

The Opportunity

The market for cancer vaccines remains highly fragmented with antigen-based vaccines and cell-based therapies dominating the pipeline.

Novel cancer treatments that operate outside of traditional cytotoxic mechanisms have focused on role players such as cytokines, monoclonal antibodies, and peptides possessing a range of function.

Roswell Park Cancer Institute researchers have developed a diverse portfolio of immunotherapy approaches to treating cancer and other diseases.

Technologies in the portfolio now available for licensing include:

- Antibodies and other research tools including p53as proteins;
- Cancer immunotherapy & chemotherapy enhancement with monoclonal antibodies;
- C-reactive proteins in combination with Tumor Necrosis Factor (TNF) for treating cancers and psoriasis.
- GD-2/GD-3 ganglioside peptide mimics;
- Heat shock protein therapeutics;
- Polyamine analog (DENSPM)-activated gene therapy; and
- Targeted drug delivery with liposomes.

Some estimates place the value of the market for cancer vaccines to reach \$6 billion by 2010.

Cancer Immunotherapy



Benefits

Anti-idiotypic antibodies, specific F36/22 MAbs, and other antigens have been demonstrated to provide significant anti-tumor, antiviral, and antimicrobial action.

The technologies also include the use of antigens such as an anti-endoglin antibody to enhance the efficacy of chemotherapeutic agents for therapy of cancer and other angiogenesis-associated diseases such as rheumatoid arthritis.

Intellectual Capital

Roswell Park's intellectual property estate is extensive. Numerous foreign filings are included, as are several patent applications that are not yet in the public domain.

Histocompatibility (HLA) antigens are a primary focus of Roswell's impressive team of researchers in its Tumor Immunology Program, led by Dr. Soldano Ferrone.

Strengthened in part by the continued growth and rebuilding of its 25-acre campus, more than 100 leading cancer specialists have been added to RPCI's already stellar team of scientists over the past three years alone.

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Roswell Park Cancer Institute (RPCI), founded in 1898, is the nation's first cancer research, treatment and education center. RPCI is a member of the prestigious National Comprehensive Cancer Network, an alliance of the nation's leading National Cancer Institute-designated comprehensive cancer centers. Visit RPCI's website at www.roswellpark.org.



Portfolio Features

Cancer vaccines

#	Patent #	Expire	Title	Unique Features
1	5503984	04/13/2013	Hybridoma Producing Monoclonal Antibody F4 Which Specifically Binds to Multidrug Resistant P-glycoprotein and Assays for Detection of P-glycoprotein	Monoclonal antibody (F4 MAb) against P-glycoprotein and its use in detecting drug resistant carcinoma. F4 hybridoma cell line possessing surprising property of solubility in aqueous systems.
2	5871936	07/29/2014	Methods of Use of a Ductal Carcinoma Antigen	Specific, F36/22 MAbs for in vitro and in vivo diagnostics and active and passive cancer immunotherapy. Especially useful for detection and treatment of breast cancer.
3	5798445	08/25/2015	Purified Ductal Carcinoma Antigen	Specific, F36/22 MAbs for in vitro and in vivo diagnostics and active and passive cancer immunotherapy. Especially useful for detection and treatment of breast cancer. (This patent represents the purified MAb.)
4	5652114	07/29/2014	Diagnostic Immunoassay Methods Using Monoclonal Antibody F36/22 Which is Specific for Human Breast Carcinoma Cells	Specific, F36/22 MAbs for in vitro and in vivo diagnostics and active and passive cancer immunotherapy. Especially useful for detection and treatment of breast cancer.
5	6998237	10/26/2022	GD3 Peptide Mimics	Peptide mimics of GD3 gangliosides for immunotherapeutics approaches to malignancies such as melanoma and neuroblastoma. Compounds elicit an immune response against a tumor associated antigen (TAA) that is not normally immunogenic.
6	6939948	03/26/2022	GD2 Peptide Mimics	Peptide mimics of GD2 gangliosides for immunotherapeutics approaches to malignancies such as melanoma and neuroblastoma. Compounds elicit an immune response against a tumor associated antigen (TAA) that is not normally immunogenic.
7	5441871	08/15/2012	Monoclonal Antibody Reactive to Human Leukemia and Lymphoma Cells and Methods of Using Same for Diagnosis and Treatment	MAb (monoclonal antibody) SN-10 hybridoma cell line designated 2B-4G9, ATCC HB 11101 to detect and treat leukemia and lymphoma.
8	5407805	04/18/2012	Monoclonal Antibody Reactive to Various Human Leukemia and Lymphoma Cells and Methods of Using Same for Diagnosis and Treatment	MAb (monoclonal antibody) SN-7 hybridoma cell line designated T6-1G9, ATCC HB 10151 to detect and treat leukemia and lymphoma.
9	4939240	07/03/2007	Monoclonal Antibodies to Human Breast Carcinoma Cells and Their Use in Diagnosis and Therapy	Specific, F36/22 MAbs for in vitro and in vivo diagnostics and active and passive cancer immunotherapy. Especially useful for detection and treatment of breast cancer.

Cancer-HSP

#	Patent #	Expire	Title	Unique Features
10	6984384	06/30/2020	Stress Protein Compositions and Methods for Prevention and Treatment of Cancer and Infectious Disease	Cancer therapeutics with demonstrated efficacy based on stress protein hsp110 or grp170 and immunogenic polypeptide complex. Additional stress polypeptides may be included such as members of the hsp70, hsp90, grp78 and grp94 stress protein families; e.g. hsp110 complexed with hsp70 and/or hsp25.

Chemotherapeutics

#	Patent #	Expire	Title	Unique Features
11	7097836	12/02/2022	Method for increasing the efficacy of anti-tumor agents by anti-endoglin antibody	Combination approach for cancer therapy and other angiogenesis-associated diseases such as rheumatoid arthritis. Enhances chemotherapy by employing anti-endoglin MAbs or antigen binding fragments. Endoglin is also known as ENG gene.
12	5620864	04/15/2014	Acceptor for Fucosyl Transferase	Provides an oligosaccharide compound to detect alpha-1,3-L-fucosyltransferases or block its activity, which is important in HIV mechanisms.
13	5438124	08/01/2012	Glycosylating Reagent for the Synthesis of Linear and Other .alpha.-L-fucosyl Oligosaccharides	Provides efficient, convenient, rapid and economical synthesis of various fucosyl oligosaccharides that are important in the study of glycoproteins and glycolipids associated with tumors.
14	5393737	08/20/2012	Cytotoxic Drug Conjugates for Treatment of Neoplastic Diseases	Non-toxic cytotoxic drug minimizes effect on normal cells. Ligand-carbohydrate-cytotoxic drug conjugates, aka toxogens, for treating cancer, autoimmunities, or allergies or any condition that requires elimination of specific cell populations that express an addressible receptor. Preferred ligands include cytokines and growth factors such as transferrin, epidermal growth factor, granulocyte macrophage - colony stimulating factor (GM-CSF).
15	6977271	08/30/2021	Method for Inhibition of Angiogenesis and Vasculogenesis	Oral administration of conjugated linoleic acid (CLA) isomers inhibit angiogenesis in a solid tumor. Economically favorable for long-term treatment.

Chemotherapeutics

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15	6977271	08/30/2021	Method for Inhibition of Angiogenesis and Vasculogenesis	Oral administration of conjugated linoleic acid (CLA) isomers inhibit angiogenesis in a solid tumor. Economically favorable for long-term treatment.
16	6939893	01/04/2023	Method of Reducing Toxicity of Anticancer Agents	Reduction of toxicity of anticancer agents, specifically irinotecan and taxol, via administration of particular selenium compounds. Data is presented for in vivo studies in two animal models.
17	6620779	04/17/2019	Method of Enhancing the Efficacy of Anti-Tumor Agents	Use of erythropoietin (EPO) to increase the efficacy of chemotherapeutic agents for treating solid tumors by improving the hematocrit.
18	6426094	04/27/2019	Method of Enhancing the Efficacy of Anti-Tumor Agents	Use of erythropoietin (EPO) to increase the efficacy of chemotherapeutic agents for treating solid tumors by improving the hematocrit. Differentiated from '779 and '620 by Claim 5 which specifies that the EPO-like substance has increased glycosylation sites compared to EPO.
19	6171620	04/27/2019	Method of Enhancing the Efficacy of Anti-Tumor Agents	Use of erythropoietin (EPO) to increase the efficacy of chemotherapeutic agents for treating solid tumors by improving the hematocrit.
20	5972907	10/31/2017	Synthetic Core 2-like Branched Structures Containing GalNAc-lewis.sup.x and Neu5Ac.alpha.2-3Gal.beta.1-3GalNAc Sequences as Novel Ligands for Selectin	Galnac-lewis compounds which bind to selectin receptors and may modulate autoimmune, inflammation, cancer, and related processes by intervening with cell-cell adhesion events.
21	5811452	01/08/2017	Taxoid Reversal Agents for Drug-Resistance in Cancer Chemotherapy and Pharmaceutical Compositions Thereof	Taxoids that prevent multidrug resistance associated with the use of anthracyclines, Taxol, Taxotere, vinblastine and vincristine.
22	6042826	11/15/2016	Method for Inducing Apoptosis of Primary Central Nervous System B cell Lymphomas	Treatment of central nervous system (CNS) lymphomas with Fas-mediated cytotoxic antibodies and/or in combination with other chemotherapeutics to induce apoptosis.
23	5286726	02/15/2011	Difluoroglumatic Acid Conjugates with Folates and Anti-Folates for the Treatment of Neoplastic Diseases	Difluoroglumatic acid conjugates with folates and anti-folates useful for treating cancers; e.g. neoplastic diseases including leukemia, melanomas, carcinomas, sarcomas and mixed neoplasias.
24	4918056	04/17/2007	2-substituted Arabinopyranosyl Nucleosides and Nucleotides	Novel arabinopyranosyl nucleosides and nucleotides with particular structure and few toxic side-effects. Exhibit useful antitumor, antiviral and antimicrobial activities.

Cytokines

#	Patent #	Expire	Title	Unique Features
25	6197744	09/21/2018	Tumor Necrosis Factor Inhibitory Protein Tip B1 and Method of Using Same	Specific, unique, and purified 27kDa protein designated Tumor-Inhibitory Protein-B1 (TIP-B1) that possesses ability to control TNF activity. Easier preparation than TIP of ROS-5136021.
26	5342613	08/30/2011	Pharmaceutical Compositions and Use Thereof in the Treatment of Psoriasis	A novel pharmaceutical composition effective for the treatment of psoriasis using tumor necrosis factor as an active ingredient. The treatment avoids the problems with traditional treatments involving steroids (withdrawal dermatitis), photochemotherapy (premature skin aging), UV radiation (premature skin aging), coal tar (stimulant dermatitis and folliculitis), methotrexate (liver problems), and retinoid (which is teratogenic).
27	5136021	08/04/2009	TNF-inhibitory Protein and a Method of Production	Novel, purified, 28 kDa protein having TNF-inhibitory activity (TNF-inhibitory protein or TIP) for treating TNF-sensitive cells or producing an antibody to detect TNF-resistant cancer.
28	4857314	08/15/2006	C-reactive Proteins in Treatment of Animal and Human Cancers	Use of C-reactive proteins (CRP) in combination with natural or recombinant Tumor Necrosis Factor (Hr-TNF) to effectively treat tumors.

Gene therapy

#	Patent #	Expire	Title	Unique Features
29	5789213	08/04/2015	Method and Compositions for High Efficiency Loading, Transfection and Fusion of Cells by Electric Pulses	Facilitates targeted delivery via liposomes. Enables transfer of biological materials such as drugs, nucleic acids, or other materials into target cells by means of a non-toxic, two phase polymer system. Materials can be introduced (loaded) into target cells with high efficiency during and after administration of an electric pulse (electroporation).
30	5681706	03/01/2016	Mammalian Anoxia-Responsive Regulatory Element	DNA sequences that control the expression of mammalian genes in tissue- or disease stage-specific manner. The recombinant vectors effect anoxic induction of genes in animals. Enables construction of an expression vector to produce an anoxia-induced gene. Potential use in (angiogenic) tumor progression studies and (diabetic) wound healing.
31	5650305	05/15/2016	Method to Produce Hybrid Cells by Electrofusion	Enables fusion of cells of heterogenous sizes, or to transfer macromolecules into target cells, with high efficiency simplicity and in the presence of a variety of pulse medium. High viability of resultant hybrid cells.

Gene therapy

#	Patent #	Expire	Title	Unique Features
32	6965009	12/27/2014	p53as Protein and Antibody Therefor	Purified protein and antibodies for p53as. Protein is present in normal cells of a mammal and is essentially identical to p53 until the final 50 amino acids. The antibody may be either a monoclonal or polyclonal antibody. Potentially useful in influencing p53 binding to target genes or detecting p53 mutations.
33	6531512	07/31/2018	Method of Treating Cancer in Patients Having a Deficiency in p53 Tumor Suppressor Gene	Cancer treatment of p53-deficient patient with polyamine analog (Norspermine; DENSPM) and inducing tumor cell apoptosis.
34	6518012	04/02/2019	Method for Regulating the Expression of MHC Antigens and CD40 by Inhibitors of Histone Deacetylation	Enhancing cell surface expression of major histocomaptibility complex (MHC) antigens on tumor cells by administration of histone deacetylation inhibitors; especially trichostatin A (TSA) or sodium butyrate.
35	6413775	07/16/2019	Polyamine Analog-Activated SSAT Gene Therapy	Enhanced anti-tumor potency via polyamine analogs (DENSPM; Norspermine). Drug-activated suicide (apoptosis) gene therapy. DENSPM down-regulates key polyamine biosynthetic enzymes, ornithine and S-adenosylmethionine decarboxylase, and up-regulates the polyamine catabolic enzyme, spermidine-spermine N.sup.1 - acetyltransferase (SSAT). SSAT transfection inhibits tumor cell growth in vitro.
36	6187588	11/24/2019	Method for Increasing the Efficiency of Transfection	Improving efficiency of transfection based on the unexpected finding that DNA-uptake induces apoptosis. Method exposes transfected cells to inhibitors of apoptosis, e.g. caspase. Very useful research tool for gene therapy applications.
37	5747650	11/18/2014	p53 as Protein and Antibody Therefor	Monoclonal or polyclonal antibody for p53as protein that is functionally equivalent to p53.
38	5726024	08/02/2013	p53 as Protein and Antibody Therefor	Provides useful tool for expression of p53 and detection and potential treatment of malignant cells.
39	5688918	11/18/2014	p53 as Protein and Antibody Therefor	Provides useful tool for expression of p53 and detection and potential treatment of malignant cells.

Liposomal delivery

#	Patent #	Expire	Title	Unique Features
40	6991805	04/26/2023	Temperature Sensitive Control of Liposome-Cell Adhesion	A method for targeted delivery of agents comprising the steps of providing a mixture of poloxamer molecules, and liposomes encapsulating the delivery agent; heating the mixture to above the critical micellar temperature (CMT) for the poloxamer, so as to allow a fraction of the poloxamer molecules to form micelles and another fraction of the poloxamer molecules to become incorporated into the liposomes; administering the heated mixture to an individual; and cooling the target site to below the CMT so as to cause the poloxamer molecules forming the micelles and incorporated into the liposomes to dissociate into monomers thereby exposing the liposomal adhesion sites causing the liposomes to be retained at or near the target site.
41	6964778	05/06/2023	Temperature Controlled Content Release from Liposomes	A liposomal composition for targeted delivery of drugs that provides a method for delivery of agents to targeted sites.