

Stanford



Steven D. Chang, MD

Robert C. and Jeannette Powell Neurosciences Professor and, by courtesy, of Otolaryngology - Head & Neck Surgery (OHNS) and of Neurology
Neurosurgery

 NIH Biosketch available Online

CLINICAL OFFICE (PRIMARY)

- Stanford Neuroscience Health Center

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ACADEMIC CONTACT INFORMATION

- Alternate Contact

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Bio

BIO

Dr. Chang is a Professor and Vice Chairman of Strategic Development and Innovation in the Department of Neurosurgery at Stanford. He is also the inaugural holder of the Robert C. And Jeannette Powell Professorship in the Neurosciences at Stanford University School of Medicine. His clinical work and research focuses on the treatment of brain tumors and cerebrovascular disease.

After receiving his Medical Degree and completing his Neurosurgery residency training at Stanford University, Dr. Chang joined Stanford's Department of Neurosurgery in 2000. He was named full professor in 2008, and that same year was appointed as the Powell Professor in the Neurosciences. Dr. Chang has a national and international reputation as an expert in both microsurgery and radiosurgery for treatment of brain, spine, and skull base tumors, and is the Co-Director of the Surgical Neuro-Oncology Program. His radiosurgery practice focuses on the use of the Cyberknife to treat neoplasms of the brain and spine. He was instrumental in the rapid growth of the Stanford Cyberknife Radiosurgery Program and is currently Co-Director of this program. Dr. Chang also specializes in the treatment arteriovenous malformations and cavernous malformations of the brain and spine, and surgical treatment of intracranial aneurysms. A fellowship trained cerebrovascular neurosurgeon, Dr. Chang specializes in multi-modality therapy for these vascular lesions. He is also an expert in both microsurgery and radiosurgery for treatment of trigeminal neuralgia.

Dr. Chang's research focuses on clinical outcomes for radiosurgery of brain and spine tumors. His lab has active research projects involving genetic analysis of arteriovenous malformation patients. He is the Director of the Stanford Neurogenetics Oncology Program and the Director of the Stanford Neuromolecular Innovations Program. He is the author or co-author of more than 300 peer-reviewed publications and book chapters.

CLINICAL FOCUS

- Cancer > Neuro Oncology
- Brain / Central Nervous System Tumors
- Brain / Central Nervous System Tumors - Neuro Oncology
- Brain / Central Nervous System Tumors - Neurosurgery
- Neurological Surgery
- Neurosurgery

- Skull Base Tumors
- Skull Base Tumors - Head and Neck Surgery
- Spinal Cancer
- Spinal Cancer - Neurosurgery
- Spinal Cancer - Surgery
- Acoustic Neuroma
- Glioma, Astrocytic
- Glioma
- Glioblastoma
- Glioblastoma with Sarcomatous Component
- Astrocytoma
- Ependymoma
- Medulloblastoma
- Meningioma
- Intracranial Aneurysm
- Carotid Stenosis
- Arteriovenous Malformations
- Intracranial Arteriovenous Malformations
- ACTH-Secreting Pituitary Adenoma
- Adenoma, Prolactin-Secreting, Pituitary
- Diabetes Insipidus, Pituitary
- Growth Hormone-Secreting Pituitary Adenoma
- Hypothalamic-Pituitary Neoplasms
- Neoplasms, Hypothalamic-Pituitary
- PRL-Secreting Pituitary Adenoma
- Pituitary ACTH Hypersecretion
- Pituitary ACTH-Producing Cells
- Pituitary ACTH-Secreting Cells
- Pituitary Adenoma, Prolactin-Secreting
- Pituitary Adrenocorticotropin-Secreting Cells
- Pituitary Apoplexy
- Pituitary Diseases
- Pituitary FSH Hypersecretion
- Pituitary Gland
- Pituitary Growth Hormone-Secreting Cells
- Pituitary Irradiation
- Pituitary Neoplasms
- Prolactin-Producing Pituitary Adenoma
- Prolactin-Secreting Pituitary Adenoma

- Vestibular Schwannoma
- brain metastasis
- Cyberknife
- Radiosurgery, Stereotactic
- Stereotactic Techniques
- spinal avm
- spinal tumor
- Spinal Meningioma
- spinal schwannoma
- Trigeminal Neuralgia
- Hemifacial Spasm
- Glossopharyngeal Nerve Diseases
- AVM (Arteriovenous Malformation) Intracranial
- Stroke
- Brain Tumor, Primary
- Brain Tumor, Recurrent
- Brain Tumors
- Malignant Primary Brain Tumors
- Primary Malignant Brain Tumors
- Aneurysm, Cerebral
- Acoustic Neuroma, Cerebellopontine Angle
- Aneurysm, Anterior Cerebral Artery
- Aneurysm, Middle Cerebral Artery
- Aneurysm, Posterior Cerebral Artery
- Anterior Cerebral Artery Aneurysm
- Cerebral Cavernous Hemangioma
- Cerebral Hemorrhage
- Cerebral Vasculitis
- Middle Cerebral Artery Aneurysm
- Posterior Cerebral Artery Aneurysm
- Vascular Malformations, Brain
- Brain Aneurysm
- Brain Neoplasms
- Brain Revascularization
- Neurogenetics
- Neuroproteomics
- Neurocutaneous Syndromes
- Glomus Tumor
- Craniopharyngioma

- Pituitary tumor

ACADEMIC APPOINTMENTS

- Professor - University Medical Line, Neurosurgery
- Professor - University Medical Line (By courtesy), Otolaryngology (Head and Neck Surgery)
- Professor - University Medical Line (By courtesy), Neurology
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Co-Surgical Director, Pituitary Program, Stanford, (2006-2007)
- Capital Asset Management Committee, Stanford, (2005-2010)
- Topic Review Editor, Editorial Board, Neurosurgery, (2005-2010)
- Editorial Board, World Neurosurgery, (2010-2012)
- Editorial Board, Journal of Radiosurgery and SBRT, (2010- present)
- Neuroscience Service Line Committee, Stanford, (2003- present)
- Co-Director, Stanford Cyberknife Program, Stanford, (2003- present)
- Director, Stanford Neuromolecular Innovation Program, (2009- present)
- Director, Stanford Neurogenetics Program, (2010- present)
- Robert C. and Jeannette Powell Professor in the Neurosciences, Stanford University, (2008- present)
- Vice Chairman, Neurosurgery Strategic Development and Innovation, Stanford University School of Medicine, (2015- present)

HONORS AND AWARDS

- Robert C. and Jeannette Powell Professor in the Neurosciences, Stanford University (2008-)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Stanford Neurosciences Destination Service Line Committee (2002 - present)

PROFESSIONAL EDUCATION

- Residency: Stanford University Dept of Neurosurgery (1999) CA
- Internship: Stanford University Dept of General Surgery (1994) CA
- Medical Education: Stanford University School of Medicine (1993) CA
- Board Certification: Neurological Surgery, American Board of Neurological Surgery (2003)
- Fellowship: Stanford University Cerebrovascular Surgery Fellowship (2000) CA
- Fellowship, Stanford University Stereotactic Radiosurgery Fellowship , CA (1996)
- MD, Stanford University , Medicine (1993)
- AB, Stanford University , Quantitative Economics (1989)
- BS, Stanford University , Biology (1989)

COMMUNITY AND INTERNATIONAL WORK

- Stanford Brain Tumor Support Group
- Neurofibromatosis Support Group

- Stanford Meningioma Support Group, Stanford
- Stanford Acoustic Neuroma Support Group, Stanford

LINKS

- Stanford Neuromolecular Innovation Program: <http://snip.stanford.edu/>
- Stanford Neurogenetic Oncology Program: <http://stanfordhospital.org/clinicsmedServices/COE/neuro/neurogenetics/>
- Stanford Cyberknife Program: <https://stanfordhealthcare.org/medical-clinics/cyberknife-stereotactic-radiosurgery-program.html>
- Stanford Acoustic Neuroma Support Group: http://stanfordhospital.org/clinicsmedServices/COE/cyberknife/acoustic_neuroma.html
- Stanford Meningioma Support Group: <http://stanfordhospital.org/clinicsmedServices/COE/cyberknife/meningiomaSupport.html>
- Get a Second Opinion: <https://stanfordhealthcare.org/second-opinion/overview.html>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

The Stanford Neurogenetic Innovation Program (SNIP) brings together clinical experts with the goal of developing new technologies to improve the diagnosis and treatment of patients affected by neurological conditions. Dr. Steven D. Chang, M.D., Professor of Neurosurgery, is leading SNIP's research efforts, which can be divided into three broad categories: (1) Neural Stem Cells, (2) New Blood Vessel Growth and Response to Radiosurgery, and (3) Nanotechnology and Microfluidic Biochips

1. Neural Stem Cells

SNIP researchers recently found that the ability of stem cells in the brain to regenerate themselves and produce new nerves is a process guided by signals from neighboring cells, in particular the cells that make up our blood vessels. SNIP researchers have succeeded in isolating stem cells from brain tumor tissue. It is possible that errors in the programming of these tumor stem cells may result in abnormal growth of tissue and the development of brain tumors. Similar to neural stem cells, these tumor stem cells are located around the blood vessels that feed the tumor. SNIP researchers are currently studying the stem cells present in brain tumors and vascular malformations to determine what changes occurred in these cells to cause them to produce or promote disease. With this knowledge, it may soon be possible to discover new therapies for affected patients, prevent recurrent tumor growth, identify genetic risk factors, and develop preventative therapies to protect against development of disease.

2. New Blood Vessel Growth and Response to Radiosurgery

Understanding the process by which new blood vessels grow in the brain is important for research on (1) stroke recovery, 2) Blood vascular malformations that are characterized by overgrowth or dysfunction of vascular elements, e.g. arteriovenous malformations, and (3) brain tumors, which grow on the basis of new blood vessel formation to feed the tumor. SNIP researchers have recently found that circulating cells, previously thought only to have functions in our immune system, are recruited to areas of new blood vessel growth in the brain. SNIP researchers hope to develop new therapies that travel through the bloodstream to affect this process in order to directly treat vascular malformations and brain tumors. SNIP researchers are examining genetic variation in key genes responsible for vascular health and response to radiation injury to explain patient variations in response to radiosurgery.

SNIP researchers are also leading efforts in biomarker discovery, a process that focuses on the isolation of circulating factors in the bloodstream of patients that may relate to specific characteristics of their tumor or vascular malformation. These biomarkers are being obtained on all patients undergoing neurosurgery for removal of their tumor or vascular malformation. Differences in biomarkers are being related to characteristics of the specimen obtained from surgery to determine whether these noninvasive measurements can reveal information specific to radiation susceptibility. Dr. Chang hopes to one day offer his patients a simple blood test that he can use to determine whether a particular patient will benefit from neurosurgery versus radiosurgery, i.e. the goal of practicing personalized medicine.

3. Nanotechnology and Microfluidic Biochips

Microfluidic systems can perform conventional chemical and molecular processes on a biochip, allowing for sample metering, mixing, reactions and detection#processes that usually require a laboratory full of equipment to be integrated and miniaturized onto chips no larger than the size of a standard glass slide. SNIP researchers are now focusing on prototyping new biochips to directly isolate specific cell populations and biomarkers using nanotechnology in order to develop tools that can enable SNIP clinicians to improve the diagnostics and treatment options available to patients affected by neurological conditions.

CLINICAL TRIALS

- Panitumumab-IRDye800 in Diagnosing Participants With Malignant Glioma Undergoing Surgery, Recruiting
- Study Assessing QBS72S For Treating Brain Metastases, Recruiting
- Cyberknife Radiosurgery and Quality of Life, Not Recruiting
- Performance and Safety of Biology-Guided Radiotherapy Using the RefleXion Medical Radiotherapy System (BIOGUIDE-X), Not Recruiting
- Phase 1-2 of Temozolomide and Hypofractionated Radiotherapy in Tx of Supratentorial Glioblastoma Multiform, Not Recruiting
- Phase I Compare OS in Post-CyberKnife Radiosurgery Tx in 1-3 VS 4 or More Brain Metastases, Not Recruiting
- Phase I Vorinostat Concurrent With Stereotactic Radiosurgery (SRS) in Brain Metastases From Non-Small Cell Lung Cancer, Not Recruiting
- Study of Fractionated Stereotactic Radiosurgery to Treat Large Brain Metastases, Not Recruiting
- Transarterial Chemoembolization Compared With Stereotactic Body Radiation Therapy or Stereotactic Ablative Radiation Therapy in Treating Patients With Residual or Recurrent Liver Cancer Undergone Initial Transarterial Chemoembolization, Not Recruiting

Publications

PUBLICATIONS

- Therapeutic approaches for spinal synovial sarcoma: a comprehensive review of the literature. *Journal of neurosurgery. Spine*
Zamarud, A., Shahnoor, S., Maryyum, A., Khan, A. M., Hassan, K. M., Ijaz, A., Sayed, R., Yoo, K., Park, D. J., Chang, S. D.
2024: 1-8
- Treatment of Trigeminal Neuralgia Secondary to Petroclival Meningioma Using Microsurgical Resection, Microvascular Decompression, and Stereotactic Radiosurgery: 2-Dimensional Operative Video. *Operative neurosurgery (Hagerstown, Md.)*
Park, D. J., Kumar, K. K., Marianayagam, N. J., Yener, U., Rahimy, E., Hancock, S., Meola, A., Chang, S. D.
2024; 26 (1): 107-108
- Surgery and stereotactic radiosurgery for spinal leiomyosarcoma: a single-institution retrospective series and systematic review. *Journal of neurosurgery. Spine*
Zamarud, A., Marianayagam, N. J., Sekar, V., Testa, S., Park, D. J., Yener, U., McCleary, T. L., Yoo, K. H., Emrich, S., Tayag, A., Ustrzynski, L., Pollock, E., Soltys, et al
2023: 1-13
- CyberKnife Radiosurgery for Extracranial Metastases of Oligodendrogloma: A Clinical Case Report. *Cureus*
Shaghaghian, E., Park, D. J., Yoo, K. H., Meola, A., Chang, S. D.
2023; 15 (12): e51035
- Spinal metastases of pineal region glioblastoma with primitive neuroectodermal features highlighting the importance of molecular diagnoses: illustrative case. *Journal of neurosurgery. Case lessons*
Shah, A., Marianayagam, N. J., Zamarud, A., Park, D. J., Persad, A. R., Soltys, S. G., Chang, S. D., Veeravagu, A.
2023; 6 (20)
- The outcome of central nervous system hemangioblastomas in Von Hippel-Lindau (VHL) disease treated with belzutifan: a single-institution retrospective experience. *Journal of neuro-oncology*
Zamarud, A., Marianayagam, N. J., Park, D. J., Yener, U., Yoo, K. H., Meola, A., Chang, S. D.
2023
- STEREOTACTIC RADIOSURGERY FOR RESIDUAL, RECURRENT, AND METASTATIC HEMANGIOPERICYTOMAS: A SINGLE INSTITUTION EXPERIENCE

Yoo, K., Park, D., Veeravagu, A., Lee, M., Marianayagam, N., Zamarud, A., Gu, X., Pollock, E., Soltys, S., Chang, S., Meola, A.
OXFORD UNIV PRESS INC.2023

● **STEREOTACTIC RADIOSURGERY FOR CYSTIC AND SOLID INTRACRANIAL HEMANGIOBLASTOMAS: A SINGLE-INSTITUTION RETROSPECTIVE SERIES**

Yoo, K., Park, D., Marianayagam, N., Pollock, E., Soltys, S., Meola, A., Chang, S.
OXFORD UNIV PRESS INC.2023

● **Stereotactic Radiosurgery for Cranial and Spinal Hemangioblastomas: A Single-Institution Retrospective Series.** *Neurosurgery*

Yoo, K. H., Park, D. J., Marianayagam, N. J., Gu, X., Pollock, E. L., Soltys, S. G., Chang, S. D., Meola, A.
2023

● **Role of Fractionation in Local Control of Spinal Metastases Treated with Stereotactic Radiosurgery.** *International journal of radiation oncology, biology, physics*

Klebaner, D., Pollock, E., Mendoza, M., Kumar, K. A., Gibbs, I. C., Chang, S. D., Hancock, S. L., Soltys, S. G.
2023; 117 (2S): e117-e118

● **Overall Survival Prediction in Stereotactic Radiosurgery Patients with Glioblastoma Via a Deep-Learning Approach.** *International journal of radiation oncology, biology, physics*

Yang, Z., Zamarud, A., Marianayagam, N., Park, D., Yener, U., Soltys, S. G., Chang, S. D., Meola, A., Lu, W., Gu, X.
2023; 117 (2S): e159

● **Practical Guideline for Prevention of Patchy Hair Loss following CyberKnife Stereotactic Radiosurgery for Calvarial or Scalp Tumors: Retrospective Analysis of a Single Institution Experience.** *Stereotactic and functional neurosurgery*

Park, D. J., Marianayagam, N. J., Yener, U., Tayag, A., Ustrzynski, L., Emrich, S. C., Pollock, E., Soltys, S., Meola, A., Chang, S. D.
2023: 1-7

● **Stereotactic Radiosurgery for Medically Refractory Trigeminal Neuralgia Secondary to Stroke: A Systematic Review and Clinical Case Presentation.** *World neurosurgery*

Zamarud, A., Park, D. J., Ung, T. H., McCleary, T. L., Yoo, K. H., Soltys, S. G., Lim, M., Chang, S. D., Meola, A.
2023

● **Optimizing the synergy between stereotactic radiosurgery and immunotherapy for brain metastases.** *Frontiers in oncology*

Yoo, K. H., Park, D. J., Choi, J. H., Marianayagam, N. J., Lim, M., Meola, A., Chang, S. D.
2023; 13: 1223599

● **Stereotactic Radiosurgery for Contrast-Enhancing Satellite Nodules in Recurrent Glioblastoma: A Rare Case Series From a Single Institution.** *Cureus*

Park, D. J., Persad, A. R., Yoo, K. H., Marianayagam, N. J., Yener, U., Tayag, A., Ustrzynski, L., Emrich, S. C., Chuang, C., Pollock, E., Soltys, S. G., Meola, A., Chang, et al
2023; 15 (8): e44455

● **Stereotactic radiosurgery for distant brain metastases secondary to esthesioneuroblastoma: a single-institution series.** *Neurosurgical focus*

Zamarud, A., Yener, U., Yoo, K. H., Park, D. J., Marianayagam, N. J., Ho, Q. A., Pollock, E., Soltys, S., Wang, L., Chang, S. D., Meola, A.
2023; 55 (2): E6

● **Stereotactic radiosurgery for sarcoma metastases to the brain: a single-institution experience.** *Neurosurgical focus*

Zamarud, A., Park, D. J., Dadey, D. Y., Yoo, K. H., Marianayagam, N. J., Yener, U., Szalkowski, G. A., Pollock, E., Soltys, S., Chang, S. D., Meola, A.
2023; 55 (2): E7

● **Metastatic Lesions of the Brain and Spine.** *Advances in experimental medicine and biology*

Ung, T. H., Meola, A., Chang, S. D.
2023; 1405: 545-564

● **CyberKnife radiosurgery for treatment of residual or recurrent Grade 1 choroid plexus papilloma: A single institution experience.** *World neurosurgery*

Zhang, M., Park, D. J., Marianayagam, N. J., Yener, U., Soltys, S. G., Pollock, E., Chang, S. D., Meola, A.
2023

● **Impact of Cochlear Dose on Hearing Preservation Following Stereotactic Radiosurgery in Treatment of Vestibular Schwannomas: A Multi-center Study.** *World neurosurgery*

Chang, S. D., Muacevic, A., Klein, A. L., Sherman, J. H., Romanelli, P., Santa Maria, P. L., Fuerweger, C., Bossi Zanetti, I., Beltramo, G., Vaisbush, Y., Tran, E., Feng, A., Teng, et al

2023

- **Efficacy of Stereotactic Radiosurgery as Single or Combined Therapy for Brain Metastasis: A Systematic Review and Meta-Analysis.** *Critical reviews in oncology/hematology*
Rostampour, N., Rezaeian, S., Sarbakhsh, P., Meola, A., Choupani, J., Doosti-Irani, A., Nemati, H., Almasi, T., Badrigilan, S., Chang, S. D.
2023; 104015
- **CyberKnife Radiosurgery for Spinal Leptomeningeal Metastases Secondary to Esthesioneuroblastoma: A Clinical Case Report.** *Cureus*
Zamarud, A., Yener, U., Sayed, R., Chang, S. D., Meola, A.
2023; 15 (5): e39791
- **Cyberknife Radiosurgery for Synovial Sarcoma Metastasizing to the Spine: Illustrative Case Reports.** *Cureus*
Zamarud, A., Park, D. J., Haider, G., Chang, S. D., Meola, A.
2023; 15 (4): e37087
- **Stereotactic Radiosurgery for Brain Metastases in Patients With a Heterozygous Germline Ataxia Telangiectasia Mutated Gene.** *Cureus*
Hall, J. C., Chang, S. D., Gephart, M. H., Pollock, E., Butler, S.
2023; 15 (4): e37712
- **Treatment Outcomes of Leiomyosarcoma Metastasis Affecting the Brachial Plexus: A Comparative Case Report Using Chat Generative Pre-trained Transformer (ChatGPT).** *Cureus*
Zamarud, A., Marianayagam, N., Sekar, V., Chang, S. D., Meola, A.
2023; 15 (3): e36715
- **Patterns of Progression in Patients with Newly Diagnosed Glioblastoma Treated with 5 mm Margins on a Phase I/II Trial of 5 Fraction Stereotactic Radiosurgery with Concurrent and Adjuvant Temozolomide.** *Practical radiation oncology*
Mendoza, M. G., Azoulay, M., Chang, S. D., Gibbs, I. C., Hancock, S. L., Pollock, E. L., Adler, J. R., Harraher, C., Li, G., Gephart, M. H., Nagpal, S., Thomas, R. P., Recht, et al
2023
- **Stereotactic radiosurgery for localized cranial Langerhans cell histiocytosis: A single institution experience and review of literature.** *World neurosurgery*
Park, D. J., Marianayagam, N. J., Yener, U., Wang, L., Soltys, S. G., Pollock, E., Chang, S. D., Meola, A.
2023
- **Cyberknife Radiosurgery for Synovial Sarcoma Metastasizing to the Spine** *Cureus*
Zamarud, A., Park, D. J., Haider, G., Chang, S. D., Meola, A.
2023; 15 (4)
- **Stereotactic radiosurgery for trigeminal neuralgia secondary to tumor: a single-institution retrospective series.** *Neurosurgical focus*
Hall, J. C., Ung, T. H., McCleary, T. L., Chuang, C., Gibbs, I. C., Soltys, S. G., Hayden Gephart, M., Li, G., Pollock, E. L., Chang, S. D., Meola, A.
2022; 53 (5): E3
- **Intracranial Control With Combination BRAF and MEK Inhibitor Therapy in Patients With Metastatic Melanoma.** *Cureus*
Hui, C., Wu, Y. F., Liu, K., Sandhu, N., Blomain, E., Binkley, M. S., Gephart, M. H., Chang, S. D., Li, G. H., Reddy, S. A., Soltys, S. G., Pollock, E.
2022; 14 (11): e31838
- **Stereotactic Radiosurgery for Trigeminal Neuralgia Secondary to Tumor: A Single Institutional Retrospective Series**
Hall, J. C., Ung, T. H., McCleary, T. L., Chuang, C. F., Gibbs, I. C., Soltys, S. G., Hayden, M., Li, G., Pollock, E., Chang, S. D., Meola, A.
ELSEVIER SCIENCE INC.2022: E83
- **Stereotactic radiosurgery for recurrent pediatric brain tumors: clinical outcomes and toxicity.** *Neurosurgical focus*
Wang, E., Gutkin, P. M., Oh, J., Pollock, E., Soltys, S. G., Grant, G. A., Prolo, L. M., Chang, S., Li, G., Fisher, P. G., Partap, S., Campen, C. J., Gibbs, et al
2022; 53 (5): E2
- **Brain Metastases from Gynecologic Primary Cancers: Prognostic Factors for Local Control and Overall Survival**
Mendoza, M., Janchenko, L., von Eyben, R., Kidd, E., Pollock, E., Chang, S., Li, G., Kapp, D., Hayden, M., Soltys, S.
LIPPINCOTT WILLIAMS & WILKINS.2022: S34
- **The Molecular Basis and Pathophysiology of Trigeminal Neuralgia.** *International journal of molecular sciences*
Chen, Q., Yi, D. I., Perez, J. N., Liu, M., Chang, S. D., Barad, M. J., Lim, M., Qian, X.
2022; 23 (7)

- **Synchronous glioblastoma and brain metastases: illustrative case.** *Journal of neurosurgery. Case lessons*
Shahsavari, N., Ahmad, M., Sekar, V., Meola, A., Hancock, S. L., Chang, S. D., Chiang, V. L.
2022; 3 (12)
- **Post-operative Stereotactic Radiosurgery of Malignant Melanotic Schwannoma.** *Cureus*
Hall, J. C., Chang, S. D., Wilson, T. J., Ganjoo, K. N., Toland, A., Vogel, H., Pollock, E. L., Rahimy, E.
2022; 14 (3): e22849
- **Radiotherapy for brain metastases from thyroid cancer: an institutional and national retrospective cohort study.** *Thyroid : official journal of the American Thyroid Association*
Blomain, E. S., Berta, S., Hug, N. F., Giao, D. M., Meola, A., Binkley, M. S., Hui, C., Churilla, T., Shahsavari, N., Desai, K., Chang, S. D., Soltys, S., Pollock, et al
2022
- **Stereotactic radiosurgery with immune checkpoint inhibitors for brain metastases: a meta-analysis study.** *British journal of neurosurgery*
Badrigilan, S., Meola, A., Chang, S. D., Rezaeian, S., Nemati, H., Almasi, T., Rostampour, N.
1800: 1-11
- **Microenvironment changes in arteriovenous malformations after stereotactic radiation.** *Frontiers in human neuroscience*
Ung, T. H., Belanger, K., Hashmi, A., Sekar, V., Meola, A., Chang, S. D.
2022; 16: 982190
- **Venous thromboembolism rates and risk factors following endoscopic skull base surgery.** *International forum of allergy & rhinology*
Chang, M. T., Jitaroon, K., Song, S., Roozdar, P., Wangworat, Y., Ibrahim, N., Ma, Y., Rao, V. K., Chang, S. D., Fernandez-Miranda, J. C., Patel, Z. M., Dodd, R. L., Hwang, et al
2021
- **RADIOTHERAPY FOR BRAIN METASTASES FROM THYROID CANCER: A RETROSPECTIVE COHORT STUDY**
Blomain, E., Berta, S., Hug, N., Giao, D., Meola, A., Binkley, M., Shahsavari, N., Desai, K., Chang, S., Soltys, S., Pollock, E.
OXFORD UNIV PRESS INC.2021: 42
- **Intracranial Response to Combination BRAF and MEK Inhibitor Therapy in Patients with Metastatic Melanoma**
Hui, C., Wu, Y., Liu, K., Sandhu, N., Blomain, E., Binkley, M., Gephart, M., Chang, S., Li, G., Reddy, S., Gibbs, I., Soltys, S., Pollock, et al
LIPPINCOTT WILLIAMS & WILKINS.2021: S48-S49
- **SARS-CoV-2 infection and venous thromboembolism after surgery: an international prospective cohort study.** *Anaesthesia*
2021
- **Letter: The Path to Surgical Robotics in Neurosurgery.** *Operative neurosurgery (Hagerstown, Md.)*
Walcott, B. P., Spetzler, R. F., Chang, S. D., Muacevic, A., Moll, F., Adler, J. R.
2021
- **Tumor Control Following Stereotactic Radiosurgery in Patients with Vestibular Schwannomas - A Retrospective Cohort Study.** *Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology*
Santa Maria, P. L., Shi, Y., Aaron, K. A., Gurgel, R. K., Corrales, C. E., Soltys, S. G., Santa Maria, C., Chang, S. D., Blevins, N. H., Jackler, R. K., Gibbs, I. C.
2021
- **Radiosurgery as a microsurgical adjunct: outcomes after microsurgical resection of intracranial arteriovenous malformations previously treated with stereotactic radiosurgery.** *Journal of neurosurgery*
Bigder, M., Choudhri, O., Gupta, M., Gummidiipundi, S., Han, S. S., Church, E. W., Chang, S. D., Levy, R. P., Do, H. M., Marks, M. P., Steinberg, G. K.
2021: 1-12
- **Microsurgical resection of foramen magnum meningioma: multi-institutional retrospective case series and proposed surgical risk scoring system.** *Journal of neuro-oncology*
Fatima, N., Shin, J. H., Curry, W. T., Chang, S. D., Meola, A.
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