Table 1
Clinical Trials on Stem Cells Therapies for Malignant Central Nervous System Tumors

Rank	ClinicalTrials.gov Identifier NCT Number	Title	Status	Study Results	Conditions	Interventions	Type of Stem Cells	Study Phase	# of Pts. Estimated Enrollment
1	NCT01672134	Neural Stem Cell Based Viroltherapy of Newly Diagnosed Malignant Glioma	Recruiting	No Results Available	Glioma|Anaplastic Astrocytoma|Anaplastic Oligodendroglioma|Anaplastic Oligoastrocytoma|Glioblastoma Multiforme|Astrocytoma, Grade III|Astrocytoma, Grade IV|Brain Cancer	Biological: Neural stem cells loaded with an oncolytic adenovirus	hNSCs	Phase 1	36
2	NCT02055196	Genetically Modified Stem Cells and Irinotecan Hydrochloride in Treating Patients With Recurrent High-Grade Gliomas	Withdrawn	No Results Available	Adult Anaplastic Astrocytoma|Adult Anaplastic Oligodendroglioma|Adult Giant Cell Glioblastoma|Adult Glioblastoma|Adult Gliosarcoma|Recurrent Adult Brain Tumor	Biological: carboxylesterase-expressing allogeneic neural stem cells|Drug: irinotecan hydrochloride|Other: laboratory biomarker analysis	hNSCs	Phase 1	0
3	NCT02019778	Stem Cell Radiotherapy and Temozolomide for Newly Diagnosed High-grade Glioma	Terminated	Has Results	Glioblastoma|Malignant Glioma|Brain Tumor|Anaplastic Astrocytoma	Radiation: Stem Cell Radiotherapy (SciRT) and Temozolomide	SciRT	Not Applicable	4
4	NCT02015819	Genetically Modified Neural Stem Cells, Fluzytosine, and Leucovorin for Treating Patients With Recurrent High-Grade Gliomas	Active, not recruiting	No Results Available	Adult Anaplastic Astrocytoma|Adult Anaplastic Oligodendroglioma|Adult Giant Cell Glioblastoma|Adult Glioblastoma|Adult Gliosarcoma|Recurrent Adult Brain Tumor|Anaplastic Oligoastrocytoma	Biological: E. coli CD-expressing genetically modified neural stem cells|Drug: fluzytosine|Drug: leucovorin calcium|Other: pharmacological study|Other: laboratory biomarker analysis	hNSCs	Phase 1	18
5	NCT01342237	Tandem High-Dose Chemotherapy and Autologous Stem Cell Rescue for High-Risk Pediatric Brain Tumors	Unknown status	No Results Available	Brain Tumors	Drug: HDCT 1(TTC), HDCT2(MEC)	peripheral blood stem cells	Phase 2	33
6	NCT01172864	A Pilot Feasibility Study of Oral 5-Fluorocytosine and Genetically-Modified Neural Stem Cells Expressing E.Coli Cytosine Deaminase for Treatment of Recurrent High Grade Glioma	Completed	No Results Available	Adult Anaplastic Astrocytoma|Recurrent Grade III Glioma|Recurrent Grade IV Glioma|Adult Anaplastic Oligodendroglioma|Adult Brain Tumor|Adult Giant Cell Glioblastoma|Adult Glioblastoma|Adult Gliosarcoma|Adult Mixed Glioma|Recurrent Adult Brain Tumor|Adult Anaplastic Oligoastrocytoma|Recurrent High Grade Glioma	Drug: fluzytosine: Other: polymerase chain reaction|Other: immunohistochemistry staining method|Biological: gene therapy|Other: pharmacological study|Other: 3-Tesla magnetic resonance imaging|Other: laboratory biomarker analysis|Procedure: therapeutic conventional surgery|Biological: E. coli CD-expressing genetically modified neural stem cells	hNSCs	Phase 1	15
7	NCT01171669	Vaccination With Dendritic Cells Loaded With Brain Tumor Stem Cells for Progressive Malignant Brain Tumor	Completed	No Results Available	Brain Tumor|Glioblastoma|Medulloblastoma|Ependymoma|Anaplastic Astrocytoma	Biological: Dendritic Cells|Drug: Imiquimod	tumor stem cells	Phase 1	8
8	NCT00846456	Safe Study of Dendritic Cell (DC) Based Therapy Targeting Tumor Stem Cells in Glioblastoma	Completed	No Results Available	Glioblastoma|Brain Tumor	Biological: Dendritic cell vaccine with mRNA from tumor stem cells	tumor stem cells	Phase 1|Phase 2	20
9	NCT00788811	High-dose Chemotherapy With Autologous Stem Cell Rescue in Pediatric High-risk Brain Tumors	Active, not recruiting	No Results Available	Brain Tumor	Procedure: high-dose chemotherapy and autologous stem cell rescue	peripheral blood stem cells	Phase 2	100
10	NCT00596154	Rituximab, Methotrexate, Procarbazine and Vincristine Followed by High-dose Chemotherapy With Autologous Stem-cell Rescue in Newly-diagnosed Primary CNS Lymphoma	Active, not recruiting	No Results Available	CNS Lymphoma|CNS Brain Cancer|Non-Hodgkin's Lymphoma	Other: Rituximab, Methotrexate, Vincristine, Procarbazine, PBPCs collection, Busulfan, Thiotepa, and Cyclophosphamide	peripheral blood stem cells	Phase 2	33
11	NCT00528437	Temozolomide, Thiotepa and Carboplatin With Autologous Stem Cell Rescue Followed by 13-cis-retinoic Acid in Patients With Recurrent/Refractory Malignant Brain Tumors	Completed	No Results Available	Brain Tumors	Drug: temozolomide, thiotepa, carboplatin, 13-cis-retinoic acid	peripheral blood stem cells	Phase 2	46
12	NCT00102886	Combination Chemotherapy With or Without Etoposide Followed By an Autologous Stem Cell Transplant in Treating Young Patients With Previously Untreated Malignant Brain Tumors	Unknown status	No Results Available	Brain and Central Nervous System Tumors	Drug: carboplatin|Drug: cisplatin|Drug: cyclophosphamide|Drug: etoposide|Drug: methotrexate|Drug: temozolomide|Drug: thiotepa|Drug: vincristine sulfate|Procedure: autologous bone marrow transplantation|Procedure: autologous hematopoietic stem cell	peripheral blood stem cells	Phase 3	120
13	NCT00254487	Combination Chemotherapy and Radiation Therapy in Treating Younger Patients Who Are Undergoing an Autologous Stem Cell Transplant for Newly Diagnosed Gliomas	Completed	No Results Available	Brain and Central Nervous System Tumors	Drug: 06-benzylguanine|Drug: busulfan|Drug: temozolomide|Procedure: adjuvant therapy|Procedure: autologous bone marrow transplantation|Procedure: conventional surgery|Procedure: peripheral blood stem cell transplantation|Radiation: radiation therapy	peripheral blood stem cells	Not Applicable	n/a
14	NCT01176863	Stem Cell Transplant for High Risk Central Nervous System (CNS) Tumors	Unknown status	No Results Available	Glioblastoma|Astrocytoma|Pineoblastoma|Rhabdoid Tumor|Supratentorial Neoplasms	Procedure: Stem Cell Transplant	peripheral blood stem cells	Phase 2|Phase 3	50
15	NCT00002819	Chemotherapy Followed by Bone Marrow or Peripheral Stem Cell Transplantation in Treating Patients With Glioblastoma Multiforme or Brain Stem Tumors	Completed	No Results Available	Brain and Central Nervous System Tumors	Biological: filgrastim|Drug: carboplatin|Drug: thiotepa|Procedure: autologous bone marrow transplantation|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 2	60
16	NCT00003846	Radiation Therapy, Chemotherapy, and Peripheral Stem Cell Transplantation in Treating Patients With Primitive Neuroectodermal Tumors	Completed	No Results Available	Brain and Central Nervous System Tumors|Neuroblastoma	Biological: filgrastim|Drug: carboplatin|Drug: cyclophosphamide|Drug: thiotepa|Drug: vincristine sulfate|Procedure: bone marrow ablation with stem cell support|Procedure: peripheral blood stem cell transplantation|Radiation: radiation therapy	peripheral blood stem cells	Phase 2	25
17	NCT00003101	Combination Chemotherapy and Bone Marrow Transplantation or Peripheral Stem Cell Transplantation in Treating Patients With Oligodendroglioma	Completed	No Results Available	Brain and Central Nervous System Tumors	Biological: filgrastim|Drug: busulfan|Drug: lomustine|Drug: procarbazine hydrochloride|Drug: thiotepa|Drug: vincristine sulfate|Procedure: autologous bone marrow transplantation|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 2	60
18	NCT00005796	Combination Chemotherapy Plus Gene Therapy in Treating Patients With CNS Tumors	Completed	No Results Available	Bone Marrow Suppression|Brain and Central Nervous System Tumors|Drug Agent Toxicity by Tissue/Organ	Procedure: filgrastim|Biological: gene therapy|Drug: lomustine|Drug: procarbazine hydrochloride|Drug: vincristine sulfate|Procedure: in vitro-treated peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 1	10
19	NCT00014573	Chemotherapy and Vaccine Therapy Followed by Bone Marrow or Peripheral Stem Cell Transplantation and Interleukin-2 in Treating Patients With Recurrent or Refractory Brain Cancer	Completed	No Results Available	Brain and Central Nervous System Tumors	Biological: filgrastim|Biological: granulocyte-macrophage colony stimulating factor|Biological: interleukin-2|Biological: tumor cell vaccine|Biological: filgrastim|Biological: sargramostim|Biological: therapeutic autologous lymphocytes|Drug: carmustine|Drug: cisplatin|Drug: cyclophosphamide|Drug: paclitaxel|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 2	n/a
20	NCT00007813	Peripheral Stem Cell Transplantation Plus Chemotherapy in Treating Patients With Malignant Solid Tumors	Completed	No Results Available	Brain and Central Nervous System Tumors|Childhood Germ Cell Tumor|Extragonadal Germ Cell Tumor|Liver Cancer|Neuroblastoma|Ovarian Cancer|Sarcoma|Testicular Germ Cell Tumor	Biological: filgrastim|Drug: carboplatin|Drug: cyclophosphamide|Drug: etoposide|Procedure: autologous bone marrow transplantation|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 1	21
21	NCT00070988	High-Dose Chemotherapy Plus Autologous Stem Cell Transplantation Compared With Intermediate-Dose Chemotherapy Plus Autologous Stem Cell Transplantation With or Without Isotretinoin in Treating Young Patients With Recurrent High-Grade Gliomas	Completed	No Results Available	Brain Tumors|Central Nervous System Tumor	Biological: filgrastim|Drug: carboplatin|Drug: etoposide|Drug: temozolomide|Drug: thiotepa|Procedure: autologous bone marrow transplantation|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 3	1
22	NCT00003141	Chemotherapy Plus Peripheral Stem Cell Transplantation in Treating Infants With Malignant Brain or Spinal Cord Tumors	Completed	No Results Available	Brain Tumors|Central Nervous System Tumors|Neuroblastoma|Sarcoma	Biological: filgrastim|Drug: carboplatin|Drug: cisplatin|Drug: cyclophosphamide|Drug: etoposide|Drug: thiotepa|Drug: vincristine sulfate|Procedure: conventional surgery|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 1	94
23	NCT00003211	Chemotherapy, Radiation Therapy, and Peripheral Stem Cell Transplantation in Treating Children With Newly Diagnosed Medulloblastoma or Supratentorial Primitive Neuroectodermal Tumor	Completed	No Results Available	Brain and Central Nervous System Tumors	Biological: filgrastim|Drug: amifostine trihydrate|Drug: cisplatin|Drug: cyclophosphamide|Drug: vincristine sulfate|Procedure: peripheral blood stem cell transplantation|Radiation: radiation therapy	peripheral blood stem cells	Phase 2	94
24	NCT00007326	Neoadjuvant Chemotherapy With or Without Second-Look Surgery Followed by Radiation Therapy With or Without Peripheral Stem Cell Transplantation in Treating Patients With Intracranial Germ Cell Tumors	Completed	Has Results	Brain Tumors|Central Nervous System Tumors|Childhood Germ Cell Tumor	Drug: carboplatin|Drug: etoposide|Drug: ifosfamide|Drug: thiotepa|Procedure: adjuvant therapy|Procedure: conventional surgery|Procedure: neoadjuvant therapy|Procedure: peripheral blood stem cell transplantation|Radiation: radiation therapy	peripheral blood stem cells	Phase 2	104
25	NCT00025558	Combination Chemotherapy Followed by Peripheral Stem Cell Transplantation or Bone Marrow Transplantation in Treating Patients With Brain Cancer	Completed	No Results Available	Brain and Central Nervous System Tumors	Biological: filgrastim|Drug: carboplatin|Drug: temozolomide|Drug: thiotepa|Procedure: autologous bone marrow transplantation|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 1	n/a
26	NCT00025324	Chemotherapy, Surgery, Radiation Therapy and Bone Marrow or Peripheral Stem Cell Transplantation in Treating Patients With Primary CNS Germ Cell Tumors	Unknown status	No Results Available	Brain and Central Nervous System Tumors	Biological: filgrastim|Drug: carboplatin|Drug: cyclophosphamide|Drug: etoposide|Drug: thiotepa|Procedure: autologous bone marrow transplantation|Procedure: bone marrow ablation with stem cell support|Procedure: conventional surgery|Procedure: peripheral blood	peripheral blood stem cells	Phase 2	n/a
27	NCT00026077	Combination Chemotherapy, Surgery or Radiation Therapy, and Peripheral Stem Cell Transplant in Treating Patients With Recurrent Medulloblastoma or Primitive Neuroectodermal and Pineal Tumors	Completed	No Results Available	Brain and Central Nervous System Tumors	Biological: filgrastim|Drug: carboplatin|Drug: cyclophosphamide|Drug: thiotepa|Procedure: conventional surgery|Procedure: peripheral blood stem cell transplantation|Radiation: radiation therapy	peripheral blood stem cells	Phase 2	50
28	NCT00008008	Thiotepa Followed by Peripheral Stem Cell or Bone Marrow Transplant in Treating Patients With Malignant Glioma	Completed	No Results Available	Brain and Central Nervous System Tumors	Biological: filgrastim|Biological: sargramostim|Drug: cyclophosphamide|Drug: thiotepa|Procedure: autologous bone marrow transplantation|Procedure: bone marrow ablation with stem cell support|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 2	40
29	NCT00007962	Chemotherapy Plus Peripheral Stem Cell Transplant in Treating Patients With Central Nervous System Cancer	Completed	No Results Available	Brain and Central Nervous System Tumors|Hand and Neck Cancer|Lymphoma	Biological: filgrastim|Drug: carboplatin|Drug: cyclophosphamide|Drug: etoposide|Drug: thiotepa|Procedure: adjuvant therapy|Procedure: autologous bone marrow transplantation|Procedure: bone marrow ablation with stem cell support|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 2	30
30	NCT00003273	Chemotherapy Followed by Peripheral Stem Cell Transplantation in Treating Children With Newly Diagnosed Brain Tumor	Withdrawn	No Results Available	Brain and Central Nervous System Tumors|Neuroblastoma|Retinoblastoma|Sarcoma	Biological: filgrastim|Drug: cyclophosphamide|Drug: etoposide|Drug: leucovorin calcium|Drug: methotrexate|Drug: temozolomide|Drug: thiotepa|Drug: vincristine sulfate|Procedure: autologous bone marrow transplantation|Procedure:	peripheral blood stem cells	Phase 2	0
31	NCT00002594	Combination Chemotherapy Followed by Bone Marrow and/or Peripheral Stem Cell Transplantation in Treating Patients With Recurrent Medulloblastoma or CNS Germ Cell Tumors	Completed	No Results Available	Brain Tumors|Central Nervous System Tumor	Biological: Sargramostim|Drug: cyclophosphamide|Drug: melphalan|Procedure: autologous bone marrow transplantation|Procedure: bone marrow ablation with stem cell support|Procedure: peripheral blood stem cell transplantation	peripheral blood stem cells	Phase 2	31

hNSCs: human Neuronal Stem Cells; **SciRT:** Stem cells Radiotherapy; U.S: United States; KR: Korea Republic; CA: Canada; CH: Switzerland; NZ: New Zealand; AU: Australia; AR: Argentina; IE:Ireland; UK: United Kingdom; SCO: Scotland; P.R: Puerto Rico.