

# Department of Pediatrics

## Curriculum Vitae

### **Name and Personal Data:**

**Sarah Rush, MD**

- Office Address:  
1 Perkins Square  
Akron, OH 44308  
Office Phone Number: 330-543-4973

Date and Place of Birth: December 8

Personal Data:

Marital Status: Married

### **Education:**

- **College:**  
John Carroll University, University Hts., OH, B.S., 1997 (Biology)
- **Professional/Graduate School:**  
The University of Cincinnati College of Medicine, Cincinnati, OH, M.D., 2002
- **Postgraduate Training**  
PL/1-3 Resident, Department of Pediatrics, Akron Children's Hospital, Akron, OH, 2002 - 2005  
  
PL/4 Chief Resident, Department of Pediatrics, Akron Children's Hospital, Akron, OH, 2005-2006  
  
Fellow, Pediatric Hematology/Oncology, Vanderbilt University Medical Center, Nashville, Tennessee, 2006-2009  
  
Fellow, Pediatric Neuro-Oncology, The Children's Hospital, Aurora, CO 2009-2010

### **Academic Appointment:**

- Assistant Professor, Pediatrics, Northeast Ohio Medical University. Dec 2015-present
- Director of Neuro-oncology, Pediatric Hematology/Oncology, Akron Children's Hospital. Jan 2013-Present
- Adjunct Assistant Professor, Pediatrics, Cincinnati Children's Hospital Medical Center/University of Cincinnati College of Medicine. Feb 2013-present

- Assistant Professor, Pediatrics, Center for Cancer and Blood Disorders, University of Colorado Denver. July 2010-December 2012.

**Awards and Honors:**

- Marci M. Matthews Endowed Chair in Telehealth

**Memberships in Professional Organizations:**

- Member – Children’s Oncology Group – 2002-current
- Member – Society for Neuro-oncology – 2013-current

**Leadership and Management:**

- VP Informatics and Chief Medical Information Officer – ACH Sept 2018-current
- Director of the Neuro-oncology program at ACH. Administrative role in program development and day to day operation. 2013-current
- Lead Oncology Physician Champion for Beacon Build at ACH 2015-current. Continues as Epic Super user
- Clinical Informaticist – ACH 2016-current
- Epic Medical Director – ACH 2017-current
- Interim CMIO – ACH 2/2018-9/2018
- Director of the Targeted therapies program at ACH 2014-2019

**Clinical Activities:**

- Primary clinical role is the care of patients with pediatric CNS tumors. Function as the primary oncologist for all patients diagnosed with these tumor types. Director of the Targeted Therapies program as well. Involved with selection and referral of patients for early phase clinical trials. Dual appointment at CCHMC as part of clinical trials consortium. Provide 6 weeks of coverage for the inpatient Hematology/Oncology service. All consults for neuro-oncology are performed by myself in the inpatient and outpatient setting. Approximately 35 new patients diagnosed with CNS tumors each year. Provide clinical management of all of these children as well as long term follow up for those that have completed therapy.

**Service and Citizenship:**

- *Committee Involvement*  
Epic Oncology Steering Committee, National, 2015-present; member  
Cancer Committee, ACH, 2013-present; member  
Pharmacy & Therapeutics Committee, ACH, 2013-present; member  
Clinical IT Physician Advisory Group (CIPAG), ACH, 6/2016-present; member
- *Participation in department recruitment activities including resident staff interviewing committee.*  
Interviewer, Pediatric Residency Program Applicants, Akron Children’s Hospital 2013-2016  
Interviewer, Pediatric Resident applicants, Children’s Hospital Colorado, 2010-2012  
Interviewer, Pediatric Hematology/Oncology/BMT applicants Children’s Hospital Colorado 2010-2012
- *Participation in local activities that benefit the institution eq. fundraising,*

*quality assurance, etc*

“Dancing for the Kids” Participant raising money to support the Akron Children’s Neuro-oncology Fund Oct 24, 2014.

- Volunteer – St Baldrick’s fundraiser Mar 17, 2014.

### **Teaching and Mentoring:**

- Indicate responsibilities in teaching of medical students, graduate students, residents, medical fellows, postdoctoral fellows and undergraduates.
  - Psychology Fellow Lecture: “Pediatric Brain Tumors” 11/10/15, 1/13/15, 6/15/14
  - Fellow Core Curriculum Lecture: “Day One Talk” 7/29/15-current (done yearly in July)
  - Fellow Core Curriculum Lecture: “Pediatric Brain Tumors”
  - Fellow Core Curriculum Lecture: “Genetic Predisposition Syndromes”
  - Fellow Core Curriculum Lecture: “Grant Writing”
  - Fellow Core Curriculum Lecture: “Pediatric Bone Tumors” 12/10/13
  - Fellow Core Curriculum Lecture: “Wilms Tumor and Neuroblastoma” 2/12/

Pediatric Hematology/Oncology Scientific Oversight Committee – Aditya Sharma; 2014-2016.

Pediatric Hematology/Oncology Scientific Oversight Committee – Matthew Henderson; 2017-2020

Pediatric Hematology/Oncology Scientific Advisor – Erin Wright; July 2015-June 2018

Pediatric Hematology/Oncology Scientific Advisor – Vanisha Patel; July 2016-current

- Indicate any teaching and mentoring awards.
- *Book Chapters:*
  - Zieber SR and Friebert S. Pediatric Cancer Care: Special Issues in Ethical Decision Making. In: Angelos P. ed. *Ethical Issues in Cancer Patient Care Second Edition*. New York, NY: Springer; 2008: 92-115.
  - Kuttesch JF, Rush SZ, Ater J. Brain Tumors in Childhood. In: Kliegman RM, ed. *Nelson Textbook of Pediatrics*. Philadelphia, PA: Elsevier; 19<sup>th</sup> ed. 2011
  - Rush, SZ and Cohen B. Brain Tumor. In: *Textbook of Pediatric Care*. 2<sup>nd</sup> ed. 2015

### **Research and Scholarly Activities**

#### Grants and Contracts:

For all grants and contracts include source of support, identifying number and title, percent effort, capacity (principal investigator, co-principal investigator, co-investigator, collaborator, etc.), dates of entire project period, and total direct costs, whether peer reviewed or not.

**Service Related:**

Curesearch Award	12/2013 (Non-Peer) \$10,000
Morgan Adams Foundation - PI Establishment of tumor bank at ACH	1/1/13-12/31/13(Non-Peer) \$25,000

**Research Related:**

St. Baldrick's Foundation Infrastructure Award – PI Expansion of services for patient with CNS tumors	12/2013-11/2014 (Peer) \$49,991 (6% effort)
Morgan Adams Foundation Correlation of CSF and serum biomarkers of oxidation, inflammation and apoptosis as predictors of CNS injury resulting from pediatric brain tumors	1/1/12-12/31/12 (Non-Peer)
St. Baldrick's Foundation Infrastructure Award -PI Private Foundation Clinical Trials for Children with Tumors Secondary to Neurofibromatosis	12/2011-11/2012 (Peer) \$50,000
Childhood Brain Tumor Foundation (PI) Private Foundation Validation of IMP3 as a prognostic marker in juvenile pilocytic astrocytoma.	7/2010-6/2011(Peer) \$30,000
National Brain Tumor Society (Co-PI) Private Foundation Targeting the Hedgehog Pathway in Pediatric Low Grade Gliomas	7/1/08 - 6/30/10 (Peer) \$155,000
Childhood Brain Tumor Foundation (Co-PI) Private Foundation Hedgehog Pathway Activation in Juvenile Pilocytic Astrocytomas	8/1/08 - 7/31/2009 \$45,000

**Publications:**

- Anandani Nellan and Erin Wright, Kristen Campbell, Kurtis D. Davies, Andrew Donson, Vladimir Amani, Alexis Judd, Molly Hemenway, Jennifer Raybin, Nicholas Foreman, **Sarah Rush**, Kathleen Dorris. Retrospective Analysis of Combination Carboplatin and Vinblastine for Pediatric Low-Grade Glioma. Neuro-Oncology accepted for publication 5/29/20.
- Patel V, McNinch NL, **Rush S**. Diagnostic delay and morbidity of central nervous system tumors in children and young adults: a pediatric hospital experience. J Neurooncol. 2019 Jun;143(2):297-304. PMID: 30929127
- Johnson A, Severson E, Gay L, Vergilio JA, Elvin J, Suh J, Daniel S, Covert M, Frampton GM, Hsu S, Lesser GJ, Stogner-Underwood K, Mott RT, **Rush SZ**, Stanke JJ, Dahiya S, Sun J, Reddy P, Chalmers ZR, Erlich R, Chudnovsky Y,

Fabrizio D, Schrock AB, Ali S, Miller V, Stephens PJ, Ross J, Crawford JR, Ramkissoon SH. Comprehensive Genomic Profiling of 282 Pediatric Low- and High-Grade Gliomas Reveals Genomic Drivers, Tumor Mutational Burden, and Hypermutation Signatures. *Oncologist*. 2017 Dec;22(12):1478-1490. PMID: 28912153

- Lindsay AJ, **Rush SZ**, Fenton LZ. Pediatric posterior fossa ganglioglioma: unique MRI features and correlation with BRAF V600E mutation status. *J Neurooncol*. 2014 Jun;118(2):395-404 PMID: 24792487
- Madden JR, **Rush SZ**, Stence N, Foreman NK, Liu AK. Radiation-induced Gliomas in 2 Pediatric Patients With Neurofibromatosis Type 1: Case Study and Summary of the Literature. *Pediatr Hematol Oncol*. 2014 Mar; 36(2):105-8. PMID:24136023
- Donson AM, Kleinschmidt-Demasters BK, Aisner DL, Bemis LT, Birks DK, Levy JM, Smith AA, Handler MH, Foreman NK, **Rush SZ**. Pediatric Brainstem Gangliogliomas Show BRAF<sub>V600E</sub> Mutation in a High Percentage of Cases. *Brain Pathol*. 2013 Nov 18. PMID: 24238153
- VN Barton, AM Donson, DK Birks, BK Kleinschmidt-DeMasters, MH Handler, NK Foreman, **SZ. Rush**. IMP3 Protein Expression is an Independent Prognostic Factor in Pediatric Pilocytic and Piloxyoid Astrocytoma. *J Neuropathol Exp Neurol*. 2013 May;72(5):442-9. PMID:23584203
- **Rush SZ**, Foreman NK, Liu AK. Brainstem ganglioglioma successfully treated with vemurafenib. *J Clin Oncol*, Jan 28 2013. PMID:23358987
- Chan M, Kleinschmidt-Demasters BK, Donson A, Bemis L, Birks D, Foreman N, **Rush SZ**. Pediatric brainstem gangliogliomas show overexpression of neuropeptide prepronociceptin (PNOC) by microarray and immunohistochemistry. *Pediatr Blood Cancer*. 2012 Dec 15;59(7):1173-9. PMID:22706982
- Xu BJ, An Q, Gowda SS, Yan W, Pierce LA, Abel TW, **Rush SZ**, Cooper MK, Ye F, Shyr Y, Weaver KD, Thompson RC. Identification of blood protein biomarkers that aid in the clinical assessment of patients with malignant glioma. *Int J Oncol*. 2012 Jun;40(6):1995-2003. PMID:22307528
- **Rush SZ**, Abel TW, Valadez JG, Pearson M, Cooper MK. Activation of the Hedgehog Pathway in Pilocytic Astrocytomas. *Neuro-Oncology* Aug 12(8):790-8, 2010. PMID:20223881
- Sarangi A, Valadez JG, **Rush SZ**, Abel TW, Thompson RC, Cooper MK. Target Inhibition of the Hedgehog Pathway in Established Malignant Glioma Xenografts Enhances Survival. *Oncogene* 28(39):3468-76, 2009 PMID:19617900

- **Zieber SR**, Friebert S. Pediatric Cancer Care: Special Issues in Ethical Decision Making. *Cancer Treat Res.* 140: 93-118, 2008. PMID:18283772
- Books:
  - **Zieber SR** and Friebert S. Pediatric Cancer Care: Special Issues in Ethical Decision Making. In: Angelos P. ed. *Ethical Issues in Cancer Patient Care Second Edition*. New York, NY: Springer; 2008: 92-115.
  - Kuttesch JF, **Rush SZ**, Ater J. Brain Tumors in Childhood. In: Kliegman RM, ed. *Nelson Textbook of Pediatrics*. Philadelphia, PA: Elsevier; 19<sup>th</sup> ed. 2011
- Abstracts:
  - **Rush, S.**, Chen, T., Stanke, J., Agamanolis, D. “Widely disseminated glioblastoma with novel mutations associated with aggressive phenotype”. International Symposium on Pediatric Neuro-oncology. *Neuro-Oncology*, Volume 18, Issue suppl\_3, 1 June 2016, Pages iii53.
  - Chen, T., Agamanolis, D., **Rush, S.** “Extra-Neural metastasis of medulloblastoma: A case report and review of the literature”. *Neuro-Oncology*, Volume 18, Issue suppl\_3, 1 June 2016, Pages iii100
  - Stanke, J., **Rush, S.** Hughes, G. “Identification of Androgen receptor mutations in pediatric medulloblastoma”. International Symposium for Pediatric Neuro-Oncology. *Neuro-Oncology*, Volume 18, Issue suppl\_3, 1 June 2016, Pages iii117.
  - **Rush S.** Madden J, Hemenway M, Foreman N. “Mutations in PTPN11 gene may predispose to development of midline low grade gliomas” International Symposium on Pediatric Neuro-Oncology. Poster Presentation. Singapore. June 28- July 2, 2014. International Meeting
  - **Rush S.** Pediatric gangliogliomas including those in the brainstem show BRAF V600E mutation in a high percentage of cases”, Pediatric Neuro-Oncology Basic and Translational Research Conference. Poster presentation. Ft. Lauderdale, FL. May 16 - 17, 2013. National Meeting
  - Dovel K, Scandlyn J, Whistler J, **Rush S**, Garrington T. The role of support groups in the well-being of pediatric hematology-oncology fellows: essential components and perceived benefits. Poster presentation. ASPHO Annual Meeting, April 2013. National Meeting
  - **Rush SR**, Stence N, Liu A. Volume of vestibular schwannoma does not correlate with hearing loss in pediatric patients with Neurofibromatosis type 2. Platform Presentation ISPNO Toronto Canada. June 26, 2012. International
  - Donson AM, Barton VN, Birks DK, Kleinschmidt-DeMasters B, Hemenway

MF, Handler MH, Foreman NK, **Rush SZ**. IMP3 protein expression is a potential independent prognostic factor in pediatric pilocytic and pilomyxoid astrocytoma. Platform presentation ISPNO Toronto Canada. June 27, 2012 International Meeting

- Hemenway M, Madden J, Macy M, Foreman NK, **Rush SR**. Brainstem low grade tumors presenting with *BRAF* V600E mutation and successful treatment with vemurafenib. Poster Presentation ISPNO Toronto, Canada. June 26, 2012 International meeting
- Hemenway M, Foreman NK, **Rush SR**. The use of bevacizumab in the treatment of Schwannoma-related pain in a patient with Neurofibromatosis Type 2. Poster Presentation ISPNO Toronto Canada. June 26, 2012 National meeting
- Hemenway M, Foreman NK, **Rush SR**. The use of bevacizumab in the treatment of Schwannoma-related pain in a patient with Neurofibromatosis Type 2. Poster presentation Children's Tumor Foundation NF Conference. June 9, 2012. National Meeting
- **Rush SR**, Stence N, Liu A. Volume of vestibular schwannoma does not correlate with hearing loss in pediatric patients with Neurofibromatosis type 2. Poster Presentation. Children's Tumor Foundation NF Conference. June 9, 2012. National Meeting
- **Rush SZ**, Fenton LZ, Donson AM, Birks DK, Kleinschmidt-DeMasters BK, Handler MH, Foreman NK. Prognostic, Radiographic and Biological Characteristics of Brainstem Gangliogliomas. Poster Presentation ISPNO Vienna, Austria. June 22, 2010. International Meeting