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Graeme F. Woodworth, MD, B.S.

Academic Title:

Professor

Primary Appointment:

Neurosurgery

Secondary Appointment(s):

Diagnostic Radiology Nuclear Medicine, Anatomy Neurobiology

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Education and Training

Education

1997	B.S., Chemistry, Tufts University
2005	M.D., Johns Hopkins University School of Medicine

Post Graduate Education and Training

2005-2006 Intern, Department of Surgery, Johns Hopkins Hospital, Baltimore, Maryland

2006-2011 Resident, Department of Neurosurgery, Johns Hopkins Hospital, Baltimore, Maryland

2009-2011 Fellow, Neuro-Oncology-NCI/Nanotechnology for Cancer Medicine Program, Johns Hopkins University School of Medicine, Baltimore, Maryland

2011 Fellow, Cranial Neuro-Endoscopy, Weill Cornell Department of Neurological Surgery, New York, New York

2011-2012 Assistant Chief of Service, Department of Neurosurgery, Johns Hopkins Hospital, Baltimore, Maryland

Biosketch

As the Director of the Brain Tumor Treatment and Research Center at the University of Maryland (UMd), I provide leadership and surgical care within a multidisciplinary team of radiologists, medical oncologists, radiation oncologists, neurosurgeons, and pathologists, treating brain cancer patients. This clinical role enables me to facilitate the cross-disciplinary group of engineers, cancer biologists, and clinician-scientists within the Translational Therapeutics Research Group (TTRG) to address key challenges in counteracting the patho-biology and improving the treatment of brain cancer. Much of this work is centered on the concept of using the operating room as a portal for discovery and opportunity to improve our understanding of and therapeutic delivery for brain cancer. I study and utilize advanced brain tumor models, including genetically-engineered and patient-derived versions directly from the operating room where the tumor tissue is rapidly passaged in vivo to avoid ischemia and biological transformation during extended manipulations or culturing conditions. We have developed a nestin-TV-A transgenic rat model to enhance investigations into the molecular and cellular mechanisms of the glioblastoma margin (GBm) and enable surgery-, local delivery-, focused ultrasound-, and targeted radiation-based studies.

A long-standing goal in treating patients with glioblastoma (GB), the most common and deadly primary brain cancer, is linking tumor specific features with effective anti-tumor therapies to generate long-term treatment responses. Ibelieve that following the principles of (1) maximal, safe tumor removal, (2) use of intra-operative access to better understand the disease and deliver therapies, and (3) targeting therapeutics to residual/unresectable invading cancer elements, we will turn GB from a uniformly fatal cancer into a chronic disease with the potential for cure.

Research/Clinical Keywords

Brain tumor, Glioma, Transcranial focused ultrasound, Magnetic resonance imaging guided treatments, Nanomedicine

Highlighted Publications

Nance EA*, **Woodworth GF***, Sailor K, Tamargo RJ, Eberhart CE, Hanes J. A dense poly(ethylene glycol) coating improves penetration of large polymeric nanoparticles within brain tissue. Science Translational Medicine, 2012, 4(149):149ra119. [* co-first authors] (PMCID: 3718558)

Woodworth GF, Garzon-Muvdi T, Blakeley JO, Yu X, Weingart J & Burger PC, Histo-pathological correlates with survival in re-operated glioblastoma. J Neurooncol. 2013, 113: 485-93. (PMCID: 3994532)

Woodworth GF, Dunn GP, Nance EA, Hanes J, Brem H. Emerging insights into barriers to effective brain tumor therapeutics. Front. Oncology, 2014, 4: Article 126. (PMCID: 4104487)

Schneider CS, Perez-Bermudez J, Cheng E, Smith P, Winkles JA, **Woodworth GF*,** Kim AJ*. Minimizing the non-specific binding of nanoparticles to the brain enables active targeting of Fn14-positive glioblastoma cells. Biomaterials, 2015, 42: 42-51. (*Co-corresponding authors). (PMCID: 4279109)

Hersh DS, Wadajkar AS, Roberts NB, Perez JG, Connolly NP, Frenkel V, Winkles JA, **Woodworth GF,** Kim AJ. Evolving Drug Delivery Strategies to Overcome the Blood Brain Barrier. Curr Pharm Des. 2015 Dec 21. PMID: 26685681

Hersh DS, Houbova P, Castellani RJ, Rodriguez FJ, Mehta MP, **Woodworth GF**. Pathologic deposition of non-amyloid immunoglobulin in the brain leading to mass effect and neurological deficits. J Clin Neurosci. 2016 Mar 4. PMID: 26954763

Hersh DS, Nguyen BA, Dancy JG, Adapa AR, Winkles JA, **Woodworth GF**, Kim AJ, Frenkel V. Pulsed ultrasound expands the extracellular and perivascular spaces of the brain. Brain Res. 2016 Jun 28. pii: S0006-8993(16)30464-4. PMID: 27369449

Dancy JG, Wadajkar AS, Schneider CS, Mauban JR, Goloubeva OG, **Woodworth GF**, Winkles JA, Kim AJ. Non-specific binding and steric hindrance thresholds for penetration of particulate drug carriers within tumor tissue. J Control Release. 2016 Jul 25;238:139-148. PMID: 27460683

Hersh DS, Kim AJ, Winkles JA, Eisenberg HM, **Woodworth GF**, Frenkel V. Emerging Applications of Therapeutic Ultrasound in Neuro-oncology: Moving Beyond Tumor Ablation. Neurosurgery. 2016 Aug 22. PMID: 27552589

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