

# Portfolio Features

## Agbiotech

#	Patent #	Expire	Title	Unique Features
1	6551820	12/23/2018	Expression of Immunogenic Hepatitis B Surface Antigens in Transgenic Plants	Edible plants that provide economical oral vaccines. Employs genetic engineering to produce a transgenic plant capable of expressing immunogenic polypeptides, including hepatitis B antigen (HBsAg) in quantities sufficient to elicit an immune response in a human or animal that consumes the plant.

## Antivirals

#	Patent #	Expire	Title	Unique Features
2	6319501	11/20/2018	Method of Immunizing Against Hepatitis B Virus	Improved hepatitis B virus (HBV) vaccine that uses antigens of non-permitted variant sequences within residues S(139-147) of the HBV surface antigen. Provides improved immunology and resistance to mutations. Use of non-permitted sequences enables convenient detection.
3	5856087	12/15/2013	Method for Detecting Immune Response to Hepatitis B	Detection of an immune response to HBV vaccine using anti-idiotypic (anti-id) antibody designated 2F10, an "internal-image" antibody capable of mimicking the group-specific "a" determinant of human hepatitis B surface antigen (HBsAg).
4	5846706	12/08/2015	Rapid and Sensitive Detection of Herpes Simplex Virus	Nucleic acid sequences (oligonucleotides) useful as primers and/or probes in the detection of a herpes virus in clinical specimens.
5	5744135	12/15/2013	Method of Raising an Immune Response With an Anti-Idiotypic Antibody Having Correspondence With Human Hepatitis B Surface Antigen	HBV vaccine: Anti-idiotypic (anti-id) antibody designated 2F10, an "internal-image" antibody capable of mimicking the group-specific "a" determinant of human hepatitis B surface antigen (HBsAg).
6	5668253	09/16/2014	Peptide Having Antigenic Properties Similar to a Determinant of Hepatitis B Surface Antigen	HBV vaccine: Anti-idiotypic (anti-id) antibody designated 2F10, an "internal-image" antibody capable of mimicking the group-specific "a" determinant of human hepatitis B surface antigen (HBsAg).
7	5569583	04/25/2015	Rapid and Sensitive Detection of Cytomegalovirus	Nucleic acid sequences (oligonucleotides) useful as primers and/or probes in the detection of a herpes virus in clinical specimens. Detection of such viruses enables specific therapeutic treatments, especially for neonatal herpes infection and bone marrow or kidney transplant-related infections.
8	5563125	10/08/2013	5'-deoxy-5'-(substituted)alkylthioribose Compounds and Their Pharmaceutical Compositions	Compounds for treating cancers (neoplastic diseases) and parasitic diseases caused by protozoa such as trypanosomiasis and malaria.
9	5531990	12/15/2013	Method of Raising an Immune Response With an Anti-Idiotypic Antibody Having Correspondence With Human Hepatitis B Surface Antigen	HBV vaccine: Anti-idiotypic (anti-id) antibody designated 2F10, an "internal-image" antibody capable of mimicking the group-specific "a" determinant of human hepatitis B surface antigen (HBsAg).
10	5484911	04/01/2013	Nucleoside 5'-diphosphate Conjugates of Ether Lipids	Conjugates of anti-HIV nucleosides and antiviral ether and thioether lipids. The conjugates can be presented in the form of micelles which more easily can be taken up by macrophages. Produce "biotransformed prodrugs" for antiviral activity and in combination with cancer chemotherapy.
11	5180714	01/19/2010	Adenosine Compounds for the Treatment of Diseases Caused by Parasitic Protozoa	Compounds for treating cancers (neoplastic diseases) and parasitic diseases caused by protozoa such as trypanosomiasis and malaria.
12	5008252	04/16/2008	Process for Inhibiting Herpes Simplex Virus-Specified Thymidine Kinase	Compositions and method of selectively inhibiting HSV-specified dThd kinase in mammalian cells infected with HSV (Herpes Simplex Virus), one that poses minimal mutagenic or carcinogenic risk to the host cell. Also decreases the dThd 5'-triphosphate (dTTP) pool of mammalian cells infected with HSV.

## Biosensors

#	Patent #	Expire	Title	Unique Features
13	5919576	11/21/2017	Immobilized Biological Membranes	Supported (immobilized) alkanethiol monolayer membrane isolated from cell membranes that retain some original functionality. Useful as biosensors.

## Cancer diagnostics

#	Patent #	Expire	Title	Unique Features
14	5652105	07/28/2015	Substrate for Detection of Mammalian 5-C-DNA Methyltransferase	Novel oligodeoxyribonucleotide (oligomeric DNA or ODN) that use standard bases (A,T,G,C) and can be routinely prepared. Enables specific detection of active mammalian DNA 5-cytosine methyltransferase (5-C-DNA methyltransferase). Diagnostic tools for premalignant tumors, esp. in colon cancer.
15	5436144	07/25/2012	Process for Performing PCR in Mammalian Cells	The polymerase chain reaction (PCR) has been performed inside intact cells to amplify specific genetic material and the resulting cells were measured using flow cytometry. This method avoids first isolating the substrate by destroying the cell. The cells must not be lost by adhesion or lysis during the process and, the reaction product must remain associated with the cell (and not leak out).
16	6752769	06/26/2021	Core Bite Biopsy Needle	A biopsy needle that is based upon an opening at the tip of the needle, not the side, that permits the entire sample to be cut from the patient yet has smooth sides to reduce injury to the patient when the needle is inserted.
17	5912147	10/22/2016	Rapid Means of Quantitating Genomic Instability	Rapid methods and compositions for quantitative genetic testing for cancerous tumors.
18	5906918	02/07/2017	Compositions and Methods for Measurement of Oxidative DNA Damage	Methods and kits for quantitative determination of DNA damage; i.e. genetic testing for identifying oxidative damage to DNA.
19	5498522	03/12/2013	Methods for the Use of Spermidine/spermine N.sup.1 -acetyltransferase as a Prognostic Indicator and/or a Tumor Response Marker	In vitro and in vivo diagnostic for responsiveness of lung carcinoma, ovarian carcinoma, or melanoma to chemotherapy. Tests chemotherapeutics that cause induction of the enzyme spermidine/spermine N.sup.1 -acetyltransferase as a significant part of their biological effect profile.
20	5238834	08/24/2010	CDNA Cloning Vectors	Enables construction of recombinant vectors useful in the high frequency cloning of cDNA, as well as vectors to direct the synthesis of single stranded cDNA, thereby permitting enrichment of specific sequences by hybridization/selection.

## Cancer diagnostics-PSA

#	Patent #	Expire	Title	Unique Features
21	6475389	08/10/2020	Method for Detection of Prostate Specific Membrane Antigen in Serum	It is becoming increasingly evident that the monitoring of prostate-specific membrane antigens (PSMA) is desirable for the detection and management of prostate cancer. PSMA is captured using an appropriate dilution of anti-PSMA antibody, coating a surface such as the surface of wells in a microtiter plate, with the resulting solution, blocking non-specific sites on the surface with blocking solution such as albumin, diluting the sample with a blocking buffer such as buffered albumin and applying a diluted sample to the surface to capture PSMA. The body fluid is preferably serum but might be another fluid such as urine.
22	6692643	08/19/2022	Method for Detecting PSA and its Molecular Forms Using Thiophilic Gel on Magnetic Beads	A method for isolation of PSA and its molecular forms that provides consistency in quantitative analysis of free PSA, complexed PSA and total PSA to increase reliability of screening tests for prostate cancer by reacting PSA and its molecular forms with magnetic beads for ease in separation without the requirement of elution from a column.
23	6379550	10/03/2020	Method for Detecting PSA and its Molecular Forms Using Thiophilic Gel	A method for isolation of PSA and its molecular forms that provides consistency in quantitative analysis of free PSA, complexed PSA and total PSA to increase reliability of screening tests for prostate cancer by reacting PSA and its molecular forms with magnetic beads for ease in separation without the requirement of elution from a column.

## Cancer vaccines

#	Patent #	Expire	Title	Unique Features
24	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.
25	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.
26	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.)
27	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.

## Cancer vaccines

#	Patent #	Expire	Title	Unique Features
28	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.
29	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.
30	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.
31	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.
32	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
33	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
34	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.
35	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.
36	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.
37	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).
38	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.
39	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.
40	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.
41	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.
42	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.
43	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 autoimmue, inflammation, cancer, and related processes by intervening with cell-cell adhesion events.
44	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.

## Chemotherapeutics

#	Patent #	Expire	Title	Unique Features
44	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.
45	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.
46	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.
47	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
48	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.
49	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).
50	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.
51	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.

## Diagnostics

#	Patent #	Expire	Title	Unique Features
52	6383138	02/25/2020	Method for Transdermal Sampling of Analytes	Transdermal extraction and sampling of analytes e.g. from blood using electroporation in the presence of liposomes. Potentially useful as glucose monitoring tool for diabetes. Claims describe fluid extraction, and measuring and detecting of analytes.

## Drug delivery

#	Patent #	Expire	Title	Unique Features
53	6537265	06/08/2021	Method for Nasal Application of a Medicinal Substance	Effective nasal delivery of a medicine to a mammal for absorption, reaction or other utilization.

## Gene therapy

#	Patent #	Expire	Title	Unique Features
54	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).
55	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.
56	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.
57	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.

## Gene therapy

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57	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.
58	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.
59	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 histocompatibility complex (MHC) antigens on tumor cells by administration of histone deacetylation inhibitors; especially trichostatin A (TSA) or sodium butyrate.
60	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.
61	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.
62	5747650	11/18/2014	p53 as Protein and Antibody Therefor	Monoclonal or polyclonal antibody for p53as protein that is functionally equivalent to p53.
63	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.
64	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
65	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.
66	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.

## Lysosomal diseases

#	Patent #	Expire	Title	Unique Features
67	5433946	07/18/2012	Synthesis and Utilization of Therapeutic Agents for the Treatment of Lysosomal Storage Diseases	Enzyme replacement therapy for lysosomal storage diseases. In particular, treatment of fucosidosis is provided via antisense therapy with leptin-glycosidase conjugates to modulate lysosomal enzymes.
68	5284934	04/24/2011	Synthesis and Utilization of Carbohydrate-binding Polymer-lectin Conjugates	Biocompatible, biologically active, and non-immunogenic, carbohydrate-binding lectin derivative useful as a therapeutic and in vivo diagnostic reagent; eg the conjugate PEG-Ricinus communis agglutinin I. Compounds useful in vivo as biological response modifiers of the immune system or as targeting agents. Overcomes loss of carbohydrate-binding activity from modification of the lectin and provides predictable, water-soluble polymer-lectin conjugate that retains carbohydrate-binding activity subsequent to conjugation.

## Medical Imaging

#	Patent #	Expire	Title	Unique Features
69	6534040	12/23/2019	Chlorin and Bacteriochlorin-based aminophenyl DTPA and N2S2 Conjugates for MR Contrast Media and Radiopharmaceuticals	Use of photosensitizers to deliver conjugates of variable lipophilicity (chelated with Gd or radionuclides) to tumors; i.e. Gd-HPPH contrast agents. The chelate is "bifunctional" because it binds the Gd at one end and binds the target specific vehicle at the other. Enables development of chlorin and bacteriochlorin-based Gd DTPA conjugates with variable lipophilicity as tumor diagnostic agents by MRI.

## Medical Imaging

#	Patent #	Expire	Title	Unique Features
69	6534040	12/23/2019	Chlorin and Bacteriochlorin-based aminophenyl DTPA and N2S2 Conjugates for MR Contrast Media and Radiopharmaceuticals	Use of photosensitizers to deliver conjugates of variable lipophilicity (chelated with Gd or radionuclides) to tumors; i.e. Gd-HPPH contrast agents. The chelate is "bifunctional" because it binds the Gd at one end and binds the target specific vehicle at the other. Enables development of chlorin and bacteriochlorin-based Gd DTPA conjugates with variable lipophilicity as tumor diagnostic agents by MRI.
70	5397777	03/14/2012	Meso poly(4-sulfonatophenyl) Porphines as MRI Image Enhancing Agents	MRI contrast agents; Mn III compounds suitable as chelates for removing manganese from chemical systems. May be administered via parenterally (IV) or by ingestion. Less toxic than TPPS4.
71	5236915	08/17/2010	Meso poly(4-sulfonatophenyl) Porphines as MRI Image Enhancing Agents	MRI contrast agents; Mn III compounds suitable as chelates for removing manganese from chemical systems. May be administered via parenterally (IV) or by ingestion. Less toxic than TPPS4.

## Photodynamic therapy

#	Patent #	Expire	Title	Unique Features
72	5403308	04/04/2012	Submersible Lens Fiberoptic Assembly for Use in PDT Treatment	The fiberoptic system has a spherical zirconia lens of high refractive index which allows treatment of areas inaccessible to "forward-looking" lenses. Allows for PDT treatment of much more surface area.
73	5190536	03/02/2010	Submersible Lens fiberoptic Assembly for Use in PDT Treatment	The fiberoptic system has a spherical lens of high refractive index which allows treatment of areas inaccessible to "forward-looking" lenses. Allows for PDT treatment of much more surface area.
74	RE38994	02/28/2023	Pyropheophorbides conjugates and their use in photodynamic therapy -- Reissue of 5,314,905	Photosensitive pyropheophorbides for photodynamic therapy (PDT). Pyropheophorbides are advantageous vs. conventional PDT photosensitizers with respect to better light absorption (further into red spectrum); better tissue penetration, shorter retention period in skin, greater toxicity per dose, and ease in synthesis. Reissued due to omission of --CH <sub>2</sub> CH <sub>2</sub> CO <sub>2</sub> R <sub>4</sub> in substituent of Claim 1.
75	6624187	06/12/2020	Long Wave Length Absorbing Bacteriochlorin Alkyl Ether Analogs	Stable photosensitizer for PDT that preferentially absorbs into hyperproliferative tissue and absorbs light efficiently at a wavelength of from about 700 to about 850 nm.
76	5952366	03/08/2016	Alkyl ether Analogs of Chlorins Having an N-substituted Imide Ring	Purpurinimides with lower phototoxicity, better tissue clearance, better effectiveness and which absorb at higher wave lengths (650-750 nm) for better penetration. Useful in diagnosis and treatment of certain cancers; psoriasis and papillomatosis.
77	5864035	03/08/2016	Synthesis of Isoimide of Chlorins and Bacteriochlorins and Their Use for Diagnosis and Treatment of Cancer	Purpurinimides with lower phototoxicity, better tissue clearance, better effectiveness and which absorb at higher wave lengths (650-750 nm) for better penetration. Chlorin and bacteriochlorin derivatives that are more convenient to synthesize. In vivo data in patent.
78	5459159	10/17/2012	Pyropheophorbides and Their Use in Photodynamic Therapy	Photosensitive pyropheophorbides for photodynamic therapy (PDT). Pyropheophorbides are advantageous vs. conventional PDT photosensitizers with respect to better light absorption (further into red spectrum); better tissue penetration, shorter retention period in skin, greater toxicity per dose, and ease in synthesis. Also includes the pyropheophorbide compounds conjugated to a ligand which is capable of binding a specific receptor such as a cellular receptor, or an antibody which is capable of binding to a particular antigen; e.g. immunoglobulin (Claims 2, 5).
79	5314905	05/24/2011	Pyropheophorbides Conjugates and Their Use in Photodynamic Therapy	Photosensitive pyropheophorbides for photodynamic therapy (PDT). Pyropheophorbides are advantageous vs. conventional PDT photosensitizers with respect to better light absorption (further into red spectrum); better tissue penetration, shorter retention period in skin, greater toxicity per dose, and ease in synthesis.
80	5198460	03/30/2010	Pyropheophorbides and Their Use in Photodynamic Therapy	Photosensitive pyropheophorbides for photodynamic therapy (PDT). Pyropheophorbides are advantageous vs. conventional PDT photosensitizers with respect to better light absorption (further into red spectrum); better tissue penetration, shorter retention period in skin, greater toxicity per dose, and ease in synthesis.
81	5093349	03/03/2009	Photosensitizing Agents	Photosensitive pyropheophorbides for photodynamic therapy (PDT). Pyropheophorbides are advantageous vs. conventional PDT photosensitizers with respect to better light absorption (further into red spectrum); better tissue penetration, shorter retention period in skin, greater toxicity per dose, and ease in synthesis.
82	5002962	03/26/2008	Photosensitizing Agents	Photosensitive pyropheophorbides for photodynamic therapy (PDT). Pyropheophorbides are advantageous vs. conventional PDT photosensitizers with respect to better light absorption (further into red spectrum); better tissue penetration, shorter retention period in skin, greater toxicity per dose, and ease in synthesis.

## Photodynamic therapy

#	Patent #	Expire	Title	Unique Features
83	6849607	05/09/2021	Galectin Recognized Photosensitizers for Photodynamic Therapy	Carbohydrate target-specific photosensitizers as therapeutic agents for PDT. Establishes a general synthetic route for the preparation of beta-galactoside-based long wavelength absorbing photosensitizers as galectin (Gal-1) recognizing agents. The Gal-1 inhibition binding affinity of the conjugates with the parent molecule was demonstrated by ELISA assay.
84	6782167	06/07/2022	Light Beam Splitter	Efficiently and accurately splits a light beam from a fiber optic input into eight outputs where the beam powers of the output beams are within ten and preferably within five percent of each other.
85	6495585	04/10/2021	Method for Treating Hyperproliferative Tissue in a Mammal	Use of xanthenone-4-acetic acid and PDT enhances the therapeutic effect and the immune response of the mammal to the hyperproliferative tissue even after the photodynamic compound and xanthenone-4-acetic acid are no longer present in the mammal.
86	6103751	06/22/2018	Carotene Analogs of Porphyrins, Chlorins and Bacteriochlorins as Therapeutic and Diagnostic Agents	Photodynamic compounds with reduced photosensitivity. Simple derivatives of many known PDT compounds such as carotene conjugates of porphyrins, chlorins and bacteriochlorins. Carotene conjugation does not significantly reduce the tumor uptake characteristics of the photosensitizer.
87	6084717	08/03/2019	Laser Beam Splitter	Efficiently and accurately splits a laser beam input into eight or more outputs where the beam energies of the output beams are within ten and preferably within five percent of each other. In particular, the eight output laser beams are able to be formed from a single laser input.
88	5770730	03/08/2016	Synthesis of Carbodimide Analogs of Chlorins and Bacteriochlorins and Their Use for Diagnosis and Treatment of Cancer	Useful for PDT; e.g. with fiber optic positioners of U.S. Patent 5,671,317. Purpurinimides with lower phototoxicity, better tissue clearance, better effectiveness and which absorb at higher wave lengths (650-750 nm) for better penetration. Chlorin and bacteriochlorin derivatives that are more convenient to synthesize.
89	5591847	05/23/2014	Long Wavelength Absorbing Photosensitizers Related to Purpurin-18, Bacteriopurpurin-18 and related Compounds With Imide Linkages	Modifications of purpurin-18 and other bacteriochlorins by converting the methyl esters to corresponding aspartyl acid derivatives to significant increase photosensitizing efficacy. Establishes the significance of hydrophilicity and hydrophobicity in localizing a photosensitizer in tumors; recommended as one of the most important requirements in designing an effective photosensitizer.
90	5498710	04/22/2014	Alkyl ether Analogues of Benzoporphyrin Derivatives	Provides a series of isomerically pure benzoporphyrin derivatives (BPD) (cis- and trans- isomers) as methyl esters having utility as fluorescent and photosensitizing compounds. Such compounds may be excited by microwaves, ultrasound, and visible or infrared radiation.
91	5257970	11/02/2020	In situ Photodynamic Therapy	PDT process (method) by separately encapsulating the components in heat-sensitive liposomes. Conventional Photofrin is preferred as the photosensitizer. The heating of the site of the tumor is accomplished by laser, ultrasound, RF or microwave frequency.
92	5190966	03/02/2010	Purified Hematoporphyrin Dimers and Trimers Useful in Photodynamic Therapy	Compounds for PDT that are dimers or trimers of hematoporphyrin, linked through ether linkages and obtained in isolated form, as well as dehydrated forms of these compounds. May also possess a target-specific component such as an immunoglobulin, e.g. derived from polyclonal or monoclonal antibodies and may contain whole antibodies or immunologically reactive fragments.
93	5173504	12/22/2009	Bacteriochlorophyll-a Derivatives Useful in Photodynamic Therapy	Tetrahydroporphyrins, such as bacteriochlorophyll-a or -b or the corresponding bacteriochlorins, for PDT and diagnostic kits. Topically or systemically administered; specifically claims a liposome carrier.
94	5171741	12/15/2009	Bacteriochlorophyll-a Derivatives Useful in Photodynamic Therapy	Tetrahydroporphyrins, such as bacteriochlorophyll-a or -b or the corresponding bacteriochlorins, for PDT and diagnostic kits. Topically or systemically administered; specifically claims a diode laser as the source of irradiation.
95	6868221	05/08/2022	Fiber Optic Positioner	Device and method uses a multi-legged "stand" to position and hold a fiber optic treatment device in proximity to the patient's skin.
96	5671317	07/16/2016	Fiber Optic Positioner	Device and method uses a multi-legged "stand" to position and hold a fiber optic treatment device in proximity to the patient's skin.
97	5219345	06/15/2010	Backscatter Monitoring System	Improvement to optical fiber treatment devices allowing for the monitoring of the condition of the light emitting tip.
98	5205291	05/12/2009	In Vivo Fluorescence Photometer	A method and apparatus for in vivo fluorometry which can be implemented in a handheld nonimaging probe where sequential tissue excitation is not feasible.
99	5111821	05/12/2009	Fluorometric Method for Detecting Abnormal Tissue Using Dual Long-Wavelength Excitation	A method and apparatus for in vivo fluorometry which can be implemented in a handheld nonimaging probe where sequential tissue excitation is not feasible.
100	5074632	12/24/2008	Fiber Optic Diffusers and Methods for Manufacture of the Same	A fiber optic diffuser which has an approximately uniform scattering light output and good mechanical properties, and suitable for use in a biological environment.
101	5062431	11/05/2008	In Vivo Fluorescence Photometer	Use of two wavelengths of light to induce fluorescence in abnormal tissue provides easy detection of abnormal tissues.
102	5015463	05/14/2008	Method to Diagnose the Presence or Absence of Tumor Tissue	Photosensitizing drugs obtained from phlorin, chlorin, or other pyrrole-containing molecules; i.e. hematoporphyrin derivatives (HpDs). Useful in diagnosis and treatment of malignant tumors.

### Photodynamic therapy

#	Patent #	Expire	Title	Unique Features
103	7097826	08/07/2020	Chlorin and bacteriochlorin-based difunctional aminophenyl DTPA and N.sub.2S.sub.2 conjugates for MR contrast media and radiopharmaceuticals	Bifunctional chelate compositions and methods of detecting tumors; e.g. with HPPH-like (pyropheophorbide) compounds as imaging agents. Chelates are "bifunctional" because they bind Gd at one end and bind the target specific vehicle at the other. 48 Claims. Related to 7,078,014 and 6,534,040. Methods for imaging and preparation of complexes useful for imaging tumors. 16 Claims. Related to 7,097,826 and 6,534,040.
104	7078014	07/21/2020	Method for using chlorin and bacteriochlorin-based aminophenyl DTPA and N.sub.2S.sub.2 conjugates for MR contrast media and radiopharmaceuticals	

### Research tools

#	Patent #	Expire	Title	Unique Features
105	5986170	11/13/2015	Murine model for human carcinoma	Mouse model for human breast, ovarian, and prostate cancer. Describes a SCID mouse that is the only mouse model to develop prostate cancer at 100% efficiency. Related to US 6284239. Describes a SCID mouse that is the only mouse model to develop prostate cancer at 100% efficiency. Claims provide additional protection of methods for evaluating effectiveness of therapy relative to parent patent, US 5986170. CIP of PCT application US96/18243.
106	6284239	11/13/2015	Murine model for human carcinoma	
107	5723719	03/03/2015	Transgenic Mouse as Model for Diseases Involving Dopaminergic Dysfunction	Transgenic mouse that expresses circling behavior without other behavioral characteristics of the "shaker-waltzer" syndrome. Useful for brain function and behavior research; i.e. treatment of dopaminergic dysfunction such as Parkinsonism and schizophrenia.