

**Testimony of Dr. David Hess, M.D., Executive Vice President, Medical Affairs & Dean,
Medical College of Georgia, Augusta University**

**Before the House Committee on Agriculture's Subcommittee on Commodity Exchanges,
Energy, and Credit Hearing: Building Opportunity in Rural America through Affordable,
Reliable and High-Speed Broadband**

June 11, 2019

Good morning. First, I would like to thank the Chairman, the ranking member, and all the members of the subcommittee for the opportunity to testify today. I am Dr. David C. Hess, Dean of the Medical College of Georgia and Presidential Distinguished Chair of Neurology at the Medical College of Georgia at Augusta University. I am here to recount my experiences as a physician providing telestroke services, a form of telemedicine, to stroke patients presenting at hospitals in the rural Southeastern United States.

Georgia is situated in the "Stroke Belt", a region of high stroke incidence in the southeastern U.S. I work at the Medical College of Georgia, the only public medical school in the state of Georgia. We are the Joint Commission certified Advanced Comprehensive Stroke Center that serves patients in rural southeastern Georgia and South Carolina, areas that are in the "buckle of the Stroke Belt". In 1996, a drug called tissue plasminogen activator (TPA) was approved for the treatment of ischemic stroke by the Federal Drug Administration (FDA).

For background, there are two types of stroke –ischemic stroke is caused by a blockage of blood flow to the brain and hemorrhagic stroke caused by bleeding into the brain. TPA is effective for ischemic strokes but can be harmful if given for hemorrhagic strokes. The only way for a physician to tell the difference is to perform and review a CT scan of the brain. While TPA is very effective for ischemic stroke, in about 3% of patients it can cause bleeding into the brain which can be fatal. This complication caused many Emergency Medicine physicians to be reluctant to use TPA and they required stroke specialists (Neurologists) to assist them in making the decision.

After TPA was approved by the FDA, only about 2% of stroke patients were receiving TPA. Nationwide, 64% of US hospitals were not using TPA and most of them were small hospitals in the rural South.¹ There was a geographic penalty for stroke care-rural patients in small hospitals in the South that were not receiving TPA, the only drug that could reduce their chance of being disabled from a stroke.

One of the problems that led to low usage of TPA was the lack of neurologists and stroke specialists in the smaller hospitals to consult and help with the treatment decisions. Neurologists and stroke specialists tend to work in larger cities like Augusta and Atlanta and there were none in rural Georgia. Moreover, the time to treatment with TPA is a major determinant of how well the patient does; shorter time to treatment equates to better outcomes. Stroke is a “time sensitive disease” and it is estimated that during a stroke, 32,000 brain cells die per second so every second and minute delay matters when administering TPA. There is no time for the physician to get in their car and drive to a rural hospital. To make a decision to use TPA, the stroke specialist needs to see the patient and examine them and also review the CT scan of the brain. We would often get phone calls from our rural hospitals with questions about treating stroke patients with TPA. However, we could not see the patient or review their CT scan of the head, thus could not make safe decisions. The problem is that we had a very effective drug for stroke, but we did not have a healthcare system with the organization and tools to administer it.

To address this problem, back in 2002, we in the Department of Neurology at the Medical College of Georgia began to develop a web-based telestroke system to help treat stroke patients at rural hospitals in Georgia. There was no system available, so we developed our own. This involved 3 components – two-way video (we can see the patient and the patient can see us), ability to read the CT scan of the brain, and decision-support software that helped us make the

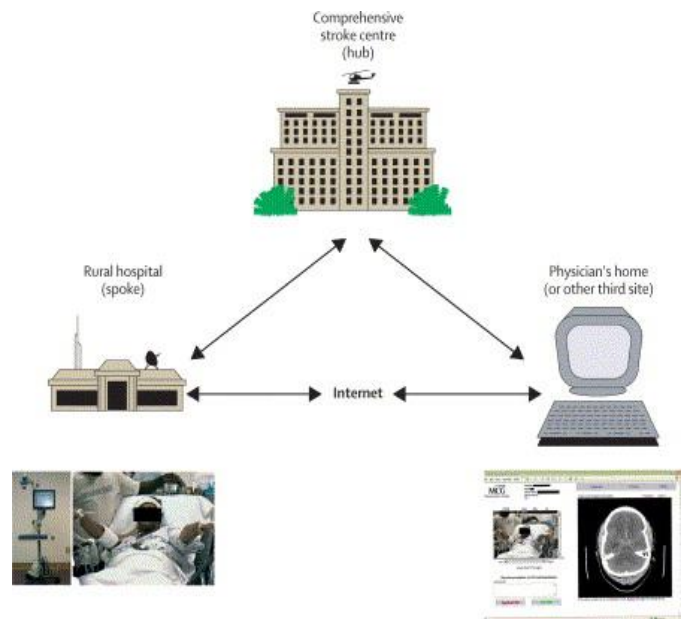


Fig 1 REACH telestroke system. Patient presents in rural hospital (lower left) Consultation done at home by Stroke specialist (lower right) and patient transferred to Comprehensive Stroke Center (top) after TPA given or if complex care needed

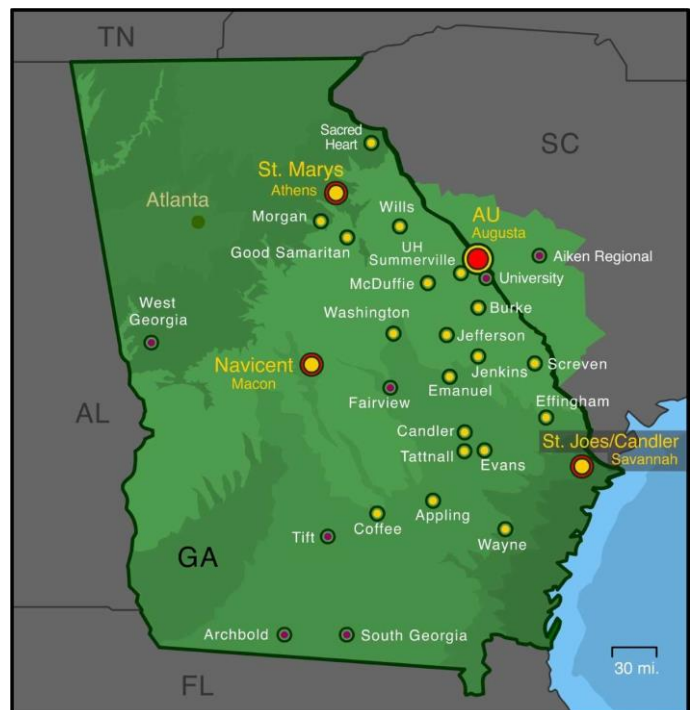


Fig 2 MCG-AU Health REACH Network: Red dot is AU Health, Comprehensive Stroke Center. Small yellow dots are small rural hospitals (<50 beds); purple dots are hospitals >100 beds. Large yellow dots are larger hospitals >200 beds

correct treatment decision and allowed us to complete a note to provide a consultation to the physicians at the site.²⁻⁴ (Fig 1) The other important feature was that the system was “site independent.” We did not have to sit and wait for calls in a specific “wired” room in the hospital. We could be at home or anywhere that we had access to the internet. We called this program REACH (**R**emote **E**valuation of **A**cute **i**s**C**hemic stroke). After building a prototype and testing it within our own hospital, we began a pilot program in 2003 with McDuffie Regional Hospital in Thomson, Georgia and Emanuel County Hospital in Swainsboro, Georgia. Both these hospitals had administrators, nurses, and physicians supportive of the telestroke program. Internet connectivity was poor on both ends –the hospital and on our end. For example, if I was coaching a Little League game, I would have to drive to the Taco Bell and “use” their hotspot as that was closer than my home.

We demonstrated that that we could accurately examine the patient and measure the severity of the stroke and that we could safely and effectively guide treatment with TPA. Once we demonstrated (in the medical literature and to our peers) that we could do this, we expanded our network to 9 rural hospitals over the next few years and now serve over 30 hospitals today throughout Georgia and one in South Carolina.^{3,4} (Fig 2) We have performed over 13,000 acute stroke consultations and have treated more than 1800 stroke patients with TPA. Most of these patients would have never been treated with TPA without a telestroke system

Telestroke is now used almost everywhere in the nation and almost every large health system has a telestroke program. Telestroke has become the “standard of care” with position statements written by expert panels from the American Stroke Association endorsing its use.⁵⁻⁸ Telestroke became a disruptive technology that changed how we manage stroke patients. Studies show that telestroke has expanded and improved stroke care in rural and “super-rural” areas.⁹

We have expanded the use of telestroke to include acute teleneurology (other neurological conditions beyond stroke) and to triage and select stroke patients for mechanical thrombectomy (MT). MT uses catheters and clot retrieval devices to mechanically remove blood clots from vessels in the brain and this is a life-saving treatment for patients with large strokes (blockage of large arteries such as the middle cerebral artery.) We currently use telestroke to triage patients from all over Georgia and fly them by helicopter to the few Comprehensive Stroke Centers (there are 4 in Georgia) where this procedure can be performed.

In 2006, a group of us licensed the REACH technology through our University and in 2006 we founded a company called REACH Health in Augusta Georgia. The company later moved to Alpharetta, Georgia, and it provided telestroke services to over 150 hospitals in the United States, including hospitals in South Carolina, New York, Pennsylvania, Louisiana, Massachusetts and Alaska. I was Chairman of the Board from 2006 to 2018

when the company was sold to InTouch. REACH health is now a division of InTouch Health, the leading developer of telestroke systems in the U.S. and around the world.

When we first started REACH back in 2003 to 2004, we had a lot of problems with internet connections to our rural hospitals. The video would often “freeze” and the consults would be delayed and occasionally dropped, and we would have to resort to using the telephone. Fortunately, this improved over the years. Access to bandwidth in rural Georgia is certainly much better than it was 10-15 years ago. There are also improved technologies that allow us to operate in a low bandwidth environment. This is stated in our Scientific Statement on “Telemedicine Quality and Outcomes in Stroke” from the American Stroke Association and endorsed by the American Telemedicine Association ⁷“The Scalable Video Coding extension of the H.264/MPEG-4 Advanced Video Coding standard (H.264/AVC) is the latest development for this successful specification, enabling high-resolution performance at the relatively low-bandwidth environments often available at more rural hospital sites. New communication (Web Real-Time Communication) and compression and decompression standards (VP8) are also emerging that promote the use of a Web browser as the primary audio/video platform while maintaining equal or better quality at half the bandwidth cost. Accordingly, technological advances on the horizon coupled with increasing access to high-speed bandwidth continue to accelerate the implementation of telemedicine services. Depending on the technology used, bandwidth requirements can range from as little as 64×10^3 bits per second to in excess of 1.2×10^6 bits per second. However, bandwidth $> 512 \times 10^3$ bits per second or closer to 1.2×10^6 bits per second will usually be needed for seamless operation. The quality of the connection is affected by many factors, including bandwidth (connection capacity and speed), distance (which introduces latency), network throttling (introduced by network configuration), and congestion (hospital systems will be “saturated” at peak times, limiting the available bandwidth). The cell structure of mobile telecommunications may lead to low bandwidths during peak times of mobile Internet use. This becomes an issue in hospitals and busy emergency departments where competing for limited bandwidth leads to degradation of quality. Other variables affecting the conferencing experience include the number of participants in a videoconference, video resolution, and video size. Recently developed technologies, such as Scalable Video Coding¹, provide better performance in low-bandwidth environments by making adjustments to frame rate, the area of the image to be refreshed, and video quality based on network environment.” ⁷

However, we do still experience problems with the video freezing and downloading imaging files. The problem is related to the people and resources necessary to adequately manage that bandwidth within the hospital. While most of these hospitals have access to broadband, they do not have the technology/IT budget to support much infrastructure inside the facility, much less support a full time IT person. The common example

is the hospital guest network being allowed to use the same internet connection (un-throttled) as the clinical applications. A better informed, professional IT manager can set-up restrictions on network use to prioritize clinical applications.

While internet connectivity is adequate for most of the rural hospitals, it is not adequate to provide telehealth consults to patients in homes and at small clinic sites in rural areas. Telehealth is able to reinvent “doctor house calls” and is moving to monitoring and consulting with the patient in their home. In addition to physicians, much of this monitoring will be done by nurses and advanced practice providers. Lack of access to physicians is a problem in many parts of rural Georgia. According to the Georgia Board for Physician Workforce (<https://gbpw.georgia.gov/>), there are 8 Georgia counties without any physicians, 11 counties without a Family Medicine Physician, 63 counties without a Pediatrician, 75 counties without an Obstetrician-Gynecologist and 78 counties without a general surgeon. Just as there are few stroke specialists in rural areas, there is a dearth of all types of medical specialists such as cardiologists, nephrologists, etc. This is likely to worsen as there is a looming shortage of physicians in the U.S. and major shortages in rural areas. One of the best ways to address these geographic disparities is through the use of telemedicine-to the patient’s home and to health clinics.

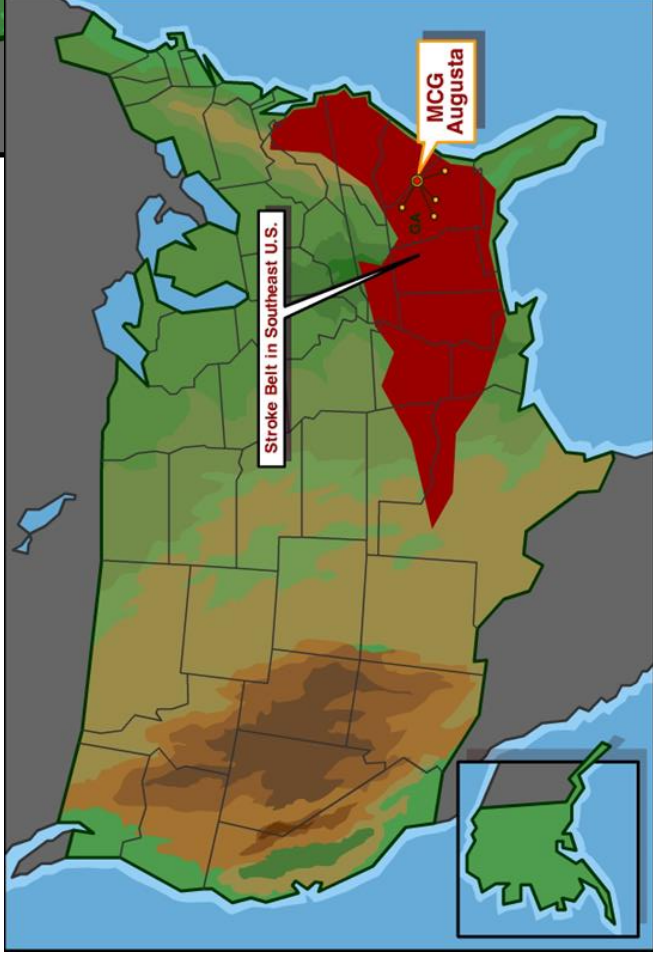
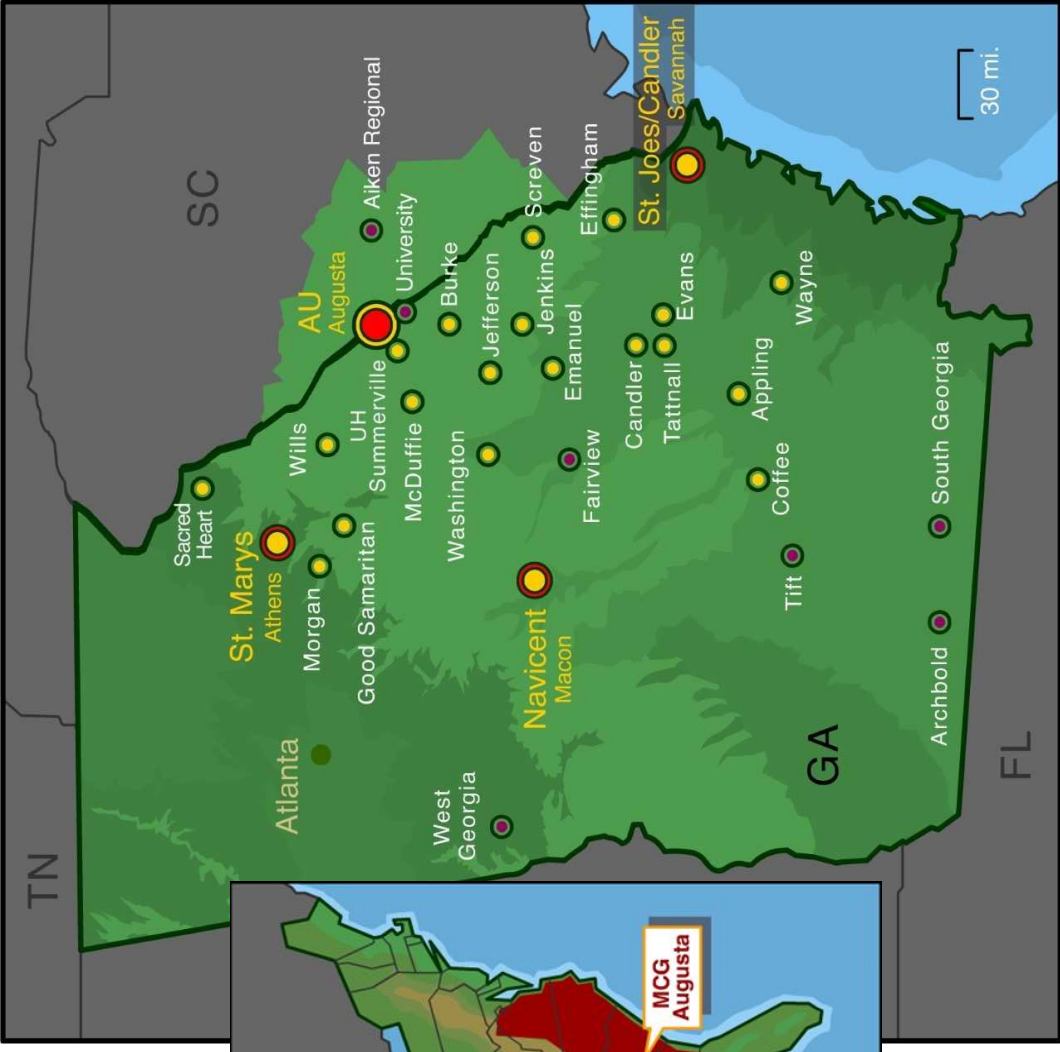
There is also another need for stroke care where there is insufficient broadband-that is the poor connectivity to ambulances in rural areas. There is increasing interest in providing telestroke services in the ambulances transporting patients to the hospitals. This is presently not feasible in many rural areas.

Thank you again for the opportunity to testify before the Committee. I am available to answer any questions you may have.

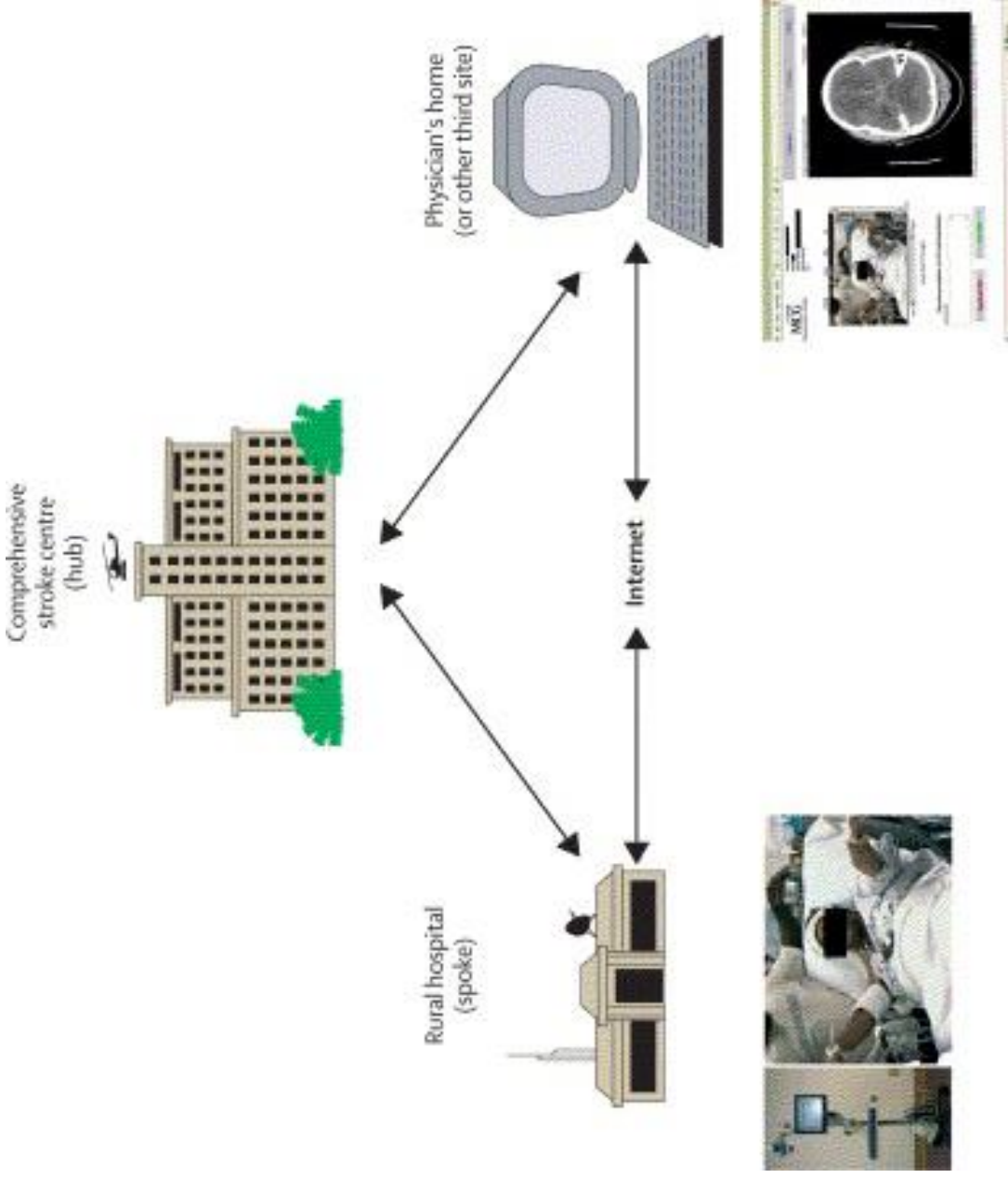
References

1. Kleindorfer D, Xu Y, Moomaw CJ, Khatri P, Adeoye O, Hornung R. US geographic distribution of rt-PA utilization by hospital for acute ischemic stroke. *Stroke* 2009;40:3580-4.
2. Hess DC, Wang S, Gross H, Nichols FT, Hall CE, Adams RJ. Telestroke: extending stroke expertise into underserved areas. *Lancet Neurol* 2006;5:275-8.
3. Wang S, Gross H, Lee SB, et al. Remote evaluation of acute ischemic stroke in rural community hospitals in Georgia. *Stroke* 2004;35:1763-8.
4. Wang S, Lee SB, Pardue C, et al. Remote evaluation of acute ischemic stroke: reliability of National Institutes of Health Stroke Scale via telestroke. *Stroke* 2003;34:e188-91.
5. Schwamm LH, Audebert HJ, Amarenco P, et al. Recommendations for the implementation of telemedicine within stroke systems of care: a policy statement from the American Heart Association. *Stroke* 2009;40:2635-60.
6. Schwamm LH, Holloway RG, Amarenco P, et al. A review of the evidence for the use of telemedicine within stroke systems of care: a scientific statement from the American Heart Association/American Stroke Association. *Stroke* 2009;40:2616-34.
7. Wechsler LR, Demaerschalk BM, Schwamm LH, et al. Telemedicine Quality and Outcomes in Stroke: A Scientific Statement for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke* 2017;48:e3-e25.
8. Wechsler LR, Tsao JW, Levine SR, et al. Teleneurology applications: Report of the Telemedicine Work Group of the American Academy of Neurology. *Neurology* 2013;80:670-6.
9. Zhang D, Wang G, Zhu W, et al. Expansion Of Telestroke Services Improves Quality Of Care Provided In Super Rural Areas. *Health Aff (Millwood)* 2018;37:2005-13.

REACH Network



REACH Hub & Spoke Telestroke Model



Hess DC, et al. *Lancet Neurol.* 2006;36:5:275-8

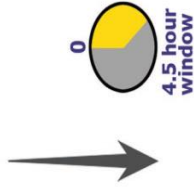


Drip & Ship

vs.

Drip & Keep

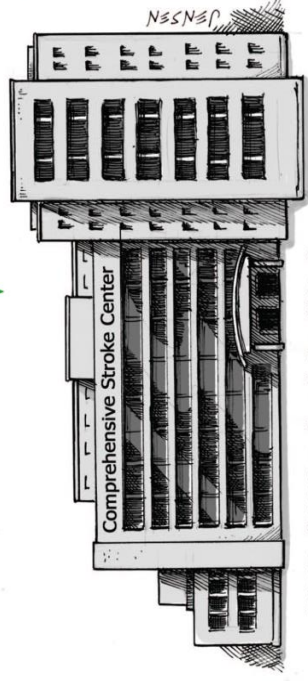
Stroke Patient



(100 bed facility)

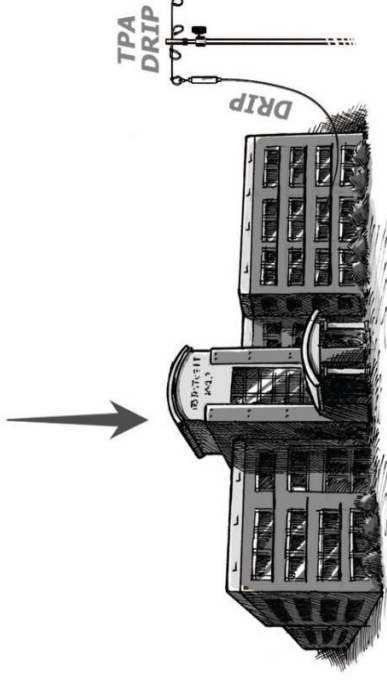


SHIP



HUB (600+ bed facility)

Stroke Patient



(200 bed facility)

- High NIH stroke scale score?
- Large MCA stroke?
- ICH with IVH?

YES?

NO?

KEEP



SHIP



tele-consult
from 3rd
location



The Two Georgias: Rural Health Care

Georgia

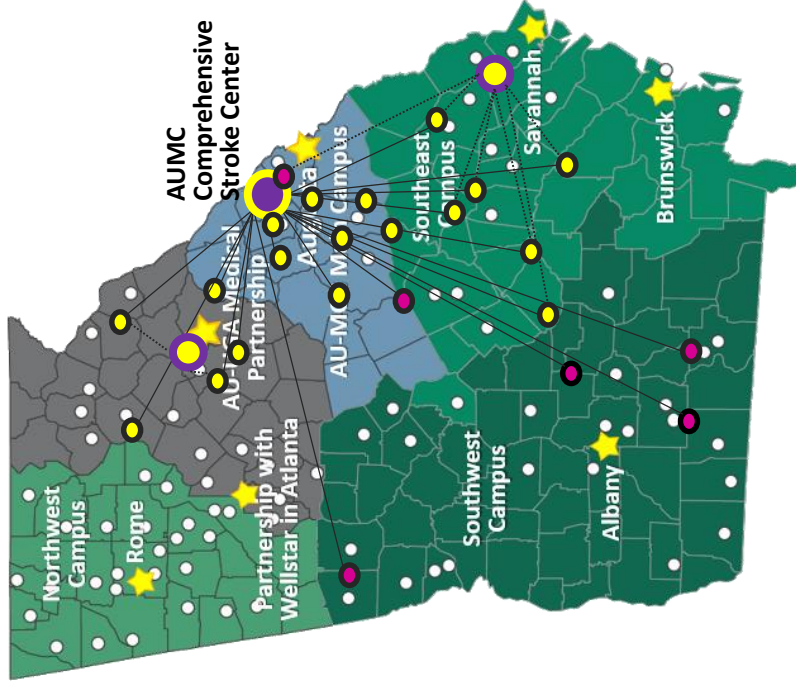
OVERALL RANK: 41

DETERMINANTS RANK: 42

OUTCOMES RANK: 37



- 108 of Georgia's 159 counties are rural
- 101 rural counties have death rates above state average
- South Georgia is one of the sickest populations in U.S.
- Majority of rural/critical access hospitals are located in counties ranked in the bottom 50%
- Populations in these counties have more health challenges



★ Regional campus location
● Joint Commission Comprehensive Stroke Center/REACH Hub
● REACH Sub Hub
● REACH Spokes
● REACH Super Spokes



CURRICULUM VITAE

NAME: David Charles Hess, M.D.

TITLE Dean, Medical College of Georgia
Executive Vice President of Medical Affairs and Integration
Presidential Distinguished Chair
Professor of Neurology
Medical College of Georgia
Augusta University

OFFICE ADDRESS: Dean's Office
Medical College of Georgia
1120 15th Street, AA 1002
Augusta University
Augusta, GA 30912

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E mail dhess@augusta.edu

CITIZENSHIP: United States

SPOUSE Diane Degrandis Hess

CHILDREN Lisa Alexandra (3-13-89)
Daniel Louis (4-16-90)
Matthew Charles (12-28-91)
Sara Elizabeth (10-3-96)

EDUCATION:

1975 - 1979 The Johns Hopkins University
University Baltimore, Maryland
B.A. Humanities

1979 - 1983 University of Maryland
M.D. School of Medicine
Baltimore, Maryland

TRAINING:

1983 - 1984
Internship
Allegheny General Hospital
Pittsburgh, PA
Internal Medicine

1984 - 1986
Residency
Allegheny General Hospital
Pittsburgh, PA.
Internal Medicine

1986 - 1989
Residency
Medical College of Georgia
Augusta, Georgia
Neurology Residency

1988 - 1989
Medical College of Georgia
Department of Neurology
Augusta, Georgia
Chief Resident

LICENSURE:
Pennsylvania (Inactive)
Georgia
South Carolina

BOARD CERTIFICATION:
Diplomate, American Board of Internal Medicine, September 1986

Diplomate, American Board of Psychiatry and Neurology, October 1990

American Board of Psychiatry and Neurology, Vascular Neurology, 2008

PROFESSIONAL/ACADEMIC APPOINTMENTS:

4/2017 – present
Dean
Medical College of Georgia

4/2017 – present
Executive Vice President of Medical Affairs and Integration
Augusta University

1/2017 – 4/2017
Interim Dean
Medical College of Georgia

1/2017 – 4/2017
Interim Executive Vice President of Medical Affairs and Integration
Augusta University

2008
Presidential Distinguished Chair

2008 - 2013
Co-Director, Brain and Behavior Discovery Institute

| | |
|------------------|---------------------------------------------------------------------------------------------------------------|
| 2/2005 - present | Clinical Co-Director, Institute of Neuroscience, Medical College of Georgia |
| 4/2001 - 4/2017 | Chairman Department of Neurology |
| 2/2000 - 4/2001 | Interim Chairman Department of Neurology Medical College of Georgia |
| 2000 - present | Professor Department of Neurology Medical College of Georgia |
| 2004 - present | University of Georgia School of Pharmacy Adjunct Professor |
| 2000 - present | Joint Appointment, Institute of Molecular Medicine and Genetics, Medical College of Georgia |
| 2000 - present | Joint Appointment, School of Graduate Studies, Medical College of Georgia |
| 1997 - 2000 | Executive, Neurosciences Service VA Medical Center Augusta, Georgia |
| 1995 - 2000 | Associate Professor Department of Neurology Joint Appointment in Medicine Medical College of Georgia |
| 1990 - 2004 | Chief, Neurology Service V.A. Medical Center Augusta, Georgia |
| 1990 - 1995 | Assistant Professor Department of Neurology and Medicine Medical College of Georgia |
| 1989 - 1990 | Cerebrovascular Fellow, Instructor Department of Neurology Medical College of Georgia |
| 1992 - present | Consultant University Hospital Augusta, Georgia |

1996 Tenure
Medical College of Georgia

AWARDS/HONORS:

1976 Humanities Honors Program
The Johns Hopkins University

1979 Humanities Honors Program
Best Thesis Award
The Johns Hopkins University

1992 Fellow
American College of Physicians

1994 Alpha Omega Alpha (AOA)

1996 Clinical Neuroscience Teaching Award
Medical College of Georgia

1991 - 1998 V.A. Superior Performance Award

1996 Outstanding Service Award, American Heart
Association, Richmond County Division

1999 Elected Member, American Neurological Association

2000 Distinguished Faculty Award for Clinical Science Teaching
Medical College of Georgia

2001 - 2017 America's Top Doctors (Castle and Connolly-top 1%)

2001 2001 Humanism in Medicine Award
The Healthcare Foundation of New Jersey

2001 - 2017 Best Doctors of America

2003 Educator of the Year Award, Medical College of Georgia Class of 2004

2004 Henry Middleton VA VISN 7 Excellence in Research Award

2001 - Gold Humanism Honor Society

2005 Mayo Clinic "Resident Choice" Visiting Professor

2010, 2011, 2012, 2014, 2017 Exemplary Teaching Award for Medical Student Education

2012 Medical College of Georgia Outstanding Faculty Member Award

| | |
|------|-------------------------------------------------------------------------------------|
| 2012 | Georgia Health Sciences University Outstanding Faculty Member Award |
| 2012 | Distinguished Research Award, Georgia Health Sciences University Research Institute |

ADMINISTRATIVE RESPONSIBILITIES/APPOINTMENTS:

Major Committees

| | |
|------------------|---------------------------------------------------------------------------------------------|
| 1992 - 1996 | Steering Committee: Thrombolytic Therapy in Acute Stroke(A0276), Genentech |
| Nov. 15-17, 1992 | Neurology Board Examiner for American Board of Psychiatry and Neurology |
| 1993 - 1997 | American Heart Association-Stroke Council, Georgia Affiliate Liaison |
| 1993 - 1995 | American Heart Association, Georgia Affiliate, Health Site Committee |
| 1994 - 1997 | American Heart Association, Georgia Affiliate, Stroke Task Force, Chairman |
| 1993 - 1997 | Director Neuro 500 Third & Fourth Year Medical Student Clerkship Medical College of Georgia |
| 1994 - 1997 | American Heart Association, Georgia Affiliate, Research Committee |
| 1997 | American Heart Association, Southeastern Affiliate Research Peer Review Committee |
| 1995 - 1997 | American Heart Association, Georgia Affiliate Board of Directors |
| 1995 - present | American Heart Association, Richmond-Columbia County Division, Board of Directors |
| 1996 - 1997 | Vice President American Heart Association Georgia Affiliate |
| 1995 - 2006 | Augusta Biomedical Research Corporation Board of Directors |
| 1997 - 1999 | American Heart Association, Southeast Affiliate, Stroke Task Force |
| 1999 - 2001 | Georgia Medical Care Foundation: Stroke Performance Measure Study |

| | |
|-------------|---------------------------------------------------------------------------------------------------|
| | Group |
| | Counselor, Association of VA Neurologists |
| 2000 - 2004 | University Hospital Consortium Clinical Process Improvement-Ischemic Stroke Steering Committee |
| 2005 - 2007 | Ethics, Law, and Humanities Committee American Academy of Neurology |
| 2007 | Governor's (Georgia) Cord Blood Commission |
| 2007- | American Heart Association Telestroke Committee |
| 2007 - 2009 | Chairman, American Heart Association Georgia Stroke Committee |
| 2010 -2019 | Vascular Neurology Board Examination Committee American Board of Psychiatry and Neurology |
| 2011 - 2017 | American Stroke Association Scientific Sessions Committee |

COMMITTEE ASSIGNMENTS:

Major Institutional Committees

| | |
|----------------|---------------------------------------------------------------------------------------|
| 1990 - 1994 | Biomedical Research Support Grant Committee Medical College of Georgia |
| 1990 - 1997 | Clinical Advisory Group VA Medical Center |
| 1990 - 1997 | Clinical Executive Board VA Medical Center |
| 1997 - 1999 | Executive Board V.A. Medical Center |
| 1991 - present | Human Assurance Committee, Institutional Review Board MCG and VA Medical Center |
| 1991 - present | Residency Credentials Review Committee VA Medical Center |
| 1991 - 1994 | Research Committee |
| 1996 - present | VA Medical Center |

| | |
|-----------------|---------------------------------------------------------------------------------------------------|
| 1993, 1997-1999 | Chairman, Research Committee VA Medical Center |
| 1992 - 1994 | Deans Committee VA Medical Center |
| 1992 - present | Research Proposal Review Subcommittee VA Medical Center |
| 1992 - 1994 | Clinical Planning Committee VA Medical Center |
| 1993 | Chairman, Chief of Medicine Search Committee VA Medical Center |
| 1993 | Internal Residency Review Committee Medical College of Georgia |
| 1993 - 1997 | Phase III Curriculum Committee Medical College of Georgia |
| 1994 - 2000 | Secretary, Professional Standards Board Medical Staff Executive Committee VA Medical Center |
| 1995 - 1998 | Chairman, Clinical Pathway Committee VA Medical Center |
| 1998 - 2000 | Co-Chairman, Managed Care Committee V.A. Medical Center |
| 1997 - 2006 | University of Georgia M.D./Ph.D Advisory Committee |
| 1996 - 2000 | Residency and Education Committee Dept.of Neurology, Medical College of Georgia |
| 1997 - 2000 | Executive Committee VA Medical Center |
| 1997 - 2000 | Chairman, Telemedicine Developmental Program Project Steering Committee VA Medical Center |
| 1998 - 2002 | Executive Committee Dept of Neurology Medical College of Georgia |

| | |
|----------------|------------------------------------------------------------------------------|
| 1998 - 2000 | Chairman, Executive Committee, VA Medical Center |
| 1999 - present | Academic Council, Medical College of Georgia |
| 1999 - 2000 | Chairman, Faculty Subcommittee of LCME |
| 2000 - present | MCG Physician's Practice Group Board of Trustees |
| 2002 | Chair, Chairman of Medicine Search Committee |
| 2004 - 2005 | Chair, Dean School of Medicine Search Committee |
| 2005 - | MCGRI/GRRI Board of Directors and Executive Committee |
| 2006 - 2009 | Dean's Advisory Committee |
| 2007, 2011 | Chair, Search Committee, VP for Technology Transfer and Economic Development |
| 2011 - 2012 | Chair, Search Committee, GRU Chief Financial Officer |
| 2015 | Search Committee, Dean, UGA/GRU Partnership Medical Campus |
| 2015 - 2016 | Co-chair, Search Committee, COO/CFO, Associate Dean |

National Research Committees

| | |
|------------------|---------------------------------------------------------------------------------------------------|
| July 7-8, 1993 | National Institutes of Health Program Project Review Special Committee Bethesda, MD |
| June 29-30, 1994 | National Institutes of Health Program Project Review Special Committee Bethesda, MD |
| 1996 - 1997 | American Heart Association (National) Brain Review Committee |
| 1998 - 1999 | Chairman, Planning Committee, VA Cooperative Study #469 |
| 1999 | VA QUERI Acute Stroke Expert Panel |
| 1999, 2000 | American Heart Association-Bugher Foundation Stroke Award Review Committee |
| | Endpoints Committee, The Iron (Fe) and Atherosclerosis Study (FeAST) VA Cooperative Study #410 |

Paul Coverdell Acute Stroke Registry Expert Panel
Centers for Disease Control, Atlanta, GA

| | |
|-------------|------------------------------------------------------------------------------------------|
| 2002 | Co-Chair, Basic Cerebrovascular Disease Platform Sessions, American Academy of Neurology |
| | NIH/NIAMS Special Emphasis Panel (ZAR1-TAS-D (C1)) RFA-01-007 |
| 2002 - 2003 | NIH BDCN 3 Study Section |
| 2003 | VA Merit Review Neurobiology C Panel |
| 2004 | NIH NICHD CHHD-K Study Section Ad hoc |
| 2007 - 2009 | NINDS SPOTRIAS Review Study Section |
| 2010 - | NIH/NINDS NSD-K Study Section Ad hoc review |
| 2009 - 2013 | NIH/NINDS SAMMPRIS Clinical Trial Data and Safety Monitoring Committee |
| 2010 - 2014 | Pfizer, Chairman, Data and Safety Monitoring Committee |
| 2011 - 2015 | NINDS NSD-K Study Section |
| 2011 - 2014 | Chair, NINDS, Clinical Trial Special Emphasis Panels |
| 2014 | NIH-NINDS Special Emphasis Panel ZNS1-SRB(J08): PD Planning Grant Review |
| 2013 -2017 | Bayer, Adjudication Committee |

Patents and Technology Transfer

Co-inventor, REACH telestroke system, licensed by GRU to REACH Call, Inc in 2006

Patent: Multistem in neurological diseases, licensed by GRU to Athersys, Inc

Companies Founded

Co-Founder and Founding CEO, REACH CALL, Inc., 2006
Chairman, Board of Directors, REACH CALL ,Inc 2006-9
Acting Chief Medical Officer, REACH CALL, 2006-9
Chairman, Board of Directors, REACH Health Inc 2009-present

REACH Health, Inc 2006 Winner of TAG-GRA Business Launch Competition

Note: REACH Call Inc, is a company spun out of GRU (name change to Reach Health, Inc)
Website: www.reachhealth.com

Food and Drug Administration IND/IDE

Sponsor, FDA IND (77,797)

Sponsor FDA IDE (G106239) Doctormate Remote Conditioning device

Advisory Boards

| | |
|------|--------------------------------------------------------------------------------------|
| 2010 | Clinical Advisory Board, Athersys, Inc |
| 2014 | Scientific Advisor, Mesoblast |
| 2014 | Scientific Advisory Board, NeuroFx (neurological regenerative biotechnology company) |

Reviewer/Editor

| | |
|-------------|---------------------------------------------------------------|
| 1998 - 2004 | Practical Reviews in Neurology, American Academy of Neurology |
|-------------|---------------------------------------------------------------|

Editorial Board

| | |
|-------------|-------------------------------------------------|
| 2010 - | Stroke (American Heart Association) |
| 2009 - | Cell Transplantation |
| 2011 - 2016 | Experimental and Translational Stroke Research |
| 2015 - | Brain Circulation |
| 2015 - | Translational Stroke Research, Associate Editor |
| 2015 - | Stroke & Vascular Neurology |
| 2017- | Conditioning Medicine, Associate Editor |

AD HOC Reviewer

Neurology
Stroke
Annals of Neurology
Southern Medical Journal
Journal of Rheumatology
Journal of Family Practice
Lupus
Scandinavian Journal of Rheumatology
Journal of Cerebrovascular Diseases
American Journal of Physiology: Cell Physiology
Lancet
Brain Research
Life Sciences
European Journal of Clinical Investigation
Journal of Cerebral Blood Flow and Metabolism
Circulation

Experimental Neurology
Lancet Neurology
Stem Cells
Neurosurgery
Stem Cells Translational Medicine

AD HOC Reviewer (Grants)

Louisiana State Board of Regents Grant System
Arthritis Rheumatism Council, Great Britain
VA Merit Review
VA-Department of Defense
South Carolina Health Sciences

GRANTS: (Investigator-initiated, peer reviewed)

Current Funding:

Active

Hess 8/1/19 to 7/30/22 2.4 month calendar effort
NIH 1U01NS113356-01 Role: PI \$725,000 total costs
Major Objective: To develop new interventions and drugs for acute ischemic stroke

Hess 8/1/17 to 7/30/21 1.8 calendar effort
NIH/NINDS/NIA R01 NS099455 A1 Role: PI \$1,520,000 total costs
Mechanisms of Remote Ischemic Conditioning in a VCID Model
Major Objective: To understand the mechanisms of RIC and if RIC is an exercise mimetic in a model of VCI, the bilateral carotid artery stenosis model in the mouse.. To specifically determine if the effects of RIC are eNOS dependent and to determine if these effects are via endothelial eNOS or circulating blood cell eNOS

Hess 9/30/2015 to 7/15/2020 Role: Consultant (F West, UGA PI)
NIH/NINDS 1R01NS093314-01A1
Combined Nanoparticle and Neural Stem Cell Therapies in a Pig Model of Stroke
Major objective: To develop an iPS-Neural stem cell derived treatment for ischemic stroke using nanoparticles to enhance potency and efficacy

Completed Research Support

Co-investigator: Validation of a Stroke Therapy Comprised of Synergistic Stem Cell-Derived Factors SBIR-
NIH 1R43NS092167-01A1; July 1, 2016 to July 31, 2017; \$79,079 direct costs 1.2 calendar effort

Principal Investigator: Remote Ischemic Conditioning for Neuroprotection in Vascular Cognitive Impairment NIH/NINDS R21NS081143-01; July 1, 2015 to December 31, 2017
\$500,000 direct costs 1.8 calendar effort

Remote Ischemic Perconditioning in acute ischemic stroke

Principal Investigator: David C Hess MD
Agency: NIH/NINDS R21 NS081143 April 1, 2013 to March 30 2015
275,000 direct costs 10% effort

Principal Investigator: Minocycline to Improve Neurologic Outcomes (MINO) Clinical trial NIH/NINDS RO1 NS 055728 ; Direct costs:1,500,000. April 1 2007-2013 (no cost extension)

Principal Clinical Investigator, MASTERS clinical trial; Athersys Inc 2011 to 2015
Co-Investigator: Mini-plasmin: Pre-Clinical Evaluation of a Novel Thrombolytic Agent. PI: Irina Sazonova, PhD NIH-NINDS 1 R21 NS072318-01; April 2011 to March 2013

Co-investigator Transplantation of multipotent adult progenitor cells in stroke NIH-NINDS UO1 NS 055914; Principal Investigator: Cesar Borlongan PhD _May 2008-March 2010

Co- Investigator Neuroprotection in the Human Brain Tissue Model of Stroke
Principal Investigator: Sergei Kirov; NIH-NINDS Type R21R21NS062154-01A1 June 1, 2009-April 1, 2011

Principal Investigator: Breaking the blood-brain barrier after stroke. NIH R21 NS 43487-01; \$200,000 direct costs 2002-2005 (with Supplement)

Co-Investigator: Vascular Protection in Acute Ischemic Stroke 1 RO1 NS044216-01A1 (Fagan, P.I.)NIH/NINDS : \$525,000 (direct costs - approx \$150,000 to MCG (Hess) as a subcontract) 5/1/2003 - 4/30/06

Principal Investigator. Blocking inflammation in acute ischemic stroke by targeting NF-kB. VA Medical Research Service Merit Review. \$420,000. 2001-2005

Principal Investigator: Blood into Brain: Regeneration of ischemic brain by bone marrow-derived progenitor cells. American Heart Association. Southeast Affiliate. \$120,000. 2000-2002

Principal Investigator: Cerebral Endothelial Cell Activation in Acute Ischemic Stroke: Role of NF-kB V.A. Medical Research Service Merit Review, \$274,000, 1997-2000

Principal Investigator: Inhibition of Cerebral Endothelial Cell Activation Using NF-kB Transcription Factor Decoys; American Heart Association, Georgia Affiliate. \$60,000, 1997-1999

Principal Investigator: Regulation of ICAM-1 in Brain Endothelium; American Heart Association, National, Grant in Aid, \$120,000; 1995-1998

Principal Investigator: Adhesion Molecules and Brain Endothelium.VA Medical Research Service. Merit Review \$165,000. 1994 - 1997

Principal Investigator: Cerebral Microvascular Endothelial Cell Activation During Hypoxia-reoxygenation. Medical College of Georgia Research Institute. \$10,000. 1993 - 1994

Principal Investigator: A Model for Antiphospholipid Stroke. Research Advisory Group. Veterans Administration Medical Research Service. \$68,000. 1992 - 1994

Principal Investigator: The Cerebral Endothelial Cell and Autoimmune Cerebrovascular Disease. American Heart Association (Georgia Affiliate). \$42,500. 1991 - 1993

Principal Investigator: Prevalence of Antiphospholipid Antibodies in a Stroke Population. Medical College of Georgia Research Institute. \$10,000. 1989 - 1990

Principal Investigator: The MRL/lpr Mouse: An Animal Model for Antiphospholipid Mediated Stroke. Biomedical Research Support Grant (Medical College of Georgia). \$3,600. 1991 – 1992

Co-Investigator: Gene Therapy for Stroke with Transcription Factor Decoys. American Heart Association. Southeast Affiliate. 10% effort 1999-2001

Teaching Grants

Faculty Advisor: Student Scholarship in Cerebrovascular Disease, American Heart Association. \$1,500. 1992

Preceptor: VA Neuroscience Fellowship; award to Khalid Malik; 1999-2001;

Principal Investigator; Health Sciences Fellowship; American Heart Association, Southeast Affiliate; \$7200. 1999-2001

Principal Investigator; Health Sciences Fellowship; American Heart Association, Southeast Affiliate; 21,600. 2001-2002

SCIENTIFIC and PROFESSIONAL SOCIETIES:

American College of Physicians, Fellow
American Academy of Neurology
Medical Association of Georgia
American Heart Association, Stroke Council
American Heart Association, Thrombosis Council
American Association for the Advancement of Science
American Neurological Association
Society for Neuroscience

PRESENTATIONS:

Invited Lectures- Over 300 (Partial list in last 3 years only included)

Invited Speaker, “Management of the Cryptogenic Stroke Patient” Georgia Chapter American College of Cardiology. November 16-18, 2018

Invited Speaker, “Remote ischemic conditioning” Symposium on Conditioning Medicine. November 4-8, 2018 Beijing, China

Invited Speaker and participant AHA and ASA sponsored International Stroke Conference. January 22-24, 2018 Los Angeles, CA

Invited Speaker, "Remote ischemic conditioning" STAIR X Conference. October 20-22, 2017, Washington DC

Invited Speaker "Ischemic Conditioning" American Neurological Association, October 14-16, 2017 San Diego, CA

Invited speaker "Telestroke in Rural Georgia" at the 30th Biennial Institute for Georgia Legislators- hosted by the Carl Vinson Institute at the University of Georgia on December 5, 2016

Invited Speaker The TEMPO EMS -a planned prehospital trial of RIC in acute stroke". "Remote ischemic conditioning: An exercise mimetic?" Chronic RIC as a treatment for Vascular Cognitive Impairment and Dementia (VCID)" 4th International Symposium on Tolerance and Conditioning: 30 Years of Science and Hope in Suzhou, China, November 13-14, 2016

Invited speaker and participant in the NIH-sponsored "Collaterals Conference 2016" at UCLA. Los Angeles, CA on November 8-10, 2016

Invited Speaker. "The World is Flat" A brief future of telestroke" St Dominic's Health System Stroke Symposium, New Orleans, LA January 16, 2015

Invited Speaker "Remote ischemic conditioning in stroke and intracranial atherosclerosis." 7th International Congress of Intracranial Atherosclerosis (ICAS 2014) September 19-21, Chengdu, China

Moderator, Session Organizer and Presenter: "Remote ischemic conditioning" in Session on "Peripheral to Central signaling" Brain Edema 2014 and 2nd Preconditioning Conference, September 27-30, Huntington Beach, CA

Invited Speaker "Remote Ischemic conditioning: is it time for clinical trials?-debate" UCLA-NIH Conference on Collateral Circulation Nov 4-6 UCLA, LA, CA

Invited Speaker "Multistem (MASTERS) clinical trial"- Presentation to Japanese Society of Cerebral Blood flow and Metabolism- Neurologists and Neurosurgeons. Okayama, Japan November 22, 2014

Invited Speaker. Stem Cell Therapy in Stroke and Master's clinical trial -Presentation to University of Tokyo, Japan, January 21, 2014

PUBLICATIONS in Non-Refereed Journals:

Hess DC, Adams RJ, Nichols FT. Antiphospholipid Antibodies in Stroke. Journal of the Medical Association of Georgia, December, 1989;815-820.

Hess DC. Multiple Sclerosis. New Help, New Hope Consultations in Primary Care. Consultant. 2000; 40:1085-1094

Hess DC. Identifying the Spectrum of Neurologic complications in Sjogren's Syndrome. Advances in Immunotherapy. 2001;8:12-16

Malik K, **Hess DC.** Evaluating the comatose patient: Step by step neurologic assessment. Postgraduate Medicine 2002; February. 38-55

ABSTRACTS (not listed)

PUBLICATIONS in Peer Reviewed Journals:

1. **Hess DC,** Sethi KD. Epilepsia Partialis Continua in Multiple Sclerosis. Journal of International Neurosciences, 1990;50(1-2):109-111.
2. **Hess DC,** Fischer AQ, Yaghami F, Figueroa R, Akamatsu Y. Comparative Neuroimaging with Pathological Correlates in Alexander's Disease. Journal Child Neurology, 1990;5(3):248-252.
3. **Hess DC,** Sethi KD, Nichols FT. Carotid Dissection: A False Localizing Sign. J. Neurology, Neurosurgery, Psychiatry, 1990;804-805.
4. Arn PH, Hauser E, Thomas GH, Herman G, **Hess DC,** Brusilow SW. Hyperammonemic Coma, often Postpartum, in Women Who Have a Mutation of the Ornithine Transcarbamoylase Locus. New England Journal of Medicine, 1990;322:1652-1655.
5. Sethi KD, **Hess DC.** Prevalence of Dystonia in a Veteran Population. Movement Disorders, 1990;5:319-321.
6. Antiphospholipid Antibodies in Stroke Study Group. **Hess, DC,** contributing author. Clinical and Laboratory Findings in Patients with Antiphospholipid Antibodies and Cerebral Ischemia. Stroke, 1990;21:1268-1273.
7. Sethi KD, **Hess DC,** Holmes G. Gaze-Evoked Involuntary Movement. Movement Disorders 1990;5 (2):139-142.
8. **Hess DC,** Awad E, Posas H, Sethi KD, Adams RJ. Miller Fisher Syndrome in Systemic Lupus Erythematosus. J of Rheumatology, 1990;17:1520-22.
9. **Hess DC,** Nichols FT, Sethi KD, Adams RJ. Transient Cerebral Ischemia Masquerading as Paroxysmal Dyskinesia. Cerebrovascular Diseases, 1991;1:54-57.
10. **Hess DC,** Krauss JS, Rardin D. Stroke in a Young Adult with Fletcher Trait. Southern Medical Journal, 1991;84:507-508.
11. **Hess DC,** Krauss J, Adams RJ, Nichols FT, Zhang D, Roundtree H. Anticardiolipin Antibodies: A Study of Frequency in TIA and Stroke. Neurology, 1991;41:525-528.
12. Sethi KD, **Hess DC.** Creutzfeldt-Jakob's Disease Presenting with Ataxia and a Movement Disorder. Movement Disorders, 1991;6:157-162.

13. **Hess DC**, Adams RJ, Nichols FT. Neurological Complications of Clotting Disorders: Sickle Cell Anemia and Other Hemoglobinopathies. Seminars in Neurology, 1991;111:314-328.
14. Chen X, Orfanos S, Ryan JW, Chung AYK, **Hess DC**, Catravas J. Species Variation in Pulmonary Endothelial Aminopeptidase P Activity. J Pharm and Exp Ther., 1991;259:1301-1307.
15. **Hess DC**. Stroke Associated with Antiphospholipid Antibodies. Stroke, 1992;[suppl I]:I-23-I-28.
16. Sethi, KD, **Hess DC**, Huffnagle VH, Adams RJ. Acetazolamide Treatment in Paroxysmal Dystonia in CNS Demyelinating Disease. Neurology. 1992;42:919-921.
17. Adams RJ, McKie V, Nichols F, Carl E, Zhang D, McKie K, Figueroa R, Litaker M, Thompson W, **Hess DC**. The Use of Transcranial Ultrasonography to Predict Stroke in Sickle Cell Disease. N Engl J Med 1992;326:605-10.
18. **Hess DC**, Sethi KD, Awad E. Thrombotic Thrombocytopenia Purpura and Antiphospholipid Antibodies: Treatment with Plasma Exchange and Cyclophosphamide. J. Rheumatol., 1992;19:1474-1478.
19. **Hess DC**, D'Cruz I, Adams RJ, Nichols FT. Coronary Artery Disease, Myocardial Infarction, and Brain Embolism, Neurologic Clinics, 1993;11:399-417.
20. **Hess DC**, Taormina M, Thompson J, Sethi KD, Diamond B, Chamberlain CR, Rao R. Cognitive and Neurologic Deficits in the MRL/lpr Mouse: A Clinicopathologic Study. J of Rheumatology, 1993;20:610-617.
21. **Hess DC**, Sheppard JC, Adams RJ. Increased Immunoglobulin Binding to Cerebral Endothelium in Patients with Antiphospholipid Antibodies. Stroke, 1993;24:994-999.
22. Antiphospholipid Antibodies in Stroke Study (APASS). **Hess DC**, contributing author. Anticardiolipin Antibodies are an Independent Risk Factor for First Ischemic Stroke. Neurology, 1993;43:2069-2073.
23. **Hess DC**, Sheppard JC, Bhutwala T, Zhao W, Smith J. ICAM-1 Expression on Human Cerebral Microvascular Endothelial Cells. Neuroscience Letters, 1994;168:201-204.
24. Scott T, **Hess DC**, Brillman J. Antiphospholipid Antibody Syndrome Mimicking Multiple Sclerosis Clinically and by Magnetic Resonance Imaging. Arch Internal Medicine, 1994;154:917-920.
25. **Hess DC**, Zhao W, MacEachin M, Carroll JC. Increased Expression of ICAM-1 During Reoxygenation in Brain Endothelial Cells. Stroke, 1994;25:1463-1468.
26. **Hess DC**. Models for the Neurological Complications of Antiphospholipid Syndrome. Lupus, 1994;3:253-257.
27. STIPAS Investigators (**Hess D**, STIPAS Participant). Safety Study of Tirilizad Mesylate in Patients with Acute Ischemic Stroke, Stroke 1994;25:418-423
28. **Hess DC**, Thompson Y, Sprinkle A, Carroll J, Smith J. E-selectin Expression on Human Brain Microvascular Endothelial Cells. Neuroscience Letters, 1996;213:37-40.

29. **Hess, DC.** Cerebral Lupus Vasculopathy: Mechanisms and Clinical Relevance, Annals of the New York Academy of Sciences, 1997;823:154-168.
30. Antiphospholipid Antibodies and Stroke Study Group (APASS) **Hess DC**, contributing author. Antiphospholipid antibodies and the risk of recurrent thrombo-occlusive events and death. Neurology 1997;48:91-94
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39. Carroll J, **Hess DC**, Howard E, Hill WD. Is nuclear factor -kB a good treatment target in brain ischemia-reperfusion injury? NeuroReport 2000;11:R1-R4
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48. Masuya M, Drake CJ, Fleming PA, Reilly CM, Zeng H, Hill WD, Martin Studdard A, **Hess DC**, Ogawa M. Hematopoietic origin of glomerular mesangial cells. Blood 2003; 101:2215-8
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52. Wang S, Lee SB, Pardue C, Ramsingh D, Waller J, Gross H, Nichols FT, **Hess DC**, Adams RJ. Remote Evaluation of Acute Ischemic Stroke. Reliability of National Institutes of Health Stroke Scale via Telemedicine. Stroke 2003 Sept 18 e pub
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55. **Hess DC**, Abe T, Hill WD, Martin Studdard A, Carothers J, Masuya M, Fleming P, Drake C, Ogawa M. Hematopoietic origin of microglial and perivascular cells in brain Exp Neurology 2004;186:134-144
56. **Hess DC**, Hill WD, Carroll JC, Borlongan C. Do bone marrow cells generate neurons? Archives Neurology 2004;61:483-485

57. Wang J, Wei Q, Wang CY, Hill WD, **Hess DC**, Dong Z. Minocycline upregulates Bcl-2 and protects against cell death in mitochondria. J Biol Chem 2004;279:19948-54
58. Fagan SC, Arora A, Edwards D, Borlongan C, Xu, L, Feuerstein G, **Hess DC**. Optimal delivery of minocycline to the brain: implications for human studies of acute neuroprotection. Exp Neurology 2004;186:248-251
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61. Borlongan CV, Lind JG, Dillon-Carter O, Yu G, Hadman M, Cheng C, Carroll J, **Hess DC**. Intracerebral xenografts of mouse bone marrow stromal cells in adult rats facilitate restoration of cerebral blood flow and blood-brain barrier. Brain Res 2004; 1009;26-33
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Life Sci. 2005 Feb 11;76(13):1503-12.

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Cell Therapy in Brain Injury. David C Hess Editor Springer Verlag, New York, 2015

SPECIAL CERTIFICATIONS/COURSES:

Certificate Course in Healthcare Evaluation Fall 1998, Department of Medicine, Medical College of Georgia

Truth in Testimony Disclosure Form

In accordance with Rule XI, clause 2(g)(5)*, of the *Rules of the House of Representatives*, witnesses are asked to disclose the following information. Please complete this form electronically by filling in the provided blanks.

Committee: Agriculture

Subcommittee: Commodity Exchanges, Energy, and Credit

Hearing Date: July 11, 2019

Hearing Title :

Building Opportunity in Rural America through Affordable, Reliable and High-Speed
Broadband

Witness Name: David C. Hess, MD

Position/Title: Dean, Medical College of Georgia, Professor and Presidential Distinguished Chair in Neurology

Witness Type: ☐ Governmental ☒ Non-governmental

Are you representing yourself or an organization? ☐ Self ☒ Organization

If you are representing an organization, please list what entity or entities you are representing:

Medical College of Georgia at Augusta University

If you are a **non-governmental witness**, please list any federal grants or contracts (including subgrants or subcontracts) related to the hearing's subject matter that you or the organization(s) you represent at this hearing received in the current calendar year and previous two calendar years. Include the source and amount of each grant or contract. *If necessary, attach additional sheet(s) to provide more information.* House Rules do NOT require disclosure of federal payments to individuals, such as farm program payments or assistance to agricultural producers.

None related to this hearing subject matter.

If you are a **non-governmental witness**, please list any contracts or payments originating with a foreign government and related to the hearing's subject matter that you or the organization(s) you represent at this hearing received in the current year and previous two calendar years. Include the amount and country of origin of each contract or payment. *If necessary, attach additional sheet(s) to provide more information.*

None