CAS TREND LANDSCAPE

Explore emerging trends in immuno-oncology

Where is the field of immuno-oncology headed? We've revealed the fastest growing areas of research among patents and journal publications so you can identify emerging opportunities sooner.

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How to read the CAS Trend Landscape

- Concepts are prioritized vertically by growth rate within each node
- Well established areas of research with the highest publication volumes are boxed in white

▲ Emerging area of research

IMMUNO-ONCOLOGY

TYPES OF THERAPY

- Chemodynamic Therapy (CDT) ▲
- Sonodynamic Therapy (SDT)
- Induce Immunogenic Cell Death (ICD)
- STING Activation
- Photothermal Therapy (PTT)
- BCL2 Inhibitor
- PARP Inhibitor
- Photodynamic Therapy (PDT)
- Combination Therapy
  - Combination Photodynamic
  - Combination Oncolytic
  - Combination Chemotherapy
    - Combination Immunotherapy
      - PD-1/TIGIT
      - PD-1/PD-L1
      - PD-L1/CTLA-4
      - CD28/4-1BB
      - LAG3/TIM-3
      - PD-1/CTLA-4
      - PD-1/PD-L1/CTLA-4
      - PD-1/TIM-3
    - Combination Radiotherapy
- Mode of Delivery
  - Extracellular Vesicle (EV)
  - Nanoparticles (NP)
    - Prodrug Nanoparticles ▲
    - Membrane-coated Nanoparticles
    - Biomimetic Nanoparticles
    - Lipid Nanoparticle
    - Core-shell Nanoparticles
    - Hybrid Nanoparticles
    - Selenium Nanoparticles
    - Iron Oxide Nanoparticles
    - Acid Nanoparticles
    - Silver Nanoparticles (AgNPs)
    - Silica Nanoparticles
    - Polymeric Nanoparticles
    - Upconversion Nanoparticles (UCNPs)
    - Gold Nanoparticles (AuNPs)
    - Magnetic Nanoparticles
- Dendritic Cell Activation
- Immune Checkpoint Based
  - Immune Checkpoint Inhibitor
    - A2AR Antagonist
    - PD-L1 Inhibitor
    - PD-1 Inhibitor
    - CD47 Blockade
    - IDO Inhibitor
  - Immune Checkpoint Activator
    - CD40 Agonist
    - 4-1BB Agonist
- Monoclonal Antibody (mAbs)
  - Anti-GPC3 Antibody
  - Single Domain Antibody
  - Immune Checkpoint Antibody
    - Anti-TIGIT Antibody
    - Anti-CD73 Antibody
    - Anti-TIM3 Antibody
    - Anti-PD-L1 Antibody
    - Anti-PD-1 Antibody
    - Anti-CD38 Antibody
    - Anti-CD47 Antibody
    - Anti-CTLA4 Antibody
  - Bifunctional Fusion Protein — Antibody Fusion Protein
  - Bispecific Antibody (BSAbs) — Bispecific Cell Engager — Bispecific T-cell Engagers (BiTE)
  - Anti-ROR1 Antibody
  - Anti-HER2 Antibody
- Autophagy Inhibition
- Adoptive Cell Therapy
  - Chimeric Antigen Receptor (CAR) Cell Therapy
    - CAR NK Cell
    - CAR T-cell Therapy — CAR-T cell Therapy (Solid tumor)
    - Anti-CD19 CAR — Anti-CD19 CAR T-cell — Autologous Anti-CD19
  - Tumor-Infiltrating Lymphocyte (TILs) — Tumor-Infiltrating CD8
  - Adoptive NK Cell
  - Adoptive T-cell Therapy
- Cancer Vaccine
  - RNA Vaccine ▲
  - Nanovaccine
  - Neoantigen Vaccine
  - Personalized Vaccine
  - Oncolytic Vaccinia
  - Targeted Delivery
- Oncolytic Immunotherapy
  - Oncolytic Herpes Simplex Virus
  - Oncolytic Adenovirus
- Toll-like Receptor (TLR) Agonist
  - TLR7/8 Agonist
  - TLR9 Agonist
  - TLR7 Agonist
- Kinase Inhibitor
  - HPK1 Inhibitor
  - CDK4/6 Inhibitor
  - Multikinase inhibitor
  - Tyrosine Kinase Inhibitor (TKI)
    - FLT3 Inhibitor
    - BTK Inhibitor
  - PI3K Inhibitor
  - JAK Inhibitor
- Stem Cell Transplantation — Hematopoietic Stem Cell Transplantation
- Antibody-Drug Conjugate (ADCs) — Anti-HER2 Antibody-Drug Conjugate
- HDAC Inhibitor

INTERLEUKINS

- IL15 ▲
- IL17 | IL17a

MECHANISM BASED

- Antitumor Immunity
- Tumor Microenvironment
  - Extracellular Matrix
  - Solid Tumor Microenvironment
  - Immune Microenvironment
- Innate Immunity — Innate Adaptive Immune
- Immunogenic Cell Death (ICD)

SIDE EFFECTS

- Immune-related Adverse Event (IRAES)
- Cytokine Release Syndrome (CR)

BIOMARKERS

- IGF2BP2
- Gasdermin E
- GPX4 ▲
- YTHDF1
- TROP2 ▲
- Nectin-4
- Tumor Mutation Burden (TMB) ▲
- LILRB1
- SETD2
- ENO1
- Microsatellite Instability (MSI) — High Microsatellite Instability
- CSF1R
- PCSK9
- INSM1
- Killer Cell Lectin-like Receptor
  - KLRB1
  - KLRG1
- CEACAM5
- SLAMF7
- TP53 Mutation
- Deficient Mismatch Repair
- Immune Checkpoint Molecules
  - Inhibitory Immune Checkpoint Molecules
    - TIGIT
    - LAG3
    - PD-L1
    - PD-1
    - B7-H3
    - VISTA
    - BTLA
    - TDO
    - TIM-3
    - IDO — IDO1
  - Stimulatory Immune Checkpoint Molecules
    - CD47
    - ICOS
    - CD38
    - CD27
    - CD137 (4-1BB)
- CLDN6
- Glypican-3 (GPC3)
- CRP
- Transcription Factor
  - TCF7
  - MYC
  - CDX2
- LC3B
- Methyltransferases
- DNMT — DNMT3A
- NPM1
- Chemokines
  - CXC Motif
    - cxcl11
    - cxcl5
  - CC Motif
    - ccl19
    - ccl2
- CDH1
- Granzyme
  - gzma
  - gzmb
- GATA3
- Leukocyte Antigen (HLA)
- Toll-like Receptor (TLR)
  - TLR9
  - TLR7
  - TLR4
- Glycoproteins
  - CD63
  - CD19
  - CD34
  - EMA
  - CD44
- CALR
- HER2
- mTOR
- RAD51
- Kinases
  - NTRK3
  - RIPK3
  - JAK
    - JAK2
    - JAK1
  - AKT — AKT1
- Fusion Protein
  - NTRK Fusion
  - ETV6-NTRK3 Fusion
- MMP9
- p62
- COX2
- FasL

RNA RELATED

- Non-coding RNA ▲
  - Long non-coding RNA
  - Circular RNA ▲
  - MicroRNA

TYPES OF CANCER

- Non-solid cancer
  - B-cell Lymphoma
  - Acute Lymphoblastic Leukemia
  - Multiple Myeloma
  - Acute Myeloid Leukemia
- Solid Tumor
  - Uterine Corpus Endometrial Carcinoma ▲
  - Lung Cancer
    - Lung Adenocarcinoma
    - Lung Squamous Cell Carcinoma
    - Non-small cell lung cancer
  - Pancreatic Cancer — Pancreatic Ductal Adenocarcinoma ▲
  - Kidney Cancer
    - Papillary Renal Cell Carcinoma
    - Cell Renal Cell Carcinoma
  - Bladder Cancer — Urothelial Carcinoma
  - Colon Cancer — Colorectal Cancer
  - Liver Cancer — Hepatocellular Carcinoma
  - Breast Cancer — Triple-negative Breast Cancer ▲
  - Gastric Cancer
  - Head Neck Squamous Cell Carcinoma (HNSCC) — Oral Squamous Cell Carcinoma
  - Ovarian Cancer

TYPES OF TARGETS

- Cells
  - Cancer-Associated Fibroblast (CAFs) ▲
  - Tumor-associated Macrophage (TAMs)
    - M1 Macrophage
    - M2 Macrophage
  - Memory Cell
  - B Cell
  - NK Cells
  - Dendritic Cell
    - Conventional Dendritic Cell — Type 1
    - Maturation Dendritic Cell
    - Plasmacytoid Dendritic Cell
- Proteins
  - Gasdermin
  - TROP2
  - Nectin-4 ▲
  - KRAS
  - CDC20
  - CGAS-STING Pathway
  - LILRB1
  - GPRC5D
  - ENO1
  - CSF1R
  - IKZF2
  - ARG1
  - PCSK9
  - Immune Checkpoint Molecules
    - Inhibitory Immune Checkpoint Molecules
      - B7-H3
      - TIGIT ▲
      - A2AR
      - PD-L1
      - LAG3
      - PD-1
      - VISTA
      - BTLA
      - TDO
      - CTLA-4
      - IDO
        - IDO1
        - IDO2
    - Stimulatory Immune Checkpoint Molecules
      - CD47
      - ICOS
      - CD38
      - CD137 (4-1BB)
      - CD27
      - CD28
  - SLAMF7
  - NKG2A
  - Fibroblast Activation Protein (FAP)
  - NPM1
  - Granzyme
  - DNMT
  - Glycoproteins (Targets)
    - CEACAM5
    - Glypican-3 (GPC3)
    - Cell surface
      - CD3
      - CD8
      - CD19
      - CD34
      - CD44
      - CD96
  - HER2
  - B-Cell lymphoma 2 (BCL2)
  - Toll-like Receptor (TLR)
    - TLR7
    - TLR9
  - ETV6-NTRK3 Fusion
  - Kinases
    - Hematopoietic Progenitor Kinase — HPK1
    - Tank-Binding Kinase (TBKI)
    - NEK2
    - Protein Kinase B
    - Cyclin-Dependent Kinase (CDK)
      - CDK 4/6
      - CDK1
    - Receptor Tyrosine Kinase
      - NTRK3
      - Tropomyosin Receptor Kinase
      - Bruton Tyrosine Kinase (BTK)
      - FLT3
      - ROR1
      - Anaplastic Lymphoma Kinase (ALK)
    - Janus Kinase (JAK)
      - JAK2
      - JAK1
    - Pyruvate Kinase M2 (PKM2)
    - Amp-activated Protein Kinase (AMPK)
    - Mitogen-activated Protein Kinase (MAPK)
    - Protein Kinase C
  - Mammalian Target Rapamycin (mTOR) — mTORC1
  - RAD51
  - p62
  - COX2
  - FasL
- Pathway/ Complex
  - M^6A
  - ROS
  - Myeloid-derived Suppressor Cell — Polymorphonuclear Myeloid-derived Suppressor Cell
  - Major Histocompatibility Complex — MHC-I
  - Innate Lymphoid Cell (ILC) — ILC2
  - Homeobox

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