



AUGUSTA UNIVERSITY  
MEDICAL COLLEGE  
OF GEORGIA

Neurology

# NEUROLOGY NEWSLETTER

Spring Issue 2025



**Feature Article : Photobiomodulation for Neurologic Diseases**

Cover Illustration : Shannon Derthick, MSc

## MESSAGE FROM THE CHAIR



### Dear Friends and Colleagues,

Hello from Augusta! A few bits of news and notes to share. We survived Helene! Augusta was shaken in late September by a catastrophic Category 4 storm. Homes were destroyed and power and internet were out for most for weeks. Thanks to the efforts of our incredible residents and faculty (see photo), while the town was devastated, there was never any breach in care for our patients.

Residents and faculty continue to receive accolades for their teaching efforts. The Medical College of Georgia 2023-24 GME and UME Exemplary Teaching Awards were recently announced, and I want to congratulate Alfredo Garcia Fenwick Nichols, Ben Barnes, David Hess, David Wilkie, Matt Kridel and Matt Abbott.

Please welcome the newest members of our faculty, Amir Mbonde and Ashutosh Pandey. Amir joins us from Mayo Scottsdale and is dually trained in vascular neurology and epilepsy and Ash comes to us after completing his neurocritical care fellowship at Ohio State University.

In this issue, Quanguang Zhang, another recent addition, provides an overview of his cutting-edge research into photobiomodulation (colloquially, “red light therapy”) for neurologic disorders including stroke and neurodegenerative diseases. Quanguang is a leader in this arena and if you missed his grand rounds last fall, this provides you a high-level overview into mechanisms and approaches that underpin this approach.

Finally, our mission is to train the best and brightest future neurologists and to make innovative advances to neurologic diagnosis and treatment. We couldn’t succeed without your support. Please let me know if you are interested in making a donation or head to <https://www.augusta.edu/giving/neurology.php>. We will target your support to have the greatest impact. Keep in touch and hope to see you soon.

**Jeffrey A. Switzer, DO, MCTS, FAHA, FAAN**  
Professor and Chair of Neurology  
Director, Telestroke and Teleneurology  
Medical College of Georgia at Augusta University

706-721-7051  
[jswitzer@augusta.edu](mailto:jswitzer@augusta.edu)

### CONTACT INFORMATION

Phone: 706-721-4581  
Fax: 706-721-1459  
1120 15th Street  
BI - 3080  
Augusta, GA 30912

We would appreciate donations that will allow our clinic to operate and grow.  
Please go to <https://www.augusta.edu/giving/neurology.php> to reach our donation page.

## FACULTY UPDATE



We are excited to welcome **Dr. Amir Mbonde** to our department.

Dr. Amir Mbonde is a neurologist with dual fellowship training in Vascular Neurology and Epilepsy. He completed his medical school and internal medicine residency in Uganda before working for two years as faculty at Mbarara University of Science and Technology (MUST) in a clinician-researcher role. He then moved to the U.S. for neurology residency at Mayo Clinic Arizona, followed by a Vascular Neurology Fellowship at Massachusetts General Hospital–Harvard University and a hybrid Electroencephalography/Epilepsy Fellowship at Mayo Clinic Arizona.

Dr. Mbonde's research and academic interests focus on stroke epidemiology, global neurology, and improving outcomes in patients with drug-resistant epilepsy. He collaborates with Dr. Moore-Hill on optimizing VNS treatment paradigms in drug-resistant epilepsy and refining imaging strategies for risk stratification of electroencephalography features on the ictal-interictal continuum. He is also passionate about medical education and research mentorship.

We are excited to welcome **Dr. Ashutosh Pandey** to our department.

Dr. Ashutosh Pandey is a neurologist with specialized fellowship training in Neurocritical Care. He completed his medical education at Gauhati Medical College & Hospital in India and his Neurology Residency at the University of Missouri, Columbia. Following this, he pursued and completed a Neurocritical Care Fellowship at Ohio State University Medical Center. Dr. Pandey is now board certified in both Neurocritical Care and Neurology.

Dr. Pandey's research and academic interests focus on hyperacute and acute ischemic and hemorrhagic stroke, with a particular emphasis on subarachnoid hemorrhage. He is dedicated to advancing treatment methods and improving imaging techniques to enhance patient outcomes. Additionally, Dr. Pandey is committed to medical education and supporting the development of future researchers and clinicians.



## DEPARTMENT UPDATES

Medical College of Georgia's **EXEMPLARY TEACHING AWARDS AY2023/24** Congratulations to the following Medical College of Georgia faculty and house staff from each of MCG's campuses in recognition of their excellence in teaching MCG medical students and residents.

### UNDERGRADUATE MEDICAL EDUCATION

Benjamin Barnes  
David Hess  
David Wilkie

### AU/UGA MEDICAL PARTNERSHIP

Alan Morgan  
Ben Thrower  
Dinesh Raju  
Jacqueline Rosenthal

### GRADUATE MEDICAL EDUCATION

Alfredo Garcia  
Fenwick Nichols

### MCG RESIDENTS & FELLOWS AS TEACHERS

Matthew Abbott

## FEATURE ARTICLE: Photobiomodulation for Neurologic Diseases

Quanguang Zhang, MS, PhD

**Photobiomodulation (PBM)** is a non-invasive therapeutic approach using specific wavelengths of light to stimulate tissues. In recent years, its potential for treating neurological diseases has been increasingly recognized.

### Mechanisms of PBM

- Enhancing mitochondrial function by upregulating cytochrome C oxidase (COX) activity to boost ATP production.
- Reducing neuroinflammation by suppressing pro-inflammatory cytokine expression.
- Promoting neurogenesis and synaptic plasticity to restore neuronal function.

### Applications of PBM

- **Brain injuries:** Stroke, traumatic brain injury (TBI).
- **Neurodegenerative diseases:** Alzheimer's disease (AD), Parkinson's disease (PD).
- **Mood disorders:** Depression, post-traumatic stress disorder (PTSD), Early life adversity (ELA).

### Clinical Implications and Future Directions

PBM shows great potential as a non-invasive therapy for neurological disorders, offering tailored treatments with minimal side effects. Its integration into clinical practice requires interdisciplinary collaboration to optimize protocols and ensure efficacy. By bridging preclinical research with clinical applications, PBM could become a valuable tool in managing conditions like stroke, traumatic brain injury, Alzheimer's disease, and psychiatric disorders.

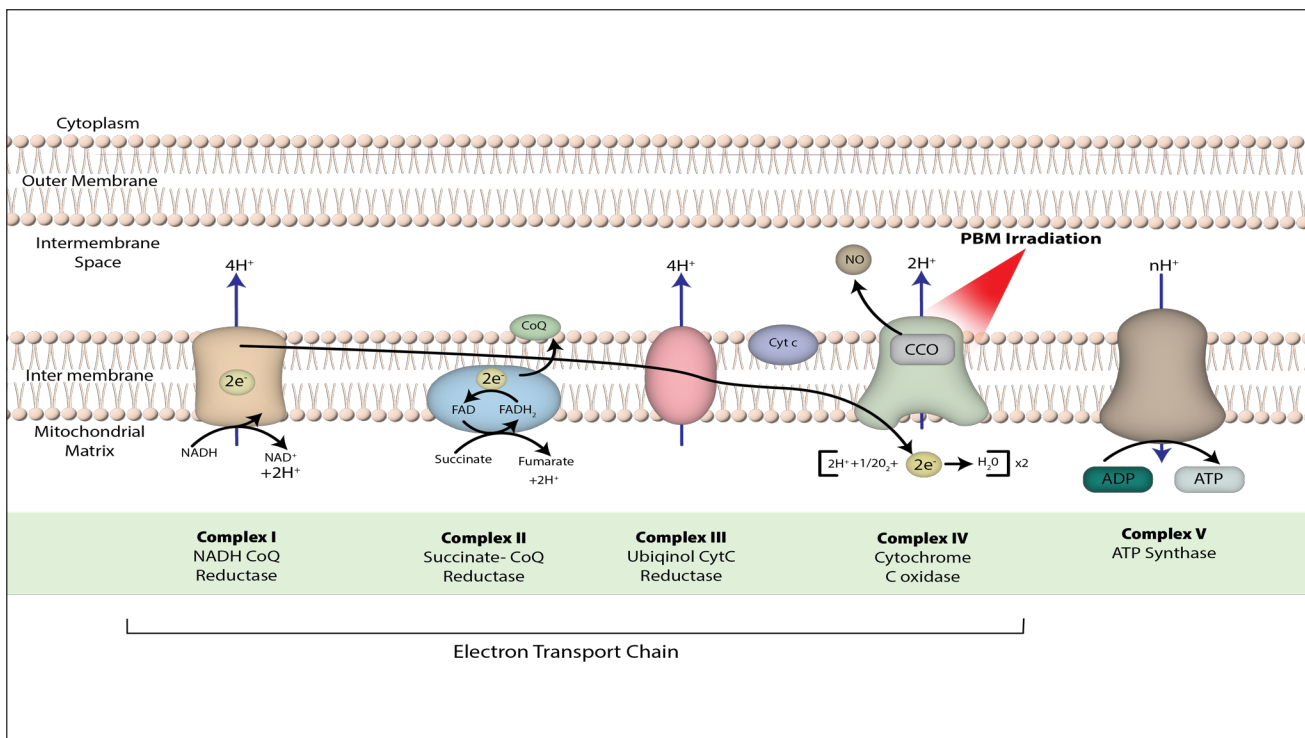
### Physical parameters of PBM

#### • Wavelengths

600–750 nm (red light) for superficial targets  
750–1270 nm (near-infrared light, NIR) for deeper tissue.

#### • Fluence (Energy Density)

0.1–100 J/cm<sup>2</sup>, depending on the target tissue and desired therapeutic effect, ensuring sufficient energy delivery without causing thermal or phototoxic damage.



**•Irradiance (Power Density)**

**10–200 mW/cm<sup>2</sup>**, balancing energy delivery and tissue safety. Lower irradiance is used for chronic conditions or sensitive tissues, while higher values may be employed for acute injuries or deep-tissue targets.

**•Operation Mode**

**Continuous wave (CW) and pulsed modes (PW)**

**1 to 100 Hz.** CW is typically used when steady energy delivery is desired, while PW are favored for their enhanced penetration and depth

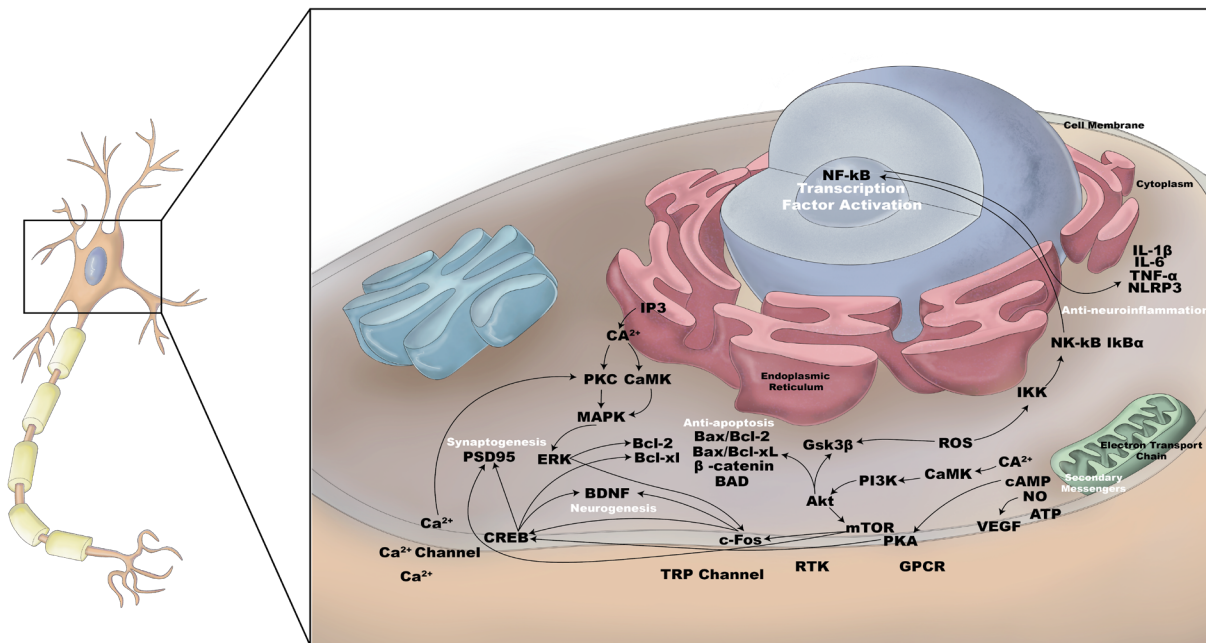
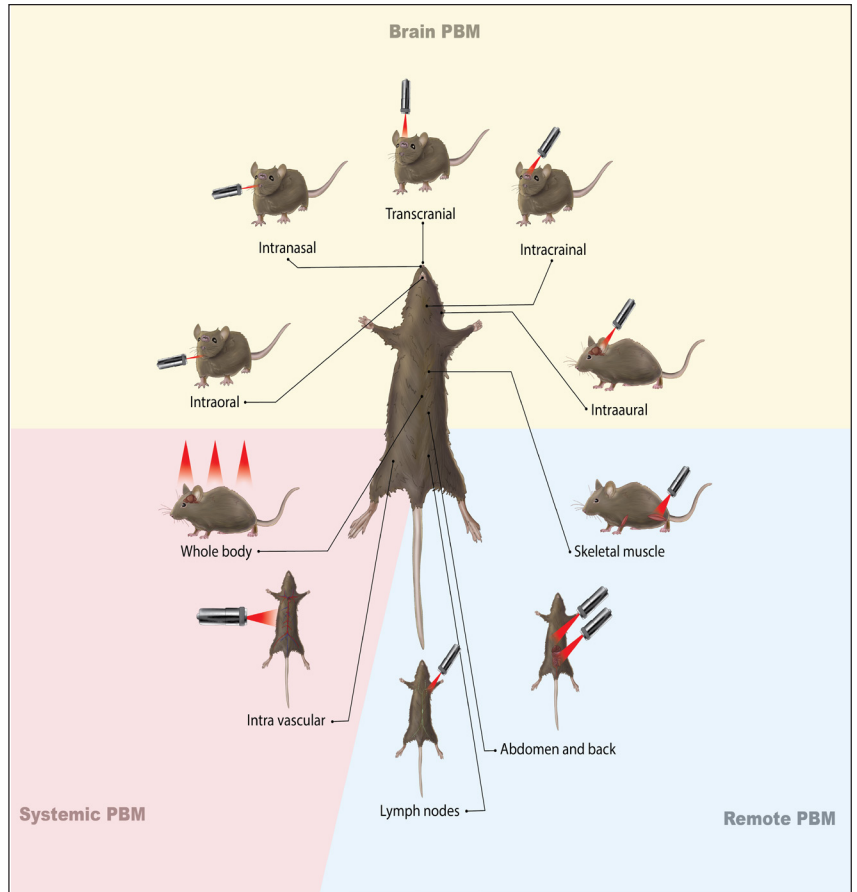
**•Light Sources**

**Lasers and light-emitting diodes (LEDs)**

Lasers are preferred for their coherence and precision, especially in research or clinical settings requiring targeted application, while LEDs are valued for their cost-effectiveness, larger treatment area coverage, and scalability in clinical or home-use devices.

**•Treatment Durations**

**30 seconds–40 minutes.** Varies with the condition, treatment area, and light source, with frequencies ranging from daily to several times per week, depending on protocol design.



## Representative Recent Research

Category	Year	First Author	Journal	Title
Brain injuries	2024	Yu Feng	Antioxidants	PBM inhibits ischemia-induced brain endothelial senescence via endothelial nitric oxide synthase
	2024	Yu Feng	CNS neuroscience & therapeutics	Activation of testosterone-androgen receptor mediates cerebrovascular protection by photobiomodulation treatment in photothrombosis-induced stroke rats
	2020	Baocheng Yang	Journal of biophotonics	PBM therapy for repeated closed head injury in rats
	2021	Luodan Yang	Theranostics	Effects of prenatal photobiomodulation treatment on neonatal hypoxic ischemia in rat offspring
Alzheimer's disease	2022	Luodan Yang	Theranostics	Non-invasive photobiomodulation treatment in an Alzheimer Disease-like transgenic rat model
	2021	Luodan Yang	Journal of Alzheimer's disease	Photobiomodulation Therapy Attenuates Anxious-Depressive-Like Behavior in the TgF344 Rat Model
Mood Disorders	2023	Zhihai Huang	Theranostics	Photobiomodulation attenuates oligodendrocyte dysfunction and prevents adverse neurological consequences in a rat model of early life adversity
	2021	Yong Li	Molecular psychiatry	Photobiomodulation prevents PTSD-like memory impairments in rats
	2021	Yong Li	Translational psychiatry	Transcranial photobiomodulation prevents PTSD-like comorbidities in rats experiencing underwater trauma

**Read the full article here**

*Photobiomodulation: shining a light on depression (Theranostics, 2025, DOI: 10.7150/thno.104502)*  
*Photobiomodulation in experimental models of Alzheimer's disease: state-of-the-art and translational perspectives (Alzheimer's Research & Therapy, 2024, DOI: 10.1186/s13195-024-01484-x)*

## REMINDERS & UPCOMING EVENTS



**Neurology Residency Research Day**

Date: March 21, 2025  
noon to 5p

Location: Lee Auditorium BC 1400

RSVP: 

<https://forms.office.com/r/hm1yUA2Zak>



Neurology for the Non-Neurologist:  
Seizures, Spells & Shakes

SAVE THE DATE!  
July 10-12, 2025

Presented by  
Department of Neurology

Medical College of Georgia, Augusta University with  
Division of Professional and Community Education

Kiawah Island West Beach Conference Center  
South Carolina

Grand Rounds every **Thursday at 8:00 am.**  
 Contact Deana Brown for more information  
 at [dbrown3@augusta.edu](mailto:dbrown3@augusta.edu)



Comprehensive Stroke Update 2025

SAVE THE DATE!  
June 12-14, 2025

Presented by  
Department of Neurology

Medical College of Georgia, Augusta University with  
Division of Professional and Community Education

West Beach Conference Center, 2 Shipwatch Road  
Kiawah Island, South Carolina

Cover illustrated by: Shannon Derthick, MSc.