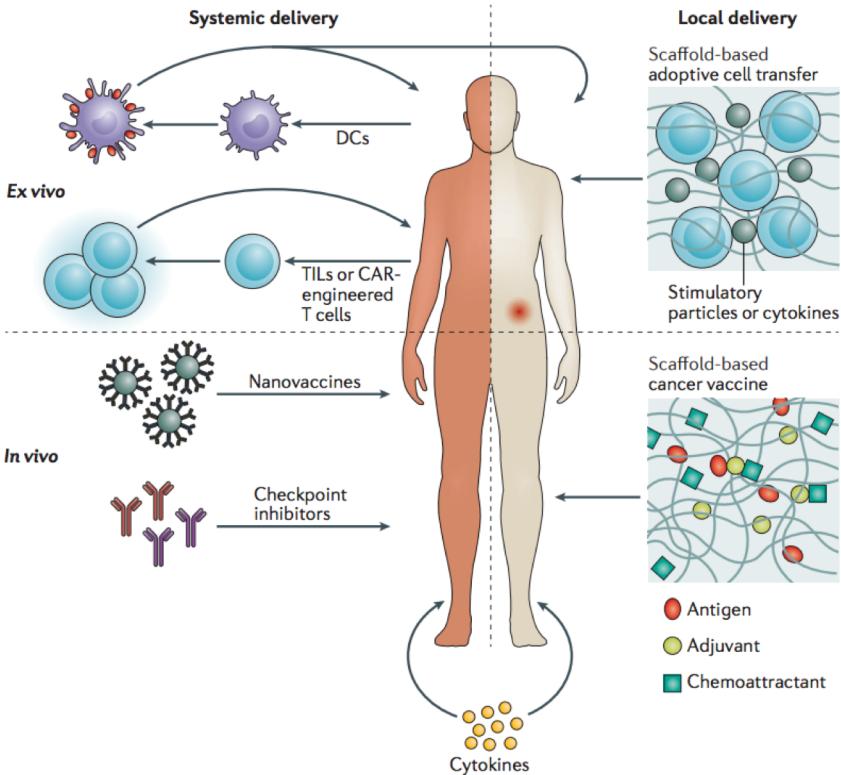
# Cancer Immunoengineering



# Immunoengineering Strategies for Cancer Therapy

- Antibody therapies
  - Checkpoint blockade, bispecific antibodies
- Cancer vaccine design
  - Biomaterials for delivery of antigen and adjuvant
- T cell therapies
  - aAPCs, CAR T cell therapy
- Modulating other immune cells
  - Tumor-associated macrophages, NK cells

# Engineering Approaches



# Biomaterials Properties Affect Immune Response

- **Particles**
  - Size
  - Shape
  - Surface charge
  - Material
  - Biodegradability
  - Surface Fluidity
  - Rigidity
- **Scaffold**
  - Porosity
  - Release rate
  - Biodegradability
  - Cell attachment



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