Patent No.	Title	Owner	Inventor	APIs	Description	Carrier/Polymer	Targeting Agent	Purpose	Type of Cancer	Mechanism of Action	Year	Ref.
US20150118311 A1	Highly penetrative nanocarriers for treatment of CNS disease	Yale University	· Zhou, Z. · Patel, T.R. · Piepmeier, J.M. · Saltzman, W.M.	- Treatment : Dithiazanine iodide Carmustine (BCNU), Temozolomide Paclitaxel, and camptothecin. - Diagnosis : radioactive, magnetic, x-ray or ultrasound-detectable agents	Small brain-penetrating polymeric nanoparticles that can be loaded with drugs and are optimized for intracranial convection-enhanced delivery (CED).	Poly(lactic acid) (PLA), Poly(lactic-co-glycolic acid) (PLGA) Poly(lactic acid)- polyethyleneglycol (PLA-PEG) block copolymers, Polyanhydrides, Poly(ester anhydrides), Polyglycolide (PGA), poly-3-hydroxybutyrate (PHB) and copolymers thereof, Poly-4-hydroxybutyrate (P4HB), Polycaprolactone, cellulose, Hydroxypropyl methylcellulose, Ethylcellulose, as well as blends, derivatives, copolymers, and combinations thereof.	Antitumor agents to target brain cancer stem cells (BSCSs)	Treatment, Diagnosis or prophylaxis	Glioblastoma (GBM)	· Convection- enhanced delivery (CED) · Agents are infused into the brain under a positive pressure gradient, creating bulk fluid movement in the brain interstitium	2013	[1]
WO2010124004 A2	Nanocarrier Therapy for Treating Invasive Tumors	· Emory University · Georgia Institute of Technology	· Munson, J.M. · Bellamkonda, R.V. · Arbiser, J.L.	Imipramine blue	Imipramine blue, a pharmaceutically acceptable salt or prodrug, in a PEGylated uni-lamellar vesicle liposome appropriately sized and formulated to cross the blood-brain barrier.	PEGylated unilamillar liposomes	Passive targeting	Treatment	Brain tumors such as gliomas	Liposomes pass through capillaries with increased permeability (enhanced permeability) and can preferentially penetrate tumor tissue, relative to normal tissue.	2010	[2]
US20140286872 A1	Nanoparticle for targeting brain tumors and delivery of o6-benzylguanine	University of Washington Through Its Center For Commercialization	· Zhang, M. · Ellenbogen, R.G. · Kievit, F. · Silber, J.R. · Stephen, Z. · Veiseh, O.	O6-benzylguanine	Coated nanoparticles consisting of cross-linked chitosan-polyethylene oxide oligomer copolymer as a core material Coat material includes glutathione-sensitive crosslinks covalently couple to O6-benzylguanine.		Small organic molecules, peptides, proteins, and nucleic acids , e.g. chlorotoxin (CTX) that bind to MMP2	Treatment	TMZ-resistant brain cancers (Glioblastoma multiform)	O6-benzylguanine inhibits O6-methylguanine-DNA methyltransferase (MGMT) that is overly expressed in brain tumors	2014	[3]
US8530429 B2	Brain tumor targeting peptides and methods	Arch Cancer Therapeutics, Inc.	· Robbins, S.M. · Rahn, J. · Senger, D.L.	Anti-tumor agent or radioactive agent	A targeting peptide of 12-20 amino acid residues in length selected for its ability to bind preferentially to a subtype of human GBM cells identified as brain tumor initiating cells (BTICs) or highly invasive glioma cells (HIGCs).	Nanoparticle made of poly(lactide-co-glycolide) copolymer, cyclodextrin or cetyl alcoholipolysorbate	· Targeting peptide SEQ ID NOS: 1-10, is used for targeting HIGCs, and SEQ ID NOS: 11-16, is used for targeting BTICs. · For Glioblastoma (GBM) in general: · Angio-pep-2 and Angio-pep-7	Treatment or Diagnosis	Glioblastoma subtypes HGIC and BTIC	· Migration of HGIC and BTIC cells toward a tumor site to be inhibited by the peptide alone. · The peptide may be conjugated to an anti-cancer agent for treatment, or radionuclide for diagnosis	2013	[4]

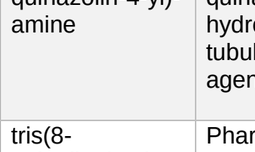
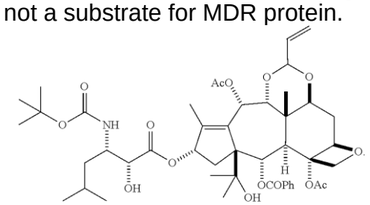
WO2014138391 A1	Targeting glutamine metabolism in brain tumors	The Johns Hopkins University	· Raabe, E. H. · Hanaford, A. · Ahsan, S. · Taylor, I. · Eberhart, C.	Glutamine metabolism inhibitor: (25)-Amino[(55)-3-chloro-4,5-dihydro-l,2-oxazol-5-yljethanoic acid (Acivicin) or 6-Diazo-5-oxo-L-norleucine (DON)	· The invention provides methods and compositions useful for diagnosing and treating Myc gene driven tumors. · Glutamine metabolism inhibitors can function as a therapeutic target in aggressive brain tumors.	N/A	Passive targeting	Treatment or diagnosis	Medulloblastoma, Glioblastoma or Primitive neuroectodermal tumor.	Inhibition of Glutaminase (GLS) led to decreased cell growth and increased apoptosis in cell culture and to decreased growth of brain tumor xenografts in immunocompromised animals	2014	[5]
US20140154269 A1	Targeted nano-vectors and their use for treatment of brain tumors	· The Methodist Hospital Research Institute · William Marsh Rice University	· Tour, J.M. · Berlin, J. · Marcano, D. · Baskin, D.S. · Sharpe, M.A.	· SN-38, a topoisomerase I inhibitor, which arrests the cell cycle in the S and G2 phases · Vinblastine · Docetaxel	Poly(ethylene glycolated hydrophilic carbon cluster (PEG-HCCs) nanovector coupled with active therapeutic agents against brain tumor cells and targeting agents with recognition activity for a marker of the brain tumor cells.		GBM surface antigens such as: · Interleukin 13 receptor (IL-13R) · Epidermal Growth Factor Receptor (EGFR) · Gglial fibrillary acidic protein (GFAP)	Treatment	Brain tumors including Glioblastoma	· Cell-specific active agent delivery by Hydrophilic Carbon Clusters (Hccs) Antibody Drug Enhancement System (HADES). · A targeting agent associated with the nano-vector with recognition activity for a marker of the brain tumor cells.	2014	[6]
WO2014095916 A1	Ninjurin-1 as therapeutic target for brain tumor	Sanofi Inc.	· Chao, T. S. O. · Curet, O. · Mahmudi, N.	Antagonist of Ninjurin-1	Antagonist of Ninjurin-1 for use in the treatment or prevention of cancers such as brain cancers.	N/A	anti-Ninjurin-1 antibodies	Treatment or screening	Brain tumors	Ninjurin-1 antagonists such as specific monoclonal anti-Ninjurin-1 antibodies reduce the proliferation of human neuroglioma/neuroblastoma cell lines	2014	[7]
US8188221 B2	Peptide homing to brain tumors	· Burnham Institute For Medical Research · The Regents Of The University Of California	· Laakkonen, P. · Ruoslahti, E. · Bergers, G.	N/A	Promising peptide candidate (CGLSGLGV) to be used in targeted delivery of therapies to the brain tumors as such and in combination with conventional therapies, such as surgery and radiation, and anti-angiogenic therapies.	N/A	Active targeting via CGLSGLGVA peptide homing	Treatment or diagnosis	Invasive brain cancers Including GBM	CGLSGLGVA peptide very specifically homes to the astrocytoma islets can deliver therapeutic or diagnostic agents	2012	[8]
US 20110002846 A1	CD24 as a brain tumor stem cell marker and a diagnostic and therapeutic target in primarys neural and glial tumors of the brain	University Of Rochester	· Goldman, S.A. · Sim, F. · Auvergne, R.M.	N/A	Utilizing the CD24 surface protein selectively expressed on tumor progenitor cells as a therapeutic target as well as a means for directing oncolytic therapeutics directly to the tumor site	N/A	Antigen/Antibody active targeting via CD24 surface protein	Treatment or diagnosis	Neural and glial tumors of the brain	CD24 represents a selective antigen with which to both diagnose tumorigenic cells in either biopsies or other patient samples, and to selectively target tumor-initiating cells for destruction as a therapeutic strategy.	2011	[9]

WO2014089209 A2	Blood-brain barrier penetrating dual specific binding proteins	Abbvie, Inc.	· Hanzatian, D. K. · Ghayur, T. · Sterman, A. J. S. · Goodearl, A. · Harris, M .C.	N/A	Multivalent and multi-specific binding proteins that bind receptors on the Blood-Brain Barrier (BBB), and capable of carrying another brain target domain into the brain, methods of making, in vivo distribution in brain, and their uses in the treatment of acute and chronic neurological diseases, brain cancer, pain are provided.	Dual variable domain (DVD) can also be used as a carrier	A dual variable domain (DVD) binding protein	Prevention, diagnosis and treatment	Brain Cancer	Dual variable domain (DVD) Binding protein binds to the antigen comprises a receptor expressed on brain vascular epithelium	2014	[10]
WO2012151523 A1	Csf-1r inhibitors for treatment of brain tumors	· Novartis AG · Sloan-Kettering Institute For Cancer Research	· Daniel, D. · Joyce, J. · Sutton, J.	CSF-1 R inhibitor formula I; where in R1 is an alkyl pyrazole or an alkyl carboxamide, and R2 is a hydroxycycloalkyl; or a pharmaceutically acceptable salt thereof	The invention provides a method to treat a brain tumor in a mammalian subject using CSF-1 R inhibitor (Formula I)	N/A	N/A	Treatment	Brain tumors particularly glioblastoma	Effectiveness of the CSF-1 R inhibitors is believed to be due to their ability to penetrate the BBB and inhibit of certain activities of Tumor-associated macrophages (TAMs)	2012	[11]
US20140039489 A1	Acute blood-brain barrier disruption using electrical energy based therapy	Virginia Tech Intellectual Properties, Inc.	· Davalos, R. V. · Rossmeisl, J. H. · Garcia, P. A.	Bioactive antitumor or diagnostic agents	A combination of an electroporation-based therapy such as electrochemotherapy, electrogenetherapy, and irreversible electroporation with the administration of therapeutic and diagnostic agents to aid the uptake of these agents into brain tissue.	N/A	N/A	Treatment or diagnosis	Brain tumors particularly glioblastoma	Pulsed electric fields into brain tissue (such as a tumor) of an animal, to cause temporary disruption of the BBB in a volume of brain tissue near the source of the pulsed electric fields over a specified time interval.	2014	[12]
US 20110178046 A1	Methods for Treating Glioblastoma	University of Massachusetts	· Ross, A. H. · Gilbert, C. · Moser, R.	Notch inhibitors such as a gamma secretase inhibitors	Treatment of cancers such as glioblastoma through the administration of an inhibitor of Notch signaling such as gamma secretase inhibitor, in combination with a chemotherapeutic agent.	N/A	Passive targeting	Treatment	Glioblastoma (GBM)	· The administration of a Notch inhibitor (such as gamma secretase inhibitor) in combination with a chemotherapeutic agent that induces cell quiescence (such as alkylating agent, temozolomide (TMZ)) greatly increases cell senescence in a model of GBM. · The Notch pathway is active in normal neural stem cells and over-expressed in brain tumors.	2011	[13]
WO2014078522 A1	Materials and methods useful for treating glioblastoma	Ohio State Innovation Foundation	· Kaur, B. · Wojton, J.	· SapC-DOPS (Saposin C-related conjugated to Dioleoylphosphatidylserined polypeptide) · mTOR inhibitor	SapC-DOPS was found to be synergistically effective at inducing cell death when administered in conjunction with rapamycin inhibitor (mTor)	(DOPS), which is a phospholipid, forms a nanovesicle incorporating the polypeptide SapC	Passive targeting	Treatment	Glioblastoma	· SapC-DOPS targets exposed phosphatidylserine on glioma cells. · SapC-DOPS can selectively and effectively cross the BBTB through fusion to negatively charged phospholipids	2014	[14]

										(PtdSer). · SapC-DOPS exerts anti-angiogenic effects by inhibiting the growth of blood vessels.		
WO2013127004 A1	Polymeric nanoparticles useful in theranostics.	The governing council of the University of Toronto	· Wu, X Y. · Shalviri, A.	N/A	Nanoparticles of the invention include a polymer backbone having grafted to polymeric chains containing carboxyl groups or amino groups, covalently linked as part of the nanoparticle are polyethoxylate moieties that present on the exterior surface of the nanoparticles.	· Polymethacrylic acid grafted starch (PMAA-g-St) nanoparticles · Polymeric backbone, the monomer is methacrylic acid (MAA), diethylaminoethyl methacrylate (DEAEM), and the polyethoxy- lated moieties are provided by polysorbate 80 (Tween® 80).	N/A	Treatment and diagnosis	Brain Tumors	PS80 is capable of binding to Apolipoprotien E (Apo-E), which in turn binds to LDL receptors in brain microvessels, enabling transcytosis of the nanoparticle.	2013	[15]
WO2012000062 A1	Diagnosis and treatment of brain tumors.	Welcome Receptor Antibodies Pty Ltd	· Furness, S. · Johns, T. · Wookey, P. J.	N/A	· The invention provides a method for the localization, diagnosis, prognosis, and/or prediction of therapeutic outcome of a brain tumor in a subject. · The method details detecting calcitonin receptor in brain cells of the subject, wherein the presence of calcitonin receptor localizes, is diagnostic, prognostic and/or predictive for, the brain tumor.		Active targeting	Treatment or diagnosis	Brain tumors	The compound bind to calcitonin receptor, allowing the compound to bind to cells within the subject, and determining the location of the compound within the brain of the subject or delivers drug.	2012	[16]
US20120039915 A1	Glioblastoma multiforme-reactive antibodies and methods of use thereof	The Regents Of The University Of California	· Liu, B. · Marks, J. D. · Zhu, X. · Bidlingmaier, S.	N/A	The disclosure provides isolated antibodies that binds specifically to glioblastoma multiform (GBM) tumor sphere cells.	N/A	Antibody/antigen	Treatment or diagnosis	Glioblastoma	Anti-GMB antibody binds to the GMB tumor cells, inhibiting proliferation and self-renewal of tumor initiating cells.	2012	[17]
WO2014203189 A1	Nanocarrier system for micrornas and uses thereof	· Rosetta Genomics Ltd., · Ramot At Tel-Aviv University Ltd	· Yerushalmi, N. · Kredp-Russo, S. · Lithwick, Y.G. · Satchi-Fainaro, R. · Ofek, P.	Nucleic acid molecule that mimics or inhibits the sequence and activity of a microRNA	A cationic carrier system incorporating a nucleic acid molecule, which can strongly improve microRNA stability, intracellular trafficking as well as miRNA's silencing efficacy, and which further exhibits accumulation in tumor and hence can be used in cancer therapy.	Cationic carrier system Hyper-branched polymer of polyglycerol-amine (PG-NH_2)	Passive targeting	Treatment	Brain tumors Particularly glioblastoma	PG-NH2 accumulates in the tumor environment due to the enhanced permeability and retention (EPR)	2014	[18]
WO2014121256 A1	Aptamers for tumor initiating cells	The Cleveland Clinic Foundation	Rich, J. N. Kim, Y. Hjelmeland, A.	N/A	Aptamers consisting of a single stranded nucleic acids having 100 nucleotides or less that specifically binds to tumor initiating cancer cells are described.		Aptamer	Treatment or diagnosis	Glioblastoma	The aptamer specifically binds to tumor initiating cells (TIC) of GBM	2014	[19]
US20150209284 A1	Dual-targeting drug carrier and method for fabricating the same	National Chung Cheng University	Kuo, Y. C. Chang, Y. H.	Anticancer drugs eg. etoposide, carmustine injection, and doxorubicin injections	The invention proposes a dual-targeting drug carrier, which comprises a plurality of methoxy poly(ethylene glycol)-poly(ε-caprolactone) nanoparticle (MPEG-PLA nanoparticles) each encapsulating at least one anticancer drug, folic acid (FA), and wheat germ agglutinin (WGA) , wherein FA and WGA are grafted on the surface of the MPEG-PLA nanoparticles		FA targets FA receptor WGA targets N-acetylglucosamine of human brain microvascular endothelial cells (HBMECs)	Treatment	Glioblastoma	MPEG-PLA nanoparticles can penetrate the blood brain barrier (BBB) of the carrier and thus, enables the anticancer drugs encapsulated inside to pass through BBB and target human glioblastoma cells	2015	[20]

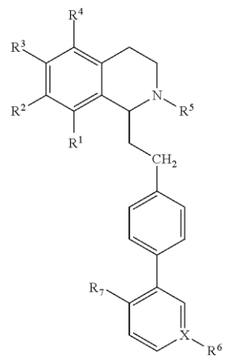
US20140128337 A1	Curcuminoids in Combination Docetaxel for the Treatment of Cancer and Tumour Metastasis	Institut National de La Sante et De La Recherche Medicale (INSERM)	Barthomeuf, C. Chollet, P. Bayet-Robert, M.	· Curcuminoids · Docetaxel	The invention relates to the use of curcuminoids for enhancing the clinical efficacy of Docetaxel (Taxotere®, DTX) for the treatment of cancers and metastases.	N/A	Passive targeting	Treatment	Tumors including glioblastoma.	Curcumin may reduce both P-glycoprotein (Pgp)-transport and HIF-1-(dependent and independent) angiogenesis through down-regulation of platelet activating factor (PAF) synthesis, which in turn inhibit tumor progression, angiogenesis and induction of resistance.	2014	[21]
US20120039808 A1	Brain Tumor Stem Cell Differentiation Promoter, and Therapeutic Agent for Brain Tumor	The University Of Tokyo	· Miyazono, K. · Ikushima, H. · Miyazawa, K. · Todo, T. · Ino, Y.	A promotor inhibits the TGF-β-Sox4-Sox2 pathway	A differentiation promoter for brain tumor stem cells, which reduces the tumorigenicity by promoting the differentiation of brain tumor stem cells.	May be: Ribozymes, high-molecular weight micelle, cation carrier or, a nucleic acid carrier	N/A	Treatment	Brain tumors including glioblastoma	The differentiation of brain tumor stem cells can be promoted by inhibiting the functions or expression of transforming growth factor (TGF-β).	2012	[22]
WO2014143765 A1	Anti-EGFR antibody drug conjugate formulations	· Abbvie Deutschland Gmbh · Co.Kg, Abbvie Inc.	· Tschoepe, M. · Kaleta, K. · Kumar, V.	Chemotherapy, auristatin	A stable formulation comprising an anti-EGFR antibody drug conjugate (ADC), including; an anti-EGFR antibody or antigen-binding portion thereof conjugated to an auristatin, a sugar, a surfactant and histidine.	N/A	Antigen/Antibody Bioconjugate	Treatment	Glioblastoma	· Auristatin inhibits cell division by blocking the polymerization of tubulin. · Also, recognizes an EGFR epitope which is found in tumorigenic, hyperproliferative or abnormal cells	2014	[23]
US20120107282 A1	Neural stem cell composition capable of treating cancer and method of treatment	S. Biomedics Co., Ltd	Kim, S. U.	Neural stem cells (NSCs) genetically engineered to contain suicide gene (eg. cytosine deaminase, carboxylesterase and herpes simplex-1 thymidine kinase)	A systemic treatment of central nervous system tumors and other tumors in both intracranial/intraspinal and extracranial/extraspinal sites, using neural stem cells (NSCs)	N/A	N/A	Treatment	Glioma and medulloblastoma	Genetically modified human NSCs expressing both Cytosine Deaminase and Interferon β (IFN-β) migrate into the intracranial tumor bed through the blood vessels, exhibit antitumor effect by the combined delivery of a suicide gene and a cytotoxic cytokine gene onto the glioma tumor and kill the tumor cells.	2012	[24]
US20140377366 A1	Biodegradable polymers for delivery of therapeutic agents	Colorado School Of Mines	Krebs, M. D.	Anti-VEGF antibodies Chemotherapeutic drug can be added as well within the hydrogel for dual drug delivery for glioblastoma management	The system would allow placement of an antibody-laden biodegradable hydrogel system into the tumor resection cavity.	· Biodegradable polymer or biodegradable gel · microsphere of poly(lactic-co-glycolic acid, alginate, chitosan, hyaluronic acid, collagen, collagen, GAG (glycosaminoglycan), chondroitan sulfate, poly(ethylene glycol) (PEG), gelatin, poly(lactic-co-glycolic acid) (PLGA), polyesters	N/A	Treatment	Glioblastoma	The biodegradable hydrogel would allow release of anti-VEGF to the periphery of the resected tumor site in a localized manner with stable release rate over a sustained period.	2014	[25]

US20150094336 A1	Methods for treating gliomas with 3-(4-amino-1-oxo-1,3-dihydro-isoindol-2-yl)-piperidine-2,6-dione	Celgene Corporation	Zeldis, J. B.	Revimid™, 3-(4-amino-1-oxo-1,3-dihydro-isoindol-2-yl)-piperidine-2,6-dione	An immunomodulatory compound administered in combination with a therapy conventionally to treat, prevent or manage diseases or disorders associated with, or characterized by, undesired angiogenesis.	N/A	N/A	Treatment	Glioma	Immunomodulatory compounds inhibit TNF-α, can be administered in combination with a second active ingredient such as temozolomide in treating Glioblastoma	2015	[26]
US9044514 B2	Lipid-peptide-polymer conjugates and nanoparticles thereof	Regents of The University of California	Xu, T. Dong, H. Shu, J.	· Therapeutic anticancer agents (such as doxorubicin, temzolomide, rapamycin and others.) · Diagnostic agents (such as radioisotopes)	The invention provides conjugates of a peptide, polymer and lipid moiety, where the conjugates self-assemble to form trimers or tetramers, helix bundles, that then self-assemble to form nanoparticles that can be loaded with a therapeutic or diagnostic agent for detection and/or treatment of a disease or condition	Lipid-peptide-polymer conjugate grafted with polyethyleneglycol (PEG)	· folic acid derivatives · B-12 derivatives, integrin · RGD peptides · NGR derivatives, somatostatin derivatives or somatstatin receptor ligands · An aptamer.	Treatment or diagnosis	Brain cancer including Gliobastoma multiforme	Lipid-peptide-polymer conjugate forms a nanoparticle that can also include a targeting agent.	2015	[27]
US 20110189205 A1	Methods of treating cancer using an agent that modulates activity of the calcitonin-gene related peptide "CGRP" receptor	University Of Rochester	Dickerson, I. M. Brown, E. B.	· The invention relates to the identification of the CGRP (calcitonin-gene related peptide) receptor (and its component protein subunits) as a novel target for cancer, particularly breast cancer and glioma. · Modulators of CFRP receptor include: 1- CGRP antagonist 2- RAMP1 ,RCP or CLR inhibitor can be an antibody, or antibody fragment , a soluble protein or partial protein or antisense nucleic acid		RNA and nucleic acid aptamers are preferably administered alone or as a component of a composition i.e. PEG-PEI iRNA molecule can also be present in the form of a bioconjugate, The iRNA, or any composition or bioconjugate containing the same, can also be administered via a liposomal delivery	Antibody	Treatment	Glioma	· CGRP Under normoxic conditions, is capable of stimulating cell replication and growth in cancer cells, which would stimulate growth of a primary tumor. Under hypoxic conditions, CGRP is capable of stimulating cell replication and growth in a metastatic variant. · Can be modulated by a CGRP antagonist, a calcitonin-like receptor (“CLR”) inhibitor, a receptor activity modifying protein 1 (“RAMP1”) inhibitor, and a receptor component protein (“RCP”) inhibitor	2011	[28]
US20110124712 A1	Anti-cancer composition comprising microRNA molecules	National Cancer Center	· Park, J. B. · Lee, S. H. · Park, E. K. · Lee, D. · Yang, H. S. · Yoo, H. · Kim, H. J. · Kim, T. H. · Kwak, H. J.	MicroRNA-125 nucleic acid molecule	The invention provides a composition microRNA-125 nucleic acid molecule for the treatment of hypoxia-induced angiogenesis-associated diseases including cancers.	Viral vectors include: · Lentivirus (preferably) Non-viral vectors: · Diethylaminoethanol (DEAE)-dextran · Polybrene-mediated · Liposome · Lipofectamine · Protoplast fusion	Passive Targeting	Treatment	Brain cancers	The microRNA-125 nucleic acid molecules can suppress the VEGF expression induced by the inactivation of PTEN (phosphatase and tensin homolog deleted on chromosome ten), resulting in the inhibition of VEGF-mediated angiogenesis, thus inhibiting invasion and metastasis of tumor cells	2011	[29]

US20140066445 A1	Composition and Methods for Modulating a Kinase Cascade	Kinex Pharmaceuticals, Llc	Hangauer, D. G.	N-(3-fluorobenzyl)-2-(5-(4-morpholinophenyl)pyridin-2-yl)acetamide (compound 1)	· Compounds and methods for modulating one or more components of a kinase cascade. · Methods of preparing substantially pure compound 1 and compound 1 salts.	N/A	N/A	Treatment	Tyrosine kinase modulated disorders , including glioblastoma multiforme	Compound 1 can inhibit Src signaling in tumors by reducing the phosphorylation level of known Src protein substrates in a dose-dependent fashion and in good correlation with growth inhibitory effects	2014	[30]
US 20120157402 A1	Methods for treating brain tumors	Cao, L.	· Cao, L. · Davis, T. W. · Hirawat, S. · Miao, H. H. · Miller, L. · Weetall, M.	Compound(s) that selectively inhibits pathological production of human VEGF  X is hydrogen; C1 to C6 alkyl optionally substituted with one or more halogen substituents; hydroxyl; halogen; or C1 to C5 alkoxy optionally substituted with aryl; A is CH or N; B is CH or N, with the proviso that at least one of A or B is N, and that when A is N, B is CH;		Lipid-Based carrier system in a self-emulsifying drug delivery system SEDDS or self-microemulsifying drug delivery system SMEDDS comprising a lipophilic component, a surfactant, and optionally a hydrophilic component.	N/A	Treatment	Brain tumor including GBM	· selective inhibition of the pathological production of (VEGF); · inhibition of tumor angiogenesis, tumor-related inflammation, tumor-related edema, and/or tumor growth; and/or · Prolongation of the G1/S phase of cell cycle.	2012	[31]
US 20110318334 A1	Taxane analogs for the treatment of brain cancer	Tapestry Pharmaceuticals, Inc.	· McChesney, J. D. · Tapolsky, G. · Emerson, D. L. · Marshall, J. · Ahmed, T. · Cohn, A. · Kurman, M. · Modiano, M.	A compound that stabilizes tubulin dimers or microtubles at G2-M interface during mitosis but is not a substrate for MDR protein. 		N/A	N/A	Treatment	Brain tumors including GBM	It stabilizes tubulin dimers at G2-M interface of mitosis but is not a substrate for MDR protein where MDR1 gene encodes for P-gp which pumps drugs such as paclitaxel and docetaxel out of the cells	2011	[32]
US 20100129470 A1	Method of treating brain cancer	Myriad Pharmaceuticals, Incorporated	Laughlin, M.	(4-Methoxy-phenyl)-methyl-(2-methyl-quinazolin-4-yl)-amine	The invention is related to the activity of (4-Methoxy-phenyl)-methyl-(2-methyl-quinazolin-4-yl)-amine hydrochloride, as a potent tubulin inhibitor and cytotoxic agent.	N/A	Passive targeting	Treatment	Brain disorders including GBM	Treating diseases of the brain and CNS that are responsive to therapy by inducing apoptosis, activating caspases, inhibiting tubulin and/or topoisomerase in the brain	2010	[33]
US20130090321 A1	Method for treating brain cancer	. Niiki Pharma Inc.	· Sheshbaradaran, H. · Baerga, R. · Cobb, J. · Valiahdi, M. S. · Keppler, B	tris(8-quinolinolato) gallium(III)	Pharmaceutical compositions and methods for treating cancer, and particularly to a pharmaceutical composition having tris(8-quinolinolato) gallium(III), and method of using thereof.	N/A	N/A	Treatment Or diagnosis	Brain tumors	Tris(8-quinolinolato) gallium(III) induces apoptosis in brain refractory tumors	2013	[34]
US 20110070314 A1	Methods for treating brain tumors	Jo, Y.J. Yang, Y.J.	· Jo, Y.J. · Yang, Y.J.	sodium meta arsenite	Methods treating brain tumors comprising administering a subject in need thereof a therapeutically effective amount of sodium meta arsenite, alone or in combination with another anti-brain tumor medicament.	N/A	Passive Targeting	Treatment	Brain tumor including GBM	Sodium meta arsenite can readily cross the blood brain barrier. and can negatively affect brain tumor cells and brain tumors in mice and humans	2011	[35]

US 20130183368 A1	P97-antibody conjugates and methods of use	Bioasis Technologies, Inc.	· Hutchison, R. · Vitalis, T. Z. · Gabathuler, R.	Anti-cancer therapeutic antibody Ex Trastuzumab	p97-antibody conjugates and related compositions and methods, used in treatment of cancers such as Her2/neu-expressing and Her1/EGFR-expressing cancers.	Bioconjugate	Antigen-antibody	Treatment	Brain cancers	· p97-antibody conjugates showed a marked transport into human brain endothelial cells (HBE) by binding to LRP · inhibits, prevents or delays metastasis of an antibody-resistant cancer	2013	[36]
US20140161762 A1	Drug delivery of temozolomide for systemic based treatment of cancer	Cedars-Sinai Medical Center	· Patil, R. · Holler, E. · Black, K. L. · Ljubimova, J. Y.	Temozolomide	A method of preparing a multifunctional nanoconjugate of temozolomide (TMZ) by conjugating TMZ in its hydrazide form to a polymalic acid platform where, the polymalic acid platform may be conjugated to a monoclonal antibody to transferrin receptor, a trileucine (LLL) moiety, and/or a polyethylene glycol (PEG) moiety.		anti-TfR antibody	Treatment	Glioma	The inventors synthesized multifunctional targetable nanoconjugates of TMZ hydrazide using a poly(β-L-malic acid) platform, which contained a targeting monoclonal antibody to transferrin receptor (TfR), trileucine (LLL) for pH-dependent endosomal membrane disruption, and PEG for protection.	2014	[37]
WO2010095940 A2	Glutathione-based drug delivery system	To-Bbb Holding B.V.	Gaillard, P.J.	N/A	Conjugates of active pharmaceutical ingredients, optionally comprised in carriers or nanocontainers, linked with ligands for glutathione transporters that mediate specific binding, endo- or transcytosis.	· Lipoplex system; comprising at least one of cationic or amphoteric lipids · Polyplex system comprising at least one of poly-L-Lysine, poly- L-ornithine, polyethyleneimine, or polyamido amine.	Receptor-mediated targeting (a ligand for glutathione receptor and transporters)	Treatment or Diagnosis	Brain disorders including GBM	Delivery of drugs to cells and across the blood-brain barrier by targeting to endogenous internalizing uptake (transport) receptors for glutathione on the capillaries in the brain, without modifying or disrupting the normal function of the neuroprotective blood-brain barrier.	2010	[38]
EP2120171160	Chimeric constructs between glioma-homing peptide and cell-penetrating peptides, gHoPe2	Cepep III AB	· Kurrikoff, K. · Eriste, E. · Oskolkov, N. · Suhorutsenko, J. · Langel, Ü. · Howl, J. · Jones, S.	N/A	The described system is used for the targeted delivery of cargo component into human glioma cells.	Cell-penetrating peptide (CPP), liposome, micelle, dendrimer, carrier polymer, carrier nanoparticle or other carrier system.	Glioma-homing peptide (gHo)	Treatment or Diagnosis	Glioma	· It comprises a targeting peptide which selectively and efficiently binds human glioma cells, carrier element whereas targeting peptide is attached or linked via linker (L1) covalently to said carrier element, and a cargo component delivered in or onto the cell and attached or linked covalently or non-covalently to the targeting peptide or to the carrier element. · The Homing peptides bind to specific target molecules of a (tumor) cell - as a conjugated domain of the CPP.	2013	[39]

US 20150111831 A1	Method for treating glioma using Tarbp2	Research & Business Foundation Sungkyunkwan University	· Yoon, K. · Byun, S. H.	New model for treating glioma by preparing Tar RNA Binding Protein 2 (Tarbp2) protein, which is a novel transcription factor in a Notch signaling system.		N/A	N/A	Treatment	Glioma	The Tarbp2 protein may bind to a CBF1 protein and may increase expression of (Hairy/Enhancer of Split) Hes1 gene in a Notch signaling pathway.	2015	[40]
US20150037437 A1	Glioma treatment	Renishaw Plc	· Gill, S. S. · White, E.	Chemotherapy agents, specifically carboplatin	A pharmaceutical composition comprising chemotherapy agent and artificial cerebrospinal fluid (aCSF). The chemotherapy agent is for administration by convection-enhanced delivery.	N/A	N/A	Treatment	Glioblastoma	Convection enhanced delivery is used.	2015	[41]
US20110059114 A1	Compositions and methods for the treatment of radioresistant Glioma stem cells	Duke University	· Bruce A. Sullenger · Jialiang Wang, · Jeremy N. Rich	Gamma secretase inhibitors (GSIs) such as · DAPT · L685,458. Notch signaling inhibitors such as · Notch 1(2) antisense RNA, shRNA, · siRNA · antibody, dominant-negative form of Notch 1 or Notch 2.	A method for inhibiting Notch signaling activity via the administration of gamma secretase inhibitors or Notch signaling inhibitors for treating glioma and glioblastoma or to increase glioma and glioblastoma sensitivity to radiation treatment.	N/A	Passive Targeting	Treatment	Glioblastoma	Inhibitors of γ-secretase (GSIs) have been used to block Notch signaling *in-vitro* and *in-vivo*.	2011	[42]
US20130224208 A1	Glioma treatment method, glioma testing method, method for delivering desired substance to glioma, and drugs used in these methods	Riken	Kondo, T.	N/A	· Glioma treatment and testing methods, and a method for delivering a desired substance to a glioma, all of which target Eva1 and/or Ceacam1. · Ceacam1 is believed to be involved in cell proliferation, inhibition of the cytotoxicity of immune cells, VEGF-induced angiogenesis, apoptosis, metastasis, as well as regulation of innate immune response and adaptive immune response.	N/A	Antibody	Treatment	Glioblastoma	· Ceacam1(carcinoembryonic antigen-related cell adhesion molecule gene whose expression is significantly reduced by suppressing the Eva1 (epithelial V-like antigen) expression. Eva1 gene are able to suppress the growth potential, tumor-forming potential, and tissue invading potential of glioma cells as well as the tumor mass-forming potential of glioma stem cells · Anti-tumor agents can be conjugated to the antibody for glioma targeting	2013	[43]

US20140296286 A1	Compounds with increased specificity for the treatment of glioma	University of Tennessee Research Foundation	· Miller, D. D. · Patil, S. A. · Patil, R. · Jones, T. · Ahmed, A. · Asres, L. · Yates, C. R. · Geisert, E.	The invention relates to compounds categorized as tetrahydroisoquinoline derivatives, which may be useful as chemotherapeutic agents for cancer treatment. The chemical structure as follows where, wherein R_1, R_2, R_3, and R_4 are each independently H, OH, or OCH_3; R5 is H, H_2Cl, CH_3, or $COOC(CH_3)_3$; X is C or N, R6 is H or HCl; and R7 is H or OCH_3. 	N/A	Active Targeting	Treatment	Glioblastoma	The compounds display significant specificity for the cancer cells, generally sparing non-cancerous cells to a certain extent at effective concentrations and have demonstrated varying effectiveness in inhibiting and/or killing glioma cells.	2014	[44]
US20110054236 A1	Compositions and methods for targeting tumors	The Regents of The University of Michigan	· Yang, V. C. · David, A. E.	Anti-tumor agents	The invention relates to functionalized magnetic nanoparticles. The magnetic iron oxide nanoparticles (MIONs) coated with a coating molecule, wherein said coating molecule is non-covalently associated with a brain targeting molecule comprising anti-tumor agent linked to a cell-penetrating peptide	Active Targeting via: · Magnetic targeting · Targeting molecule	Treatment or diagnosis	Brain tumors including glioblastoma	· Orienting the MIONs at the site of the brain tumor with an external magnetic field. · A brain targeting moiety is used.	2011	[45]
US9011913 B2	Use of functionalized magnetic nanoparticles in cancer detection and treatment	The Regents of The University of California	· Akhtari, M. · Engel, J.	Anti-tumor agents	· Methods of detecting a cancer cell in an individual, grading a cancer, and treating a cancer. The methods involve use of functionalized magnetic nanoparticles (MNP) that comprise a moiety that provides for selective association with, and/or metabolic uptake into, a cancer cell. · MNP has the formula is M-S-(L)-Z, wherein M is a magnetic core, S is a polymer, L is an optional linker, and Z is a functional moiety that has differential affinity for and/or metabolic uptake into a cancer cell.	Active Targeting via: · Magnetic targeting Targeting molecule such as alpha-methyl tryptophan which crosses the tryptophan channels or apolipoprotein which binds to endothelial cells of the BBB	Treatment and diagnosis	Brain tumors including glioblastoma	The differential affinity for metabolic uptake into a cancer cell allows for discrimination between a cancerous and normal tissues	2015	[46]
US8252338 B2	Synthetic LDL as targeted drug delivery vehicle	The Regents of The University of California Children's Hospital Research Center Oakland	· Forte, T. M. · Nikanjam, M.	Small organic molecules, inorganic molecules, therapeutic peptides and proteins, antibodies, radioisotopes, siRNA and nucleic acids for gene therapy, toxins, and anti-cancer agents as paclitaxel oleate, paclitaxel, or doxorubicin.	The invention provides a novel synthetic LDL (sLDL) nanoparticle comprising a lipid moiety a synthetic chimeric peptide comprises an amphipathic α-helix and an LDL receptor binding domain consisting of the following sequence: (R_1)-x-Arg-Leu-Thr-Arg-Lys-Arg-Gly-Leu-Lys-(R_2)y in which: · R_1 is an amino acid sequence from 1 to 40 amino acids wherein each amino acid is independently selected from the group consisting of naturally occurring amino acids and amino acid mimetics; · R_2 is an amino acid sequence from 1 to 40 amino acids wherein each amino acid is independently selected from the group consisting of naturally occuring amino acids and amino acid mimetics; and · x and y are independently selected and are equal to zero or one.	Active Targeting	Treatment and diagnosis	Brain tumors including glioblastoma	The unique aspects of the synthetic LDL nanoparticles are based on their being generated by using chimeric peptides (29 to 46-mer) that represent the fusion of a lipophilic amphipathic α-helix with the apoB100 sequence that recognizes the LDL receptor.	2010	[47]

US 20100076092 A1	Lipid-derived nanoparticles for brain-targeted drug delivery	· Panyam, J. · Chavanpatil, M. D.	· Panyam, J. · Chavanpatil, M. D.	Anti-tumor agents	A nanoparticle composition comprising: · A brain lipid, (phospholipid): phosphatidylethanolamine, phosphatidylserine, phosphatidylcholine, phosphatidic acid, and phosphatidylinositol. · A supplemental lipid, long chain saturated or unsaturated fatty acids, stearic acid, palmitic acid, linolic acid, or linoleic acid. · A PEG-conjugated lipid, that promote stability or extended circulation times, or allow the nanoparticles to avoid detection by a recipient's immune system: distearoylphosphatidylethanolamine-polyethylene glycol · A drug or therapeutic compound.	Active receptor Targeting	Treatment	Brain cancer	Nanoparticles containing brain-derived lipids, may be transported into the brain through specific receptors for these lipids	2010	[48]
US 7659314 B2	pH-sensitive polymeric micelles for drug delivery	University of Utah Research Foundation	· Bae, Y. H. · Na, K. · Lee, E. S.	Drugs including Anticancer drugs such as Adriamycin (ADR)	· Mixed micelles containing poly(L-histidine)-poly(ethylene glycol) block copolymer and poly(L-lactic acid)-poly(ethylene glycol) block copolymer are a pH-sensitive drug carrier that releases the drug in an acidic microenvironmet of solid tumors and endosomes. · Targeting ligands, such as folate, can also be attached to the mixed micelles for enhancing drug delivery into cells.	Folate receptor targeting	Treatment	Solid tumors including brain tumors	For active internalization of the micelles, folic acid was introduced into the pH-sensitive mixed micelle. After internalization, the micellar carrier actions can be combined with pH-triggered ADR release at early endosomal pH and the fusogenic activity of polyHis, which helps ADR release from endosomal compartment to cytosol.	2010	[49]
US 20140017331 A1	Polysaccharide-containing block copolymer particles and uses thereof	· McCarthy, S. J. · Koroskenyi, B. · Nicolosi, R. J.	· McCarthy, S. J. · Koroskenyi, B. · Nicolosi, R. J.	N/A	Amphiphilic linear block copolymer can be synthesized from a polysaccharide by reacting it with a polymer such as a polyester, polycarbonate, polyanhydride, polyamide, polysaccharide, poly(β-hydroxy acid), poly(vinyl alcohol), protein, or copolymers of any of these materials.	N/A	Treatment or diagnosis	Brain tumors	· Particles of sufficiently small size and adequate hydrophilicity/hydrophobicity can travel through the blood-brain barrier (BBB). · Increasing hydrophobicity by functionalizing the particles with fatty acids that enable them to pass through the blood-brain barrier (BBB).	2014	[50]
US 8795648 B2	Poly(beta malic acid) with pendant Leu-Leu-Leu tripeptide for effective cytoplasmic drug delivery	Cedars-Sinai Medical Center	· Ding, H. · Ljubimova, J. Y. · Holler, E. · Black, K. L.	siRNA, microRNA, and aptamer drug antisense morpholino oligos (Laminin α4 antisense polynucleotide and/or β1 antisense polynucleotide)	· The invention relates to the use of Polycefin-LLL nanoconjugate as a means of cytoplasmic delivery of drugs. · The Nanoconjugate compromises: – A drug delivery molecule, comprising a polymerized carboxylic acid molecular scaffold covalently linked to L-leucylleucylleucine – Polycefin-LLL includes drug antisense morpholino oligos, targeting antibodies, and a pH-sensitive endosome escape unit. In addition, the drug could be siRNA, microRNA, and aptamer.	Anti-transferrin receptor (TfR) antibodies	Treatment	Glioma	The Polycefin-LLL passes through BBB. It is pH-sensitive, non-toxic, and biodegradable, proves to be the most effective for cytoplasmic delivery of active anticancer agents as compared to previously described Polycefin variants	2014	[51]
US 20140221442 A1	Use of dianhydrogalactitol and analogs and derivatives thereof to treat glioblastoma multiforme	Del Mar Pharmaceuticals	Bacha, J. A. Brown, D. Dunn, S. Steinø, A.	Dianhydrogalactitol	The use of dianhydrogalactitol provides a novel therapeutic modality for the treatment of glioblastoma multiforme. Dianhydrogalactitol acts as an alkylating agent on DNA that creates N_7 methylation.	To cross the BBB, a bioconjugate is used and may compromise the following: · A chimeric peptide of the structure of Formula (D-III): A-NH$(CH_2)_2$S—S-B (cleavable linkage) · Avidin-biotin-agent complex · PEGylated neutral liposome · A fusion protein	Active targeting	Treatment	Giloblastoma	· Dianhydrogalactitol acts as a small alkylating agent on DNA that creates N_7 methylation. · Dianhydrogalactitol crosses the blood-brain barrier and can suppress the growth of cancer stem cells (CSC).	2014	[52]

US20150093399 A1	CNS-targeted conjugates having modified fc regions and methods of use thereof	Bioasis Technologies, Inc.	Jefferies, W.	Anti-tumor antibodies ex. Trastuzumab	Conjugates comprising a blood-brain barrier (BBB)-transport moiety linked to an antibody or therapeutic Fc-fusion polypeptide, having modified Fc regions to facilitate the delivery of therapeutic and/or diagnostic polypeptides across the blood-brain barrier (BBB), and thereby treat and/or diagnose conditions associated with the CNS, including cancer.	To cross the BBB, a bioconjugate is used and may compromise the following: · Fc-modified antibody or Fc-fusion polypeptide · BBB-transport moiety can be · A p97 (melanotransferrin) polypeptide · A Receptor Associated Protein (RAP) · An aprotinin peptide · A protein transduction domain (PTD) · A human low-density lipoprotein receptor (hLDLR) binding peptide · An antibody or natural ligand that binds to a BBB-associated receptor · Glutathione (GSH)	Active targeting	Treatment or diagnosis	Glioblastoma	· The antibody specifically binds to one or more of human cancer specific antigens, a pro inflammatory molecule (cytokines), or Granulocyte macrophage colony stimulating factor · The presence of an Fc region in conjugates can alter their biodistribution, for example, by interacting with Fc receptor-expressing cells outside of the CNS. Thus, modifying Fc regions showed higher availability in targeted tissues	2015	[53]
US 2011027749 A1	Methods and compositions for targeting agents into and across the blood-brain barrier and other endothelial cell microvascular barriers	Bbb Holding B.V.	· Gaillard, P. J. · De Boer, A. G. · Brink, A.	Anti-tumor agents	Nucleic acids and polypeptides (lipopolysaccharide-sensitive (LPSS)) encoded thereby, whose expression is modulated in brain microvascular endothelial cells undergoing early dynamic inflammation-induced changes in blood-brain bather functionality. These nucleic acids and polypeptides may be useful in methods for controlling blood-brain bather properties in mammals in need of such biological effects.		Active targeting, mostly receptor mediated endocytosis (targeting moiety that binds Diphteria toxin or Diphteria Toxin Receptor)	Treatment and Diagnosis	Brain disorders including glioma	· The methods for reversibly increasing the microvascular permeability in a subject may advantageously be applied when one wants to deliver blood-borne, membrane-impermeant drugs to the brain	2011	[54]
WO 2011057216 A1	Bioconjugation of calcium phosphosilicate nanoparticles for selective targeting of cells in vivo	The Pennsylvania State Research Foundation	· Adair, J. H. · Kester, M. · Smith, J. P. · Altinoglu, E. I. · Barth, B. M. · Kaiser, J. M. · Matters, G. L. · Mcgovern, C. · Morgan, T. T. · Sharma, R.	Anti-tumor agents	Non-aggregating resorbable calcium phosphosilicate nanoparticles (CPNPs) are bioconjugated to targeting molecules that are specific for particular cells. The CPNPs are stable particles at normal physiological pH. In this manner, the agents are protected from interaction with the environment at normal physiological pH. However, once the CPNPs have been taken up, at intracellular pH, the CPNPs dissolve releasing the agent.	Non-aggregating resorbable calcium phosphosilicate nanoparticles	Gastrin-10	Treatment	May be used in glioblastoma	· PEG-maleimide bioconjugation for gastrin- 10 may permit penetration of the blood-brain barrier · Targeting of the gastrin-10-PEG-CPNPs to the brain was confirmed by excising and imaging the brain during necropsy	2010	[55]
US 20130090467 A1	Aptamer bioconjugate drug delivery device	Ecosynthetix Ltd.	· Bloemberge n, S. · McLennan, I. J. · Jones, N. · Wagner, R. · Shermon, A. K. G. · Elsayed, A. R.	Anti-tumor agents	A delivery device for an active agent comprises nanoparticles based on a biopolymer such as starch. The delivery device may also be in the form of an aptamer-biopolymer-active agent conjugate wherein the aptamer targets the device for the treatment of specific disorders. The nanoparticles may be made by applying a high shear force in the presence of a crosslinker. The particles may be predominantly in the range of 50-150 nm and form a colloidal dispersion of crosslinked hydrogel particles in water. The biopolymer may be functionalized. The aptamer may be conjugated directly to the cross-linked biopolymers. The active agent may be a drug useful for the treatment of cancer. The delivery device survives for a period		Active targeting via targeting molecules such as aptamers	Treatment	Cancer including glioblastoma	· A nucleotide such as an aptamer may be attached, for example via a carbodimide linkage, directly to the surface of a crosslinked structure forming the core of the particle. · Other forms of functionalization may influence the	2013	[56]

			· Liu, J.		in the body sufficient to allow for the sustained release of a drug and for the transportation and uptake of the conjugate into targeted cells. However, the biopolymer is biocompatible and resorbable.				attachment of a targeting molecule or the release profile of a drug.		
US20150174267 A1	Compositions and methods for the transport of therapeutic agents	Angiochem Inc.	· Castaigne, J. P. · Demeule, M. · Che, C. · Regina, A.	Any therapeutic agent, including RNAi agents, polynucleotides (e.g., encoding RNAi agents), anticancer therapeutics, small molecule drugs, polypeptide therapeutics, and hydrophobic agents.	Polypeptide-transport vector conjugates that is capable of transporting a therapeutic agent across the blood-brain barrier (BBB) or into a cell. The transport vector may contain any therapeutic agent, including RNAi agents, polynucleotides (e.g., encoding RNAi agents), anticancer therapeutics, small molecule drugs, polypeptide therapeutics, and hydrophobic agents.	Transport vector is a lipid vector, a nanoparticle, a polyplex, or a dendrimer.	Polypeptide vector such as Angiopep-6	Treatment	Glioma or glioblastoma	Angiopep is a polypeptide capable of crossing the blood-brain barrier or entering one or more cells via active targeting.	2015	[57]
US20110274625 A1	Liposomal Composition for Convection-Enhanced Delivery to the Central Nervous system	MedGenesis Therapeutix, Inc.	· Redelmeier, T. · Luz, M.	- Therapeutic agent such as topoisomerase I/II inhibitors (ex: topotecan) - Diagnostic agent such as: · MRI magnet · Gadolinium chelate · Gadodiamide and Rhodamine · Gadodiamide.	Non-PEGylated liposomal composition comprising at least one saturated neutral phospholipid and at least one saturated anionic phospholipid and a therapeutic or diagnostic agent encapsulated therein is used to overcome toxicity associated with high peak drug concentration delivered locally via convection enhanced delivery (CED).		N/A	Treatment and diagnosis	Glioblastoma	· Convection-enhanced delivery. · Liposomes can be highly convective in tissues of the central nervous system when an anionic lipid component is employed in the formulation in lieu of PEGylation.	2011	[58]
US20100196393 A1	Modulation of blood brain barrier protein expression	St. Louis University	· Banks, W. A. · Kumar, V. B. · Darling, T. · Clayton, R.	A therapeutic or diagnostic agent is selected from topotecan, conotoxin, gadodiamide or rhodamine.	The inhibition of Pgp expression would allow increased accumulation of chemotherapeutic drugs in the CNS and so increase the effectiveness of treating CNS tumor.		N/A	Treatment	Several diseases including brain cancer.	Antisense inhibition of the function of RNA and DNA encoding blood brain barrier proteins especially efflux transporter.	2010	[59]

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