

1966

50  
YEARS

2016

UR MEDICINE NEUROLOGY

*50 Years of  
Neurology History*

# A Welcoming Message from the Chair

Welcome to the Department of Neurology's 50th Anniversary Celebration! Whether you visited Rochester or were here in spirit, we hope these pages and the events brought back fond memories and rekindled friendships from years gone by.

It was on July 1, 1966 when Robert J. Joynt was appointed Chair of a newly created Department of Neurology at the University of Rochester. While much has changed in 50 years, we really do remain, as you remember us; snow in the winter, lilacs in the Spring, festivals all summer long, beautiful Septembers and yes, great residents learning from great faculty and great faculty learning from great residents – and actually having fun while doing it.

We thank the many individuals who organized and coordinated the 50th Anniversary Celebration. The creativity, energy & enthusiasm put forth by all of them was tremendous. "Many hands make light work" and each one of them deserves a special thanks.

## Department of Neurology, 50th Anniversary Committees

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Patrick Phalen

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Peter Kapatoss

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Peter Kapatoss

We hope you look as fondly back on your years in Rochester as we remember them.

My very best,

Robert Holloway, MD, MPH (Chair, 2012-present)

# In Memorium

While we reflect on where we have been, where we are, and where we are going, it's important to remember from where we came. While these faculty, trainees, and staff may no longer be with us, they were inspirations, mentors, friends, and colleagues to many of us. They passed on the gift of their knowledge and decisively influenced the field of medicine and neurology around the globe. We are forever indebted to all them and this Department would not be what it is today without the enormous impact they have had on us personally and the field of neurology in general.

*We dedicate this celebration to the wonderful memories provided by all of them.*

Robert Joynt

Fred Horner

Josh Hollander

Richard Satran

David Goldblatt

David Marsh

Maurice Charlton

Steve Schwid

David Loiselle

James Garbern

Kenneth Plotkin

William Markesbery

Bernard Macik

Donald Castle

Marvin Goldstein

Andrew Vadasz

Nancy Benjamin



## THE DEPARTMENT TODAY

By: Robert G. Holloway, MD, MPH

The Department of Neurology at the University of Rochester officially started on July 1, 1966 when Dr. Robert Joynt was recruited from the University of Iowa to become its first Chairman. From those humble beginnings, Dr. Joynt and six faculty and trainees began a journey of professional and personal growth that would impact thousands of physicians and millions of patients. While one can attempt to quantify such accomplishments, it is ultimately a human story of relationships and how a rare combination of Dr. Joynt's great intellect, common sense, humility, wit, and charm can move the neurological needle on a global scale.

In 50 brief years, we have grown into a Department of over 100 faculty, 30 residents, 15 fellows, 28 nurse practitioners and physician assistants, over 70 nurses, technicians, and social workers, 30 research coordinators, and over 140 staff: 13 divisions and 3 Centers (Center for Human Experimental Therapeutics, Center for Neural Development and Disease, and Center for Translational Neuromedicine) with an annual budget of over \$61 million to oversee our clinical (>35,000 outpatient visits, >13,000 procedures, >2000 inpatient admissions), research (>90 grants, >250 peer-reviewed publications), and educational programs; consistently ranked in the US News and World Report as one of the nation's best, a model and magnet for teaching the clinical neurosciences, a leader in translational neuroscience and experimental therapeutics; and consistently in the top 10 institutions nationally for research funding. How was this accomplished?

Dr. Joynt was known for saying "Hire people smarter than you – and then get out of their way." Brilliant himself, Dr. Joynt did just that. During the late 1960s and 1970s, Dr. Joynt hired and surrounded himself with a core group of individuals, many of whom stayed and built the Department to what it is today. Key early recruits and partners included Gerald Honch (1968), Joshua Hollander (1969), Robert Griggs (1971), Richard Moxley (1974), Ira Shoulson (1975), Gary Myers (1971), Frederick Horner (1968),

David Goldblatt (1965), Richard Satran (1962), and David Marsh (1963), Barbara Herr (1969) and Katherine Donohoe (1977). While Dr. Joynt created a comfortable and humanistic work environment to learn and teach, care for patients and pursue scholarship, these individuals sustained a legacy of leadership, inspiration and loyalty that continues to today. As one example, the Department has over 40 faculty and staff who have been with the Department and University for 25 years or more, collectively contributing over 1200 years of service!

Dr. Robert Griggs became Chair in 1986 and took the Department to unprecedented heights of achievement. Just like Dr. Joynt, Dr. Griggs did it all as a brilliant clinician, teacher, scientist, editor, and mentor and strengthened the foundation which was started 20 years earlier. During the 22 years of Dr. Griggs' chairmanship (1986 to 2008), everything grew by a factor of 10 or more – the number of faculty and staff, the number of outpatient visits, procedures, and inpatient admissions, and the number of research grants and revenues. The clinical, educational and research programs each became internationally prominent.

Key milestone events during Dr. Griggs' chairmanship included recruiting and supporting world-class faculty and leaders in all subspecialty areas, obtaining the NINDS-sponsored T32 post-doctoral training grant in Experimental Therapeutics of Neurological diseases (1990 and now in its 26th year), establishing the Strong Epilepsy Center (1990), opening the Stroke Unit (1996), creating a community-based practice in general neurology, (1993), tapping Ralph Jozefowicz to lead nearly all educational programs (1988 and 1996), strengthening relationship with the Strong Memorial Hospital and expanding to Highland Hospital (2004), and creating vibrant partnerships with allied research centers, including the Clinical Trials Coordinating Center (now called the Center for Human Experimental Therapeutics [CHET]), the Center for Translational Neuromedicine (CTN) and the Center for Neural Development

and Disease (soon to be the Center for NeuroTherapeutics Discovery [CND]). Subsequently, when Dr. Steve Goldman was Chairman (2008 to 2012), the Department's academic stature increased further, including the activities of his own Center for Translational Neuromedicine (CTN) which is one of the most productive centers for basic and early stage translational neuroscience in the world.

Over the past 4 years (2012 to present), the Department has accomplished a great deal to support our ambitious strategic plan: 1) radically change clinical practice; 2) strategic research growth; 3) targeted educational efforts; 4) develop new leaders; 5) intense relationship building; and 6) financial stability. As the academic environment has become increasingly complex, we have greatly benefited by excellent relationships with our various stakeholders, including other Departments and Centers, URM hospitals, academic deans, and medical faculty group leadership.

Given the size and scope of the Department's academic operations, the administrative structure now includes a Vice Chair, 6 Associate Chairs (Education, Academic Affairs, Clinical Affairs, Basic Research, Clinical Research, and Administration and Finance), and a Financial Advisory Committee. We have recruited an additional 30 faculty, 8 advanced practice providers and 153 staff, have promoted 6 faculty to Professor, 6 to Associate Professor, as well as appointed 10 new Division Chiefs and Directors of educational and clinical programs.

We successfully launched a neurohospitalist program (2014) and initiated the first Neuro-Intensive Care Unit in the Department's history (2013), we have been accredited (2013) and re-accredited (2015) as a Joint Commission Certified Comprehensive Stroke Center, we started the URM Headache Center (2013) and expanded the General Neurology Program with greater on-site and county presence in Bushnell's Basin (2015). We now have a regional presence in Ithaca and Elmira/Corning and evolving relationships with other health systems, and established the foundation to initiate teleneurology services throughout Central New York.

We continue to influence and reshape the approach to design and implement clinical research and have directly contributed to the approval of over 10 FDA-approved therapies and devices. We have expanding research programs in teleneurology, global neurology, experimental therapeutics, systems neuroscience, and early stage molecular, cell and gene-based therapeutic programs. Also, we participated in the establishment of the DelMonte Neuromedicine Institute (2015) and the recruitment of its first Scientific Director (John Foxe, PhD).

We have ever-improving and expanding educational and training programs consistently rated as tops at the Medical Center and highly ranked nationally. Since 2001, 111 UR medical school graduates matched into either adult (82) or

child (29) neurology residency programs (7% of graduating classes compared to 1% nationally), and 28 of our residents received the Arnold Gold Foundation Humanism in Medicine Award from the 4th year medical students (33% of the awards given). In addition to our adult and child neurology residency programs, we have 10 fellowships (clinical neurophysiology, vascular neurology, neuromuscular medicine, epilepsy, sleep medicine, neuro-oncology, movement disorders, neuro-immunology, behavioral neurology, and experimental therapeutics), with plans to develop fellowships in neuro-critical care and headache.

What is even more impressive than the growth and accomplishments of the Department is the magnitude and impact of our alumni who moved on to establish careers elsewhere. Since our first graduating residents in 1969 (Marvin Goldstein and Donald Castle), we have graduated over 250 adult and child neurology residents, 70 experimental therapeutics fellows, over 100 clinical fellows, and over 50 faculty alumni. The impact they have had on the field of neurology is nothing short of astonishing.



These alumni have or are currently practicing neurology in over 20 countries and in over 35 states. In New York State alone, over 35 alumni have joined private practice groups or other academic departments of neurology. And these numbers do not even include the graduating medical students who trained in neurology elsewhere or non-clinician trainees who have participated in our programs. In addition, these alumni have had enormous leadership impact on the field becoming academic CEOs, Deans, Associate Deans, Chairs (at least 8), Editors-in-Chiefs, Presidents of professional societies, NIH study section chairs/scientific council members, and President/CEOs/Research Directors of industry partners.



## LOOKING TO THE FUTURE

By: Robert G. Holloway, MD, MPH

Neurology in 50 years will look very different than it does today. Our concept of disease will change, our ability to diagnose will become much more precise, and the impact of our therapies more profound and meaningful to patients. Almost everything will change. The way we measure outcomes, the way we organize our subspecialties, how we conduct research, what we teach our trainees, how we round on patients, where they are principally cared for, how we are valued and the way we get paid. But some things will not change.

The patient will remain at the center of all we do guiding our way, remembering that the most important things we do in our lives, we do for others. While we have heard many motivating “-isms” and powerful simple phrases, they are only words on a page. There is no need to repeat them here – we are familiar with many, if not most, of them. What we have been witness to is a unique blend of individuals that have created and sustained a department of character. Where kindness, wisdom, and a deep appreciation of the human condition prevail. In our ever changing world of medicine, such ideals are more important now than ever. They are the things that create legacies and make “institutions” endure. We must pass them forward to generations to come.

Just as there are faculty and staff who are still with us nearly 50 years later, so too will there be faculty and staff with us 50 years hence. Not many, but a few who will join in that centennial event, celebrating that particular brand of Rochester neurology of core values, shared experiences, and professional accomplishments that will keep us together forever.

*And so our journey continues....our work is but begun. To our next 50 years. Meliora.*

## EDUCATION PROGRAMS

By: Ralph F. Józefowicz, MD  
Robert Thompson-Stone, MD



The UR Department of Neurology has had education at the forefront since its beginnings. Over the past 50 years, the education of both medical students and residents has been a priority for the department. The medical student Mind, Brain and Behavior course, the neurology clerkship and the neurology residency programs are all considered benchmark programs with national prominence.

### Medical student programs – Neuroscience Course and Mind, Brain and Behavior Course

The Department of Neurology has been integrally involved in neuroscience teaching at UR from the start. Drs. Robert Joynt and David Goldblatt were the founding course directors for the neural science course in the 1970’s, which was one of the first integrated courses in the medical school. They incorporated numerous clinical exercises into the lecture schedule and laboratory sessions and won numerous teaching awards for their efforts. In 1988, Dr. David Felten was recruited into the Department of Neurobiology and Anatomy to take over this course. He and Ralph Józefowicz, the co-director, further enhanced the integration of basic neurosciences and clinical neurology in this course.

In 2000, as part of the Double Helix Curriculum, this course was integrated with neuropathology, psychopathology and psychopharmacology to become “Mind, Brain and Behavior” (MBB), an intense ten-week course that employs lectures, neuroanatomy and neuropathology laboratories and problem based learning (PBL) sessions to teach integrated neurosciences. Many neurology faculty members teach in this course, including Erika Augustine, Michel Berg, Emma Ciafaloni, Charlie Duffy, Bob Gross, Chad Heatwole, Eric Logigian, Jon Mink and Rob Stone. All of the neurology chief residents serve as laboratory instructors and PBL tutors for this course. The course is consistently rated by the medical students as the best basic science course at UR, with a 100% satisfaction rate. This course has also achieved national stature.

Since 2000, the American Neurological Association has funded a teaching fellowship for junior faculty members from US medical schools to spend two months in Rochester working with Ralph Józefowicz during the MBB course learning how to organize and run an integrated neural science course. We have had 10 fellows participate in this program to date.

### Medical student programs – Neurology Clerkship

Shortly following his arrival at Rochester, Dr. David Goldblatt became director of the neurology clerkship. David’s long-time secretary, Adele Cook, became the clerkship coordinator. This clerkship was initially an elective for fourth year medical students. In the 1980’s, the neurology clerkship became part of a fourth year “selective”, whereby students could select two of the following clinical rotations: neurology, orthopedics and rehabilitative medicine. The vast majority of students selected neurology as one of their two choices. Dr. Goldblatt introduced the weekly clerkship conferences at which he showed his famous videotapes of patients with neurologic disorders that he initially prepared for the ABPN oral examinations. UR medical school graduates are very familiar with many of the patients on these videotapes, which illustrated Wernicke aphasia, neglect syndromes, Alzheimer’s disease, tardive dyskinesia and many other disorders. David had a unique ability to have the patients tell their stories in a most telling and poignant way on these videotapes.

In 1994, David asked Ralph Józefowicz to assume the directorship of the neurology clerkship. Ralph continues to direct the clerkship to this day with the assistance of Rob Stone, the clerkship co-director, Fred Marshall, the associate clerkship director, and Lorie Wolfanger, the clerkship coordinator. Under Ralph’s leadership, the clerkship moved into the 3rd year of the medical student curriculum as one of the required six clerkships. This has had a major impact on the recruitment of medical students into neurology. Since 2001, 82 UR medical school graduates

matched into adult neurology residency programs and 29 matched into child neurology residency programs! These students matched into the most competitive neurology training programs, including both Harvard programs, Johns Hopkins, UCSF, UCLA, University of Pennsylvania, University of Michigan and the University of Virginia. Thirty-two students matched into our own residency programs, including 25 in adult neurology and 7 in child neurology.

At present, the UR neurology clerkship is the most highly rated clinical clerkship in Rochester with a 99% satisfaction rate. Students praise the priority that neurology faculty and residents place on teaching as well as the emphasis on the development of physical examination skills and clinical reasoning. Clinical sites for the clerkship include the inpatient, consultation, pediatric neurology and Neuromedicine ICU services at SMH and Highland Hospital, as well as outpatient sites at Bushnell's Basin and Linden Oakes. Drs. Robert Holloway, Gerald Honch, Ralph Józefowicz, Jennifer Kwon, Fred Marshall, Jon Mink and Rob Stone have received multiple teaching awards from the medical students for their teaching efforts in the neurology clerkship, representing the single largest contribution from any department in the medical center.

#### Residency programs – Adult Neurology

The UR neurology residency program began shortly after the arrival of Robert Joynt as chair of the department in 1967. Jerry Honch and Marvin Goldstein were among the very first residents in the program. Dr. David Marsh was appointed as the first residency program director and steadily expanded the size of the program to 4 adult positions and 1 child position per year. Dr. Roger Kurlan became program director in 1987 and continued to expand the program size and create a more structured curriculum and expanded elective and ambulatory rotations. Ralph Józefowicz became adult neurology program director in 1996 and continues to run the program to this day, and is ably assisted by Clara Vigelette, the residency program coordinator. In 2004 the residency program was expanded to 5 positions per year, which allowed us to set up a night float rotation and eliminate overnight call so that we could be fully compliant with the new work hour restrictions. In 2006 the residency program became a four-year categorical program, fully integrating the preliminary internship year into the curriculum. In 2009, the residency program was further expanded to 6 positions per year.

At present, the UR adult neurology residency program is considered to be one of the top programs nationally, and consistently recruits highly competitive candidates from across the US. This past year, we received 574 applications and interviewed 62 candidates for 6 adult positions. The residency program has always maintained full accreditation by the Residency Review Committee in Neurology and boasts a 96% first time pass rate for the ABPN board

examination since 2000. Our neurology residents consistently receive a disproportionate number of medical student teaching awards in recognition of their high quality teaching and role modeling. Over the past 16 years, 28 of our residents received the Arnold Gold Foundation Humanism in Medicine Award from the 4th year medical students, which represent 33% of the awards given! Fifteen of our residents were selected for AOA membership by the 4th year class over the past 16 years, and seven residents received the medical student graduation award at convocation.

Our residency graduates all pursue fellowship training, with many electing to stay in Rochester. Since 2001, 52 of our residency graduates stayed to pursue fellowships in clinical neurophysiology (22), experimental therapeutics (7), vascular neurology (7), neuromuscular medicine (4) as well as other departmental fellowships (12). Fifteen of our graduates pursued fellowship training at outside institutions, including the University of Pennsylvania, Washington University, Mayo Clinic, Sloan-Kettering, Cleveland Clinics, University of Michigan and Vanderbilt University. The majority of our residency graduates become academicians and many have gone on to become department chairs and residency program directors.

#### Residency programs – Child Neurology

The child neurology residency program was established by Dr. Fred Horner during his tenure in the department. Dr. Leon Epstein took over the program when he became chief of child neurology. Dr. Jonathan Mink re-established the child neurology residency program in 2003, starting with one position per year. In 2006 the program was expanded to two positions per year. In 2013, Dr. Robert Thompson-Stone was appointed program director for the Child Neurology residency training program and is ably assisted by Magda Ramzy, child neurology program coordinator.

At present, the UR child neurology residency program is considered to be one of the top programs nationally, and consistently recruits highly competitive candidates from across the US. This past year, we received 122 applications and interviewed 32 candidates for two child positions. The residency program has always maintained full accreditation by the Residency Review Committee in Neurology.

Included in the above statistics on teaching awards are our child neurology residents, who have also won a disproportionate number of awards and accolades. Since 2003, more medical students at the UR have entered child neurology training programs than from any other medical school in the country. In fact, each year almost 3% of the UR medical student graduating class selects child neurology residency training, which is triple the national average.

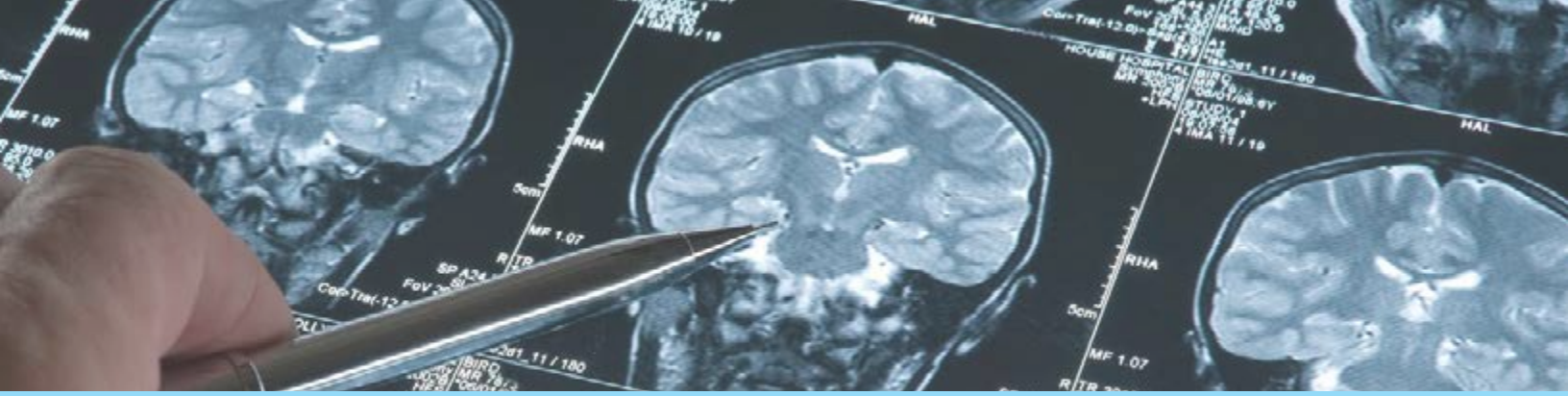
Many of our child neurology residency graduates pursue fellowship training, with a large number electing to stay in Rochester. Since 2009, ten of our residency graduates pursued fellowships, nine of which were completed at Rochester. These fellowships included sleep medicine (2), movement disorders (1), epilepsy and experimental therapeutics (2), neuro-immunology (1), neuro-oncology (1), neuromuscular disease (1), pediatric stroke (1), and pain medicine (1). The majority of our residency graduates pursue an academic career and two have become residency program directors.

#### Fellowship Programs

The first two fellowships sponsored by our department were the Neuromuscular Disorders fellowship, directed by Berch Griggs, and the Movement Disorders fellowship, directed by Ira Shoulson. Both of these fellowships were founded in the late 1970's. The Experimental Therapeutics fellowship was next to be established by Berch Griggs in the 1980's. The 1990's saw a proliferation of neurology fellowships, both locally and nationally. The ACGME began to accredit fellowships in the late 1990's and presently accredits five neurological subspecialties, including clinical neurophysiology, neuromuscular medicine, vascular neurology, epilepsy and sleep medicine. The United Council for Neurologic Subspecialties (UCNS) was established in 2006 and presently accredits nine neurologic subspecialties. Dr. Józefowicz currently chairs the UCNS. Our department currently sponsors five ACGME fellowships, one UCNS fellowship and four departmental fellowships, as listed below:

|                                 | Positions | Fellowship director            |
|---------------------------------|-----------|--------------------------------|
| <b>ACGME fellowships</b>        |           |                                |
| Clinical neurophysiology        | 2         | Eric Logigian                  |
| Vascular neurology              | 2         | Bogachan Sahin                 |
| Neuromuscular medicine          | 2         | Emma Ciafaloni                 |
| Epilepsy                        | 2         | Lynn Liu                       |
| Sleep medicine                  | 1         | Michael Yurcheshen             |
| <b>UCNS fellowship</b>          |           |                                |
| Neuro-oncology                  | 1         | Nimish Mohile                  |
| <b>Departmental fellowships</b> |           |                                |
| Experimental therapeutics       | 4-6       | Robert Griggs, Erika Augustine |
| Movement disorders              | 2         | Richard Barbano                |
| Neuro-immunology                | 1         | Andrew Goodman                 |
| Behavioral neurology            | 1         | Fred Marshall                  |

Plans are underway to develop fellowships in Neuro-critical care and in Headache Medicine. Additional information concerning these fellowships is included in the individual unit updates.



## ACADEMIC AFFAIRS

By: Robert A. Gross MD, PhD

The department has had a strong history of superb academic achievements, particularly in research and education. Academic Affairs has as its portfolio the recruitment and retention of faculty, with collaborative efforts with others as to mentoring and career building. The long tenure of our first two chairs assured stability of this portfolio for much of its history, though in its early years, the department did not have a need for a formally appointed Associate Chair. Dr. Richard Moxley served in this position during Robert Griggs' tenure as chair, and, as Vice Chair, Robert Holloway served in this role during Steve Goldman's term, forming a defined Promotion and Tenure Committee. Dr. Holloway appointed Robert Gross upon the former's acceptance of the chair.

### Tenure and Promotions:

Over the 50 years of the department, there have been changes in the way our institution views criteria for promotion and tenure. We no longer have 'tracks'; rather, individuals are evaluated on the various components of their jobs, with appropriate standards based on academic rank (increasing recognition of expertise, from local to national or international, for example). As the primary item in the Academic Affairs portfolio, we have revised our internal standards with the institution. Our Promotion and Tenure Committee serves, in essence, as the intradepartmental ad hoc committee, vetting the qualifications of our faculty as a surrogate for the institutional committee. When appropriate, input is sought from the Senior Associate Dean of Academic Affairs.

We have organized the tenure and promotion process to be more transparent, reflecting the goals of the medical center's processes for advancement. There is a formal committee that oversees the tenure and promotion process, chaired by the Associate Chair for Academic Affairs, with the Vice Chair serving ex officio. Members of the committee are drawn from senior members of the department, most of whom are tenured; there are set terms, so that other faculty may have the opportunity to serve, and so the thinking within the committee does not become 'stale.' Candidates for re-appointment are

brought to the committee after discussion among the unit chiefs and chair (with input from the committee chair as needed); the candidate's portfolio is reviewed for completeness and to assure that the documentation would support a successful review for re-appointment or promotion (with tenure, as appropriate).

To ensure greater transparency as to the criteria, we have developed a survey that each candidate reviews and amends on a yearly basis, which serves as the basis for discussion with unit chief or chair. This form was developed in collaboration with the recently developed Women in Neurology Committee (founded and chaired by Emma Ciafaloni), as a targeted effort to support the retention and promotion of women, with the recognition that the process was generalizable to all faculty.

As the criteria for re-appointments and promotions have evolved at the medical center, we have updated our procedures and criteria by which we evaluate individual faculty. In a related area, we have developed a clear policy about volunteer faculty, including expectations of service.

### Mentoring and Training:

Some activities within the Academic Affairs portfolio overlap with those of education. We have developed new programs for residents and fellows.

Recognizing the relative paucity of education in career development for residents, we have started a seminar series entitled 'Crafting your Neurology Career' (CYNC). Seminars follow a multi-year schedule, and are a mixture of research talks by our faculty (autobiography mixed with ongoing research topics) and seminars designed to help residents and fellows plan their next career moves: there are presentations about careers in academics, practice and industry; how to negotiate a contract (and what matters); work-life balance; and writing for publication. Fellows are invited to this series, but there is an independent skills-building series for fellows, with overlapping content.

We have started an early mentorship program for residents. Faculty-resident dyads are established in the R1 year. The idea is for the residents and their mentor to meet as desired, to discuss career goals, any challenges or impediments in their training, etc. We have avoided assigning residents to their firm supervisor, recognizing that there might be too much of a conflict of interest! The expectation is that faculty may serve as career mentors primarily early on, but that as the interests of the resident develop, there may be a 'hand-off' to other, 'content' or 'career' mentors, as appropriate and desired.

### Faculty Development/Retention:

Two recent initiatives are worth mentioning. The Women in Neurology group, developed and led by Emma Ciafaloni, was instrumental in arranging seminars with topics related to career balance and development. Heidi Schwarz, in an effort related to her service as chair of the AAN Practice Committee, has directed a 'burnout' task force, working within a larger medical center-wide effort. The goal is to survey faculty, assess the level of burnout, and to develop mitigation strategies. The ultimate goal is 'wellness,' which will benefit our faculty, of course, but will benefit our patients as well.

One of the historical strengths of the department has been mentoring. On this foundation, we have developed additional measures to assure faculty success. Faculty recruitment involves specific language in their offer letter about mentoring, and, ideally, will outline the members of the mentoring team and specific items to be covered. Discussion with the unit chiefs have been directed towards emphasizing the importance of mentoring and the need for individual faculty – particularly, junior faculty – to have a mentoring team, whatever the emphasis of their work.



## CLINICAL PROGRAMS

By: Curtis Benesch, MD, MPH, Associate Chair for Clinical Affairs

### Faculty/Clinical Providers

Adam Kelly, *Chief of Neurology, Highland Hospital*

Jeffrey Burdett, *Medical Director, 5-1600 Unit*

Kathy England, *Senior Advanced Practice Provider*

Timothy Kehl, *Nurse Manager-Outpatient*

Michelle Murphy, *Nurse Manager-51600 Unit*

### Administrative Staff

Christine Miller, *Associate Chair for Administration and Finance*

Lee Albert, *Director of Division Operations*

Christy Clary, *Director of Acute Care Operations*

Sara Uschold, *Director of Research and Finance*

Lisa Oppelt, *Director of Central Administration*

Dan Rosica, *Director of Neuromedicine Information Technology*

Karen Calabro, *Billing Administrator*

Roxanne Cannarozzo, *Practice Administrator*

### General Overview

The Department of Neurology maintains a robust clinical program across 15 divisions, operating in inpatient, outpatient, and administrative/billing environments. Clinical services are provided by over 75 faculty members, 8 clinical-adjunct physicians, 12 fellows and 35 Advanced Practice Providers, with administrative support from Central Administration, Central Billing and the Call Center. Of course, each division provides additional infrastructure support as needed. Many units in the Department have received national accolades for their clinical care (see Unit Summaries for details). In combination with the Department of Neurosurgery, the Department of Neurology has once again been recognized in 2016-17 by the U.S. News and World Report as one of the top 50 programs in the country and the highest ranking program at URM.

Two steering committees meet monthly to oversee clinical operations of the department (Acute Services, chaired by Dr. Benesch, and Ambulatory Care, formerly chaired by Dr. Tony Maroldo and currently headed by Dr. Holloway). These committees comprise clinical providers, administrators, billing personnel, housestaff, and quality officers who address benchmarks, new initiatives, and on-going practice activities. Efforts are focused on maintaining our high level of quality care as well as meeting specific goals of the University of Rochester Medical Faculty Group, such as providing early access for new patient evaluations, minimizing bump rates for scheduled patients, and securing timely discharges from the inpatient service.

### Clinical Volumes and Revenues

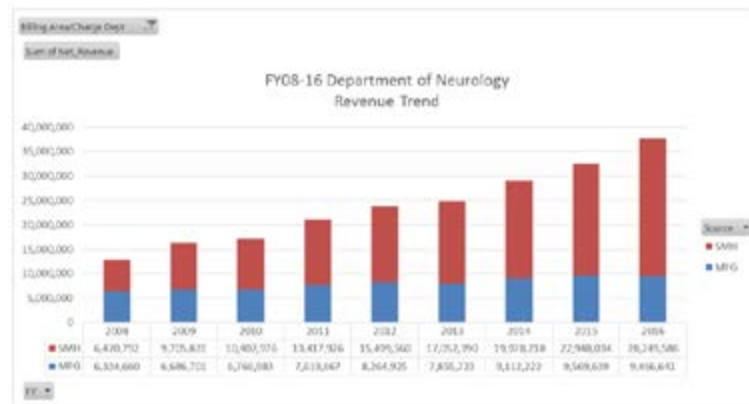
#### Inpatient Admission Volume

| Service      | FY13         | FY14         | FY15         |
|--------------|--------------|--------------|--------------|
| Stroke       | 694          | 817          | 937          |
| General      | 1,170        | 1,005        | 852          |
| Epilepsy     | 315          | 333          | 343          |
| <b>Total</b> | <b>2,179</b> | <b>2,155</b> | <b>2,132</b> |

#### Outpatient Visits

| Visit Type   | FY13          | FY14          | FY15          |
|--------------|---------------|---------------|---------------|
| Follow up    | 18,688        | 20,373        | 23,886        |
| New          | 6,754         | 7,376         | 8,448         |
| <b>Total</b> | <b>25,442</b> | <b>27,749</b> | <b>32,334</b> |

### Clinical Revenues



### Inpatient Care

Our primary site of inpatient care is the 24-bed 5-1600 Neurology Unit at Strong Memorial Hospital. Patients are admitted to this unit with general neurological disorders, cerebrovascular disease, or epilepsy, with 8 beds dedicated for long-term monitoring (LTM) by the Strong Epilepsy Center. Floor teams (Red and Blue) consist of a first-year neurology resident, a Psychiatry or Anesthesia Intern, and 2 medical students, overseen by the Chief Resident and a Neurology Attending. These teams share patients equally across the General Inpatient and Stroke Service attending physicians. Patients admitted for LTM are staffed by a neurology resident/epilepsy fellow, Nurse Practitioner, and an Epilepsy Attending. The average daily census is approximately 16 patients with cerebrovascular disease, 10 patients with general neurological disorders, and 6-8 patients with epilepsy/LTM. Additional Neurology patients are often admitted to 5-3600 for routine floor care or the 6-bed progressive care unit ("step-down" unit).

The 5-1600 Neurology unit is devoted to providing Patient-Family Centered Care focusing on quality and safety. Staffing includes a Nurse Manager, 3 Assistant Nurse Managers, 26 RNs, 3 LPNs, 5 PCTs and 2 secretaries.

Nursing utilizes bedside handoff at the change of each shift so that each transfer of care engages the staff, patient, and family members. This verbal communication and screen summary is essential in promoting patient safety by having a visual check on the patient and including the patient in the plan of care. Educating patients is an essential part of each admission and an integral part of remaining a Comprehensive Stroke Center.

Another unique 5-1600 initiative is comfort/safety rounding which occurs at set times throughout the day. The nursing and PCT staff pair and round or check on each patient to address all issues. Incorporated into the daily routine is 51600's fall program where each patient is specifically assessed and proper fall prevention equipment can be utilized. Both providers and nurses are well educated on fall prevention and prioritize patient safety on the unit.

Physical therapists, occupational therapists, speech pathologists and Social Work providers all provide specialized care to the patients admitted to our Neurology service, across all specialties.

### Highland Hospital

The Department of Neurology's Highland Hospital neurology service was started in 2005 under the leadership of Dr. Heidi Schwarz. Soon after, in 2007, Highland Hospital was designated as a New York State Primary Stroke Center through the work of Dr. Schwarz and fellow members of the hospital's stroke team. A newly remodeled inpatient unit on East 7, focusing on the care of patients with stroke and other neurological and neurosurgical conditions, was opened in 2011. Many faculty members have played a key role in the success of the Highland neurology service in the past and present, as part of the outpatient clinic, inpatient consult team, or both.

The outpatient clinic at Highland was consolidated with the practice at Westfall Road in 2010, but the department still maintains an active inpatient consult service, with Dr. Adam Kelly as the current chief of this program. The census of the service typically includes 6-8 patients, translating into an annual volume of roughly 2,500 encounters. Dr. Kelly also serves as the director of the hospital's stroke center, which has maintained its stroke center designation and is consistently awarded the American Stroke Association's Get With the Guidelines Gold Plus Award for continued high performance on quality measures.

Highland Hospital is continually recognized for its excellent care of inpatients with neurologic disorders, and as an outstanding site for neurology resident and medical student education. First-year neurology residents gain some of their first experiences directing a consultation service, and in the process, begin their development as

independent, autonomous neurologists. This is in large part due to the culture of the hospital, which is a terrific balance between its roots as a community hospital and its current status as a key affiliate of a world-class academic medical center. Moving forward, Highland will be expected to play a large role in the department's and medical center's plans to further expand care to patients across the region.

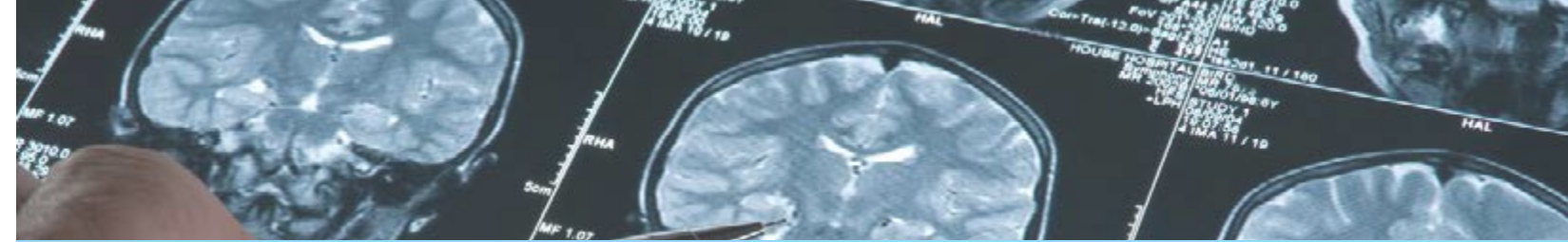
### Outpatient Care

Outpatient centers of care for the Department of Neurology are located at Westfall Road, the Sleep Center, the combined Vascular Neurology/Neurological Surgery office at 2180 South Clinton Avenue, Bushnell's Basin, and the Ambulatory Care Facility (AC-1) adjacent to Strong Memorial Hospital. Currently, 15 nurses and 8 clinical technicians provide care across the outpatient clinic locations. The clinical technicians obtain vital signs, height, and weight, perform screening evaluations, and help the patient through the clinical appointment. Nursing staff perform infusion therapy, assist with Botox injections, triage phone calls, including my chart messages, and communicate with providers and patients. The suite at 919 Westfall Road has recently expanded as the department was able to acquire additional space (8,500 sq ft), allowing for 10 additional examination rooms, 3 large procedure rooms, and 6 recovery bays for Botox treatments. Clerical and scheduling personnel (Access Center) will now be housed there as well. In 2017, all child neurology ambulatory clinics and Pediatric Epilepsy will be relocated to a new facility on East River Road.

### Multidisciplinary Team Care

Advanced Practice Providers. Advanced Practice Providers (APPs), including nurse practitioners (NPs) and physician assistants (PAs), today are a mainstay in providing patient care in the department. In 1977, Katharine Donohoe, NP, was hired to work in the Neuromuscular Division and paved the way for many to follow. Historically, APPs were used in a variety of roles, often providing medical and nursing care to subspecialty populations. Currently, there are 20 Nurse Practitioners and 5 Physician Assistants working in General Neurology, Stroke, Headache, Neuroimmunology, Neuromuscular, Neuro Oncology, Epilepsy and the Movement Disorders divisions. Additionally, 5 NPs work in Child Neurology, as well as 5 NPs and PAs work in the Neuromedicine Critical Care Unit.

In outpatient settings, APPs work with a team diagnosing and treating both chronic and acute conditions. These skills encompasses comprehensive history and physical examination; preventive screening and health assessment; ordering and interpreting laboratory, imaging studies, and other diagnostic tests; and prescribing medication, physical, occupational and speech therapy, assistive devices



and durable medical equipment. Crucial roles also include education and teaching individuals, families, groups and other members of the health care team.

In the acute care environment, the Stroke APPs round with the team on the neurology unit, care for and manage a subset of patients, conduct histories, neurological assessments, diagnosis, and develop and execute treatment plans with the physician team. They conduct family meetings, discharge planning, and facilitate increased throughput and reduce length of stay. They respond to stroke codes and insure stroke standards of care are met for every patient. In addition, they see patients in follow up clinic post discharge. APP Neuromedicine Critical Care team members provide care 24/7, and work with intensivists to care for critically ill patients and independently manage patient assignments.

APPs can be credentialed to provide a variety of procedures across divisions including muscle and nerve biopsies, Botox and trigger point injections, nerve blocks, lumbar punctures, as well as programming of devices such as the vagus nerve stimulator (VNS), responsive nerve stimulator (RNS), deep brain stimulator (DBS) and intrathecal pumps. In Critical Care, APPs place central venous catheters and arterial lines, perform ultrasonography, and under supervision, intubate and place chest tubes. Amy Vierheil, NP, in Child Neurology, is a leader in developing a telemedicine program for children with neurological disease. Patricia Rogers, NP, Ann Leonhardt, NP, and Amy Vierheil, NP, are candidates for the Doctor of Nursing Practice at the University of Rochester School of Nursing and several other APPs have appointments as Clinical Associates. Some have published and lectured nationally on their areas of expertise.

#### Expansion of clinical programs

##### *Infusion Center:*

The infusion center continues to grow rapidly, now providing nearly 4000 infusion encounters annually, for patients with multiple sclerosis, neuromuscular disease, headache, and auto-immune disorders.

##### *Lumbar Puncture ("LP") clinic:*

This project was spear-headed by Dr. Justin Chandler, Neurology resident, in 2015, and overseen by Dr. Nimish Mohile, with the goal of providing access for Neurology patients to undergo spinal taps. Patients are scheduled each week for the procedure which provides a supervised and educational setting for both patients and residents.

##### *Neuro-hospitalist Program:*

The Department of Neurology ceased providing inpatient coverage at Rochester General Hospital in September 2014 which enabled the creation of a Neuro-hospitalist

Program at SMH. Drs. Jeff Burdett and Mike Chilungu relocated to SMH and assumed similar clinical roles here, each providing attending/consulting coverage 26 weeks per year. Both physicians are assigned to the Stroke Unit but provide clinical coverage to the General Inpatient and Consult Services, as well as the Stroke Service. This program has provided a stable core for inpatient services and has freed up other faculty from inpatient obligations.

##### *Neuro-Medical Intensive Care Unit:*

This Unit opened in 2014 with the creation of the new 12-bed NMICU on 8-1200, allowing for expansion of our programs in cerebrovascular disease, epilepsy monitoring, and neuro-critical care. Dr. Debra Roberts serves as the Director of the Unit, with the recent hiring of Dr. Christopher Zammit, certified in both Emergency Medicine and Neuro-critical Care, further enhancing the program.

##### *Regional Expansion:*

Extensive efforts are underway to expand clinical services across the region, headed by Dr. Richard Barbano, Associate Chair for Regional Development, with collaborations and affiliations with numerous hospitals in upstate New York. Dr. Karen Odrzywolski heads the Neurology Program at Auburn Memorial Hospital, and Dr. Deana Bono, recently joined the practice group at Cayuga Medical Center, to provide leadership for the LTM Epilepsy Unit, in collaboration with the Department of Neurology at URM. Telestroke is expanding throughout the region, with the initial goal of faculty members within the Stroke Unit providing 24/7 emergent telestroke consultations with 5 sites: Cayuga Medical Center, Arnot-Ogden Memorial Hospital, Wyoming County Community Hospital, Auburn Memorial Hospital, and St. Joseph's Hospital Health Center. Expanded services of tele-neurology are likely to follow in 2017.

## BASIC SCIENCE RESEARCH PROGRAMS

By: Marc W. Halterman, M.D., Ph.D.

#### Program Overview

Despite its focus providing world-class care and research in the clinical arena, many members of the Department of Neurology have a track record of continuous funding for their work in basic and translational neuroscience and maintain close ties with the neuroscience research community at the University of Rochester. In 2015, NIH research support to research faculty in the Department of Neurology alone totaled \$17.1 million, which resulted in a ranking of 9th in total NIH funding among all medical schools. The institution has also continued to make substantive investments in basic research, including the opening of the Kornberg medical research building and the MRB-extension (MRBX) in 1998 and 2002, respectively, which house both the Center for Neural Development and Disease and the Center for Translational Neuromedicine. Indeed, these changes have catapulted Rochester into the ranks of the country's premier neuroscience research institutions.

#### Departmental Research Faculty

Relative to other institutions, the University of Rochester is unique with regards to the balance, breadth and depth in the areas of cellular and molecular neuroscience, systems neuroscience and clinical research. And true to the history of the institution, the work being done across the URM campus remains highly collaborative in nature with faculty holding multiple appointments, working with colleagues across basic and clinical departments. These include the Department of Neuroscience, Center for Neurodevelopment & Disease, Center for Translational Neuromedicine, Center for Visual Science, Brain and Cognitive Science among others.

Many current departmental faculty serve as the principal investigator (PI) for major research projects sponsored by the NIH, Department of Defense, private foundations and other agencies. These laboratories are engaged in discovering the basic mechanisms and potential treatments for a broad range of disorders including stroke, dementia, HIV/AIDS, neuromuscular disorders, and mul-

tipl sclerosis. Our faculty are also asking systems level questions to better understand how the nervous system integrates visual inputs, regulates complex movements and other higher level functions in both developmental and disease paradigms. Here are just a few examples of the work being done by our faculty in the Department of Neurology:

*Charles Duffy, M.D., Ph.D.* The Cognitive Neuroscience Laboratory focuses on cortical information processing in aging and Alzheimer's disease. We combine neurophysiological and psychophysical analyses of visual processing in humans and monkeys. Our studies of human aging and Alzheimer's disease have identified specific defects in visual information processing that precede symptom onset in Alzheimer's disease and provide biomarkers of disease vulnerability and progression. Our studies in monkeys use a diverse set of visual displays combined with single neuron recordings, intracortical field potentials, and intracranial evoked potentials to bridge the gaps between human neurophysiology and cellular neurophysiology. Our studies have led to the founding of Cerebral Assessment Systems, Inc., which was recently granted the world's first FDA approval for a dementia test.

*Harris Gelbard, M.D., Ph.D.* The Gelbard lab is interested in glial and immune effector cell interactions with synapses during neuroinflammation. Focusing on HIV-1 associated neurocognitive disorders (HANDs), the lab has characterized the effects of pro-inflammatory metabolites, viral gene products and other neurotoxins on normal immune effector functions in the CNS as well as synaptic function. This line of investigation has led to the identification and commercial development of lead compounds for the treatment of a variety of neuroinflammatory conditions, as well as peripheral diseases including non-alcoholic steatohepatitis and congestive heart failure/ischemia-reperfusion injury.

*Steven Goldman, M.D., Ph.D.* The Goldman Lab seeks to understand the regulatory control of stem and progenitor cells of the human CNS, and to utilize that knowledge to design new approaches for treating neurological



diseases, primarily using cell and gene therapy. Relevant disease targets include demyelinating disease, hereditary leukodystrophies and storage disorders, and degenerative conditions including Huntington's disease. Gliomas and gliomagenesis are studied from the standpoint of dysregulated signaling by endogenous glial progenitors.

*Marc Halterman, M.D., Ph.D.* The Halterman lab is developing treatments for acute ischemia and reperfusion injury following stroke and cardiac arrest. Their studies are geared towards identifying drugable nodes in ischemia-induced transcriptional circuits that regulate selective neuronal vulnerability, neuroinflammation and neuroplasticity. The team is also investigating how modulation of peripheral immunological priming that occurs in the gut and lung could be used to reduce collateral brain injury following cardiac arrest. Their work has resulted in several patents related to improvements in viral vector delivery and ischemic drug discovery. The lab is also collaborating with industry partners to develop novel anti-apoptotic and anti-inflammatory small molecules for stroke and other disorders in which ischemia is a central component.

*Jonathan Mink, M.D., Ph.D.* The Mink Lab uses electrophysiology, imaging and other advanced neurophysiological approaches to understand function of the basal ganglia in normal control of movement and the pathophysiology of basal ganglia disorders characterized by abnormal involuntary movements. Translational work includes understanding the natural history of Juvenile neuronal Ceroid Lipofuscinosis (Batten Disease) and pursuing potential disease modifying therapeutics.

*Alex Paciorkowski, M.D.* The Paciorkowski Lab focuses on gene discovery in developmental brain disorders including autism, brain malformations, intellectual disability, and epilepsy. The laboratory uses a unique approach involving rare gene variant detection and next-generation sequencing (NGS) analyses performed on parent-child trios to identify putative disease causing genes. Putative disease targets are analyzed in pre-clinical biological models to establish genotype-phenotype correlations. Dr. Paciorkowski has also developed new bioinformatics tools to analyze both laboratory and clinical data, gaining new insights regarding the genetic bases of neurodevelopmental disorders by combining neurogenetics datasets in innovative ways.

*Gary Paige, M.D., Ph.D.* The Paige lab studies multisensory interaction and adaptive plasticity in spatial localization and orientation. These processes underlie our ability to localize, track and interact with the environment and are often severely affected in normal aging, after head trauma and in the setting of a variety of neurological diseases. The Paige lab is interested in understanding how plastic neural mechanisms adaptively adjust to maintain proper spatial calibration across sensory modalities and how support recovery after suffering pathologic loss.

*Marc H. Schieber, M.D., Ph.D.* The Schieber Lab investigates how the brain controls movements of the body, and translates these findings to advance brain-computer interface technology for restoration and repair of lost or damaged neurological function. A longstanding line of investigation explores control of fine finger movements, like those used in typing, playing a musical instrument, or performing delicate surgery. More recent work explores the combination of reaching, grasping, and manipulating. In both realms, their group studies how the brain controls a rather complex set of muscles to achieve the required movement. In addition to traditional neurophysiological approaches, recent studies use brain-computer interfaces to explore brain function beyond that accessible through normal behavior.

*Nina Schor, M.D., Ph.D.* The Schor lab is focused on the preclinical pharmacology of targeted therapies for neuroblastoma, a deadly childhood cancer. Of particular interest are the roles of neurotrophin receptors and other developmentally regulated neural crest proteins in signaling pathways contributing to resistance to chemotherapy of neuroblastoma cells.

*Charles Thornton, M.D.* The Thornton Lab has studied the molecular basis for neurogenetic disorders including myotonic dystrophy. Working in close collaboration with Richard Moxley, M.D., the Thornton lab has made exciting progress not only characterizing the molecular basis for myotonic dystrophy, but also in completing seminal studies in a potential treatment for the disorder. Partnering with Ionis Pharmaceuticals, Thornton and colleagues have shown that injection with antisense oligonucleotides improves muscle function in a mouse model of DM1 also created in their lab. Clinical trials are now underway to investigate the potential of translating this approach in the clinic.

#### **Continuing the Rochester Tradition of Innovation in Research Training**

In addition to making break-through discoveries, these labs serve an equally important role as the primary training site for the institutions undergraduate, medical, pre-doctoral and post-doctoral fellows. It is recognized that there is a growing deficiency in the pool of physician-scientists who are sufficiently trained to become academic, tenure-track faculty in the basic and clinical neurosciences (1). Barriers trainees choosing an academic research career include: accrual of significant educational debt, increased GME regulation of training with limited exposure to research, and a lack of mentoring during the formative years of career development (2). New models of post-graduate research training coupled with loan repayment initiatives instituted by the federal government have resulted in modest gains in the physician-scientist career pipeline (3). Our faculty take great pride in mentoring trainees across a range of UR based programs.

Here are just a few examples of our efforts to support the pipeline of future neuroscience researchers:

**Undergraduate Research.** The University of Rochester prides itself on the unique research opportunities available to undergraduate students enrolled in the College of Arts and Sciences and School of Engineering. Research experiences greatly enhance the undergraduate experience by providing learning opportunities distinct from in-class learning. Yet, while many neuroscience labs at the UR Medical Center have a long history of mentoring undergraduates, most students are unsuccessful in securing such positions. To address this challenge, faculty from the Center for Neural Development and Disease (CNDD) and Department of Neurology have partnered with the Office of Undergraduate Research led by Steven L. Manly, Ph.D., to create the UR Undergraduate Placement Program (UR-UPP).

The goal of UR-UPP is to increase the number of successful undergraduate-mentor matches in both the basic and clinical neurosciences. In addition to providing details about these research opportunities, UR-UPP works with member labs to provide skills training modules and didactic sessions designed to help undergraduates acclimate to the unique culture of the lab environment.

UR-UPP has now expanded to include the clinical neurosciences for those students interested in a clinical research career path.

**Resident Research.** The philosophy of the Department of Neurology is that research should be part of each resident's educational experience. Our overarching goal is to promote the development and dissemination of scholarly work from departmental trainees, to provide opportunities for residents to get early exposure to research training, and incentivize faculty promotion in actively mentoring departmental trainees. Accordingly, each resident is encouraged to develop a research project during the four years of residency. In their first year, residents are paired with a faculty mentor with expertise in an area of interest declared by the trainee. We have also implemented a seminar series geared to help trainees explore career options in research that covers topics such as writing and reviewing paper and grants, creating and delivering an effective presentation, issues pertaining to managing a clinical practice, as well as navigating issues related to work-life balance. This series features chalk talks by departmental faculty regarding their cutting edge research providing opportunities for flash mentoring and potential future collaboration. In the later years of training residents are encouraged to disseminate their scholarly work through presentations, abstract submission to the American Academy of Neurology or the American Neurological Association annual meetings and/or submission of a manuscript for publication.

**The Schwid Research Symposium.** Departmental trainees also participate annually in the Steven R. Schwid Neurology/Neurosurgery Research Symposium that coincides with the annual Insley Lecture. Dr. Steven R. Schwid initiated this research symposium in 2005 in his role as Associate Chair for Clinical Research in the Department of Neurology. The symposium is now named in his memory. Dr. Schwid was Professor of Neurology, co-director of the Multiple Sclerosis Center, and associate director of the Clinical Trials Coordination Center when he died in 2008. He was an expert on multiple sclerosis and Parkinson's disease whose research emphasized the testing of new treatments for these conditions in carefully performed clinical trials. He was also an outstanding Associate Editor for Neurology, serving from 2001 to 2006. The 2016 Schwid Research Symposium featured abstracts from 47 trainees affiliated with the Departments of Neurology and Neurosurgery. This forum is a tribute to his scholarly achievements and provides trainees an opportunity to explore local projects, network with peers and identify potential faculty mentors.

(1) *Biomedical Research Workforce Working Group Report, NIH, June 14, 2012.*

(2) *Saving the Clinician-Scientist: Report of the ANA Long Range Planning Committee. Ann Neurol. 2006;60:278-285.*

(3) *Ley TJ & Rosenberg LE. 2005. The Physician-Scientist Career Pipeline in 2005. Build it and They Will Come.*



# MOVEMENT DISORDER DIVISION

By: Richard Barbano, MD, PhD, FAAN, Division Chief

## Faculty

Richard Barbano, MD, PhD, FAAN, Division Chief  
Jamie Adams, MD  
Kevin Biglan, MD, MPH  
Michelle Burack, MD, PhD  
E. Ray Dorsey, MD, MBA  
Karl Kieburtz, MD, MPH  
Frederick Marshall, MD  
Irene Richard, MD  
Ruth Schneider, MD  
Miriam Weber, PhD

## Pediatric Movement Faculty:

Jon Mink, MD, PhD  
Erica Augustine, MD  
Alex Paciorkowski, MD

## Major clinical and research interests:

The Movement Disorders Division trains fellows in the clinical and experimental evaluation and treatment of movement disorders. Fellows are also trained in deep brain stimulation, working together with colleagues in the Department of Neurosurgery, as well as botulinum toxin therapy for movement disorders. The Movement Disorders Division has current research programs in: Parkinson's disease, Huntington's disease, dystonia, ataxia and telemedicine. A wide range of patients with other movement disorders, such as restless leg syndrome, tremor/essential tremor, and Tourette's syndrome are also cared for in the Movement Disorders Clinics.

## History of the MIND/ Movement Disorders Division

Movement disorders emerged as a nascent neurological subspecialty in the late 1960s coinciding with the advent of levodopa treatment for Parkinson disease. In the early years of the Department of Neurology, the care of Parkinson disease patients was shared by many faculty members including Paul Garvey, David Goldblatt, Robert Joynt, David Marsh, and Richard Satran.

The Movement division took form in 1975 when Bob Joynt recruited Ira Shoulson back to the UR after he completed his US Public Health service as a clinical and research fellow in experimental therapeutics at the National Institutes of Health (NIMH, NINCDS). Ira developed a clinic for movement disorders as he completed his training in internal medicine and neurology. Interests in clinical care and research broadened from Parkinson disease to the hereditary disorders Huntington disease and Wilson disease. Patients became families and families became patients. Unmet needs multiplied. Charlyne Miller soon joined Ira Shoulson as the first nurse clinician in the Department in order to expand the care and outreach for persons affected by movement disorders. Later Peter Como joined the unit to provide much needed help in neuropsychology and behavioral interventions.

Experimental therapeutics became the clinical and research focus of the unit. Ira Shoulson in turn recruited Bob Joynt, David Goldblatt, and Maurice Charlton to conduct a trial of the muscimol, a potent GABA agonists, in Huntington patients. The study, completed in 1976 and published in 1977, was notable because it was a randomized, placebo-controlled study of rational therapeutic intervention for a disorder that was characterized by a GABA deficiency. The study also represented one of the earliest neurology clinical trials to be conducted at the UR Clinical Research Center, which was then largely an endocrinology and metabolism unit directed by Christine Waterhouse.

Educational programs in the Division took root in 1977 when Ira Shoulson established bi-weekly movement disorders rounds and clinical neuropharmacology seminars that included Department of Pharmacology faculty Drag Anders, Louis Lasagna, and Michael Weintraub. As a fellowship program developed and matured in the Unit, these educational offerings for neurology residents would eventually morph into the "Working Group on Clinical Trials", movement disorder video conferences and "Mellow Fellows" seminars. After completing his neurology residency in 1983, Roger Kurlan was lured away from private practice opportunities to become the division's first movement

disorder/experimental therapeutics fellow. It was Roger who was responsible for the expansion of clinical care and research to encompass Tourette syndrome, attention deficit disorder and other behavioral entities associated with movement disorders. In 1988 Roger Kurlan became chief of the Movement division which he ably led for a decade.

In 1989, Ira Shoulson and David Oakes of the Department of Biostatistics joined forces under the leadership of Berch Griggs to craft the "Experimental Therapeutics of Neurological Disorders Program", which has trained many movement disorder fellows who have gone on to distinguish themselves in academia, industry and government: Kevin Biglan, Karen Blindauer, Toni DeMarcaida, Theresa Dimitopolos, Ray Dorsey, Andrew Feigin, David Finkelstein, Samuel Frank, Tom Guttuso, Don Higgins, Penny Hogarth, Chris Hyson, Karl Kieburtz, David Lichter, Lisa Majumdar, Mark Mapstone, David Marcus, Fred Marshall, Jill Miller, Chris O'Brien, Irene Richard, Garrett Riggs, Allen Rubin, Heidi Schwarz, Steven Schwid, Andrew Siderowf, David Song, Kim Trinidad, Miriam Weber, Joanne Wojcieszek, Lin Zhang, Tiffini Voss, Rachel Biemiller, and Kelly Andrzejewski.

The clinical research focus of the Division was embedded in the early 1980s through a key series of enduring collaborations with the Division and then Department of Biostatistics. Ira Shoulson and Charles Oderoff designed the "Baclofen as Protective Therapy in Huntington Disease" study, which was the first of many placebo-controlled trials sponsored by NIH. Despite Charlie's untimely death from cancer, the collaboration with biostatistics continued to thrive and endure as David Oakes took over the biostatistics partnering that was further enhanced by the addition of Michael McDermott.

In 1984-85, Ira Shoulson, David Oakes, and Stanley Fahn (Houston Merritt Professor, Columbia University) joined forces to conceive and organize the DATATOP (Deprenyl and Tocopherol Anti-Oxidative Therapy of Parkinson) clinical trial. This multi-center effort, sponsored by NIH, involved 29 research sites in the US and Canada, nearly 70 investigators and coordinators who would successfully recruit and enroll 800 patients with early Parkinson disease. The findings from DATATOP are

still being analyzed and published to provide information about clinical trial design, the natural history of Parkinson disease, placebo effects, and biomarkers. DATATOP was also the lynchpin for many other multi-center studies to follow under the aegis of the Parkinson Study Group (PSG), which was established in 1986 and has since been headquartered in Rochester.

The DATATOP clinical trial also provided the makings of a unique infrastructure to organize, support and coordinate multi-center clinical trials. Karl Kieburtz arrived on the scene in 1989 to enmesh himself in the DATATOP trial and soon thereafter in the creation of a splendid resource to facilitate clinical research: The Clinical Trials Coordination Center (CTCC) which was established within the Movement Division initially to support the work of the PSG.

Karl Kieburtz served as chief of the Movement Division from 1999 until 2005. With clinical trials continuing to be a major strength, the division successfully recruited Bernard Ravina from the NIH as its next chief in 2005. Bernard oversaw the establishment of Experimental Therapeutics as a fully independent Center commensurate with its expanded role in the Medical Center. Clinical services such as the Botulinum Toxin Clinic, organized and directed under Jau Shin Lou in 1993 and later directed by Rich Barbano starting in 1995, continued to grow. The division kept pace with advancing therapies for Parkinson's disease by opening the deep brain stimulation program and Intrajejeunal levodopa infusion program, offering our patients with Parkinson's Disease cutting edge therapeutics.

In 2012, Rich Barbano took over as chief of the division. With the growing recognition of the inherited nature of many non-movement neurologic diseases, the division name was shortened from MIND to the Movement Disorders in 2014.

Over the past four plus decades, the Movement Division has continued to enjoy success in carrying out its mission to improve care and treatments for our patients and families. The division remains very involved with multiple research protocols and is expanding the field of care delivery through its rapidly growing telemedicine initiatives under Ray Dorsey and Kevin Biglan.





## NEUROMUSCULAR DIVISION

By: David Herrmann, M.D

The Neuromuscular (NMD) Unit had its start in 1971 when Dr. Robert (Berch) C. Griggs joined the Departments of Neurology, Medicine, and Pediatrics, as Assistant Professor. Shortly after joining Dr. Griggs assumed directorship of the MDA NMD Clinic in 1972. In parallel, Dr. Griggs worked with Barbara Herr, Assistant Professor of Neurology, to establish the Strong Memorial Hospital Muscle and Nerve Histopathology Laboratory. The large number of patients referred to our NMD Clinic created a challenging experience that captivated house staff and enhanced teaching, diagnosis, and treatment of NMD disease. Further enhancing were Dr. David VanDyke and Dr. Gary Myers, Department of Pediatrics and Neurology, recruited by Dr. Fred Horner in 1970 and 1971. In 1974 the clinical, teaching, and research structure of the NMD Unit gained further energy and breadth with the recruitment of Dr. Richard T. Moxley III, who had received his neurology training along with Dr. VanDyke and Dr. Myers at the Harvard-Longwood Medical Center. Dr. Moxley became Director of the Strong Memorial Hospital EMG Laboratory and initiated an NIH-funded clinical research program with a focus on muscle wasting in myotonic dystrophy. Dr. Griggs became Director and Dr. Moxley Co-Director of this newly formed Unit. During the 70s and 80s there was vast growth of the clinical care, teaching, and research programs of the Unit, facilitated by the addition of Katherine Donohoe RN,

who subsequently became a faculty member and leader in the School of Nursing. "KD" enhanced the treatment of patients with myasthenia gravis, and worked with Dr. David Goldblatt to establish an ALS Clinic.

The MDA-funded Clinical Investigations in Duchenne Dystrophy [CIDD], had its start in the late 1970s and continued into the early 1990s. Dr. Griggs worked with colleagues nationally to initiate this study of the natural history of Duchenne muscular dystrophy (DMD). He and Dr. Moxley played important roles in the many treatment trials performed by the CIDD. A critical factor in the success of the CIDD was the collaborative interaction with the clinical evaluator Shree Pandya D.P.T, M.S. Shree joins our patients, families, and all the CIDD group in celebrating a major accomplishment; the discovery that prednisone is an effective treatment for DMD. Shree is Associate Professor of Neurology, and an international leader in the design of endpoint measures for therapeutic trials in NMD.

During the 1970s and 80s six clinical fellows and seven research fellows completed training in the NMD Unit. Some fellows became NMD Division Faculty members in the 1980's and 1990's. Drs. Bill Kingston, Anne Moss, Ziad Rifai MD. All three remain in the Rochester region as community neurologists. Dr. Charles Thornton, who received his neurology residency training in Oregon, completed NMD and Experimental Therapeutics fel-

lowships at University of Rochester, and became an NMD Division Faculty member in 1992. Dr. Thornton teamed up with Dr. Moxley in the study of myotonic dystrophy, establishing a laboratory aimed at clarifying the pathomechanism of myotonic dystrophy. Dr. Thornton rapidly rose through the ranks to become a tenured Professor of Neurology in 2006, and continues his internationally acclaimed research in myotonic dystrophy. In 2012, Dr. Thornton was installed as the Saunders Distinguished Professor of Neurology.

During the 1980s New York State also provided funding to Dr. Griggs and the NMD Unit to undertake a study of the natural history and genetic mechanism of facioscapulohumeral muscular dystrophy [FSHD]. This funding allowed the hiring of Dr. Denise Figlewicz PhD as assistant professor in 1993 to establish a FSHD genetics laboratory to search for and to characterize the underlying mutation responsible for this second most common form of adult muscular dystrophy. Dr. Figlewicz, remained in the NMD Division until 2002, before moving to University of Michigan. Dr. Rabi Tawil, a graduate of University of Beirut School of Medicine, and the University of Rochester Department of Neurology Residency program and NMD fellowship program, joined the NMD faculty in 1993, teaming up with Drs. Figlewicz and Griggs in the study of FSHD and Periodic Paralysis with Dr. Griggs. Dr. Tawil became Professor of Neurology in 2005, and the Fields Professor of Neurology in 2015.

The NMD Division was further strengthened in 1998, when Dr. Eric Logigian joined the Division as Professor of Neurology, having previously been Associate Professor of Neurology and EMG laboratory Director at Harvard University's Brigham and Women's Hospital. Dr. Logigian assumed the leadership of the UR EMG laboratory in 1998, and succeeded Dr. Moxley in 2001 as Chief of the NMD Division. Dr. David Herrmann, who completed his Neurology and NMD training at University of Michigan, joined the Division as junior faculty in 1999, to grow electrodiagnostic and NMD Pathology laboratory services and develop a dedicated Neuropathy Clinic. He became Professor of Neurology and Pathology in 2013, and took over the reins as NMD Division Chief in 2015. The NMD Division saw further growth in the 21st century, as Dr. Emma Ciafaloni, was recruited from Duke University in 2002, as an electromyographer and clinician investigator in NMD disease. Dr. Ciafaloni was promoted to Professor of Neurology in 2015. Dr. Michael Stanton joined the Division in 2003 as an electromyographer and neuropathy specialist. He is currently an Associate Professor of Neurology. After completing his neurology residency, and clinical neurophysiology and experimental therapeutics fellowships, Dr. Chad Heatwole became faculty in 2008, and has risen rapidly to the rank of Associate Professor. The NMD Division faculty has also benefited over the past 15 years from the University of Rochester Neurology resi-

dents, and trainees in the clinical and research fellowship programs (Drs. James Cleland, Jill Miller, Paul Twydell, Jeff Statland and Thurman Wheeler) and Dr. Amy Chen. Each served briefly on the faculty of the NMD Division.

The success of the Division over the past 40 years would not have been possible without the outstanding contribution of nurse practitioners first K.D., followed by Cynthia Gibson who joined the Division in 1991 and Debra Guntrum (2000 - present), its research coordinators and data managers (see below) and outstanding administrative leadership over the years from Barbara Herr (1997 - 2000), Nancy Merriman (2000-2010), Roxanne Cannarozzo (2013-2015) and Lisa Stephenson (2016-).

### The NMD Division in 2016:

In 2016, the NMD Division comprises 8 physician faculty, 2 nurse practitioners (Cynthia Gibson and Debra Guntrum), a nurse (Joan Mountain), 2 physical therapists (Shree Pandya and Dr. Kate Eichinger), research coordinators and research data managers, laboratory managers, technicians and postdoctoral fellows in its NMD pathology and research laboratories.

### Clinical Care:

Members of the NMD Division care for patients in its MDA, ALS and peripheral neuropathy clinics, and conduct electrodiagnostic studies and muscle, nerve and skin biopsies. The NMD Division provides clinical care and diagnostic services to patients throughout the upstate New York Region, and evaluate patients from across the U.S. and Internationally. Drs Tawil and Ciafaloni, direct a weekly multidisciplinary MDA clinic which cares for over 1500 patients annually. Dr. Thornton has lead efforts along with Drs. Tawil, Ciafaloni and Heatwole, to develop the multidisciplinary ALS clinic that cares for about 275 patients/year. This effort has been supported in part by generous philanthropic efforts by the Peter Lawrence annual golf event. Dr. Emma Ciafaloni leads the Division efforts in pediatric NMD Disease and has developed a large multidisciplinary Duchene's muscular dystrophy (DMD) center within the MDA clinic. Dr. David Herrmann, along with Dr. Eric Logigian and Dr. Michael Stanton spearhead clinics dedicated to the care of patients with peripheral neuropathy with a volume of 1150 patients/year, including a multidisciplinary, tertiary referral clinic for patients with Inherited Neuropathies (Charcot Marie Tooth Disease) led by Dr. Herrmann. Cynthia Gibson and Debra Guntrum and Dr. Kate Eichinger support each of these clinics and the coordinated care of patients.

Under the stewardship of Dr. Eric Logigian and Michele Ferguson (laboratory manager), the University of Rochester EMG laboratory is a state of the art, AANEM accredited laboratory, performing over 2600 EMGs annually. Dr. Logigian has developed a state of the art EMG database that powers the laboratory. In 2015, Dr.

# CHILD NEUROLOGY DIVISION

By: Jonathan W. Mink, MD PhD

Logigian pioneered integration of NMD ultrasound with electrodiagnostic testing in the Upstate New York area.

The NMD Pathology laboratory under the Direction of Dr. Tawil, Donald Henderson (laboratory manager), Bharati Shah (technician), and Dr. Herrmann is a referral laboratory, processing and interpreting over 600 muscle, nerve and skin biopsies (for epidermal nerve fiber density) annually.

The highly integrated, multidisciplinary clinical programs offered by the NMD Division, are enabled by administrative support, led by Erin Collins.

## Education

The NMD Division's Education Programs parallel its excellence in clinical care. The Division is home to ACGME accredited NMD medicine (Dr. Ciafaloni, Program Director) and Clinical Neurophysiology Fellowship Programs (Dr. Logigian, Program Director). Mrs. Karen Lee is administrator of these programs. These ACGME accredited fellowship programs have graduated 60 trainees over the past 20 years. Additional training opportunities are available in the NMD Division via a myriad of Departmental and Research fellowship opportunities.

## Research

The NMD Division continues as a national standout in research in inherited and rare NMD disorders and has 34 active research grants. Dr. Richard Moxley and Dr. Charles Thornton continue to lead national and internationally acclaimed efforts toward an effective therapy for myotonic dystrophy type 1. Key accomplishments by Dr. Thornton include development of an animal model for myotonic dystrophy type 1 (DM1), identification of RNA-mediated toxicity as the disease mechanism, development of effective morpholino treatment of an animal model of DM1, and partnering with Industry to bring ASO therapy to early phase human trials. Dr. Moxley has pioneered mexiletine for myotonia in DM1, and development of a disease registry for myotonic dystrophy. The bedside to bench to bedside work in DM1 has been enabled by sustained extramural funding through the NIH and Foundations, including the Senator Wellstone Muscular Dystrophy Research Center at University of Rochester led by Dr. Moxley, and the establishment of a disease registry and clinical trial network for DM1. The work of Drs. Moxley and Thornton has been facilitated by generous philanthropic donations, including The Helen Arresty Fine Endowed Professorship to Dr. Moxley (1996), The Phillip R. Saunders NMD Research Center (Dr. Moxley (2011)) and Saunders endowed Professorship (Dr. Thornton (2012)).

Drs. Rabi Tawil and RC Griggs have led efforts in periodic paralysis an effective (FDA-approved in 1025) therapy for

the disorder and R. Tawil, being part of a team that discovered the genetic mechanism of Andersen Tawil Syndrome. Dr. Tawil has been a leader in FSH Dystrophy (FSHD), from the initial clarification of the genetic defect to clarification of disease mechanisms for FSHD1 and discovery of the genetic defect in FSHD type 2. This work was supported by The Fields Center for FSHD Research, made possible by generous support from Richard T. Fields.

The NMD Division is a hub for Duchenne muscular dystrophy research. Drs. Ciafaloni and Griggs lead a vigorous experimental therapeutics program in DMD, while Drs. Ciafaloni and Shree Pandya collaborate in epidemiologic research in DMD, supported by the CDC MD STARNET.

Dr. Heatwole's research focuses on the development of multiple disease-specific, patient reported clinical trial outcome measures including those for DM1, myotonic dystrophy type-2 (DM2), FSHD, congenital myotonic dystrophy, Charcot-Marie-Tooth-Disease, and spinal muscular atrophy. His work is supported by NIH and Foundation grants and philanthropy from the Goldberg Nathan Foundation for DM2 research.

The NMD Division has active Peripheral Nerve Research Programs. Dr. Herrmann leads research in Charcot Marie Tooth Disease and related disorders through the NIH supported Inherited Neuropathies Consortium Rare disease Clinic Research Center, and MDA supported North American CMT Database. This Research conducts natural history, outcome measure and biomarker studies in inherited neuropathies with a goal of developing effective therapy for inherited neuropathies. Dr. Logigian works across peripheral neuropathies and NMD disorders to refine electrophysiologic approaches.

The research of the NMD Division would not be possible without the support of its clinical evaluators, led by physical therapist, Dr. Kate Eichinger, and a superb team of research coordinators (Jeanne Dekdebrun, Susanne Heining, Jim Hilbert, Leann Lewis, Elizabeth Luebbe, Joan Mountain, Kim Hart, Patty Smith and Janet Sowden), a data management center and research administrators (Tracy Forrester and Adele Cook who is retiring in 2016 after 47 years with the Department of Neurology).

## Our Faculty and Staff

### Primary Faculty

Jonathan W. Mink, MD, PhD  
Heather R. Adams, PhD  
Erika F. Augustine, MD  
David Bearden, MD, MS  
Marina R. Connolly, MD  
Harris A. Gelbard, MD, PhD  
Inna Hughes, MD, PhD  
Jennifer M. Kwon, MD, MPH  
Gary J. Myers, MD  
Alex Paciorkowski, MD  
Laurie E. Seltzer, DO  
Robert Thompson Stone, MD  
David Wang, MD

### Secondary Faculty

Gretchen L. Birbeck, MD, MPH  
Emma Ciafaloni, MD  
Richard Moxley, MD  
Nina Schor, MD, PhD  
Laura Tomaselli, MD

### Nurses

Amy Vierhile, PNP  
Lisa Augustini, PNP  
Carolyn Dickinson, PNP  
Elaine Philipson, PNP  
Julie Socha, PNP  
Cyndi TenHoop, PNP  
Nicole Walsh, RN  
Kathleen Wright, RN

### Genetic Counselor

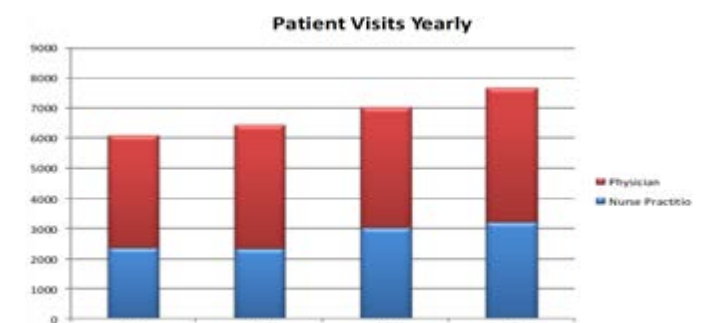
Kelly Q. Minks, MS

The University of Rochester has been a leader in child neurology as a subspecialty since its inception. In the 1940s a number of UR graduates (Drs. Philip Dodge, Frederick Horner, Patrick Bray, Jasper Daube) were inspired by Dr. Wilbur Smith to pursue child neurology and they became pioneers in our field. One of them, Dr. Horner, returned to URM in 1967 and established the first division of child neurology. He and subsequently Dr. Leon Epstein trained a number of child neurologists and taught many adult neurologists how to care for children with neurological problems. In 2001, Jonathan Mink was recruited to lead the Division of Child Neurology. Since then, the division has evolved further and

our training, clinical and research programs have expanded substantially. In 2014, Dr. Mink was named the Frederick A. Horner, MD Endowed Professor in Pediatric Neurology in memory of the founding Chief.

## Clinical Activities

The Division of Child Neurology receives patient referrals from most counties in New York State, including Buffalo and Syracuse. We now have over 7500 outpatient visits a year (up from just over 6000 in 2012) In the past year, patients have come from as far as California, Texas, Florida, Canada, Brazil, and India for consultation. The Inpatient Child Neurology Service evaluates children in the Emergency Department, the Neonatal Intensive Care Unit, the Pediatric Intensive Care Unit, on the pediatric units, and admits its own patients. We average over 600 inpatient consultations each year and admit an additional 200 patients to our service.



Our division provides care to children with all types of neurological problems. We have specific expertise in a number of disorders for which we have dedicated specialty clinics. These include attention deficit hyperactivity disorder, Batten disease (neuronal ceroid lipofuscinosis), epilepsy, headache, movement disorders, neurofibromatosis, neurogenetics, demyelinating disease, leukodystrophies, neurometabolic disorders, and Tourette Syndrome. In addition, we have collaborative clinical programs with other departments and divisions for children with autism, brain tumors, metabolic disorders, cerebral palsy, neonatal brachial plexus injury, and neonatal brain injury. The Neuropsychological Assessment Clinic provides comprehensive neuropsychological evaluations, neuropsychological consultation, and educational advocacy for children with neurocognitive impairment. The need for clinical

child neurology services in upstate and western New York continues to challenge our capacity. To meet the growing need to provide neurological care to children in upstate New York, we have recruited one new faculty member in the past year to bring our number to 13. In addition, we have 6 Pediatric Nurse Practitioners with specialty expertise in child neurology, two RNs, and a Genetic Counselor in our Division.

We have been recognized by being named a Batten Disease Support and Research Association Center of Excellence and a Tourette Association of America Center of Excellence. In addition, we have been named as a Children's Tumor Foundation Neurofibromatosis Network Clinic. We have developed an innovative telemedicine consult program for ADHD (Amy Vierhile, PNP) and are developing a telemedicine program for evaluation and care of children with epilepsy (David Wang, MD).

### Teaching Activities

The child neurology residency program was established by Dr. Fred Horner during his tenure in the department. Dr. Leon Epstein took over the program when he became chief of child neurology. Dr. Jonathan Mink re-established the child neurology residency program in 2003, starting with one position per year. In 2006 the program was expanded to two positions per year. In 2013, Dr. Robert Thompson-Stone was appointed program director for the Child Neurology residency training program and is ably assisted by Magda Ramzy, child neurology program coordinator.

At present, the UR child neurology residency program is considered to be one of the top programs nationally, and consistently recruits highly competitive candidates from across the US. This past year, we received 122 applications and interviewed 32 candidates for two child positions. The residency program has always maintained full accreditation by the Residency Review Committee in Neurology.

Included in the above statistics on teaching awards are our child neurology residents, who have also won a disproportionate number of awards and accolades. Since 2003, more medical students at the UR have entered child neurology training programs than from any other medical school in the country. In fact, each year almost 3% of the UR medical student graduating class selects child neurology residency training, which is triple the national average.

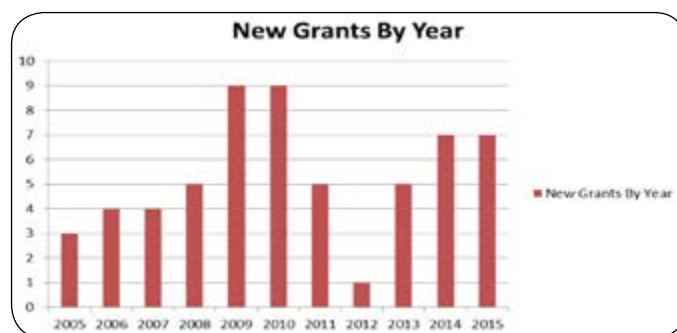
### Research and Scholarly Activity

#### Scope of Research:

The Division of Child Neurology has a robust research program. Eleven of our fourteen primary faculty, one of our PNPs, and our genetic counselor are engaged

in funded research. The scope of the research includes neuroimmunology, motor control, movement disorders, Batten disease, genetics of epilepsy, biomarkers of infantile epilepsies, cognitive disorders, ADHD, and HIV/AIDS. Goals of our research range from understanding molecular, cellular, and neural systems mechanisms underlying disease to understanding the clinical characteristics, response to treatment, and public health aspects of complex neurological disorders of children.

Our faculty have published over 130 peer-reviewed papers in the past 3 years and have published numerous books and chapters in leading textbooks. Our grant portfolio is strong.



## NEUROIMMUNOLOGY DIVISION

By: Andrew D. Goodman, MD, Chief

### Faculty

Andrew D. Goodman, MD, Chief  
 Matthew Bellizzi, MD, PhD  
 Megan Hyland, MD; Medical Director, MS Center  
 Jessica Robb, MD  
 Lawrence Samkoff, MD

### APP's

Pamela Clark, MSN, NP  
 Jocelyn Doehler, MSN, NP

### Research Nurses

Cynthia Irish, RN  
 Eileen Scheid, RN, MSN

### Current Fellows

Andrew D. Smith, III, MD  
 Tirisham Gyang, MD

### Neuroimmunology Division history

The history of what is now the Neuroimmunology division dates back to the recruitment of Dr. Robert Herndon from Johns Hopkins in 1977. At Rochester, Bob assumed the dual role of both directing the Center for Brain Research and the first dedicated MS clinic. He developed a core group of faculty including Drs. Randy Schiffer, Rick Rudick, and Cory Ford (the latter two trained as residents and fellows). By the end of the 1980s, Dr. Rudick had been recruited to be the founding director of the Mellen Center for MS at the Cleveland Clinic. Bob Herndon was recruited to chair the neuroscience program at the Good Samaritan hospital, and Cory Ford was recruited to the

University of New Mexico. Randy Schiffer remained and Andrew Goodman was recruited from the Neuroimmunology Branch (NIH) in 1988 by Herndon and Berch Griggs. The following year David Mattson was also recruited from NIH. Fellows training under this group included Dan Giang, Steve Schwid, and Cornelia Mihai. By the end of the 1990's Randy Schiffer had been recruited to Texas Tech University to be chair of Neuropsychiatry. David Mattson was recruited to Indiana University to direct their multiple sclerosis program. Steve Schwid had joined the faculty after completing the departmental experimental therapeutics fellowship and Ben Segal was recruited from NIH. After seven years of fruitful laboratory work in an animal model of MS, experimental autoimmune encephalomyelitis, Ben Segal was recruited to direct an endowed program at the University of Michigan. Lahar Mehta completed fellowship training in experimental therapeutics during this time. Tragically by 2010, both Steve Schwid and Jim Garbern, who had been recruited from Wayne State University, succumbed to metastatic cancer. Since 2010, Andrew Goodman has recruited Megan Hyland (former resident), Matt Bellizzi (former resident and fellow), and Jessica Robb (former resident and fellow) to the faculty. Larry Samkoff successfully transitioned from Rochester General Hospital to full time status at the URMC in Neuroimmunology.

### Research

Under Bob Herndon, the group began seminal studies of interferon beta for the treatment of relapsing MS with Larry Jacobs in Buffalo. They also published important findings regarding the treatment of pseudo-bulbar behavior in MS patients with low dose amitriptyline. Following their departure, Herndon and Rudick continued as leading investigators in landmark studies of interferon beta begun in Rochester.

Building on this tradition of experimental therapeutics research in MS, Schiffer, Giang, Goodman, and Mattson were part of the pivotal trial leading to the approval of co-polymer 1 in MS (now known as Copaxone). Working with Steve Schwid (first as an experimental therapeutics fellow and later as a faculty member), Andrew Goodman began systematic investigation of 4-aminopyridine for symptomatic treatment of multiple sclerosis with particular emphasis on the impact of this drug on gait function. Ultimately, a series of studies led to the FDA-approval of dalfampridine (4-aminopyridine) for improving abnormal gait in people with MS.

It is an exciting time for our program as we embark on new clinical and research initiatives: Jess Robb and Megan Hyland are leading the implementation of our departmental telemedicine initiative aimed at improving access to care for a widely dispersed and traditionally underserved rural population of disabled individuals with neurological diseases such as MS; implementation of a NYSTEM (New York State Stem Cell Science)-funded research award for which Drs. Goodman and Steven Goldman are the URM Co-PI's; this is an Upstate NY (Rochester, Buffalo, Syracuse) Consortium project in which we propose to perform a phase 1 first-in-man study testing the safety (and preliminary efficacy assessment) of human oligodendrocyte progenitor cells (hOPC's) into the cerebral white matter of patients with secondary progressive multiple sclerosis. Matt Bellizzi has developed an animal model system to better understand the increasingly well-documented gray matter pathology in MS. He is collaborating with Handy Gelbard on pharmacologic approaches to neuroprotection particularly in regard to synaptopathy as observed in his model system.

### Teaching

While the MS group has offered fellowship training since its inception, limited funding was always a daunting obstacle. However, since 2014, we have been among the first wave of seven institutions nationally to receive a five-year Institutional Clinician Training Award from the National Multiple Sclerosis Society (NMSS). Additional support for fellows interested in experimental therapeutics research may also be available from the NMSS or our departmental NIH-funded training grant.

Clinical fellows have daily interaction with the staff as needed to optimize patient care. There are twice monthly planned staff meetings during for clinic operations and coordination of patient care. The fellows are involved with our ongoing clinical research efforts emphasizing cutting-edge experimental therapeutics. Also available to them are a network of collaborative basic and translational research opportunities investigating the immunology, virology, and neurobiology of multiple sclerosis, and disorders of myelin. Under Megan Hyland's leadership,

we also offer an elective for residents interested in a deeper experience in neuroimmunology.

### Clinical

We provide state-of-the-art comprehensive care of MS patients in the setting of a university-based MS center for adults and an associated pediatric MS clinic (directed by former adult and child neurology trainee, Rob Stone). Our estimated adult MS population is over 3500 drawn from a broad catchment area encompassing all of upstate New York and the northern tier of Pennsylvania. The clinical staff includes a highly experienced team of research nurses, 2 NP's, a social worker, as well as an infusion center-nursing cadre. We also see patients with other CNS neuroimmunologic conditions including neuromyelitis optica, neurosarcoidosis, and autoimmune encephalitis. New initiatives include an inpatient consult service organized by Larry Samkoff.

# EPILEPSY UNIT

By: Michel J. Berg, MD, Division Chief

### Our Faculty and Staff

#### Neurology Faculty:

Michel J. Berg, MD, Division Chief  
Gretchen Birbeck, MD, MPH, DTMH  
Deana Bonno, MD  
A. James Fessler, MD  
Robert A. Gross, MD, PhD  
Lynn C. Liu, MD  
Olga Selioutski, DO  
Thomas Wychowski, MD

#### Neurophysiology:

James Burchfiel, PhD  
Michael Chilungu, MD

#### Psychiatry:

Michael Privitera, MD

#### Neuropsychologist:

John Langfitt, PhD

#### Pediatric Epilepsy:

Inna Hughes, MD, PhD  
Laurie Seltzer, DO  
David Wang, MD

#### Family Psychology:

William H. Watson, PhD

#### Neurosurgery:

Webster Pilcher, MD, PhD

#### Emeritus:

Giuseppe Erba, MD

#### Nurse Practitioners:

Kathy England, FNP  
Patricia Rogers, ANP

#### Pediatrics:

Julie Socha, PNP

The Strong Epilepsy Center (SEC) began in 1990 with 2 video-EEG long term monitoring beds on 5-1600. Today the SEC has 12 beds: 8 adult beds on 5-1600 and 4 pediatric beds in the Golisano Children's Hospital (8 North). During the past 25 years, the SEC has served over 8,500 patients including performing over 600 epilepsy surgeries. Our clinical neurophysiology service performs 3,000 EEGs and 1,500 hours of intraoperative monitoring per year. The SEC is a regional program with one-half of the people we care for traveling from outside Monroe County.

### I. Historic Perspective:

Until 1990, there were no specialized epilepsy programs in New York. In the mid-eighties, the DDSO (Developmental Disabilities Service Office) expressed concern about the care of mentally challenged clients with intractable epilepsy cared for in group homes and other state facilities. They prompted the Department of Health to invite the University of Rochester Medical Center, Albany Medical College and Columbia Presbyterian Medical Center to submit a Certificate of Need (CON) proposal for an epilepsy program in Western New York, Capital district, and New York City. The University of Rochester and Columbia University worked for nearly 4 years with various state agencies to complete the process. During the last year of negotiation (1989), other centers from the metropolitan NYC area joined the CON process and were eventually all certified by the Department of Health. As a result, by 1990, New York State had established six new epilepsy programs, five of which were concentrated in the NYC metropolitan area and one in Western New York (University of Rochester Medical Center).

Giuseppe Erba, MD and James Burchfiel, PhD were recruited in 1989 during the final stage of the CON process. They joined Drs. Robert Griggs and Margaret McBride (pediatric epileptologist) and the panel of experts from various disciplines who had worked on the CON for the previous four years. They found, in Rochester, a most favorable environment, receptive to new ideas and responsive to the needs of the new unit. The hospital offered a first class setting with a Department of Neurology known for its strong tradition and vision of academic excellence.

Among the young and talented professionals who were ready to commit themselves and to join the venture, there was a scholarly neurosurgeon, Webster Pilcher, who had just completed his training and PhD and who did not hesitate to spend an extra year of training in epilepsy surgery with Dr. George Ojemann in Washington. An enthusiastic chief resident in neurology, Michel Berg, became the first epilepsy fellow. An experienced neuropsychologist, Peter Como, joined the team and provided the initial neuropsychological support and who organized the Intracarotid Amytal procedure.

Soon after, Craig Applegate, PhD, moved to Rochester, to assist in the organization of the basic research laboratory, and continue with Dr. Burchfiel's ongoing NIH funded research projects on the Kindling Model of epileptogenesis. In the meantime, a young psychiatrist, Walid Nassif, MD joined the faculty, dividing his time between psychiatry and the epilepsy program. His work over the next five years led

# NEURO-ONCOLOGY DIVISION

By: Nimish Mohile, MD

to a better understanding of psychogenic seizures. The subsequent appointments of John Langfitt, PhD, Betsy Wood, PhD, William Watson, PhD, Julie Fudge, MD, Paul Burkat, MD, and Michael Privitera, MD continued to expand research and improve the psychosocial aspects of epilepsy patients. Cesare Lombroso, MD, PhD, a pioneer in epilepsy, joined us as a visiting professor.

Over the past 2.5 decades of the epilepsy program, numerous superb faculty have joined our program. Several of these faculty have since left our program for a variety of reasons but each contributed to our improvement of patient care, fellow education and research activity. These faculty, who we were honored to work with, include: Charles Duffy, MD, PhD, Lisa Oestreich, DO, Haidy Behman, MD, Maria Toczek, MD, Kenneth Plotkin, MD, J. Craig Henry, MD and Adam Juersivich, MD.

Our current adult epileptology faculty include: Robert A. Gross, MD, PhD, Michel Berg, MD, Lynn Liu, MD, A James Fessler, MD, Olga Seliouski, DO, Gretchen Birbeck, MD, PhD, Thomas Wychowski, MD, and most recently Deana Bonno, MD. Our long time pediatric epilepsy provider, David Wang, MD, has recently been joined by Laurie Seltzer, DO and Inna Hughes, MD, PhD as we continue to expand our pediatric epilepsy service.

Throughout this time, the Epilepsy Center has had a strong contingent of APPs including our current, longstanding, highly valued nurse practitioners: Patty Rogers, Kathy England and Julie Socha and collaboration with Neurosurgery nurse practitioner, Susan Smith. Additionally, Lisa Augustini has worked with our pediatric neurology colleagues running the new onset spell clinic for many years. Patty McCabe, Jennifer Willison, Jan Anderson, Jeanne Borowski, Amy Jerum, and Shelly DeValle previously cared for our growing patient population. With the expansion of the epilepsy program we have brought on three registered nurses, Laurie Walker, Nicole Walsh, and Kathy Wright, to assist with adult and pediatric patients.

Originally the Epilepsy Unit was privileged to have a dedicated social worker beginning with Joan Chodosh followed by Kathy Neidert and Nancy Shinder. Economic pressures subsequently resulted in shared social work services.

Our neurophysiology staff has been extremely dedicated under the initial leadership of John Hanley, Mary Jo Martin, Willie Riorden and the current head Steve Erickson. Under Steve, the number of technologists has expanded to over 20 with most certified through ABRET in multiple neurophysiology areas. Over one-half of the team has worked in our center for over 8 years including the Assistant Supervisor Ramona Heisig and Lead IOM technologist, Sara Gannon.

Similarly the administrative core had long tenures with previous administrators, Linda Hurst and Terri McDonald. Currently, the majority of the administrative staff has over

10 years of service within the epilepsy program and consists of Jeanette Griebel, Sara Ludwig, Courtney L'Esperance and headed by Melissa Scharett.

Since early in the development of our program, we have had specialized services including Western NY's only Charlie Foundation approved ketogenic diet program. We have been privileged to work with several dedicated dietitians over the years. Currently our ketogenic diet program is under further expansion with our full time dietitian, Kelly Russo.

## II. Organization:

The Epilepsy Unit is an autonomous unit within the Department of Neurology. It consists of two components: 1) The Strong Epilepsy Center (SEC) formerly called the Comprehensive Epilepsy Program (CEP), which is responsible for the care of patients with intractable seizure disorders 2) the Clinical Neurophysiology Laboratory, which initially was started in the late 1960's by Maurice Charlton and Richard Satran, pioneers in the early days of EEG, dramatically expanded in the 1990's to include long term video/EEG monitoring, and, with the recruitment of David Loiselle, evoked potentials and intraoperative monitoring.

Since the advent of the Strong Epilepsy Center, there has been a close working relationship among the faculty among the neurologists, neurosurgeon, and neuropsychologists meeting weekly to every other week to discuss our epilepsy surgery cases.

The SEC has been at the forefront of treatment development participating in over 25 clinical intervention studies since its inception including the NIH sponsored early surgery for epilepsy trial, the Responsive NeuroStimulator (RNS) which is the most complex implantable medical device ever made and well-designed studies of medical marijuana as well as over 20 premarketing studies of almost all the new AEDs approved by the FDA since 1990. Our current studies also include cerebral malaria and other infectious causes of epilepsy in Africa, electrophysiology and genetics of infantile spasms, epileptogenicity of tumors, acute treatments of super refractory status epilepticus, and generic medications.

The Epilepsy unit has a strong fellowship program with 2-5 trainees per year. During the past 25 years we have trained over 70 neurophysiologists and epileptologists who now practice throughout the United States and throughout the world including Thailand, Japan, and Iceland.

In memory: Special mention is appropriate of the valued Epilepsy Unit faculty who have passed away. Drs. Maurice Charlton, Craig Applegate, Kenneth Plotkin, Cesare Lombroso, Richard Satran, and David Loiselle.

## Our Faculty and Staff

### Neurology Faculty

Nimish Mohile, MD  
Joy Burke, MD  
Steven Goldman, MD PHD  
Thomas Wychowski, MD  
Jennifer Serventi, R-PA-C, MS  
Chinazom Ibegbu, MD

### Neuropathology

Mahlon Johnson, MD, PHD

### Pediatric Oncology

David Korones, MD

### Neurosurgery Faculty

Kevin Walter, MD  
Webster Pilcher MD, PHD  
Howard Silberstein, MD  
Michael Yan Li, MD, PHD  
G. Edward Vates, MD, PHD

### Radiation Oncology:

Louis Constine, MD  
Michael Milano, MD, PHD  
Kenneth Usuki, MD

The Division of Neuro-Oncology was founded in 2007 by Nimish Mohile MD, Joohee Sul MD and Jennifer Serventi PA. In collaboration with the Department of Neurosurgery and the Wilmot Cancer Center, they created the first multi-disciplinary neuro-oncology clinic in Upstate New York, the largest brain tumor clinical trials program in Upstate New York and one of the first UCNS neuro-oncology fellowships in the country. Important contributions were made to the division by Steven Goldman MD PHD who served as the first fellowship program director and Adilia Hormigo MD PHD who was a faculty member doing both clinical and translational work from 2011 to 2014. In 2015, Joy Burke, a former Rochester neurology resident and the first neuro-oncology fellow to graduate from the program joined the division.

**The Mission of the Neuro-Oncology Division is to improve and extend the lives of neuro-oncologic patients in Upstate New York.**

## Current State of the Program:

The Neuro-Oncology Program at the University of Rochester encompasses the multi-disciplinary treatment of primary brain tumors, treatment of central nervous system metastases from other cancers and neurologic complications of cancer and cancer therapies. Our strengths are our commitment to education, clinical trials, a multi-disciplinary clinic, access to novel therapies and personalized cancer care. A weekly multi-disciplinary tumor board includes participation from neuro-oncology, neurosurgery, radiation oncology, neuropathology and neuro-radiology. Faculty in the program are involved in multi-center clinical trials, teach courses at the AAN, provide nursing and mid-level education throughout the country and participate in development of guidelines and quality measures at the national level.

The **Education Program** aims to create the next generation of clinicians and scientists to treat and improve care for neuro-oncologic diseases. A Neuro-Oncology Fellowship was created in 2009 by Joohee Sul and is currently training its fourth fellow. We are involved in the education of medical students, neurology residents, neurosurgery residents, radiation oncology residents and hematology oncology fellows so that they can improve the care of neuro-oncology patients in their practices. Faculty actively mentor medical students and residents on research projects that have resulted in successful presentations and publications.

The Clinical trials program has offered over 40 trials since 2009. We have made a commitment to have clinical trials available for every possible tumor type. We currently offer more than 15 clinical trials per year for patients, allowing them to get all of their care in Rochester.

Our multi-disciplinary clinic allows patients with primary brain tumors and brain metastases to receive all of their care in one coordinated setting. The clinic includes neurosurgeons, neuro-oncologists, radiation oncologists, pharmacists, palliative care and social workers. Mid-level practitioners and nurses from each specialty help in coordinating all aspects of care to minimize the burden on patients.

Important basic science contributions to the field of neuro-oncology are being made by numerous laboratories at URM. Work in the Steven Goldman lab is improving our understanding of the biology of brain tumor progenitor cells. Mark Noble and colleagues are studying the impact of chemotherapies on neural stem cells and consequent impact on cognition. Edward Brown has developed a mouse

model to study the development of brain metastases from breast cancer. Bradley Mills PHD in the Marc Halterman lab is leading the investigation of phosphatase-mediated HIF1a regulation in glioblastoma.

Our program aims to offer hope to patients with devastating diseases. Outside of clinical trials we offer aggressive and novel treatment options. We are the first program in upstate New York to offer the Optune device that was recently found to significantly improve survival in patients with Glioblastoma. We offer patients access to personalized cancer care through diagnostic testing. A tumor bank is maintained, where tissue is collected at time of surgery and stored for later use and testing if new diagnostic tests are developed. We routinely test a number of markers on tumor tissue to ensure accurate diagnosis and to determine if newer therapies will be effective.

#### Current Research Initiatives and Interests:

Phase I/ Phase II clinical trials in Gliomas: We currently offer clinical trials sponsored by the National Cancer Institute as well as by pharmaceutical companies. We are in collaboration with laboratories at UR to study the role of novel drug combinations of FDA approved drugs to treat glioblastoma.

Tumor Associated Epilepsy: This research program, led by Thomas Wychowski is dedicated to better understanding and predicting the development of epilepsy in brain tumor patients. Our research projects aim to devise a risk stratification score that will help us predict which brain tumor patients are likely to develop seizures and which will need treatment. We are currently studying a series of biomarkers that can be identified on tumor tissue. We are also interested in minimizing the burden of epilepsy in this population by studying new drugs that are specifically effective in brain tumor patients with the goal of decreasing seizures and improving quality of life.

Chemotherapy Induced Neuropathy (CIPN): We are interested in developing a clinical and research program devoted to patients that suffer from CIPN. In 2016, we opened a clinical trial studying a device that aims to reduce the pain

related to CIPN. In collaboration with the NCI Community Oncology Research Program, we will also be initiating a study examining the role of exercise interventions in reducing the burden of CIPN. Our goal is to offer more clinical trials of novel drugs and devices that can help improve patient's symptoms.

**Health Services Research in Glioblastoma:** We maintain a prospective database of all patients with primary brain tumors to facilitate research projects. We are currently studying the impact of a palliative care intervention on patient outcomes, quality of life and caregiver quality of life. We have also completed studies assessing the cost of treatment and describing the burden of acute care utilization in glioblastoma. These projects are ongoing and have been led by medical student, Lauryn Hemminger and residents, Andrea Wasilewski and Benjamin George.

Telemedicine in Neuro-Oncology: In 2017, we will initiate a pilot of a telemedicine visits, led by Jennifer Serventi, for patients with glioblastoma in order to offer better access to patients in the southern tier.

#### Fellow and Faculty Alumni

Joohee Sul, MD  
*Medical Officer, Brain and CNS Malignancies Scientific Liaison, Center for Drug Evaluation and Research, FDA*

Joy Burke, MD  
*Assistant Professor of Clinical Neurology, Division of Neuro-Oncology, UPMC*

Jennifer Mulbury  
*Assistant Professor, Child Neurology, UPMC*

Adilia Hormigo, MD PHD  
*Associate Professor of Neurology, Mt. Sinai Medical Center*

Ajay Abad, MD  
*Assistant Professor, Neurology, Roswell Park Cancer Institute*

## GENERAL NEUROLOGY DIVISION

By: Raissa Villanueva MD, MPH, Division Chief

#### Faculty

Joy Burke MD  
Robert Holloway MD, MPH  
Ralph Jozefowicz MD  
Davender Khera MD  
Harold Lesser MD, PhD  
Anthony Maroldo MD  
Giovanni Schifitto MD  
Michael Stanton MD  
Raissa Villanueva MD, MPH

#### Nurse Practitioners:

Ann Ford Fricke NP  
Gladys Hill RN

#### Nurse:

Ann Leitten NP

#### Major clinical and research interests:

The Division of General Neurology was initiated in 1989-90 by Dr. Randy Schiffer. Dr. Schiffer was recruited from psychiatry to neurology by Berch Griggs because of his interest in teaching plus his expertise in general neurology. Randy then designed what is now the general neurology resident clinic---an integrated "firm" that includes medical students, junior and senior neurology residents and an attending seeing patients from all socioeconomic backgrounds. Drs. Ralph Jozefowicz, David Goldblatt, and Richard Satran joined him. This flexible practice subsequently grew to include other faculty, both subspecialists and generalists, broadening the expertise within general neurology. The resident firms and "GNU" were housed in a newly-renovated floor of the "U wing".

In 1992-1993 Drs. Tim Counihan, Mike McQuillen and Richard Barbano were recruited and the general neurology practice relocated to an off-site faculty practice at the Lattimore Road facility. EMG and EEG were added to a faculty that included Randy Schiffer, Dan Giang and Ralph Jozefowicz. The chief residents would spend one afternoon per week in the clinic as part of a "faculty practice" clinic experience. In the late 1990's, the entire Lattimore Road operation moved to Clinton Crossings on Westfall Road. Eventually the Movement Disorder program and Epilepsy joined the Westfall operation. This opened up space for the outpatient department at Strong and the resident program moved to the first floor of the Ambulatory Care Building

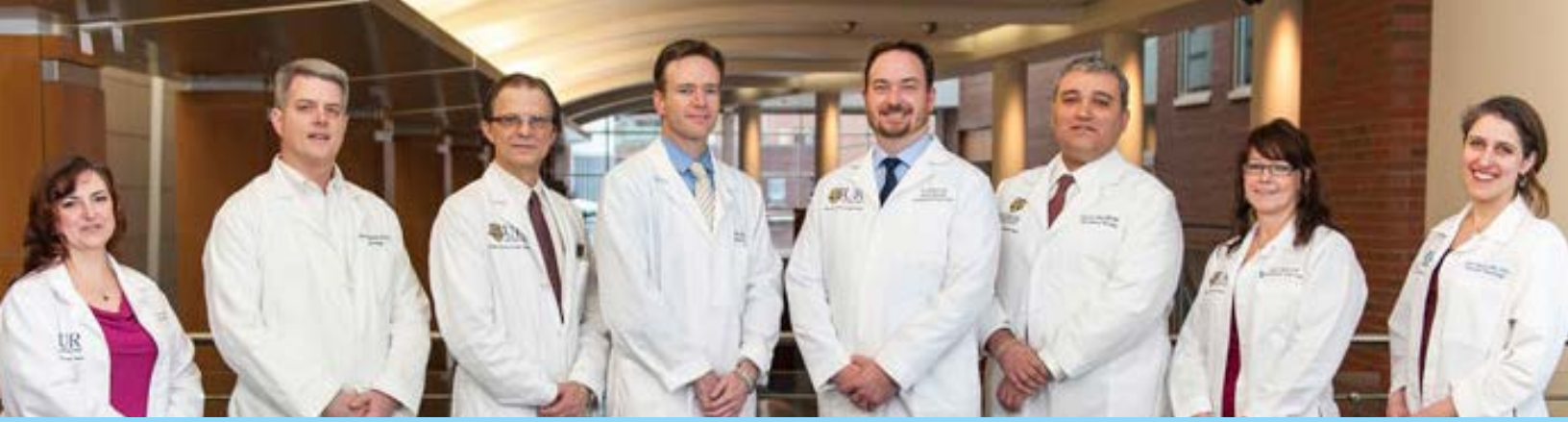
where they remain today.

When Bob Holloway was division chief for general neurology, Heidi Schwarz was recruited in 2003 from many years in private practice in general neurology to grow general neurology and establish a general neurology practice at Highland Hospital. In August 2004, Highland Neurology was established with Heidi Schwarz as chief and Garrett Riggs MD, PhD and James Cleland MBBS as faculty members. Chief residents often did outpatient rotations at the office located in the Physician Office Building adjacent to Highland Hospital. Over the 6 years that Highland Neurology was operational, it was a prime location for many of the UPMC Neurology residents to start their careers practicing general neurology including Jill Miller, Leslie Lee, Anthony Maroldo and Chris Burke. Highland Neurology was closed in 2010 but our residents and faculty continue to cover the inpatient service at Highland Hospital.

Anthony Maroldo and Heidi Schwarz then moved over to the Westfall office. Anthony Maroldo took on increasing responsibility in ambulatory operations in addition to broader responsibilities across the entire department. Raissa Villanueva joined general neurology in 2011 and Davender Khera joined in 2013. In January 2015, Harold Lesser joined the department after 20+ years in private practice in the community and his office location in Bushnell's Basin has allowed for additional expansion of general neurology into the eastern region of Rochester.







## STROKE UNIT

By: Curtis Benesch, MD, MPH

### History

The Stroke Unit has grown considerably since its inception in 1996. Prior to that time, faculty members Dr. Richard Satran and Dr. Joshua Hollander (RGH) had been participating in a few clinical trials in stroke prevention and were overseeing an outpatient stroke clinic. Dr. Benesch, inaugural and current Chief of the Stroke Unit, then expanded the number of clinical trials and began conducting weekly Stroke Rounds. A Stroke Consult service emerged, eventually leading to the consolidation of patients with stroke into a single geographic location (5-1600). By 1996, nearly all patients admitted to SMH were attended by Neurologists on the Stroke Service on 5-1600, rather than by non-neurologists on various units throughout the hospital. Early on, faculty members from across the department rotated through the Stroke Service, which became a separate inpatient service line, along with the General Neurology Service, in 1997. Drs. Griggs, Holloway, Barbano, Jozefowicz and Schiffer, along with Dr. Benesch, all served as attendings on the service in those early years. Fellowship-trained vascular neurologists Drs. Judith Hinchey, Scott Burgin and David Rempe joined the Unit between 1998 and 2003. Today, the Stroke Service is a robust clinical program staffed simultaneously with two Vascular Neurologists (Acute Stroke Service and Inpatient Attending), a fellow in Vascular Neurology, and an inpatient Stroke Nurse Practitioner, along with the housestaff. Stroke Unit faculty and nurse practitioners also maintain a comprehensive outpatient practice, providing new patient consultations, hospital discharge follow-up evaluations and ultrasound services.

Strong Memorial Hospital was designated by the New York State Department of Health as a Primary Stroke Center in 2005, and was accredited by the Joint Commission as a PSC in 2006. The Stroke Unit has received the AHA Gold Award for quality performance every year since 2007, most recently being named to the Target Stroke Honor Roll for exemplary care of pa-

tients with acute stroke. Through collaborations across Endovascular Neurosurgery, Neuromedical Critical Care and Vascular Neurology, the University of Rochester Medical Center was accredited by the Joint Commission as a Comprehensive Stroke Center in 2014, and reaccredited in January 2016, joining the ranks of only 3 comprehensive stroke centers in New York State at the time. Dr. Benesch, surgical director of the CSC and Dr. Amrendra Miranpuri, Department of Neurosurgery, serves as medical director of the CSC.



### Clinical Program

The Stroke Service admitted over 1100 patients with cerebrovascular disease in 2015, including over 800 patients with ischemic stroke, making it one of the largest programs in New York State. In combination with Endovascular Neurosurgery and Neuromedical Critical Care, the service provides acute stroke care, including intravenous thrombolysis and mechanical thrombectomy, diagnostic angiography, endovascular and neurosurgical care for complex cerebrovascular disease (vascular malformations, aneurysms, hematomas), carotid revascularization, and comprehensive critical care monitoring and treatment in a dedicated NMICU (Debra Roberts, Director). The program has fostered seamless collaboration between EMS, Emergency Medicine, Imaging Sciences, Cardiology, Physical Medicine and Rehabilitation, Nursing, and restorative therapy in providing a comprehensive approach to each patient from the time of stroke onset to well beyond hospital discharge. Most recently, the Stroke Unit has teamed up with Neurosurgery, Imaging Sciences and Cardiology, to establish the Rapid Access TIA Clinic which provides urgent evaluations (<24 hours) for patients with transient ischemic attacks, including diagnostic studies: carotid ultrasonography, echocardiography & MR imaging.

### Research

The Stroke Unit has a long history of participation in clinical trials of acute stroke and stroke prevention, and is currently engaged in 8 active trials in cerebrovascular disease. Dr. Benesch (co-PI) recently completed a 4-year funded project (Stroke Treatment Alliance of Rochester—STAR) to establish a consortium of the 4 hospitals located in Rochester with goals of increasing the number of patients receiving acute interventions and improving adherence to secondary stroke prevention measures. Dr. Kelly focuses on end-of-life decision-making in stroke and management of severe stroke, and Dr. Holloway was the lead author on the recent guidelines for Palliative Care in Stroke. Dr. Halterman currently has 3 active grants exploring mechanisms of cerebral ischemic injury and potential treatments. Drs. Sahin and Busza are actively developing interests and investigative studies in stroke recovery.

### Education

Stroke Unit faculty conduct teaching rounds every Monday-Thursday, present an annual lecture series in cerebrovascular disease, participate in an extensive fellowship training program (didactic lectures, journal clubs, clinical conferences), and of course, provide innumerable episodes of bedside teaching to students and residents on the clinical service.

The Fellowship in Vascular Neurology program is an ACGME-accredited program (since 2006) currently headed by Dr. Bogachan Sahin, with two slots available annually. Nine individuals have completed the program, several of whom subsequently joined the Stroke Unit Faculty. Dr. Sahin has recently enriched the program, with didactic lectures provided by faculty and external speakers, journal clubs, and clinical and research updates on Seminar Fridays, in addition to a vibrant clinical experience, with participation in both inpatient and outpatient vascular neurology, along with exposure to related fields and disciplines.

The Stroke Program also participates in the Fellowship for Experimental Therapeutics with four fellows completing the program (Drs. Benesch, Kelly, Joel May and Yi Zhang) since 1994. Dr. Ania Busza, recent graduate of the ACGME-accredited Vascular Neurology Fellowship, is a current fellow in the program.

### Current Faculty and Staff: Vascular Neurologists

#### Curtis Benesch, MD, MPH

Unit Chief, Professor of Neurology and Neurosurgery:

Dr. Benesch completed a Fellowship in Experimental Therapeutics in Cerebrovascular Disease in 1994 and became Unit Chief in 1996. He is currently the Associate Chair for Clinical Affairs and Acute Neurological Services in the Department of Neurology, and Medical Director of the URM Comprehensive Stroke Center.

#### Adam Kelly, MD

Associate Professor of Neurology:

Dr. Kelly completed his Vascular Neurology and Experimental Therapeutics Fellowships at the University of Rochester. He is currently Chief of Neurology and Stroke Center Director at Highland Hospital, and serves as Director of Clinical Research in the Unit.

#### Todd Holmquist, MD

Assistant Professor of Neurology and Imaging Sciences:

Dr. Holmquist completed his Vascular Neurology Fellowship at the University of Rochester and is board-certified in Neurosonology. He currently serves as the Director of Ultrasonography in the Stroke Unit and oversees our Rapid Access TIA Clinic.

#### Bogachan Sahin, MD, PhD

Assistant Professor of Neurology:

Dr. Sahin completed his Neurology Residency and Vascular Neurology Fellowship at Johns Hopkins University. He is currently the Program Director for the Vascular Neurology Fellowship. He has research interests in stroke treatment and stroke recovery, in particular in patients with visual field deficits.

#### Marc Halterman, MD, PhD

Associate Professor of Neurology:

Dr. Halterman is a clinician-scientist with research interests in mechanisms of ischemic brain injury and novel treatments for stroke. He is also Associate Director of the MSTP Program.

#### Robert Holloway, MD, MPH

Professor of Neurology:

Dr. Holloway is the current Chair of the Department of Neurology. He participates on the clinical service and, despite his many other obligations, he is a stroke neurologist at heart.

### Neuro-hospitalists/Vascular Neurologists

#### Jeffery Burdett, MD, PhD

Assistant Professor of Neurology:

Dr. Burdett completed his Vascular Neurology Fellowship at the University of Rochester before serving as Stroke Center Director at Rochester General Hospital. He is now Medical Director of 5-1600.

#### Mike Chilungu, MD

Assistant Professor of Neurology:

Dr. Chilungu completed a Fellowship in Clinical Electrophysiology before he served as neuro-hospitalist at Rochester General Hospital. He is now working as a neuro-hospitalist

as part of the Stroke Unit, and providing EEG interpretations and outpatient hospital discharge follow up evaluations.

#### Fellows

##### **Ania Busza, MD, PhD**

Senior Instructor and Fellow:

Dr. Busza completed her Neurology Residency at Boston University and her Vascular Neurology Fellowship at the University of Rochester. She is currently a Fellow in Experimental Therapeutics, with research interests in stroke recovery.

##### **Justin Chandler, MD**

Dr. Chandler completed his residency in Neurology at the University of Rochester and recently started his Fellowship in Vascular Neurology.

##### **Eugene Scharf, MD**

Dr. Scharf completed his residency in Neurology at the Mayo Clinic and recently started his Fellowship in Vascular Neurology.

#### Nurse Practitioners/Nursing

##### **Ann Leonhardt, MS, RN, ANP-BC**

Ann is the Program Coordinator for the URM Comprehensive Stroke Center, and serves as the Quality Liaison Officer for the Department of Neurology.

##### **Dawn Martin, ACNP**

Dawn is a nurse practitioner with extensive inpatient experience in neurology, originally serving as a floor nurse on 5-1600 and as the first dedicated NP on the inpatient Neurology Service in 2001.

##### **Jennifer Richard, AGPCNP-BC**

Jennifer is a nurse practitioner who recently joined our Unit.

##### **Christine Boerman, RN, SCRNP**

Christine recently joined the Unit as the Assistant Program Coordinator for the URM Comprehensive Stroke Center.

#### Administrators

##### **Christina Clary, MS**

Christy is the Program Administrator for the Stroke Unit and Acute Care Services.

##### **Karen Sukert**

Karen is the Administrative Assistant for the Stroke Unit who keeps everyone on track.

## NEURO-MEDICINE INTENSIVE CARE UNIT

By: Debra Roberts, MD, PhD

The NMICU service was founded in 2013 based on the vision of Robert Holloway MD, MPH, Chair of Neurology, Webster Pilcher, MD, PhD, Chair of Neurosurgery and Michael Apostolakos MD, Director of Adult Critical Care. Manjunath Markandaya, MD, MBBS became the first NMICU medical director and neurointensivist with Amrendra Miranpuri, MD serving as the surgical co-director. At that time the fledgling NMICU consisted of 8 dedicated beds within the Burn Trauma ICU, and was staffed by just 1 attending and 3 advanced practice providers (APPs). In June 2014 the NMICU moved to unit 812 with its own newly renovated, state-of-the-art 12 bed unit.

#### **The NMICU Team**

The NMICU team has grown substantially since inception. A second neurointensivist, Debra Roberts MD, PhD, joined the service in 2015 and took over as medical director later that year. Christopher Zammit, MD, who is trained in both Neuro-ICU and Emergency Medicine, recently joined the program. He provides important perspective to bridge patient care from the ED to the ICU.

There are now 7 APPs who cover the unit 24/7. The APPs work closely with the NMICU nurses to ensure a high level of patient care, maintenance of communication with consulting teams and engagement of patients' families. Our nurses play a key role within the NMICU. Our nurse-led rounds help engage all team members, facilitate documentation, and prevent errors. The NMICU is also fortunate to have a dedicated staff pharmacist, social worker, respiratory therapists, a nutritionist and rehabilitation specialists.

#### **Clinical Practice**

The NeuroMedicine team strives to provide the highest level care to critically ill patients with complex neurological and neurosurgical diseases. We specialize in the management of cerebral edema, intracranial hypertension, traumatic brain injury, acute ischemic stroke, intracranial hemorrhage, spinal cord injury, status epilepticus, and neuromuscular respiratory failure. Advanced level procedures and monitoring are performed by our team including intracranial pressure monitoring, pupillometry, endotracheal intubation and ventilator management, central venous catheterization, arterial line placement, bronchoscopy, diagnostic ultrasonography, cardiac output monitoring and targeted temperature management/therapeutic hypothermia. Olga Selioutski, DO, with the Strong Epilepsy Center, has worked tirelessly to develop a continuous EEG program and consultation service to guide care of patients with seizures and disorders of consciousness.

NMICU faculty and staff have helped develop hospital and ICU-wide guidelines for many disorders including acute ischemic stroke, intracranial hemorrhage, targeted temperature management, osmotic management of cerebral edema, tPA reversal and pentobarbital coma induction.

#### **Education**

Education of residents, medical students, and fellows in the management of the brain injured patient is a priority for our team. We have expanded the number of programs rotating with us every year since inception to include: Neurology, Neurosurgery, Anesthesia and Emergency Medicine residents rotating in the unit throughout the year. Medical students join the team for 2 week blocks during their Neurology Clerkship and fellows from Surgical and Anesthesia Critical Care frequently elect a month or more in the NMICU during their training.

September 2016 will inaugurate a new monthly NMICU lecture series for the Neurology & Neurosurgery residents covering major topics encountered in the NMICU. We also participate in the neurology & neurosurgery resident lecture series and the Neurologic Support section of the Fundamentals of Critical Care Support (FCCS) certification course.

We recognize the importance of APP education and have established a twice monthly APP teaching session. This session is dedicated solely to refining our APPs neurocritical care knowledge base and is taught at a level appropriate to their needs. Topics covered include intracranial pressure management, mechanical ventilation techniques and the key concepts of neuroanatomy and physiology.

NMICU faculty and staff have taken the lead in Emergency Neurological Life Support (ENLS) certification courses for

URMC residency programs and at regional hospitals. The goal of these courses is to improve patient care and outcomes during the first few hours after an acute neurologic injury. Plans are underway to develop a NeuroCritical Care Fellowship program.

#### **Quality Improvement and Research**

The NMICU faculty and staff are devoted to patient safety and quality assurance. Our APPs and nursing staff are highly engaged in quality improvement projects and are encouraged to voice any concerns or opportunities to improve. We have started an "Ever Better Board" to encourage staff input on safety and quality projects, and we review all mortalities monthly. Joint M&M conferences between the NMICU and the Stroke and Neurosurgery services stimulate collaboration and discussion. These conferences have led to guideline updates and the initiation of new protocols.

Research projects are ramping in the unit. We recently completed a trial testing a non-invasive intracranial pressure monitoring device and are awaiting the device's FDA approval. A randomized controlled trial of treatment for super-refractory status epilepticus is currently underway. We are in the protocol development stage of an observational study to non-invasively monitor cerebral edema burden in stroke patients. Finally, we are doing a retrospective study of pupillometry for neurosurgical decision-making regarding the need for hemicraniectomy.





## HEADACHE CENTER

By: Raissa Villanueva MD, MPH

### Faculty

Raissa Villanueva MD, MPH, Division Chief  
Heidi Schwarz MD  
Caren Douenias MD

### Nurse Practitioners

Valerie Davis NP  
Rachael Skeldon NP

### Nurses

Holly Gekoski RN  
Corinne Kiseleski RN  
Michelle Smith RN

### History

The UR Department of Neurology opened a Headache Center in February 2014 with the recruitment of Dr. Catherine LaVigne, a headache specialist. The division's initial focus is on caring for complex headache and facial pain patients. Dr. Heidi Schwarz was recruited back to URM in June 2014 to join both Raissa Villanueva, who had been practicing headache medicine within general neurology, and Carly LaVigne. We recently recruited Dr. Caren Douenias, a longstanding private practice neurologist and headache specialist from Corning, New York to join our team.

### Clinical Activities

During the first 2 years, the clinical activities of the Division expanded greatly with currently over 1200 patient visits per year. We provide medical management and interventional procedures for complex headache and facial pain patients, including botulinum toxin injections and targeted nerve blocks. We currently see patients on the 5th floor of the Ambulatory Care facility with plans to move over to expanded space at Westfall Road in the Fall of 2016. We have a full multi-disciplinary model of care, fully incorporating nurse practitioners and nurses into the overall management of our patients.

### Teaching Activities

We are very active teaching neurology residents, pain fellows, and medical students. We provide a series of lectures to the neurology residents and occasionally give headache updates at Neurology Grand Rounds. Our goal is to establish a United Council for Neurologic Subspecialties (UCNS)-accredited Headache Fellowship and to enroll our first fellow within the next two years.

### The Future

In the future, we hope to continue to grow the faculty and expand to become a multidisciplinary clinic and begin taking part in clinical research.



## SLEEP DISORDERS DIVISION

By: Michael E. Yurcheshen, MD

One of the department's newest divisions, sleep medicine at the University of Rochester has benefitted from neurology's strong clinical, educational, and research base. The division has blossomed into the premier regional program, and is gaining visibility on a national stage.

### History

Although a sleep disorders program was not considered a division of neurology until the early 2000's, no history of the discipline in Rochester would be complete without acknowledging Dr. Richard Satran. A founding member of the department, and a champion of the biopsychosocial model, Dr. Satran is the forefather of sleep medicine at the University of Rochester. Dr. Satran evaluated and managed patients with sleep disorders just over a decade after the first description of REM sleep as a distinct state. A 1982 Democrat and Chronicle article cited Dr. Satran as one of the only sleep specialists in the region.

Sleep in Rochester and elsewhere is a multidisciplinary specialty. The clinical field was advanced locally by pulmonologist Dr. Donald Greenblatt who started many of the regions' clinical centers, and eventually founded the University's first dedicated clinical sleep disorders practice in 2000. He was joined by another pulmonologist,

Joe Modrak MD. Michael Perlis PhD and later Wilfred Pigeon PhD brought expertise from the psychiatry department. Neurology joined the division, primarily through the efforts of the late Dr. Kenneth Plotkin who was recruited after completing residency and sleep training at Georgetown in 1998, and Dr. Lynn Liu from Duke in 2000. They worked closely with the pulmonologists, breaking through the traditional silos of academia, to develop a robust and vibrant multidisciplinary program.

Pediatric expertise was added in 2000, with Dr. Heidi Connolly, pediatric pulmonologist, as program director. This practice was initially located within the adult sleep center on South Clinton Avenue, but grew rapidly, and has moved twice in the past 10 years to accommodate the burgeoning patient need.

The development of sleep medicine in Rochester beyond primarily a clinical practice to a full-fledged academic endeavor has occurred in the past decade. Adult neurologists Dr. Michael Yurcheshen, recruited back from Michigan and Dr. Jonathan Marcus, and pediatric neurologist Dr. Laura Tomaselli have all joined the sleep program, and through their diligent efforts are moving the division forward to take advantage of educational and research strengths of the division.

Dr. Carolina Marcus, an allergist/immunologist from the Department of Medicine, has rounded out the division in the past year.

#### Sleep Disorders Center, Missions

##### Clinical Care

Regardless of which faculty members are staffing the sleep disorders center, patient care has been at the center of the mission. This emphasis has expanded since many other private practice centers in Western New York are contracting or closing. Patients are referred to the UR Medicine Sleep Center from Rochester, the Southern Tier, Syracuse, and beyond. The multidisciplinary team approach has been a successful model for balanced patient care, and the cadre of skills provided by our neurologists and others has led to the program's success.

Although the most common referrals are for evaluation and management for obstructive sleep apnea and insomnia, the program manages unusual and rare cases including narcolepsy, parasomnias, and primary hypersomnias. The pediatric sleep center is particularly well-known as the only such program between Cleveland and New York City. With the relationship between sleep disorders and other disease states, neurologic and otherwise, the demand for clinical services continues to grow.

##### Education

Once our multispecialty program was established, our training program has led the program to distinction. One of only 72 such training programs in the country, the sleep medicine fellowship was developed under the well-established neurology education umbrella. Mike Yurcheshen has served as the program's director since its inception in 2009. Since then, the program has trained pulmonologists, pediatricians, neurologists, family medicine physicians, and otolaryngologists in sleep medicine. Our trainees have assumed positions in both private practice and academia nationwide. Because of our diverse faculty body, other fellowship programs routinely mandate rotations in Rochester to benefit from the faculty's expertise, particularly in the pediatric sleep center. In addition to formal fellowship training, the sleep center has accommodated scores of fellows, residents, and medical students on elective from the University of Rochester's other training programs. Since 2003, nine graduates from our adult and pediatric neurology programs have gone on to formally train in sleep medicine fellowships, either in Rochester or across the country.

##### Research

Our most aspirational goals include further buttressing and development of basic science, translational, and clinical research in the fields of sleep medicine and circa-

dian sciences. In addition to Dr. Pigeon's ongoing work, other faculty members have advanced these initiatives. Maiken Nedergaard MD, D.M.Sc. effected a world-wide paradigm shift with her 2013 publication regarding the glymphatic system and its importance in the functionality of sleep. Michael Selix PhD is a recent appointee in the endocrinology division of the Department of Medicine, and is the university's first chronobiologist, studying circadian rhythm and its impact on metabolic disease. Other research projects include the role of sleep disordered breathing in suicidality in military veterans, pediatric sleep and the control of ADHD, and biomarker studies in patients with parasomnias at risk for neurodegenerative conditions.

# CENTER FOR NEURAL DEVELOPMENT AND DISEASE (CNDD)

By: Harris A. Gelbard, M.D., Ph.D., Director

#### Neurology Faculty

Harris A. Gelbard, M.D., Ph.D.  
Matthew J. Bellizzi, M.D., Ph.D.  
Marc W. Halterman, M.D., Ph.D.  
Shao-Ming (Pat) Lu, Ph.D.  
Alexander R. Paciorkowski, M.D.  
Zhenzhi Tang, Ph.D.  
Ning Tong, B.Med., Ph.D.  
Charles A. Thornton, M.D.

#### Secondary Faculty

Sina Ghaemmaghami, Ph.D. (Biology)  
Gail V.W. Johnson, Ph.D. (Anesthesiology,  
Pharmacology & Physiology)

#### Faculty Appointed in Other Departments

Douglas S. Portman, PhD. (Biomedical Genetics,  
Biology, Neuroscience)  
Rupal I. Mehta, M.D. (Pathology and Laboratory  
Medicine, Neuroscience)

#### Professor Emeritus

Paul D. Coleman, Ph.D.

#### Adjunct Faculty

William J. Bowers, Ph.D.

The Center for Neural Development and Disease (CNDD), soon to be renamed as the Center for NeuroTherapeutics Discovery (CND), grew out of the Center for Aging and Developmental Biology (CADB), founded by Howard J. Federoff in 1999. Harris ("Handy") A. Gelbard, from the Division of Child Neurology was invited to be one of the original members in 1999. In 2007, after Dr. Federoff had accepted a position as CEO of Georgetown University Medical Center, Dr. Gelbard became the interim director of CADB, until renaming it the CNDD in 2008. Since that time, Dr. Gelbard's initial 5-year appointment as the Director has been renewed until 2018. CNDD has had a multidisciplinary, cross-department constituency, with members from Biology, Biomedical Genetics, Neurosurgery, Pathology and Laboratory Medicine, as well as Neurology. The core Neurology faculty that now comprise CNDD include Matthew ("Matt") J. Bellizzi,

Harris A. Gelbard, Marc W. Halterman, Alexander R. Paciorkowski and Charles A. Thornton.

Dr. Bellizzi, a member of the Gelbard laboratory, has an interest in hippocampal and cortical synaptopathies that occur during multiple sclerosis (MS) and progress independently of current immunomodulatory therapies. His research is currently focused on prevention and reversal of synaptic damage using receptor antagonists for platelet-activating factor and mixed lineage kinase inhibitors developed in Dr. Gelbard's lab. Dr. Halterman's research program focuses on hypoxia and stroke, with a therapeutics program that targets development of novel tetracycline compounds. Dr. Halterman has had a strong focus on bioinformatics, developing tools for screening novel drug targets and pathway analyses in the CNS, relevant to his stroke therapeutics program. Dr. Gelbard's research, while largely focused on HIV-1 associated neurocognitive disorders (HAND), has been responsible for the discovery and development of over 200 compounds, including a lead candidate, URM-099 that is a "selectively non-selective" inhibitor of mixed lineage kinase type 3 (MLK3). URM-099, and its congeners are protected by three national and international patents, and have proven utility in models of post-operative cognitive dysfunction (POCD), MS, Alzheimer's disease (AD), eradication strategies for HIV-1, non-alcoholic steatohepatitis (NASH) and ischemia-reperfusion injury and myocardial infarction. URM-099 is in clinical development for several indications, including POCD, MS and HAND, with a newly formed company, WavoDyne Therapeutics. Dr. Gelbard serves as the head of the scientific advisory board. Dr. Paciorkowski, a pediatric neurologist and neurogeneticist, uses next generation sequencing approaches for gene discovery in severe developmental epilepsies such as infantile spasms in order to model and treat the molecular events that lead to phenotypic expression of the epileptic encephalopathies. Dr. Thornton's research has focused on the molecular pathogenesis of myotonic dystrophy, with the creation of several paradigm-shifting models for the disease and an entirely new approach to therapy using antisense oligonucleotides.



# CENTER FOR TRANSLATIONAL NEUROMEDICINE

By: Steve Goldman, M.D., Ph.D. and Maiken Nedergaard, M.D., D.M.Sc.

## Faculty (including both Rochester and Copenhagen)

### Division of Cell & Gene Therapy

Martha Windrem, PhD  
 Abdellatif Benraiss, PhD  
 Romane Auvergne, PhD  
 Joana Osorio, MD  
 Tamara Major, PhD  
 Robert Agate, PhD  
 Su Wang, MD, PhD  
 Robin Williamson, PhD  
 Devin Chandler-Militello, MA

### Division of Glial Therapeutics

Alex Verkhravsky, MD, PhD  
 Helene Benveniste, MD, PhD  
 Iben Lundgaard, PhD  
 Weiguo Peng, MD  
 Nanhong Lou, MD  
 Rashid Deane, PhD  
 Fengfei Ding, PhD  
 Erlend Nagelhus, PhD  
 Jeff Iliff, PhD

The Center for Translational Neuromedicine was established in 2007 as a joint enterprise of URMC's departments of Neurology and Neurosurgery. It was formed from the merger

into a single unit of the Goldman and Nedergaard labs, which were recruited to Rochester from Weill Cornell medical school a few years earlier. In the years since its formation, it has evolved into one of the most productive centers for basic and early stage translational neuroscience in the US.

Mission and emphasis: Fundamentally, the goal of the Center is to develop new approaches for both investigating and treating neurological diseases, primarily using the tools of physiology and imaging coupled with cell and gene therapy. Our emphasis is on using these technologies to enable neural and glial cell replacement in the adult brain and spinal cord, as a means of both disease modeling and therapeutic repair. Our disease targets are those attributable to dysfunction or loss of specific cell types; for instance, demyelinating disease is studied as a potential target for oligodendrocyte progenitor cell delivery, while Huntington's Disease is studied as a potential beneficiary of both glial replacement and medium spiny neuronal replacement from endogenous stem cells. Conversely, gliomas and gliomagenesis are studied from the standpoint of dysregulated signaling by endogenous glial progenitors. In parallel studies, interstitial fluid transport and glymphatic flow are studied from the standpoint of CSF fluid dynamics and protein clearance, and its dysregulation in proteinopathic neurodegenerative disorders, including Alzheimer's disease.

The principal groups in the Center include Dr. Goldman's, whose division focuses on neural stem and glial progenitor

biology and the translational application thereof, and Dr. Nedergaard's, whose division focuses on astrocytic physiology and pathology, as well as on cerebral blood flow and its glial regulation. Together, the labs are expanding the scope of glial biology, such that disorders long thought neuronal in nature are now being investigated as disorders principally of glial cells, including both astrocytes and oligodendrocytes as well as their progenitors.

### Goldman Lab (Division of Cell & Gene Therapy)

- Glial progenitor-based cell therapy in myelin disease: pediatric leukodystrophies & progressive MS
- Glial replacement and induced neurogenesis as treatments for Huntington Disease
- Use of human iPSC and ES cell-derived neural and glial progenitors for modeling neuropsychiatric diseases, including schizophrenia and frontotemporal dementia
- Transcriptional architecture and modulation thereof of human neural and glial progenitor cells
- Identifying selectively expressed targetable pathways in glioma stem cells of the adult CNS

### Nedergaard Lab (Division of Glial Therapeutics)

- Mechanisms of CSF clearance and fluid homeostasis in both normal and injured CNS
- The role of astrocytes in epileptogenesis and the treatment of seizure disorders, especially post-stroke
- Therapeutic targeting of neuronal-astrocytic interactions in stroke and traumatic brain injury
- Developing new modalities for imaging native and transplanted glial progenitors in vivo
- The role of astrocytes in the regulation of sleep & arousal
- The evolutionary biology of astrocytes
- Imaging of fluid flow and convection in the adult brain

International reach: In 2014, the Center opened a new laboratory in the University of Copenhagen Faculty of Medicine in Denmark, as the Center for Basic and Translational Neuroscience. This new department is supported by significant funding from the Novo Nordisk Foundation; Drs. Goldman and Nedergaard were co-recipients of the 2014 Novo Laureate Awards, which enabled this new facility with a 14 year grant of 160 million Danish kroner (\$26 million). Additional funding has since been achieved through a variety of Danish and European funding agencies, enabling the rapid growth of the facility there. Many faculty and students have joint appointments between Rochester and Copenhagen, and the labs are both administratively and scientifically integrated. Clinical staff have opportunities at

Rigshospitalet, the Copenhagen University Hospital, as well as in the laboratory. This venue offers interested residents and fellows the possibility of gaining significant experience in the European research environment, as well as with European clinical and regulatory systems. In addition, Center faculty have over 3 dozen active collaborations with other labs and clinical divisions in the US and world-wide, with additional current foreign opportunities in Sweden, Germany, the UK, Israel and Japan.

Structure and track record: At Rochester, the Center now (July, 2106) includes over 70 faculty, postdoctoral fellows, technical associates, administrative staff, and students. In addition, the Copenhagen lab now includes over 40 faculty, postdocs, students and staff, for a total census of 110 scientists, including basic and translational neuroscientists alike. The labs are highly collaborative, with many students and fellows working with several faculty. The group's work is supported by several dozen national and international grants, with current funding commitments approaching \$50 million. Past and present pharmaceutical collaborators include Biogen Idec, Sanofi and Merck, as well as QThera and Healios, advancing the translational scope of these studies. The Center has enjoyed consistent productivity, and is one of the most well-recognized in American neuroscience; in the last 3 years alone, the Center's research has appeared in Science, Science Translational Medicine, Science Signaling, Cell, Cancer Cell, Cell Stem Cell, Developmental Cell, Development, Nature Medicine, Nature Biotechnology, Nature Neuroscience, Nature Communications, the Journal of Clinical Investigation, Proceedings of the National Academy of Sciences, the Journal of Neuroscience, Neuroscience, Neurotherapeutics, Annals of Neurology, Glia, Experimental Neurology, Scientific American, and others.



## CENTER FOR HUMAN EXPERIMENTAL THERAPEUTICS (CHET)

By: Ray Dorsey, MD, Alicia Augustine, PhD, MS-CI, Karl Kieburtz, MD, MPH, Erika Augustine, MD

### Humble Beginnings:

In 1987, the Center for Human Experimental Therapeutics had its origins in the formation of the Coordination and Data Center ('CDC') founded by Dr. Ira Shoulson in response to an operational need to manage the large, NIH-sponsored DATATOP (Deprenyl and Tocopherol Antioxidative Therapy of Parkinsonism) clinical trial. The DATATOP trial recruited 800 participants from 28 academic research centers across the US and Canada. All study operations were conducted by 6 'CDC' employees via telephone, fax, and postal mail out of offices located in the Town House building (recently demolished in the construction of College Town). Dr. Shoulson also initiated the formal assembly of the participating academic institutions into the Parkinson Study Group, which was also administratively housed at the 'CDC', and is now the largest not-for-profit scientific network of Parkinson centers in North America, currently managed at Massachusetts General Hospital. In 1993 Dr Shoulson led the creation of the analogous Huntington Study Group, which is still located in Rochester.

In 1991 the CDC was re-named the Clinical Trials Coordination Center (CTCC), and Dr. Karl Kieburtz was named the director. Over the next 18 years, as a unit in the Neurology Department, the CTCC assisted in the design and conduct of multi-center randomized controlled trials for Parkinson, Huntington, and HIV disease in partnership with the NIH, foundations, and industry. In 2003, the CTCC converted from a paper-based study document management system to an electronic clinical trials management system. This process required vendor selection, infrastructure upgrading, staff and investigator training, internal auditing to assure compliance with federal regulations, and roll out to clinical trial sites. The CTCC maintained quality operations throughout the process and, between 1997 and 2015, the CTCC has been instrumental in conducting pivotal clinical trials in support of FDA approval for four novel, symptomatic therapies for Parkinson disease (pramipexole, entacapone, rasagiline, and rotigotine), one for Huntington disease (tetrabenazine), and recently, one for primary periodic paralysis (keveyis) (Table 1). It is anticipated that two more therapies (one for Huntington disease and one for Friedreich's Ataxia) may receive FDA approval in the next year.

**Table 1: CTCC conducted pivotal clinical trials in support of FDA approval for six novel therapies**

| DATE        | DRUG           | SPONSOR                                  | INDICATION                 |
|-------------|----------------|--|----------------------------|
| June 1997   | Pramipexole    | Pharmacia & Upjohn, Boehringer Ingelheim | Parkinson disease          |
| June 2003   | Entacapone     | Orion, Novartis                          | Parkinson disease          |
| May 2006    | Rasagiline     | Teva and Lundbeck                        | Parkinson disease          |
| May 2007    | Rotigotine     | Schwarz Pharma                           | Parkinson disease          |
| August 2008 | Tetrabenazine* | Prestwick Pharma Ovation Pharma          | Huntington disease         |
| August 2015 | Keveyis*       | Taro Pharma                              | Primary Periodic Paralysis |

\*Orphan Designation

In 2008, the Clinical Materials Services Unit (CMSU) was created in response to a growing URM C need for a dedicated, regulatory-compliant facility, operating under current Good Manufacturing Practices (GMP) to provide all investigational drug/device packaging, labeling, distribution, and return services for the many large, multi-center, multi-year clinical trials being conducted by URM C. The CMSU currently occupies 8,000 sq. ft. of cGMP compliant space located at 77 Ridgeland Rd., Rochester, NY.

### Present-day Success:

In 2009, Dr. Kieburtz, with the support of the UR medical school Dean and UR Medical Center CEO, created the Center for Human Experimental Therapeutics (CHET). CHET was designed to provide guidance and assistance to University investigators who wished to conduct human experiments, including clinical trials. This activity was initiated by combining the operational infrastructure of the CTCC and CMSU with a cadre of academic faculty with clinical investigation experience, including pharmacometrics and biostatistics. CHET's founding mission was to conduct hypothesis-driven, rigorously-designed, initial investigations of novel therapeutic interventions for human diseases in an academic setting and for collaborators across academia (including disease-specific academic study groups), industry, federal agencies, or private institutions. CHET's capacity for regulatory-compliant clinical research activities and services span the full spectrum of investigational, managerial, and financial activities, including: protocol design and development, site recruitment and management, study participant recruitment and retention strategies, quality assurance and regulatory compliance training, clinical trial database design, operational data acquisition, processing and query resolution, administrative and clinical data reporting, site monitoring, structuring of project governance and data safety monitoring committees, overall financial and administrative project management, and drug supply chain manage-

ment. In practice, CHET provides services that are much like a clinical research organization (CRO), but CHET's advantage over a CRO is the breadth and depth of the available academic faculty expertise, the almost thirty years of experience in clinical trial design and conduct, and the commitment to publication of research findings and public posting of research databases.

CHET's mission also aligned with the objectives of the University of Rochester's Clinical and Translational Science Institute (first funded in 2006), in which CHET served a natural role as the home for the initial step in translational science: translational of basic science discoveries to human clinical investigation. In keeping with this multi-disciplinary role, the CHET faculty and staff offices were re-located to the newly-constructed Saunders Research Building in 2011. CHET supports the mission of the CTSI in several ways: 1) providing consultative services to academic investigators with regard to clinical study design and operations, 2) developing tools and technologies for 21st century clinical trials, and 3) fostering external relationships with researchers and drug developers.

To date, CHET has conducted 120 clinical trials, enrolled 39,000 participants from sites across North America, Europe and Australia, and partnered with over 80 cross-sector collaborators and sponsors (e.g. academic study groups, federal agencies, pharmaceutical industry, and private foundations) (see Figure 1), resulting in over 350 publications in leading journals, such as Lancet, Neurology and JAMA, and six FDA-approved treatments (see Table 1 above). In the field of neurology, the operational capacity of CHET was fully implemented in the conduct and support of the largest clinical trials for Parkinson disease (NINDS Exploratory Trials in Parkinson Disease Long-term Study 1 [NET-PD LS1]) and Huntington disease (Creatine Safety, Tolerability, & Efficacy in Huntington's Disease [CREST-E] and Coenzyme Q10 in Huntington's

Disease [2-Care]) to date. In addition to neurologic diseases, CHET expanded its disciplinary reach to neuro-ophthalmology (in collaboration with the Neuro-Ophthalmology Research Disease Investigator Consortium), Friedrich's ataxia (in collaboration with the Friedrich's Ataxia Research Alliance), periodic paralysis, Batten disease, and other rare conditions.



All of CHET's efforts have been collaborative and have relied on relationships with neurologists, pharmacologists, biostatisticians, and outstanding staff. At the University of Rochester, close collaborators have included Drs. Kevin Biglan, Steven Feldon, Ronnie Guillet, Berch Griggs, Fred Marshall, Irene Richard, Giovanni Schifitto, and Wojciech Zareba. Regionally, CHET has had close collaborations with the School of Pharmacy and Pharmaceutical Sciences at the University at Buffalo, especially with Dr. Eugene Morse. Nationally, CHET has worked closely with Drs. Merit Cudkowicz, Steven Hersh, Michael Schwarzschild, and Mark Kupersmith, who have each led major NIH-funded multi-center clinical trials and consortia of academic investigators.

Since its inception, CHET has benefited from an outstanding relationship and collaboration with faculty in the Department of Biostatistics and Computational Biology, especially Drs. Chris Beck, Michael McDermott, and David Oakes, who together have led or supported approximately 90 trials. Finally, CHET has long benefitted from an outstanding team of project managers, database programmers, site monitors, information analysts, systems managers, attorneys, finance administrators, pharmacologists, and countless others. Among the many who have served for much of CHET's existence are Alice Rudolph (recently retired), Debbie Baker, Connie Orme, Elise Kayson, Cornelia Kamp (director of the CMSU), and Cindy Casaceli, who has directed the Clinical Trials and Coordination Center for the last 7 years.

CHET has also been a primary training ground for many

of the Department of Neurology's Experimental Therapeutics Fellows who went on to careers within the University, at numerous other institutions and private companies across the country. Fellows included: Karl Kieburtz, Robert Holloway, Fred Marshall, Giovanni Schifitto, Steve Schwid, Irene Richard, Andrew Siderowf, Karen Blindauer, David Song, Penelope Hogarth, Lin Zhang, Joy de Marcaida, Tom Guttuso, Kevin Biglan, Sam Frank, Chris Hyson, Ray Dorsey, Tiffini Voss, Erika Augustine, Ryan Evans, Andrew McGarry, Charles Venuto, and Abeer Abu-Zeitone.

### Looking to the Horizon:

In 2014, Dr. Ray Dorsey assumed leadership of CHET and immediately expanded the vision of its research program to be one that would enable anyone anywhere to receive care, participate in research, and benefit from its advances. This vision builds upon the strong foundation in the design and conduct of traditional clinical trials, but seeks to incorporate evaluation of ground-breaking research in the fields of telehealth (e.g. video conferencing and smartphone technology) and wearable sensors as a means to increase access to care (telemedicine) and accelerate clinical research. These pursuits, which include the first national randomized controlled trial of telemedicine for Parkinson disease, have received support from the Patient-Centered Outcomes Research Institute and NIH, as well as early interest from the pharmaceutical industry.

In addition, through the leadership of Dr. Gretchen Birbeck, CHET's efforts have begun to expand to Africa to support clinical investigations of important treatments for cerebral malaria. These efforts are poised for greater growth in the future.

Over the past generation, CHET has re-shaped the conduct of clinical research and has advanced knowledge to improve health for thousands, if not millions, of individuals. What began as a Coordination and Data Center that served a single clinical trial, has evolved to an international, multi-faceted research and operations center, which has redefined how academic institutions can conduct rigorous clinical investigation on a global scale and is leading the field in evaluation of how to harness the tools and technologies of the early 21st century technology to extend the reach and impact of research and clinical care beyond what was previously possible.

# TRAINING PROGRAM IN THE EXPERIMENTAL THERAPEUTICS OF NEUROLOGICAL DISEASE

**Program Director: Robert C. Griggs, M.D.**

**Co-Directors: Robert Holloway, M.D., M.P.H., Steve Goldman, M.D., Ph.D.,**

**Karl Kieburtz, M.D., M.P.H., and David Oakes, Ph.D.**

**Assistant Program Director: Erika Augustine, M.D., M.S.**

As early as the mid-1970's, the Rochester Department of Neurology challenged the therapeutic nihilism of most neurology departments and neurologists, recruiting and supporting a generation of leaders focused on experimental therapeutics: first in neuromuscular diseases, then movement disorders and stroke, followed by multiple sclerosis/neuroimmunology, HIV-neurology, epilepsy and other subspecialties. As fellowship programs began to develop within the department, faculty leaders Ira Shoulson and Berch Griggs enlisted the help of biostatisticians to train residents and fellows in the skills essential to developing, supporting and conducting clinical trials.

The department's training program began officially with the acceptance of Karl Kieburtz as the inaugural fellow in 1989. The initial submission of a T32 grant to the NINDS met with an unusual review: A majority report that indicated that "no one goes into neurology to treat patients" and an enthusiastic minority report that applauded the notion of developing novel treatments for neurological diseases. The resubmission argued that neurotherapeutics was the future of neurology and was funded for 4 slots in 1990. Since most trainees remain in the program for 2-3 years, this funding enabled us to recruit an average of 2 trainees per year. The program has successfully competed for refunding in 1995, 2000, 2005, 2010 and 2015 --- with the most recent renewal extending through 2020. We have also been successful at securing supplements to fund additional fellows on 4 occasions. Initially the NINDS did not encourage the inclusion of non-NINDS funded trainees in the program. However, the program has always insisted that the ideal training strategy is for fellows to seek alternative funding --- and if successful, the program can accept additional fellows. Recently, the NINDS has recognized that it is optimal if the program recruits, supports and trains additional fellows and encouraged us to do just that. Since the beginning, the program has also accepted trainees without U.S. citizenship/green card status --- and ineligible for T32 support. Highly talented individuals from the U.K., Italy, Canada, Thailand, China as well as US-trained residents who are foreign nationals have received training. In addition, many trainees have been supported by other federal and non-federal monies. Over 90% of trainees have been post-residency neurologists. In addition, the program has trained clinical neuroscientists with other backgrounds:

neuropsychology, psychiatry, pharmacology, emergency medicine, statistics, pediatrics.

**Program Structure and Goals:** The program trains post-residency fellows for a career in clinical neuroscience with a focus on experimental therapeutics including: (1) conceptualization, design, implementation, analysis, reporting and ethics of controlled clinical trials; (2) investigation of pathomechanisms and natural history of disease; (3) discovery of promising therapeutic agents; (4) examination of clinical biomarkers that help clarify therapeutic mechanisms and have the potential to serve as surrogate end points; (5) integration of potential treatments into clinical care by cost/benefit analyses, outcomes research, and health care economic considerations; (6) identification, recruitment, retention and longitudinal investigation of research subjects; and (7) mentored development of research proposals for extramural funding. The program has been strengthened by the Departments of Biostatistics, Psychiatry, Public Health Sciences, and Pharmacology and Physiology, and three interdepartmental centers: The Center for Translational Neuromedicine, the Neural Development and Disease Center, and the Center for Human Experimental Therapeutics.

**Participating Faculty Members:** The program directors and assistant fellowship director are joined by 18 mentors to create an interactive and collegial program that participates in activities with the trainees, and has numerous ongoing research collaborations.

Training is highly individualized but trainees participate in program seminars and establish a mentoring team to foster their success: The mentoring team is fundamental to the infrastructure of the training program. Each trainee works with a team that includes a clinical neuroscientist and a biostatistician and they are responsible for the trainee's program and development. The trainee and a specific single mentor agree early in the training on a long-term mentor/mentee relationship. A basic neuroscientist/mentor also guides the development of the trainee in appropriate focused areas of basic neuroscience. The Working Group on Therapeutic Trials (established in 1988 by Drs. Griggs and McDermott and now Co-directed by Drs. Dworkin and Busza) has been meeting 1-2 times a month since October 1988. Attended by all trainees and mentors, the Working Group provides an interactive forum for: (1) review and



critique of planned clinical trials; (2) presentation of statistical design for controlled trials; (3) review of preliminary results; (4) discussion of pilot data and idea-generation for future studies; (5) review of trainee proposals; (6) presentations by visiting clinical investigators.

Mellow Fellows, co-led by Drs. Kieburtz and McDermott, is a monthly meeting of fellows and mentors that has focused on issues of clinical trials and trainees' early plans for research projects. The meetings provide for a presentation of ideas and preliminary plans followed (and often interrupted by) a free-wheeling and far-reaching discussion of goals, issues, methods, practical limitations and ideas ranging from design and patient recruitment to funding and publication strategies. These sessions have forged collaboration, spawned projects, facilitated recruitment of trainees, and provided mentoring opportunities often lacking in more formal gatherings. The Interfaces Between Regulation, Law and Clinical Research is a seminar series that employs a case-based, interactive format to consider challenges met in the context of clinical projects by program fellows and mentors. Topics have included intellectual property, regulatory approvals, conflicts of interest, contract negotiation, consulting for Pharma, insider training, scientific misconduct, and DSMB service and liability. The Career Development Seminar Series (established in 2014 by Dr. Augustine, now co-directed with Dr. Andrew (Trey) Smith) provides support, education, and guidance for fellows regarding critical elements of success in academia and

career advancement. Topics have included grant writing, career development planning, promotion processes, team management, networking, CV and biosketch preparation, and scientific communication, among others.

The program has trained over 60 fellows who now have positions around the U.S. and throughout the world. The program has defined "success" broadly: academic positions, pharmaceutical industry leadership, and positions at the FDA, NIH or other Federal institutions. (See table) Currently there are seven trainees in the program and we anticipate that there will be ten trainees in 2017-18. At the time of the 5-year review of the program in 2013, the site visitors noted that the proliferation of subspecialty certification in neurology risked delaying the ability of post-residency clinical neuroscientists to get started on their research careers. They recommended that the program explore initiating research training in both ACGME- and UCNS-approved specialty training programs. In response to this recommendation Stroke, Neuromuscular Disease and Sleep all have accepted fellows focused on experimental therapeutics training who will begin to develop their research careers during their clinical training. Current and accepted trainees include: Ania Busza, Christopher Tarolli, Andrew (Trey) Smith, Tirisham Gyang, Jennifer Cialone, Shannon Dean, Johanna Hamel, Peter Creigh and Alex Fricke.

| Trainees in Experimental Therapeutics |         |                          |  |                                 |
|---------------------------------------|---------|--------------------------|--|---------------------------------|
| (* denotes T32 Support)               |         |                          |  |                                 |
| Fellow Name                           | Year(s) | Specialty/Subspecialty   | Current Location                                 | Current Position                |
| Christopher O'Brien, MD               | 1989-91 | Movement                 | Neurocrine Biosciences, Inc, San Diego, CA       | Chief Medical Officer           |
| Karl Kieburtz, MD*                    | 1989-93 | Movement                 | Uof Rochester                                    | Professor                       |
| Charles Thornton, MD*                 | 1991-93 | Neuromuscular            | U of Rochester                                   | Professor                       |
| Curtis Benesch, MD, MPH*              | 1992-94 | Stroke                   | U of Rochester                                   | Professor                       |
| Andrew Feigin, MD*                    | 1992-94 | Movement                 | Feinstein Insttit Medical Research North Shore U | Professor                       |
| Joanne Wojcieszek, MD*                | 1993-95 | Movement                 | Indiana U  | Associate Professor             |
| Neeru Sehgal, MD*                     | 1994-95 | Epilepsy/Ped Neurology   |  |                                 |
| Frederick Marshall, MD*               | 1994-95 | Movement/Geriatric       | U of Rochester                                   | Professor                       |
| Steven Schwid, MD*                    | 1994-96 | Neuroimmunology          |  | Deceased                        |
| David Finkelstein, MD*                | 1995-96 | Movement                 |  |                                 |
| Irene Richard, MD*                    | 1995-97 | Movement                 | U of Rochester                                   | Professor                       |
| Allen Lifton, MD*                     | 1996-97 | Neuromuscular            |  |                                 |
| Andrew Siderowf, MD*                  | 1996-98 | Movement                 | Avid Radio Phila PA                              | Medical Director                |
| Nirupama Laroia*                      | 1997-98 | Pediatrics               | U of Rochester                                   | Professor                       |
| Karen Blindauer, MD*                  | 1997-99 | Movement                 | Medical College of WI                            | Associate Professor             |
| David Song, MD, PhD*                  | 1997-99 | Movement                 | U C-San Diego                                    | Associate Professor             |
| Penelope Hogarth, MD*                 | 1998-00 | Movement                 | Oregon Health Sciences U                         | Associate Professor             |
| Lin Zhang, MD, PhD*                   | 1998-01 | Movement                 | UC-Davis   | Associate Professor             |
| J. Antonelle deMarcaida, MD*          | 1999-01 | Movement                 | Movement Disorders Ctr Hartford Hosp             | Director                        |
| Jeffrey Campbell, MD*                 | 1999-00 | Neurosurgery             |  |                                 |
| David Marcus, MD*                     | 1999-00 | Movement                 |  |                                 |
| Kevin Biglan, MD*                     | 2000-03 | Movement                 | U of Rochester                                   | Professor                       |
| Thomas Guttuso, MD*                   | 2000-03 | Movement                 | U of Buffalo                                     | Associate Professor             |
| Mark Mapstone, PhD*                   | 2000-03 | Cognitive/Behavioral     | U C-Irvine                                       | Professor                       |
| Garrett Riggs, MD*                    | 2001-04 | Cognitive/Behavioral     | Ucentral Florida -Orlando                        | Assistant Professor             |
| Samuel Frank, MD*                     | 2002-03 | Cognitive/Behavioral     | Beth Israel, Boston                              | Professor                       |
| Miriam Weber, PhD*                    | 2003-06 | Cognitive/Behavioral     | U of Rochester                                   | Associate Professor             |
| Louis Profenno, MD, PhD*              | 2003-05 | Psychiatry               |  |                                 |
| Richard Lango, MD*                    | 2004-05 |                          | Seattle WA                                       | Private Practice                |
| Joel May, MD*                         | 2004-05 | Stroke/Emergency Med     | U of Rochester                                   | Associate Professor             |
| Jill Miller, MD, PhD*                 | 2004-06 | Neuromuscular            | Melbourne Fl                                     | Private Practice                |
| Ray Dorsey, MD, MBA*                  | 2005-07 | Movement                 | U of Rochester                                   | Professor                       |
| David Gill, MD*                       | 2005-07 | Cognitive/Behavioral     | U of Rochester                                   | Clinical Assist Prof            |
| Chad Heatwole, MD*                    | 2006-08 | Neuromuscular            | U of Rochester                                   | Associate Professor             |
| Tiffany Voss, MD*                     | 2007-09 | Movement                 | Merck Research Laboratories                      | Director, Clinical Neuroscience |
| David Shprecher, DO*                  | 2007-09 | Movement                 | Banner Health, Sun Res Health Insttit Phoenix    | Director                        |
| Lehar Mehta, MD*                      | 2007-09 | Neuroimmunology          | Amgen  |                                 |
| Adam Kelly, MD*                       | 2007-10 | Stroke                   | U of Rochester                                   | Associate Professor             |
| Erika Augustine, MD*                  | 2008-09 | Pediatric Neurology      | U of Rochester                                   | Assistant Professor             |
| Ryan Evans, MD*                       | 2008-10 | Movement                 | Neurology Associates of Rochester                | Private Practice                |
| Andrew McGarry, MD*                   | 2008-10 | Movement                 | Cooper U Hospital                                | Assistant Professor             |
| Qing Ke, MD, PhD                      | 2009-11 | Neuromuscular            | Zhejiang U                                       | Associate Professor             |
| Araya Puwanant                        | 2010-11 | Neuromuscular            | U Pittsburgh Medical Center                      | Assistant Professor             |
| Jeffrey Statland, MD*                 | 2010-12 | Neuromuscular            | U Kansas   | Assistant Professor             |
| Charles Venuto, Pharm.D.*             | 2010-13 | Movement                 | U of Rochester                                   | Assistant Professor             |
| Annie Kiloran, MD                     | 2011-12 | Movement                 |  |                                 |
| Matthew Bellizzi*                     | 2011-13 | Neuroimmunology          | U of Rochester                                   | Assistant Professor             |
| Yi Zhang, MD PhD*                     | 2011-13 | Stroke                   | St. Louis U                                      | Neurology Resident              |
| Nicholas Johnson, MD*                 | 2012-13 | Neuromuscular            | U Utah   | Assistant Professor             |
| Rachel Biemiller, MD*                 | 2013-15 | Movement                 | Gunderson Health System WI                       | Assistant Professor             |
| Jessica Robb, MD*                     | 2013-15 | Neuroimmunology          | U of Rochester                                   | Assistant Professor             |
| Kelly Andrzejewski, MD*               | 2014-16 | Movement                 | U of Buffalo                                     | Assistant Professor             |
| Abeer Abu-zeitone, PhD.*              | 2014-15 | Movement                 |  |                                 |
| Andrew Smith III, MD                  | 2015-17 | Neuroimmunology          | U of Rochester                                   | In training                     |
| Annie Busza, MD, PhD *                | 2016-18 | Stroke                   | U of Rochester                                   | In training                     |
| Christopher Taroli, MD*               | 2016-18 | Movement                 | U of Rochester                                   | In training                     |
| Erika Wexler, MD*                     | 2015-16 | Pediatric Neurology      | Noran Neurological Clinic                        | Private Practice                |
| Christopher Hyson                     |         | Movement                 | Western U Ontario Canada                         | Assistant Professor             |
| Amy-Lee Bredlau                       |         | Pediatric Neuro-oncology | Medical University of South Carolina             | Assistant Professor             |



# CENTRAL ADMINISTRATION

By: Christine Miller

The tripartite missions of the Department of Neurology continue in great force under the leadership of Central Administration. Our clinical, teaching and research enterprise has grown to over \$61.3 million in revenue and international recognition of our teaching and research programs. This growth and success reflects our dedicated faculty and the administrative team that supports their work.

The department is organized into thirteen divisions, and managed through a central administrative structure. The role of the Department Administrator has seen some evolution in its leadership. Sadly, Virginia Weslowski left the department in 2010 after 12 years of service. Dr. Goldman then promoted Anthony Beckman into the role after serving in Neurology Research Administration from 2009 through 2010. With research administration as his calling, Anthony accepted a position in the Office of Research and Project Administration in January 2011. Anne Dickinson then took the reins for a short time in 2012. In January, 2013 the current Chair, Dr. Robert Holloway, recruited Christine Miller to be Department Administrator. During her tenure, she has strengthened the core structure of Central Administration by adding the new positions of Director of Acute Care Divisions, Christina Clary and Director of Divisional Operations, Lee Albert.

Research and Finance have been consolidated under the leadership of Sara Uschold. With a team of two research administrators, Emily Adams and Libby McClung, two research accountants, Allyson Fess and Matt Taber, we are able to effectively manage our growing research enterprise. Chris Annis, Senior Health Project and NeuroNext Coordinator, actively supports many of our Principal Investigators in the exciting world of clinical trials for neurological conditions. The finance side of our business is in the capable hands of Alanna Orr, Senior Accountant, with the help of Joe Kreeel and Charlie Levin as our Staff Accountant and Accounting Bookkeeper.

Lisa Oppelt continues to be the backbone of the Central Administration team. With over 30 years of experience in the department, she is a resource to many for her acumen in human resources, recruitment, promotion and tenure and nearly everything else that may come in question. Lisa oversees a stellar support team of Jessica Brown, Brittney Ellison, and Nancy Baldwin. Nancy continues in her role as Administrative Assistant for Central Administration and also supports Dr. Giovanni Schifitto. Jessica provides support of the Grand Rounds coordination and scheduling support of the Chair and Department Administrator. Brittney serves

in a new role after the retirement of Mary Eichorn and assists Clara Vigelette with the residency program as well as providing support for the Chair's office.

Our residency and fellowship programs continue to thrive under the administrative leadership of Clara Vigelette. Sadly, in May of 2014, we lost Nancy Benjamin after her courageous battle with cancer. New beginnings brought Lorie Wolfanger to residency administration, as the Medical Student Clerkship Coordinator and support to Dr. Ralph Jozefowicz. Magda Ramzy acts as the Residency Coordinator of Child Neurology.

The clinical arm of our department is managed by Tim Kehl, Nurse Manager, and Roxanne Cannarozzo, Practice Administrator. Our clinical business has seen tremendous growth and continues to evolve with the formation of the Neurology Access Center. Under the leadership of Tracy Kenney, this group manages all incoming calls to the department providing scheduling of appointments and triaging of patient calls to clinical providers. Our clinic footprint has grown with the addition of our combined Neurology and Neurosurgery Stroke clinic at 2180 South Clinton and an additional suite of over 9000 square feet of clinical space at 919 Westfall Rd. In early 2017, our Child Neurology clinic will move to a new state-of-the-art building on East River Road. Additionally, in January of 2014, Neurology acquired its first private practice in Bushnell's Basin.

Karen Calabro continues to oversee our billing team and is a standout for her skills both in her management and performance metrics. Due to this success, she was recently asked to oversee the billing administration for the Department of Ophthalmology. Karen has been a pioneer in the restructuring of her team to effectively manage coding, charge entry and collections.

Tiina Walsh was a new addition in 2016 as Human Resources Business Partner to both Neurology and Neurosurgery. She has brought a breath of fresh air and tremendous experience in human resource management and leadership to our Central Administrative team.

The department would also like to recognize the many years of service to those staff who retired from the department: Kathryn Smith, Patricia Limburg, Lisa Veyberman, Terri McDonald, Mary Eichorn, Patricia Hopkins, Shirley Thomas, Donna LaDonna, Adele Cook and Nancy Merriman. We wish them well in the next chapter of their lives and thank them for their dedication and service to the department.

# NEUROLOGY ALUMNI

By: Barney J. Stern, MD  
Resident Emeritus (1979)

Department of Neurology alumni include faculty, residents, and fellows who have been members of the Department. Many have moved on from the small cadre of faculty who joined Dr. Joynt 50 years ago, the Department has attracted hundreds of talented physicians, and many of them have chosen to remain in or in contact with the Department. The value that Dr. Joynt placed on creating a comfortable, humanistic environment in which to learn and educate, care for patients, and pursue scholarship and discovery has remained to this day and has led to relationships that endure long after leaving the Department.

Alumni remain loyal to a school or department for many reasons. In speaking with alumni over the years it is apparent that they continue their attachment to the Department because of enduring friendships, professional collaborations, and long-term mentoring relationships. Alumni recognize that Rochester's Department of Neurology represents a special "brand" that identifies a cohort with shared experiences, values, and professional accomplishments.

Dr. Joynt recognized the importance of alumni in the fabric of the Department when he took advantage of the American Academy of Neurology's decision in the early 1980's to reserve Tuesday evenings of the Annual Meeting for department reunions. From a small gathering of current and past faculty and residents, the reunion has grown to a much anticipated event that attracts dozens of individuals. Importantly, the reunion has fostered relationships that now connect alumni even though they were not in the Department during the same time span. These "inter-generational" relationships provide additional evidence as to the impact that the Department has had on alumni.

To recognize the contributions that faculty and alumni

have made to the Department, an alumnus award is presented to a current and former member of the Department at each annual reunion held at the Annual American Academy of Neurology meeting. Table I lists the Alumni awardees, who represent individuals with wide-ranging accomplishments. The awards ceremony is accompanied by a State of the Department presentation by the Chair and an update on education successes by Dr. Ralph Jozefowicz.

The Department is justifiably proud of its alumni, who have gone on to be well-respected neurologists in clinical practice, academics, government and industry. Many alumni have achieved senior leadership positions during their careers, and thus have been role models for countless others, thereby multiplying many-fold the impact that the Department has had on the lives of countless physicians. Alumni have been integral to development initiatives within the Department. Alumni have contributed to funds to honor Drs. Joynt, Marsh and Griggs.

Although we tend to only consider physician members of the Department when we think of alumni, we must also acknowledge as alumni the thousands of medical students that have benefitted from their interactions with the Department as well as the research scientists, nurses, technicians, and support staff that have been members of the Department at one time or another. All of these individuals have been touched by the Department and all represent the Department in some small way. Many of these alumni have maintained important ties the Department. Therefore, the Department's influence has extended far beyond the conventional view of a network of [neurologist] alumni.

The alumni of the Department are its enduring legacy. Dr. Joynt would be so very proud of us.

| Year | Neurology Alumni Award | Year | Neurology Alumni Award                       |
|------|------------------------|------|--|
| 1996 | Patricia Penovich, MD  | 2007 | Alastair Corbett, MD, Elizabeth McCusker, MD |
| 1997 | Barney Stern, MD       | 2008 | Joanne Lynn, MD                              |
| 1998 | Richard Rudick, MD     | 2009 | Perrin Pleninger, MD                         |
| 1999 | Richard Nordgren, MD   | 2010 | Randolph Schiffer, MD                        |
| 2000 | Susan Iannoccone, MD   | 2011 | Christopher Commichau, MD                    |
| 2001 | Mark Brown, MD         | 2012 | Michael F. Finkel, MD, FAAN                  |
| 2002 | Peter Calabresi, MD    | 2013 | Samuel A. Frank, MD                          |
| 2003 | Charles DeCarli, MD    | 2014 | Gerald L. Moriarty, MD                       |
| 2004 | Karen Johnston, MD     | 2015 | James P. Wymer, MD, Ph.D.                    |
| 2005 | Linda S. Williams, MD  | 2016 | Richard A. LaFrance, MD                      |
| 2006 | Daniel Giang, MD       |      |  |

# CURRENT AND FORMER NEUROLOGY FACULTY AND RESIDENT BIO'S

**Jamie Adams** started medical school at the University of Rochester in 2007. She completed her fellowship in 2012. Currently she is a Senior Instructor at the University of Rochester. Her current work interests are Parkinson's diseases, Huntington's disease, Dystonia, and Telemedicine. Her future plans are to continue as an attending movement disorder specialist here at the University of Rochester. She is married to Dan Lachant who works in Pulmonary and Critical Care as a fellow. They are expecting their first baby in October 2016. Her favorite "Pearl" came from Dr. Richard Barbano; "F's"- fame, fortune, freedom, family, fun. Another "pearl" she remembers is "repetition, repetition, repetition" from Dr. Ralph Jozefowicz. Her most memorable event was teaching neurology in Krakow, Poland during her third year of medical school. This was such a great experience and amazing trip! Her mentors include Richard Barbano, Ray Dorsey, and Ralph Jozefowicz. Her most important event was getting married to her husband and starting a family!

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**Jorge Almodovar-Suarez** was at the University of Rochester for clinical neurophysiology fellowship from 2010-2011. He is currently an Assistant Professor at Dartmouth-Hitchcock Medical Center. His work interests are patient care, student/resident education and leadership. He is married to Lara, they have a daughter (Emilia) and a dog (Luigi). His most memorable experience was performing an EMG on a patient with hammer toes and high arches, which he noted an unexpected post-synaptic myasthenic defect on motor nerve conduction studies. A few years later he received a call from Dr. Herrmann wanting to include him as an author on a novel based on his studies.

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**Michael Aptman** was a resident from 1972. Currently he is an associate clinical professor at Florida International University Medical School and he also volunteers at University of Miami Medical School. He has been married to his wife

Lynn for 47 years. He had 3 children, unfortunately one of his daughters was murdered in 1995 as a result he helped found melissainstitut.org for violence prevention.

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**Michel Berg** has been with the University of Rochester since 1987. He is currently a Professor and Director of the Epilepsy Program. His interests are assessing the generic equivalence of medications and developing an automated home medication dispenser. He is married to Dr. Sarah Nemetz and they have 2 children, Ben and Matt.

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**Gretchen Birbeck** joined the faculty at the University of Rochester in 2013. She is currently a Rykenboer Professor of Neurology at the University of Rochester. Her work interest are global neurology with a focus on epilepsy and infection – related seizures. She is married to the Chief of Neurorads at the University of Rochester.

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**Peter Como** served as faculty at the University of Rochester from 1984 to 2009. He is currently a Medical Reviewer at the Food and Drug Administration. His work interests are medical and clinical reviewer in the Division of Neurological and Physical Medicine Devices at the U.S. Food & Drug Administration. His future plans are to retire and start consulting. He is married to Lisa. His favorite "pearl" is when Dr. Joynt was asked if money from the pharmaceutical industry was tainted, his reply was "yes, it taint enough". The most important event from his time spent in Rochester was switching primary appointment from the Department

of Psychiatry to the Department of Neurology and becoming a member of the Movement and Inherited Neurological Disorders (MIND) unit. His mentors were Robert Joynt, Ira Shoulson, Roger Kuran, and Eric Caine. One of his accomplishments after leaving Rochester was being fundamentally involved in the FDA approval of recent drugs and medical devices for the diagnosis and treatment of neurological and psychiatric disorders.

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**Tim Counihan** served as faculty from 1997-2002. His most important event after leaving the University of Rochester was himself and son submitted an entry for the unfinished Sherlock Holmes pastiche series by the late great Bob Joynt, for which Neurology had invited submissions.

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**Cory Ford** was at the University of Rochester from 1982-1988. At the present time he is a Sr. Associate Dean at the University of New Mexico. He is interested in multiple sclerosis clinical care, multiple sclerosis clinical research, and research administration. His future plans are considering retiring by 2020 and plans to start a new career. He has a wife and two children. His most memorable event from living in Rochester was having interviewed and visited up the eastern seaboard, Philadelphia, New Haven and Boston but nothing felt right until the trip to Rochester.

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**Elmar Frangenberg** started his residency at the University of Rochester in 1969 and is now a Medical Director. His future plans is to maintain status quo. He has been married to his wife Catherine for 51 years. His favorite pearl was "when in doubt, go back to the patient" (Fred Horner). His mentors included Fred Horner, Bob Joynt, Richard Satran, David Marsh, Gary Myers, David VanDyke, and Agneta Borgstedt. His most important time in Rochester was while a resident, he presented a paper on the effects of roseola infantum on

the nervous system at an AAN convention and consulted on patients in the Newark State School under the tutelage of Dr. Frederick Homer, which lead him on a career path in the field of developmental disabilities. One of his major accomplishments was serving as a Chief of Medical Services at the Monroe Developmental Disabilities and as Medical Director of CP Rochester.

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**Kazuhiko Fukuda** completed his residency program at the University of Rochester. After mandatory retirement from the Tohoku University. He engaged in a private practice for seventeen years, then later retired. His future plans are to raise vegetables in a small garden on brighter days and read books on rainy days. He is married. His oldest daughter is a prefecture Delegate and his youngest is a physician nephrologist in Tokyo. He also has a son who is an Officer of a shipping business in Santiago, Chile. His favorite "pearl" was when Dr. Joynt asked him "Anything new?" he replied "Nothing special." Then Dr. Joynt said while smiling, "An ordinary thing is the best." The most memorable event from his time spent in Rochester was his income increased double after leaving the University. His mentors were: Dr. Joynt, Dr. Goldblatt, Dr. Marsh, Dr. Satran, Dr. Molinari, Dr. Summers, Dr. Mac Smith and Dr. Honch.

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**Daniel Giang** came to the University of Rochester in 1985 and completed the residency and fellowship program. He served as faculty until 1995. Currently he is a President at Loma Linda University. His work interests are fusing an academic medical center and a Federally Qualified Health Center to create the largest Teaching Health Center in the country. He is married to Sarah Roddy with 3 children. The most memorable event was in morning report as a senior resident, he suggested a diagnosis. Berch went with a different one which was not the correct one. Berch responded with a laugh: "Giang 1, Griggs 1000." That's when he knew simultaneously he had made it to the big leagues, but nowhere near Berch level. His most important accomplishment after leaving Rochester was serving on the AAMC task force that is transforming the Medical Student Performance Evaluation (Dean's Letter) into a reliable instrument that will promote holistic admissions for GME.

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**Berch Griggs** was Chief Resident 1970-1971 and joined the faculty in 1971. With Dick Moxley he established the Neuromuscular Disease Unit. He became Chair in 1986, serving until 2008. He has directed the Experimental Therapeutics of Neurological Disease training program since 1989, training over 70 fellows. He continues his own research on finding new treatments for muscle diseases. His work on periodic paralysis led to the FDA-approval of the first treatment for these muscle diseases (in 2015). His most important Rochester mentors were Bob Joynt and his colleagues Dick Moxley and Gary Myers. He and his wife Rosalyn have two daughters: Jennifer an oncologist at the University of Michigan and Heather an attorney in Rochester. They have 2 granddaughters and a grandson.

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**Robert Herndon** joined in 1977 until 1987 on the faculty at University of Rochester. Currently he is a Professor of Neurology at the University of Mississippi. He is interested in Demyelinating diseases, (MS, NMO) and Parkinson disease. He has been married 60 years with 3 children and 5 grandchildren. The most memorable event was the successful intrathecal interferon trial for treatment of MS which led to the phase III trial and launch of Interferon beta 1a for MS. His mentor was Robert Joynt who taught him a great deal about running a department. Also Robert Doty because he was an amazing neurophysiologist with an encyclopedic knowledge of neuroscience. After leaving Rochester he won a Life Time achievement award for his MS work. From the consortium of MS Centers Outstanding alumnus award from the University of Tennessee Medical School.

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**Linda Hershey** completed her fellowship from 1978 to 1980 at the University of Rochester. She has been retired since July 2016. Even though she is retired her current work interest is writing about dementia and mild cognitive

impairment with her colleagues from Oklahoma University Medical Center. Her future plans are to enter into training as a Stephen Minister. She is married to Charley and they have three children. Ed is a High School physics teacher in Chicago. Bill is an organic farmer in Eugene, OR and Erin is an orthopedic nurse in Portland, OR. A word of wisdom Dr. Ira Shoulson taught her was to pay close attention to the patients' mood and cognitive status. The most memorable event from the time she spent in Rochester was during the second year of fellowship she served as a "junior attending" at the Monroe Community Hospital. Her mentors were: Ira Shoulson, Thomas Gift, Leonor Rivera-Calimlim, Robert Joynt and Louis Lasagna. After leaving Rochester in 2010 she appointed Professor of Neurology, Ethelyn McElwee Endowed Chair in Alzheimer's Research, and Director of Dementia and Behavioral Disorders, University of Oklahoma Health Sciences Center.

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**Todd Holmquist** completed his residency, fellowship and serves as faculty at the University of Rochester since 2004. He is currently an Assistant Professor of Neurology at the University of Rochester. His work interests are attending physician for inpatient stroke and outpatient clinic, neurosonology, medical educator and LEAN process improvements. His future plans are to continue to work for UR Medicine Department of Neurology. He has a wife, Amelia, and son Luke. Some of his hobbies consist of spending time with his family, gardening, wining and dining. His favorite "pearl" was the way Dr. Robert "Berch" Griggs would describe a knowledge gap identified on bedside rounds as a "stumbling upon a morass of ignorance". Though it seemed intimidating at the time now he looks back and laughs. His most memorable event was playing poker with his fellow residents and Dr. Robert Joynt at his home after a journal club. He has several mentors: Robert Joynt, Robert Griggs, Ralph Jozefowicz, Curtis Benesch, and William (Scott) Burgin.

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**Ralph Jozefowicz** started the residency program at the University of Rochester in 1979. He continued with his fellowship and is now currently a Professor of Neurology. His work interests are Neurologic education General Neurology

and International medicine. In the future he would like to continue with the same profession until retirement. The most memorable event was being appointed the adult neurology residency program director in 1996. His 2 mentors are Bob Joynt and Berch Griggs. One of his most important accomplishments was receiving Fulbright Scholar Award for Lecturing in Neural Science and Neurology at Jagiellonian University in Krakow, Poland in 1992.

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**Natan Khishchenko** completed his fellowship at the University of Rochester in 2008. Currently he is a Director of Clinical Neurophysiology at Monroe Community Hospital. His work interests are growing general neurology and neurophysiology at RRHS. He is married and he and his wife have 3 children. Some of his hobbies are going to jazz and rock concerts and practicing aikido. His favorite "Pearl" word is from Dr. Emma Ciafaloni, "Why can't it (story) just be (the diagnosis)?" The most memorable event from his time in Rochester was having throat surgery in the middle of fellowship, not being able to talk for 2 weeks and having to communicate with techs and colleagues via a letter board. He would like to acknowledge everyone at SEC and Strong neuromuscular that put up with him and trained him. His three mentors are: Dr. Michel Berg, Dr. Lin Liu, and Dr. Eric Logigian. The most important accomplishment after leaving Rochester is having confidence and training to go to a mid-size hospital and function as swiss army knife general neurologist and help grow the program.

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**Seth Kolk** completed his residency program at the University of Rochester from 1986-1989. His current title is a Chief Neurology Psychiatry Rehabilitation Service at White River Junction VA. He has 2 sons, Zach 33, married, attorney in NYC and Nick 23 Artificial Intelligence computer science graduate student.

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**David Lichter** did his residency and fellowship from 1984-1989. He is currently a Clinical Professor of Neurology at The University of Buffalo. His work interests are clinical management and clinical research involving patients with movement disorders, particularly Parkinson's disease (PD) and Tourette Syndrome (TS). In the future he would like to explore new MRI measures as possible biomarkers of disease progression in PD. Further studies to better define predictors of outcome in adult TS. He has a wife that is a Pediatric Neurologist and 2 sons who are both interested in careers in Medicine. His most memorable event in Rochester was first week of residency and meeting Bob Joynt, in the Garvey Room, after Grand Rounds: "I hear you're from the southern hemisphere, New Zealand, where people walk around on their heads. Your brain must be water-logged. It will probably take about two weeks to dry out. Until then, we won't expect too much from you."

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**Gary Myers** came to the University of Rochester in 1971-1978. Returning in 1990 and currently a Professor in Child Neurology. His current interest is child neurology practice with an emphasis on neonatal neurology and research on environmental toxicants and nutrients from fish consumption. Married to Ruth, daughters (Cindy & Tracy [deceased]), 3 grandchildren by Tracy, and Sammie (a rescue greyhound). His most memorable event in Rochester was in 1971 when he started his academic career in Child Neurology with Dr. Horner. His 4 mentors are: Frederick Horner, Robert Joynt, Richard Moxley and Robert Griggs. One of his major accomplishments was in 1989-1990, traveling to the Republic of Seychelles and lived there while enrolling the first cohort in the Seychelles Child Development Study (SCDS).

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**Shree Pandya** started at the University of Rochester in 1980 and is currently an Associate Professor in Neurology. Her interest is research related to Muscular Dystrophies. She is married to her husband (Kishan Pandya).

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**Harald Reich** completed his residency and fellowship from 1974 to 1978. He has been retired since 2012 and plans on doing more traveling. He is married with 2 children. One of his most memorable events was flying solo out of Rochester airport in 1977. His mentors were Robert Joynt, Frederic Horner and Shu-Ren Lin. After leaving Rochester one of his major accomplishments was opening a private practice in Adult and Pediatric Neurology in the 2000 year old city of Augsburg Germany in May of 1986.

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**Michael Rossen** completed his residency, fellowship and served on the faculty at the University of Rochester from 1995-2004. Currently he is a Neurologist and has an interest in neurology cognitive neuroscience. He is married to Kate Troast and they have 2 daughters. His mentor was Charles Duffy.

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**Richard Rudick** completed his residency and fellowship and served on the faculty at the University of Rochester from 1975-1986. Currently he is a Vice President at Biogen and has an interest in clinical and translational research focused on neurologic disease in the future. He is married to Marilyn and the most memorable event from the time in Rochester was the birth of their two children. While at the University of Rochester he had three mentors: Robert Joynt, Berch Griggs and Robert Herndon. One of his most important accomplishments after leaving the University of Rochester was becoming the Chief Clinical and Translational Research Officer at the Cleveland Clinic Foundation serving from 2001 to 2008.

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**David Shprecher** completed his fellowship from the University of Rochester in 2009. He is currently a Director of Movement Disorders. His work interest are program building and administration/clinical trials. In the future he plans to expand the movement disorder program at Banner

Research and U of Arizona in Phoenix, move neuroprotection trials to the premotor stage of alpha-synucleinopathies. He is married to his wife (Nobuko) and they have 1 daughter. The most memorable time spent in Rochester was joining Dr. Joynt on grand rounds. His mentors are Rodger Kurlan, Jon Mink, Karl Kieburtz, Ray Dorsey and Kevin Biglan. His important accomplishment after leaving Rochester was in 2015, he became co-director of one of the first programs named as a Center of Excellence (and one of only 3 funded programs) by the Tourette Association of America.

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**Rabi Tawil** has been with the Department of Neurology at the University of Rochester since 1988. He is currently a Professor. He is interested in clinical-research in neuromuscular diseases with emphasis on muscle channel disorders and FSH muscular dystrophy. His future plans are to find effective treatments for neuromuscular disorders. Rabi has a wife (Ghinwa Dumyati) and 2 children Yasmina and Kareem. His most memorable event was Launching the Fields Center for FSHD and Neuromuscular Research. Berch Griggs was his mentor.

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**Robert Thompson Stone** is currently a Neurologist at the University of Rochester. His work interest are Child Neurology, Neuroimmunology and Medical Education. In the future he would like to lead more towards Academic Clinical Practice, Residency Director and Clerkship Director. He has a wife (Jennifer), and 2 children (Samuel and Rosemary). His most memorable event was discovering the unexpected enjoyment of treating children with neurologic problems and shifting his entire career focus to child neurology. This was made possible through the incredible teaching and support of the child neurology division. He had 4 mentors: Ralph Jozefowicz, Jonathan Mink, Robert Holloway and Andrew Goodman.

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**Niangui Wang** stayed at the University of Rochester for a short period of time while completing his fellowship. He is currently a Neurologist at a private practice. He is interested in EMG, neuromuscular medicine and general neurology.

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**William Watson** started at the University of Rochester in 1986 as a fellow. He is currently an Associate Professor of Psychiatry at the University of Rochester. His work interest are treatment of somatoform disorders; use of process group therapy techniques in the training and professional development of therapists and other healthcare providers. His future plans are to work less and enjoy life more. He is married to his wife Katy and they have 2 daughters. His most memorable time was consulting with the marvelous SEC patients who shared their life stories.

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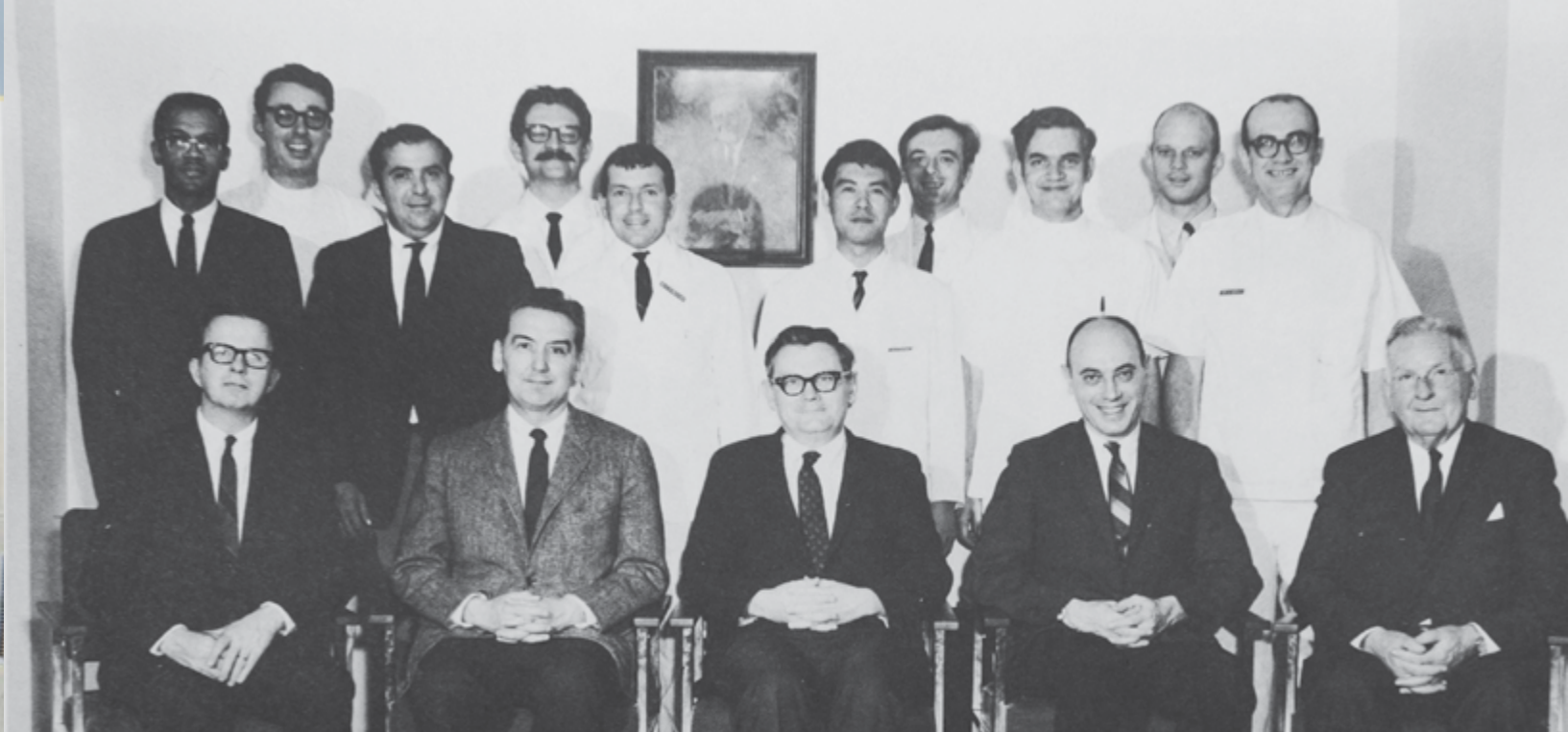
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**Linda Williams** started her residency at the University of Rochester in 1992 and completed in 1995. Currently she is a Professor of Neurology at The University of Indiana. Her work interest are health service research and mentoring primarily within the VHA system to improve the quality of stroke care and the outcomes of Veterans with stroke. In the future she will be leading a national evaluation of a VHA telestroke program in the beginning of 2017. She is married to Mac who is an architect and bookkeeper. They have a son Elliott he is a junior at Purdue and daughter Claire is starting at The University of Iowa. Of the many words of wisdom she received from Ralph, she will always remember his teaching about taking a good history and recording exactly what the patient said. This came back to haunt him one day when she dutifully recorded in an inpatient note the patient's many comments about how attractive Dr. Jozefowicz was! The one thing she appreciated about her time in Rochester was the wonderful sense of camaraderie among the residents and faculty. Whether it was trying to stump Dr. Griggs on Professor Rounds, freak out Irene by holding her MRI up to a spot on the window so it looked like she had a frontal lobe lesion, or being part of the victorious "Spike and Wave" volleyball team.

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1966-2004













2005



2006

2007

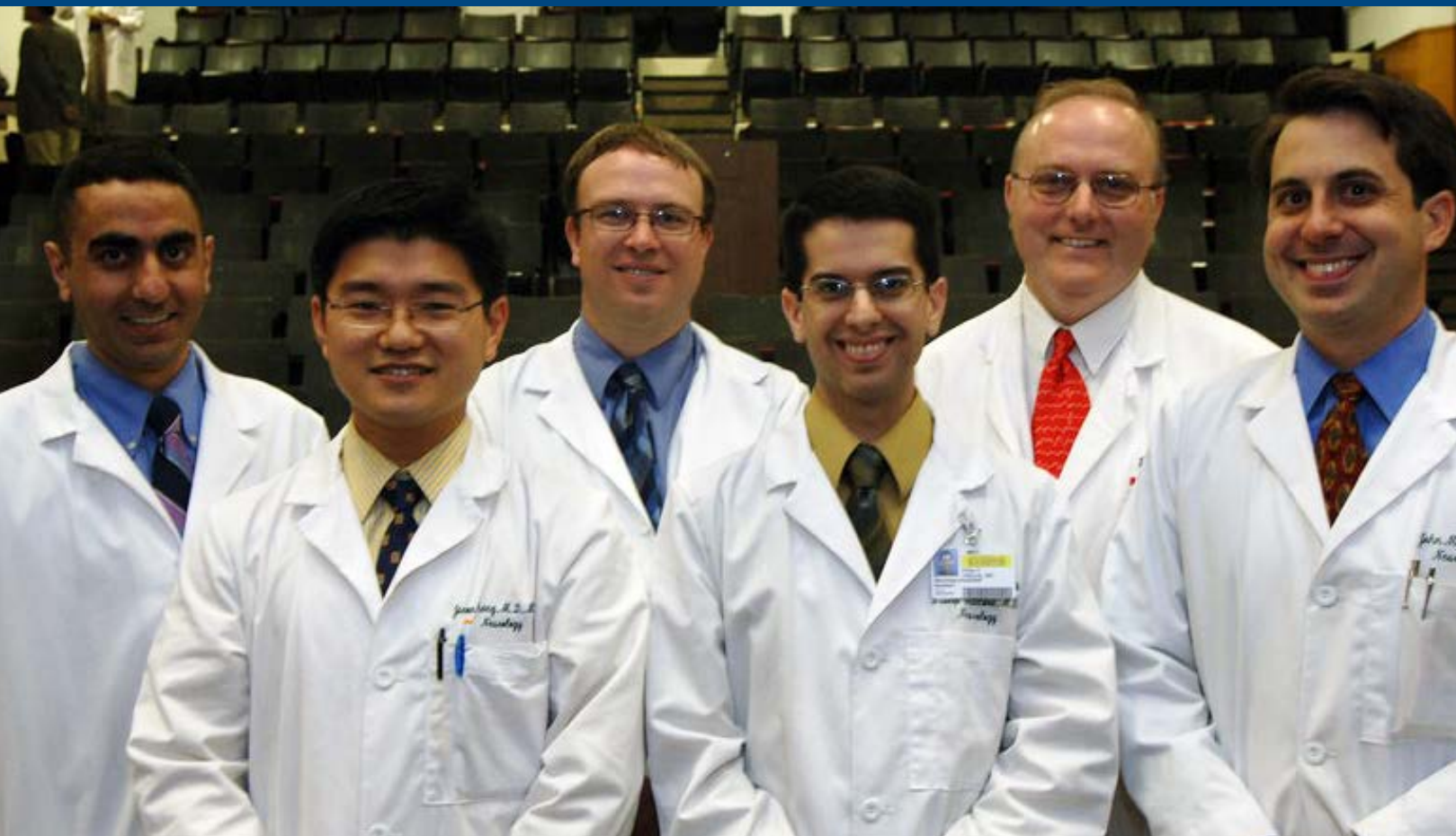


2007 Group Photo

2008



2008 Group Photo



2007 Resident Graduate Class



2008 Resident Graduate Class

2009



2009 Group Photo

2010



2010 Group Photo



2009 Resident Graduate Class



2010 Resident Graduate Class

2011



2011 Group Photo

2012



2012 Group Photo



2011 Resident Graduate Class



2012 Resident Graduate Class

2013



2013 Group Photo

2014



2014 Group Photo



2013 Resident Graduate Class



2014 Resident Graduate Class

2015



2015 Group Photo



2015 Resident Graduate Class



2015 Residents

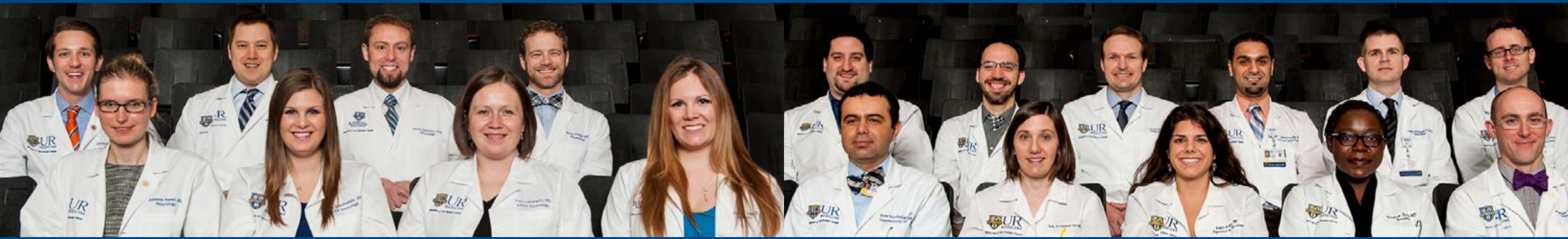


2015 Fellows

2016



2016 Group Photo



2016 Resident Graduate Class

2016 Fellows



2016 Residents

# 50<sup>th</sup> Celebration









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*MEDICINE of THE HIGHEST ORDER*



MEDICINE *of* THE HIGHEST ORDER