



GSK oncology pipeline

A catalyst for transformative medicine

This brochure is designed to foster collaboration with the research community by highlighting study molecules in our GSK oncology pipeline. Compounds are investigational. Inclusion in this brochure does not imply regulatory approval for these compounds or indications. For more information on GSK compounds currently in clinical trials, please go to www.clinicaltrials.gov.



GSK oncology

Our approach

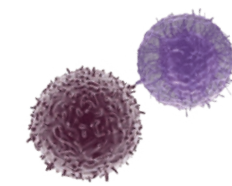
Patient-driven science. Trailblazing discovery.

GSK oncology is committed to the discovery and development of new oncology therapies that leverage patient-driven science to deliver improved outcomes for more patients.

We have prioritized our research efforts into four key areas that we believe offer the greatest potential for transformational medicines that can help patients diagnosed with cancer.

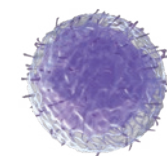


Seeking answers to some of the most challenging questions in cancer research



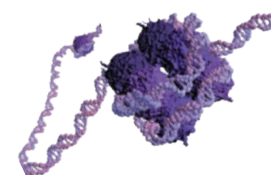
IMMUNO-ONCOLOGY

- How can we harness the body's own immune system to attack cancer?
- Which drugs, alone or in combination, have the greatest potential to reduce treatment resistance and provide the most durable response?



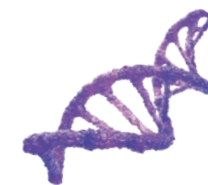
ONCOLOGY CELL THERAPY

- Can a patient's own immune cells be modified with redirected specificity to treat his or her cancer?
- Which targeted receptors have the most potential impact on tumor cells?



CANCER EPIGENETICS

- How can we target these specific epigenetic pathways to treat cancer?
- What epigenetic changes drive cancer development and progression?



GENETIC MEDICINE

- Which pathways are required for detection, repair, and bypass of DNA damage in cancer cells?
- How can we interfere with maladaptive DNA repair processes to inhibit tumor growth cancer treatments?



Immuno-oncology

Harnessing the body's immune system

The emerging field of immuno-oncology harnesses the body's own immune system to fight cancer by using different immunological pathways to enhance antitumor responses.^{1,2} GSK is exploring different therapies aimed at augmenting the immune response, reducing immune suppression, and modulating the tumor microenvironment.

In clinical development

BELANTAMAB MAFODOTIN | ANTI-BCMA ANTIBODY-DRUG CONJUGATE (ADC)*:

B-cell maturation antigen (BCMA) is expressed on the surface of various malignant tumor cells of hematopoietic origin, and its activation may contribute to their survival and proliferation.³ Belantamab mafodotin is an anti-BCMA ADC that consists of a monoclonal antibody (mAb) directed against BCMA joined to a microtubule-disrupting agent via a stable linker. Belantamab mafodotin is currently being investigated in phase 1 and phase 2 clinical trials.

GSK3174998 | OX40 AGONIST ANTIBODY*: GSK3174998 is an agonistic mAb that selectively binds to OX40 (CD134), a member of the tumor necrosis factor receptor superfamily.⁴ GSK is investigating this OX40 agonist mAb in phase 1 studies both as monotherapy and in combination with pembrolizumab in subjects with advanced solid tumors (ENGAGE-1 trial) and in combination with a toll-like receptor (TLR) agonist (GSK1795091) in subjects with advanced solid tumors.

DOSTARLIMAB (TSR-042) | PD-1 ANTAGONIST ANTIBODY†: PD-1, or programmed cell death protein 1, is a key immune checkpoint molecule that can limit T-cell-mediated immune responses.⁵ The presence of the PD-1 ligand PD-L1 has been identified on many tumor types, and expression of PD-L1 has been linked to poor clinical outcomes in a variety of cancers. Anti-PD-1 antibodies have demonstrated in vivo efficacy in tumor models and several clinical studies. Dostarlimab is a humanized anti-PD-1 monoclonal antibody that binds with high affinity to the PD receptor and effectively blocks interactions with PD-1 ligands, PD-L1 and PD-L2.

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TSR-022 | TIM-3 ANTAGONIST ANTIBODY†:

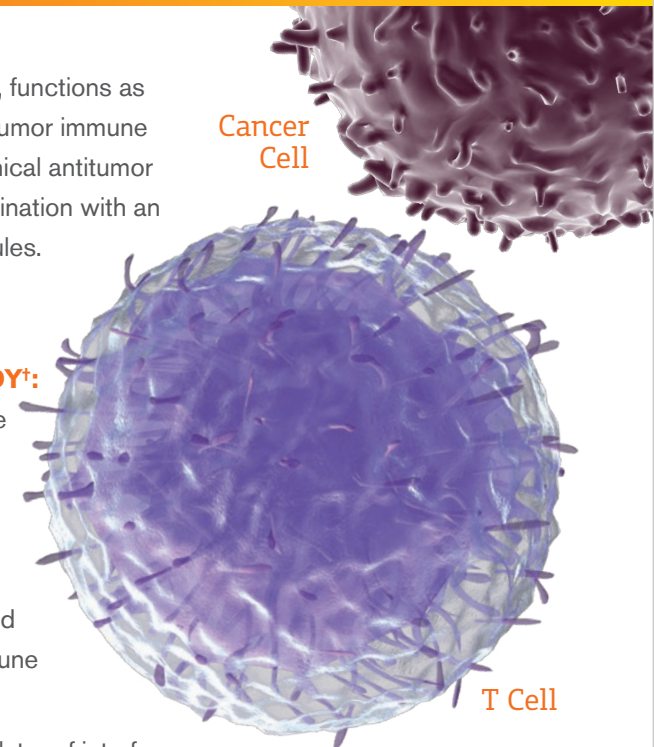
TIM-3, or T-cell immunoglobulin and mucin domain-3, functions as a pattern recognition receptor that dampens the antitumor immune response.⁵ Anti-TIM-3 antibodies have shown preclinical antitumor activity and may enhance antitumor immunity in combination with an anti-PD-1 agent or other immune-modulating molecules. TSR-022 is an anti-TIM-3 antagonist antibody under investigation in solid tumors.

TSR-033 | LAG-3 ANTAGONIST IgG4 ANTIBODY†:

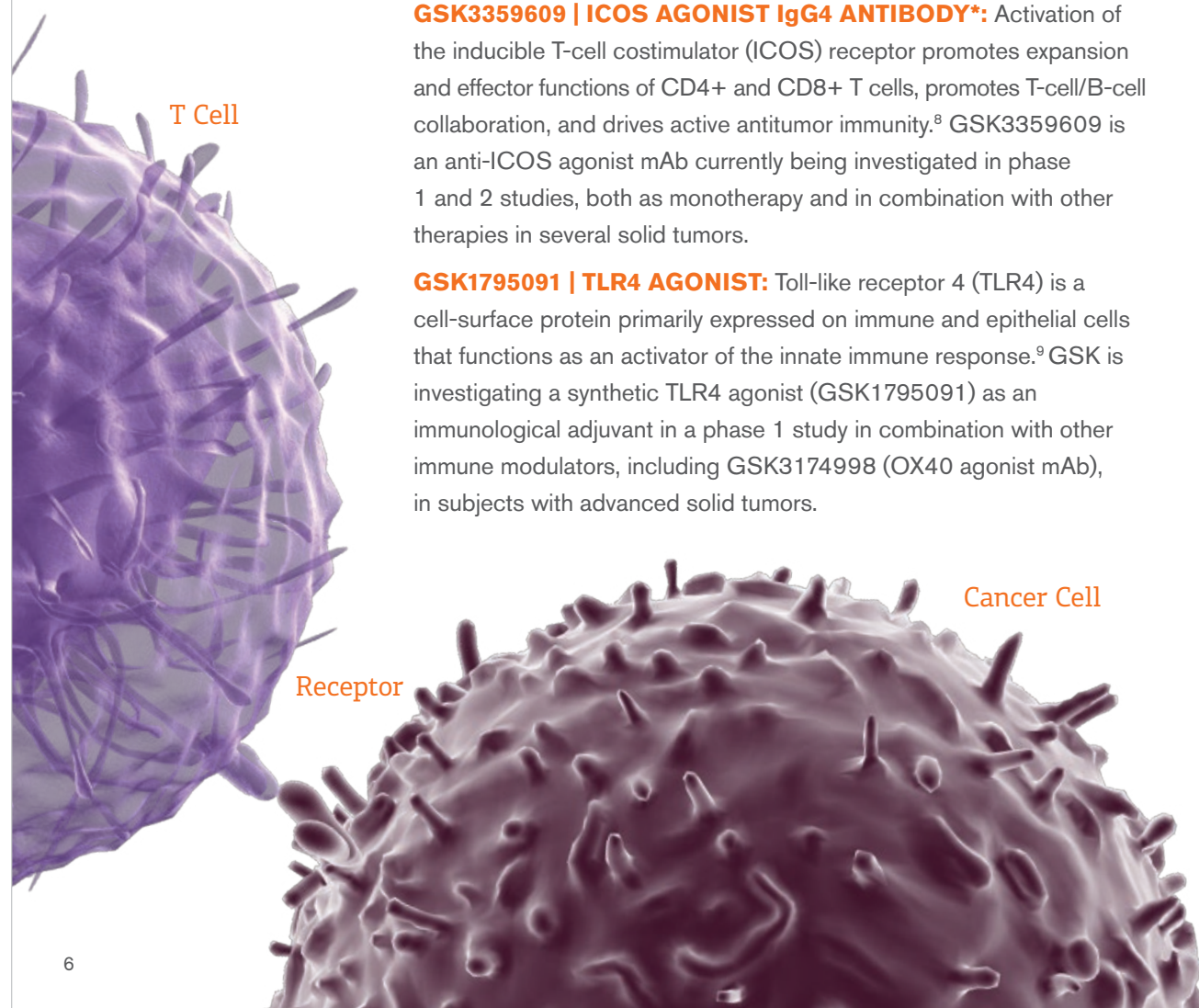
LAG-3, or lymphocyte activation gene-3, is a negative regulator of T-cell activity.⁶ Preclinical studies have demonstrated antitumor activity by blocking LAG-3 and PD-1 in tumor models, and a LAG-3 IgG fusion protein has demonstrated promising results in clinical trials for various solid tumors. TSR-033 is a humanized anti-LAG-3 antagonist IgG4 mAb with potential immune checkpoint inhibitory and antineoplastic activities.

GSK3745417 | STING AGONIST: STING, or stimulator of interferon genes, is a key adapter molecule that mediates sensing of cytosolic DNA and activates T-cell-dependent tumor immunity.⁷ Preclinical studies have shown that STING agonism enhances tumor antigen presentation and demonstrates potent and durable antitumor immunity. GSK3745417 is a synthetic STING agonist that is currently being investigated in a phase 1 study as monotherapy and in combination with pembrolizumab in advanced solid tumors.

*In-license or other partnership with third party.
†Tesaro acquisition.



Immuno-oncology (cont'd)



GSK3359609 | ICOS AGONIST IgG4 ANTIBODY*: Activation of the inducible T-cell costimulator (ICOS) receptor promotes expansion and effector functions of CD4+ and CD8+ T cells, promotes T-cell/B-cell collaboration, and drives active antitumor immunity.⁸ GSK3359609 is an anti-ICOS agonist mAb currently being investigated in phase 1 and 2 studies, both as monotherapy and in combination with other therapies in several solid tumors.

GSK1795091 | TLR4 AGONIST: Toll-like receptor 4 (TLR4) is a cell-surface protein primarily expressed on immune and epithelial cells that functions as an activator of the innate immune response.⁹ GSK is investigating a synthetic TLR4 agonist (GSK1795091) as an immunological adjuvant in a phase 1 study in combination with other immune modulators, including GSK3174998 (OX40 agonist mAb), in subjects with advanced solid tumors.

GSK3145095 | ANTI-RIPK1 ANTIBODY: Receptor-interacting serine/threonine-protein kinase 1 (RIPK1) has been identified as a top gene contributing to immunotherapy resistance and pancreatic oncogenesis.¹⁰ GSK is investigating the activity of GSK3145095, an inhibitor of RIPK1, in a phase 1/2 clinical trial alone and in combination with other anticancer agents, including pembrolizumab.

M7824 (BINTRAFUSP ALFA) | BIFUNCTIONAL ANTI-PD-L1 ANTIBODY/TGFβ TRAP FUSION PROTEIN*: PD-L1 is a ligand expressed on APCs that interacts with PD-1 to inhibit T- and NK-cell maturation, proliferation, and effector function.¹¹ TGFβ is a cytokine that promotes tumor progression through its effects on angiogenesis, epithelial-to-mesenchymal transition, and immune suppression. Preclinical studies have shown that PD-L1/TGFβ antagonism activates strong and durable T- and NK-cell mediated antitumor immunity. M7824 (bintrafusp alfa) is a bifunctional anti-PD-L1 antibody and TGFβ trap fusion protein that is currently being investigated in several phase 1 and phase 2 studies, both as monotherapy and in combination with other anticancer agents in various malignancies.

NY-ESO-ImmTAC® (IMCnyeso)*: NY-ESO-1 and LAGE-1 are cancer-testis antigens expressed in several tumor types.¹² NY-ESO-ImmTAC (immune mobilizing monoclonal TCR against cancer; IMCnyeso) is a bifunctional soluble high-affinity TCR specific for NY-ESO-1 on cancer cells that also engages the CD3 receptor on T cells. It is currently being studied in a phase 1/2 trial in patients with advanced NY-ESO-1- and/or LAGE-1a-positive cancers.

*In-license or other partnership with third party.

*Being developed in a strategic global alliance between GSK and Merck KGaA, Darmstadt, Germany.

*Option-based alliance with Immunocore Ltd.

ImmTAC is a registered trademark of Immunocore Ltd.



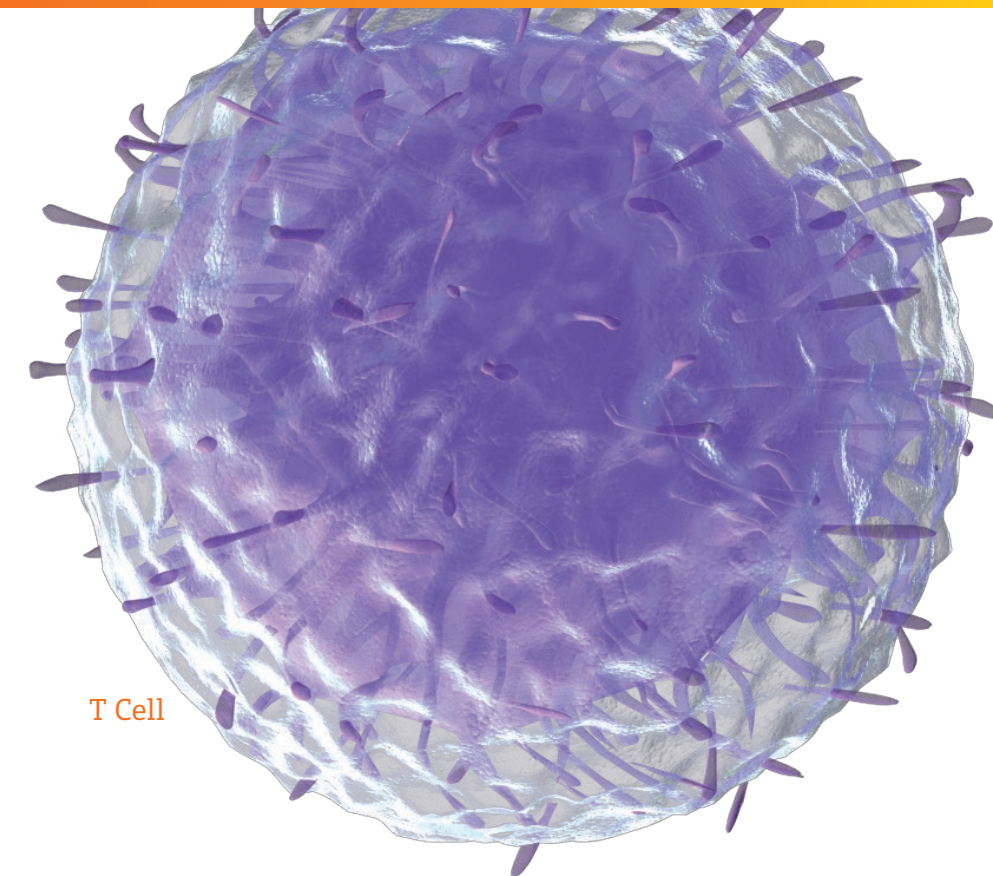
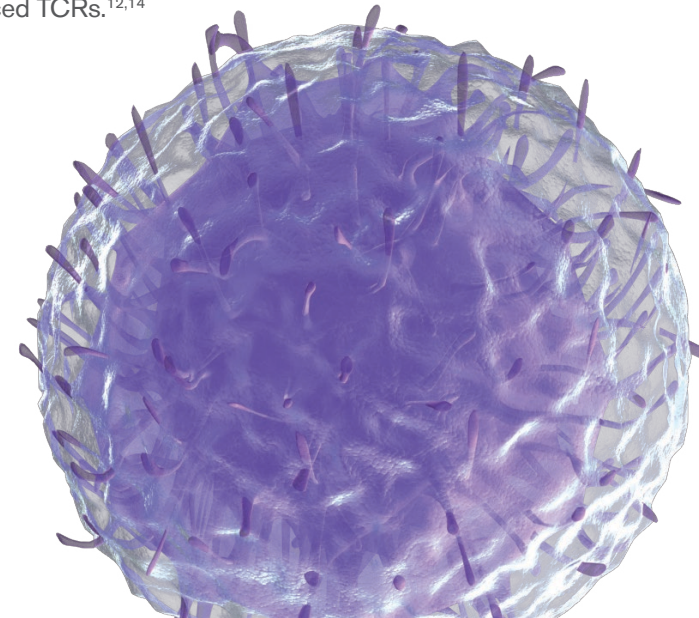
Oncology cell therapy

Engineering mediation of antitumor effects

Oncology cell therapy uses adoptive transfer of engineered T cells that may mediate antitumor effects. In adoptive cell therapy, T cells are removed from the patient, engineered to present an enhanced T-cell receptor that recognizes specific antigens, then reintroduced into the patient.¹³ GSK is exploring a number of adoptive cell therapies, including engineered T-cell receptor (TCR) and chimeric antigen receptor (CAR) T cells.

In clinical development

GSK3377794 | NY-ESO-1 TCR T CELL: NY-ESO-1 is a cancer-testis antigen expressed in several tumor types. NY-ESO-1 TCR-specific T cells are genetically engineered autologous T cells that express NY-ESO-1-specific affinity-enhanced TCRs.^{12,14}



T Cell



Cancer epigenetics

Addressing a hallmark of cancer

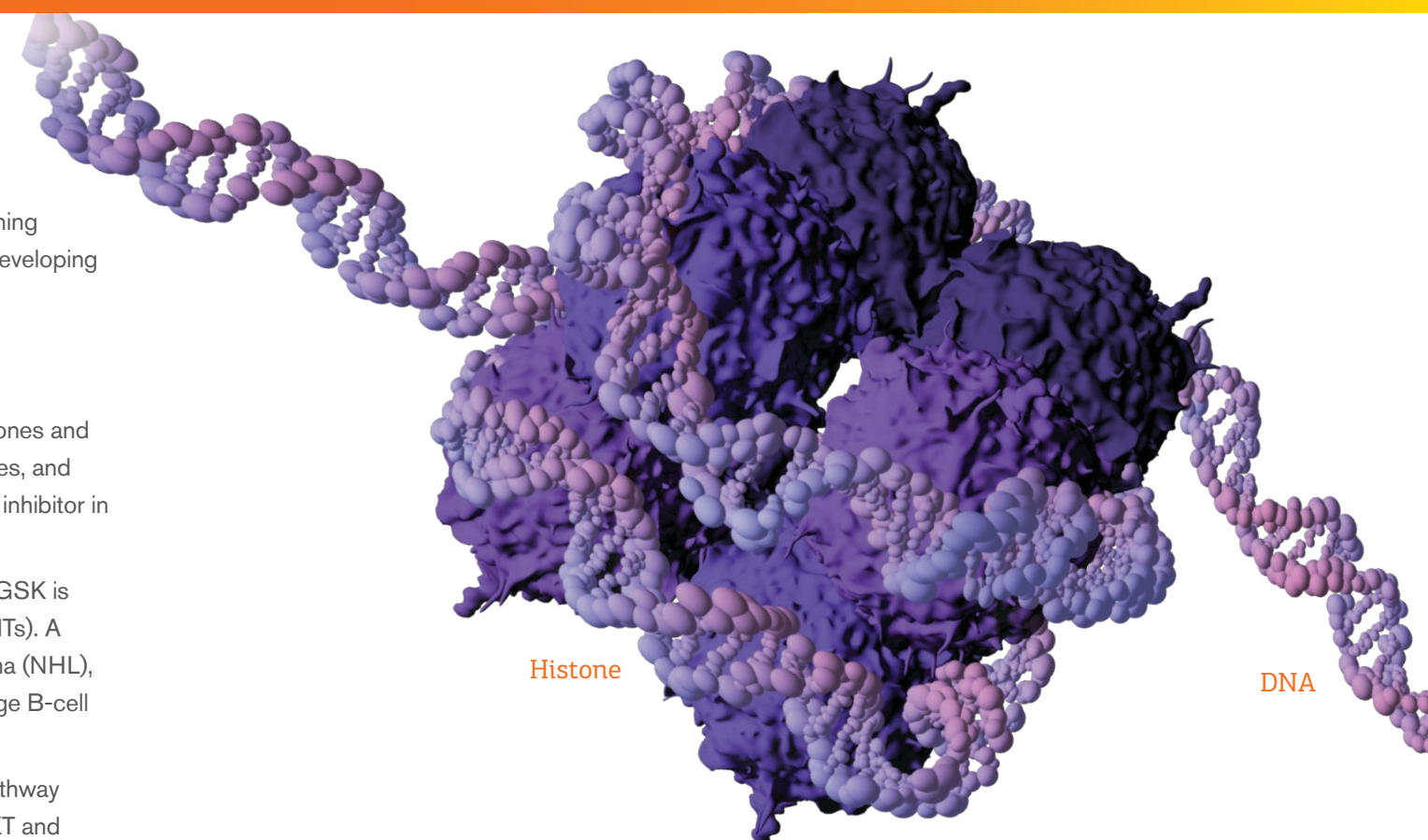
Aberrant gene expression, regulated in large part by epigenetic mechanisms, is a hallmark of cancer. Epigenetics refers to heritable changes in gene expression that arise from changes in chromosomes without altering the DNA sequence. DNA methylation and posttranslational modifications of histones play key roles in regulating gene expression—specifically, in determining the expression of oncogenes and tumor suppressors in cancer cells.^{15,16} GSK is working on developing a number of molecules that may help regulate aberrant gene expression.

In clinical development

GSK525762 | BET INHIBITOR: Bromodomain and extraterminal (BET) proteins bind to histones and other nuclear proteins to regulate the epigenetic landscape, expression of cancer-related genes, and the cell cycle.¹⁷ Inhibition of BET proteins arrests cell growth, and GSK is investigating a BET inhibitor in patients with solid tumors and hematologic malignancies in phase 1/2 clinical trials.

GSK3326595 | PRMT5 INHIBITOR* AND GSK3368715 | TYPE 1 PRMT INHIBITOR*: GSK is investigating the activity of 2 compounds that target protein arginine methyltransferases (PRMTs). A PRMT5 inhibitor is being investigated in patients with solid tumors and non-Hodgkin lymphoma (NHL), and a Type 1 PRMT inhibitor is being investigated in phase 1 trials for patients with diffuse large B-cell lymphoma and solid tumors.

GSK2636771 | PI3Kβ INHIBITOR: The phosphoinositide 3-kinase (PI3K)/AKT signaling pathway regulates various cellular functions, including proliferation, growth, and survival.¹⁸ The PI3K/AKT and phosphatase and tensin homolog (PTEN) pathways are among the most frequently mutated pathways in human cancers.¹⁹ GSK is investigating PI3K/AKT in solid tumors, including melanoma, prostate cancer, and gastric cancer, and is currently investigating a PI3Kβ inhibitor in combination with enzalutamide in PTEN-deficient metastatic, castration-resistant prostate cancer (CRPC) in a phase 1 trial.

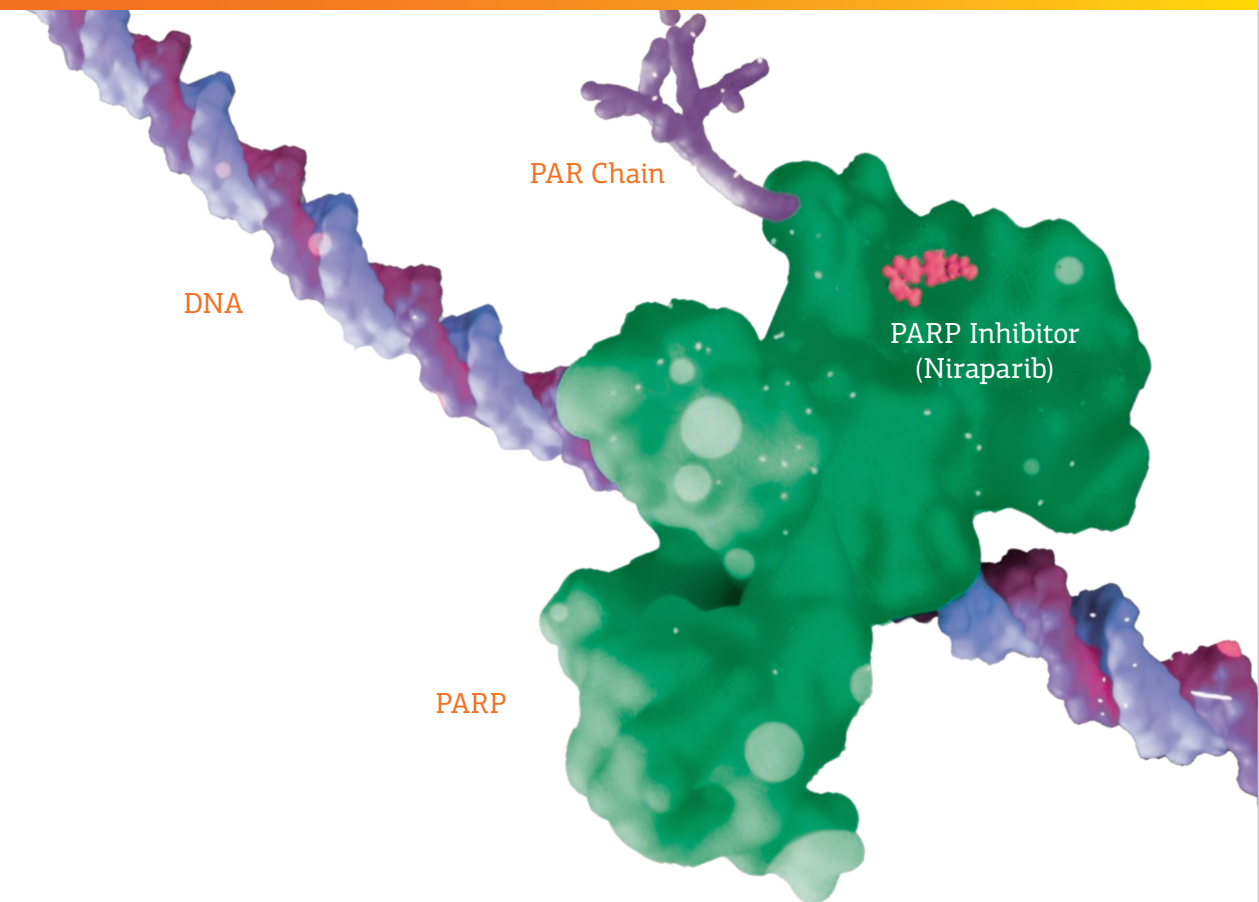


Inhibiting pathways that contribute to aberrant DNA repair

Defects in DNA repair, the accumulation of DNA damage, and genomic instability are pervasive characteristics of human tumors.^{20,21} Genetic medicine aims to target and arrest dysregulated and maladaptive DNA repair processes to induce tumor death and increase sensitivity to traditional chemotherapeutic agents.²² Inhibition of pathways that contribute to aberrant DNA repair in cancer cells is a promising area of research for increasing the effectiveness of current therapies and the discovery of novel treatment options.

In clinical development

NIRAPARIB | PARP INHIBITOR*: Poly ADP ribose polymerases (PARPs) are a family of enzymes with many diverse cellular functions, including DNA repair, gene expression, cell cycle control, intracellular trafficking, and energy metabolism.²³ PARP proteins play key roles in DNA single-strand break repair through the base excision repair pathway.²⁰ Niraparib is being investigated both as a monotherapy against tumors with and without existing DNA repair defects and as combination therapy with anti-cancer agents that induce DNA damage.



GSK-sponsored clinical trials



Immuno-Oncology

	Phase 1	Phase 2
Anti-BCMA ADC (belantamab mafodotin)*		
Relapsed/Refractory Multiple Myeloma in Japanese Patients	NCT03828292	
DREAMM-2: Multiple Myeloma		NCT03525678
DREAMM-4: Relapsed/Refractory Multiple Myeloma in Combination With Pembrolizumab		NCT03848845
DREAMM-6: Relapsed/Refractory Multiple Myeloma in Combination with Lenalidomide Plus Dexamethasone or in Combination With Bortezomib Plus Dexamethasone	NCT03544281	
Relapsed/Refractory Multiple Myeloma in Combination With Pomalidomide and Low-Dose Dexamethasone	NCT03715478	
Anti-PD-1 Antibody (dostarlimab, TSR-042)†		
GARNET: Microsatellite Instability High (MSI-H) Tumors (Including Metastatic Endometrial Cancer), Microsatellite Stable Endometrial Cancer, and Non-Small Cell Lung Cancer (NSCLC)	NCT02715284	
ICOS Agonist IgG4 Antibody (GSK3359609)*		
INDUCE-1: Advanced Solid Tumors	NCT02723955	
INDUCE-2: Advanced Solid Tumors in Combination With Tremelimumab	NCT03693612	
Entrée-Lung: NSCLC in Combination With Docetaxel		NCT03739710
Anti-TIM-3 Antibody (TSR-022)†		
AMBER: Melanoma, NSCLC, and Colorectal Cancer Alone and in Combination With Dostarlimab	NCT02817633	
Anti-LAG-3 Antibody (TSR-033)†		
CITRINO: Various Tumor Types Alone and in Combination With Dostarlimab	NCT03250832	
STING Agonist (GSK3745417)		
Advanced Solid Tumors Alone or in Combination With Pembrolizumab	NCT03843359	

ADC, antibody-drug conjugate; BCMA, B-cell maturation antigen; ICOS, inducible T-cell costimulator; IgG4, immunoglobulin G4; ImmTAC, immune mobilizing monoclonal TCR against cancer; LAG-3, lymphocyte activation gene-3; LAGE-1a, cancer-testis antigen 2; MSI-H, microsatellite instability high; MSS, microsatellite stable; NSCLC, non-small cell lung cancer; NY-ESO-1, New York esophageal squamous cell carcinoma 1; PD-1, programmed cell death protein 1; PD-L1, programmed cell death protein ligand 1; RIPK1, receptor-interacting serine/threonine-protein kinase 1; STING, stimulator of interferon genes; TCR, T-cell receptor; TIM-3, T-cell immunoglobulin and mucin domain-3; TLR4, toll-like receptor 4.

Immuno-Oncology (cont'd)

	Phase 1	Phase 2
Bifunctional PD-L1/TGFβ Inhibitor (bintrafusp alfa, M7824)†		
HER2+ Breast Cancer in Combination With Chemotherapy	NCT03620201	
RACHEL1: Metastatic HR+/HER2- Breast Cancer in Combination With Radiation Therapy	NCT03524170	
Metastatic Triple Negative Breast Cancer in Combination With Mesylate	NCT03579472	
Advanced or Metastatic Solid Tumors	NCT02517398	
PD-1-Expressing Advanced NSCLC		NCT03631706
Human Papillomavirus (HPV)-Associated Malignancies		NCT03427411
Advanced Metastatic Consensus Molecular Subtype 4 (CMS4) Colorectal Cancer	NCT03436563	
Small Cell Lung Cancer (SCLC) in Combination With Topotecan or Temozolomide	NCT03554473	
OX40 Agonist Antibody (GSK3174998)*		
ENGAGE-1: Advanced Solid Tumors Alone and in Combination With Pembrolizumab	NCT02528357	
TLR4 Agonist (GSK1795091)		
Advanced Solid Tumors in Combination With GSK3174998 (OX40 Agonist), GSK3359609 (ICOS Agonist), or Pembrolizumab	NCT03447314	
RIPK1 Inhibitor (GSK3145095)		
Advanced Solid Tumors Alone and in Combination With Pembrolizumab	NCT03681951	
NY-ESO-ImmTAC® (IMCnyeso)§		
Advanced NY-ESO-1- and/or LAGE-1a-Positive NSCLC, Melanoma, Urothelial Carcinoma, and Synovial Sarcoma	NCT03515551	

*In-license or other partnership with third party.

†Tesaro acquisition.

‡Being developed in a strategic global alliance between GSK and Merck KGaA, Darmstadt, Germany.

§Option-based alliance with Immunocore Ltd.

ImmTAC is a registered trademark of Immunocore Ltd.



GSK-sponsored clinical trials (cont'd)



Oncology Cell Therapy

	Phase 1	Phase 2
NY-ESO-1 TCR T Cell (GSK3377794)		
Synovial Sarcoma	NCT01343043	
Relapsed/Refractory Multiple Myeloma Alone and in Combination With Pembrolizumab		NCT03168438
Myxoid/Round Cell Liposarcoma		NCT02992743
Relapsed/Refractory Synovial Sarcoma in Combination With Anticancer Agents Including Pembrolizumab	NCT03697824 (phase 1b/2a)	
Advanced/Recurrent Non-Small Cell Lung Cancer (NSCLC) Alone and in Combination With Pembrolizumab	NCT03709706 (phase 1b/2a)	
Long-Term Follow-Up of Subjects	NCT03391778	

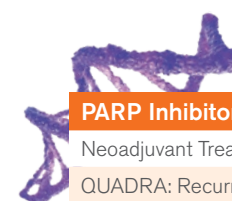


Cancer Epigenetics

	Phase 1	Phase 2
BET Inhibitor (GSK525762)		
Relapsed/Refractory Hematologic Malignancies	NCT01943851	
Castration-Resistant Prostate Cancer Combination With Androgen Deprivation Therapy and Other Agents	NCT03150056 (phase 1b)	
HR+/HER2- Breast Cancer in Combination With Fulvestrant	NCT02964507	
PRMT5 Inhibitor (GSK3326595)*		
Solid Tumors and Non-Hodgkin Lymphoma (NHL)	NCT02783300	
Myelodysplastic Syndrome (MDS) and Acute Myeloid Leukemia (AML)	NCT03614728	
Type 1 PRMT Inhibitor (GSK3368715)		
Solid Tumors and Relapsed/Refractory Diffuse Large B-Cell Lymphoma (DLBCL)	NCT03666988	

Cancer Epigenetics (cont'd)

	Phase 1	Phase 2
PI3Kβ Inhibitor (GSK2636771)		
Metastatic Castration-Resistant Prostate Cancer (mCRPC) in Combination With Enzalutamide	NCT02215096	
Advanced Gastric Adenocarcinoma in Combination With Paclitaxel		NCT02615730
Metastatic Melanoma in Combination With Pembrolizumab		NCT03131908
Biomarker Integrated, Advanced Gastric Cancer		NCT02951091 (observational)



Genetic Medicine

	Phase 1	Phase 2	Phase 3
PARP Inhibitor (Niraparib)*			
Neoadjuvant Treatment in HER2- and <i>BRCA</i> ^{Mut} Breast Cancer	NCT03329937		
QUADRA: Recurrent Ovarian Cancer Treatment (Fourth Line or Later)		NCT02354586	
OVARIO: Ovarian Cancer Maintenance (First Line) in Combination With Bevacizumab		NCT03326193	
OPAL: Platinum-Resistant Ovarian Cancer (Second or Third Line) in Combination With Dostarlimab and Bevacizumab		NCT03574779	
JASPER: Advanced NSCLC in Combination With Dostarlimab		NCT03308942	
PRIMA: Ovarian Cancer Maintenance (First Line)			NCT02655016
FIRST [†] : Ovarian Cancer Treatment and Maintenance (First Line) Chemotherapy Alone and in Combination With Dostarlimab Followed by Maintenance Niraparib Alone and in Combination With Dostarlimab			NCT03602859

*In-license or other partnership with third party.

[†]Tesaro acquisition.

[‡]In collaboration with ENGOT, the European Network for Gynaecological Oncological Trial groups. Bevacizumab may be included as part of the chemotherapy and maintenance regimen per local standard of care.

BET, bromodomain and extraterminal protein; *BRCA*, breast cancer susceptibility gene; HER, human epidermal growth factor receptor; HR, hormone receptor; PD-1, programmed cell death protein 1; PARP, poly ADP ribose polymerase; PI3K β , phosphoinositide 3-kinase β ; PRMT, protein arginine methyltransferase; PRMT5, protein arginine methyltransferase 5.



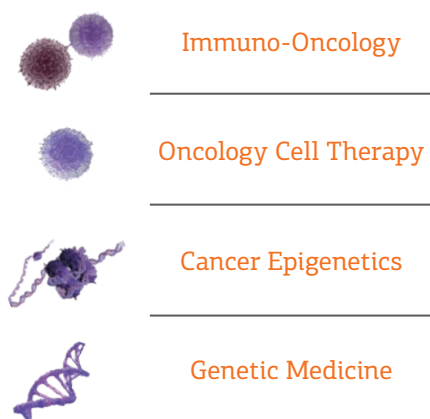
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Our partnerships

We welcome collaboration

If you are interested in collaborating with GSK on our investigational agents in hematologic malignancies and solid tumors, please contact us by visiting: <https://iss.gsk.com>

Join our world-class collaborative teams as we focus on four key areas of oncology research



This fourfold strategy has helped us develop a diverse pipeline of innovative agents with the transformational potential of becoming the next breakthrough therapies in the treatment of cancer. Together, we can make a difference.

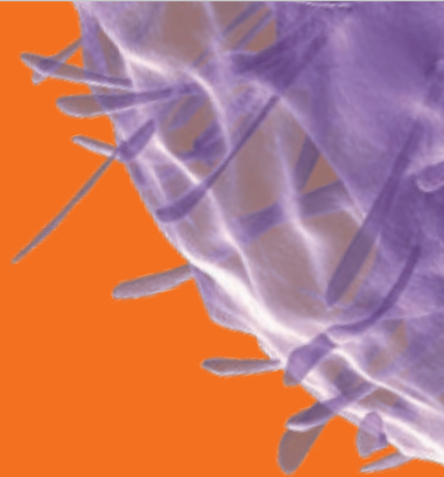


“GSK oncology is committed to discovering and developing new medicines for patients with cancer. Join us.”

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GSK oncology clinical pipeline
Innovation to deliver
transformational
medicines



4 key areas of
cancer research

15+ clinical
assets

40+ GSK-sponsored clinical
trials currently underway



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