NAA 2017

May 19 & 20, 2017

North American Artery Seventh Annual Meeting

Beyond the Clinic: Blood Pressure and Vascular Function

Mechanisms, Assessment & Management in Health and Disease

University of Illinois-Chicago, Chicago, Illinois, USA

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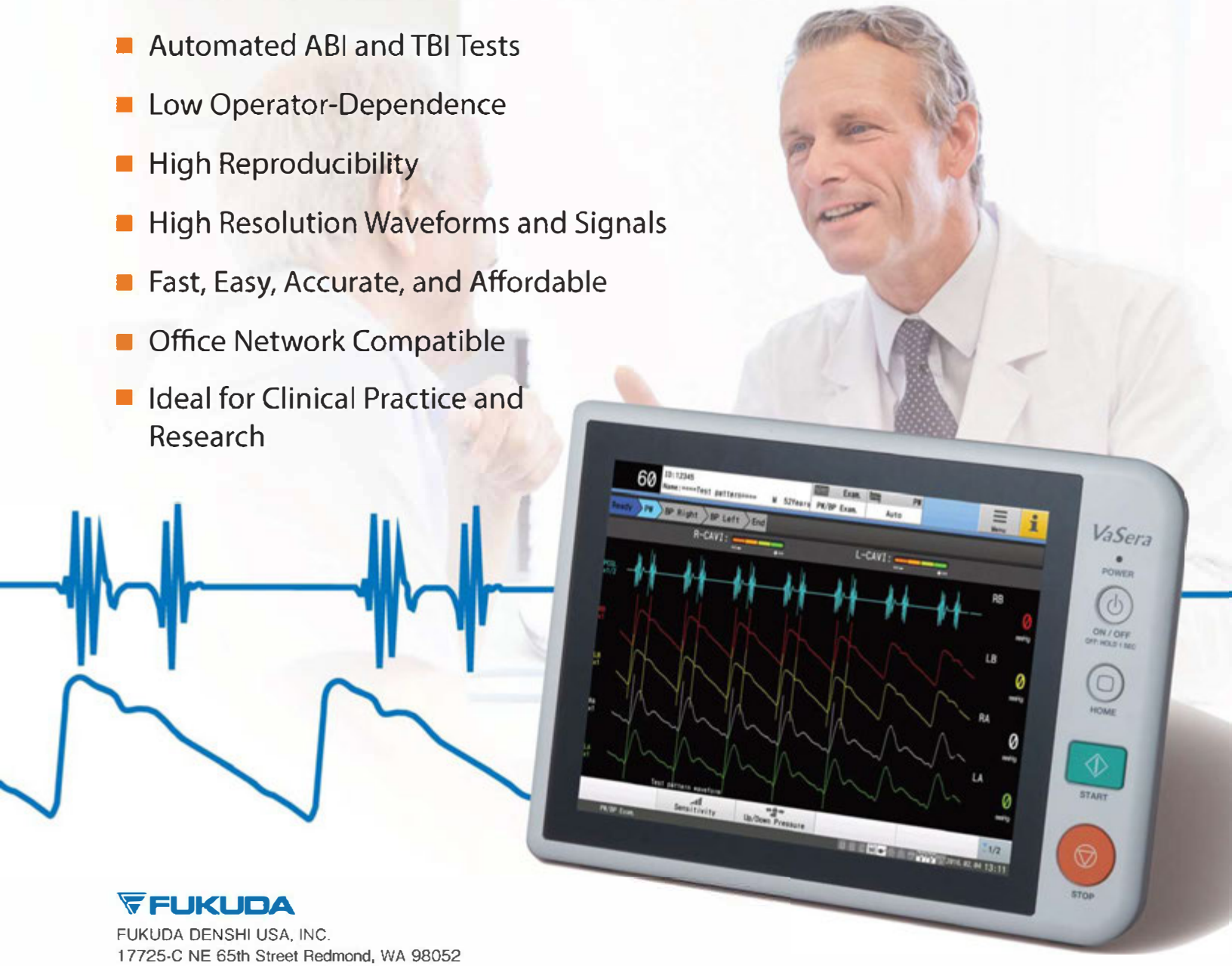

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PRESIDENT'S WELCOME

Dear Colleagues,

Please accept my personal welcome to each of you on the occasion of our Seventh Annual NAA Meeting, with this year's theme of "Beyond the Clinic: Blood Pressure and Vascular Function: Mechanisms, Assessment & Management in Health and Disease". Arterial hemodynamics remains an exciting area and the North American Artery Society continues to unite inspired speakers and energetic attendees in forums like this, leveraging our position at the cutting edge of research and the practical applications for technologies that measure arterial structure and function.

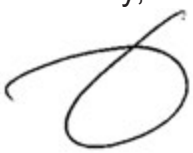
I'm indebted (again) to the yeoman efforts of our Conference Co-Chairs, Bo Fernhall and Gary Pierce, and to the members of the Program Committee for working diligently with me to assemble this program. We are also deeply grateful for assistance from Hansen Global Event Management for such excellent logistical support.

I look forward to meeting our members, both old and new who will be here. For those of you attending who are not members, there is information about the NAA included within this book, and membership applications are available at the registration desk. Please think about becoming a part of our new and exciting organization.

This conference would not be possible without the generous support of our Conference Co-Sponsor, the University of Illinois at Chicago, our Diamond sponsor, Fukuda USA, and our Gold sponsors, AtCor Medical, Inc., Cardiovascular Engineering, Inc., Hitachi Healthcare, IEM GmbH, UNEX Corporation, and Uscom Inc. The NAA is grateful to each of them for their support of our organization. Please visit with them in the exhibit area during our breaks.

In closing, thanks to each of you for attending the conference, and contributing your expertise to our gathering. Throughout this conference, you are encouraged to engage faculty and sponsors. My very best to you all!

Sincerely,



Raymond R. Townsend MD
University of Pennsylvania
President, North American Artery

WELCOME FROM THE CO-CHAIRS

It is with great pleasure that we welcome you to the Seventh Annual Meeting of North American Artery (NAA), "BEYOND THE CLINIC: BLOOD PRESSURE AND VASCULAR FUNCTION: Mechanisms, Assessment & Management in Health and Disease". The NAA is a multidisciplinary society dedicated to the understanding of vascular structure and function in health and disease and its application to clinical medicine, basic/translational/population research, and pharmaceutical and medical device development.

The focus of NAA 2017 will be on the mechanisms, assessment and management of high blood pressure and vascular dysfunction 'beyond the clinic'. This year's meeting includes sessions on controversies and methodologies in measurement of clinic and ambulatory brachial and central blood pressure and arterial stiffness, sleep and vascular risk, methodology and treatment of cerebrovascular dysfunction and cognitive impairment, autonomic regulation of blood pressure, endothelial function and arterial stiffness, racial disparities and vascular risk and response to exercise. This year's popular debate will feature the topic of white-coat hypertension is/is not associated with increased cardiovascular disease risk.

We are pleased to welcome the participation of representatives from sister organizations. ARTERY is represented by John Cockcroft, Trustee and Past-President and J. Kennedy Cruickshank, President who will give the opening and closing plenary lectures respectively. LATAM ARTERY is co-sponsoring a symposium featuring Dr. Luis Pupi and the President, Dr. Pedro Forcada discussing Environment and Hypertension.

The Program Committee worked tirelessly to create a dynamic program that has continued to build on the success of previous meetings. This is demonstrated by the 33 abstract presentations that are included in this year's meeting, as well as the exciting main lectures, debates, exhibits, and new this year, practical hands-on demonstrations provided by our sponsors.

We truly hope you will enjoy the 2017 NAA meeting at the University of Illinois at Chicago and that you take the opportunity to meet and network with our speakers, exhibitors, and delegates from not only the United States, but from Canada, South America, Europe and Asia as well.

We would especially like to thank our Conference Co-Sponsor, the University of Illinois at Chicago, and our supporters, AtCor Medical, Inc., Cardiovascular Engineering, Inc., Fukuda USA, Hitachi Healthcare, IEM GmbH, UNEX Corporation, and Uscom Inc. for making this exciting and scientifically enriching conference possible. Thank you for participating and helping to move the NAA forward as our organization continues to grow.

Sincerely,

Bo Fernhall, Ph.D.

Gary Pierce, Ph.D.

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ACKNOWLEDGEMENT

North American Artery sincerely thanks the following organizations for their support of the Seventh Annual Meeting.

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Meeting Venue
University of Illinois at Chicago (UIC)
All sessions and food functions will take place on the 2nd floor in the Student Center West Building located on the UIC campus at 828 S. Wolcott Avenue, Chicago, IL.

Meeting Registration – Second Floor Foyer
All Conference materials including badges can be picked up from the registration desk during the following hours:

Friday, May 19, 2017	6:30 AM - 6:00 PM
Saturday, May 20, 2017	6:30 AM - 2:00 PM

Badges are required for entry to all functions.

Conference Sessions
Michele Thompson Rooms A&B
All sessions will take place in Michele Thompson Rooms A&B except for the Dinner, which will take place in the College of Nursing Event Center.

Diamond Sponsored Keynote Breakfast Lecture
Friday, May 19, 2017
The Keynote breakfast lecture, sponsored by Fukuda USA will take place from 7:00 to 8:25 AM in Michele Thompson Rooms A&B on the second floor.

Posters on Display – Michele Thompson Room C
Posters will be on display throughout the conference. Presenters will be available to discuss their posters during the lunch on Saturday.

Practical Hands-on Product Demonstrations
Exhibiting sponsors will provide practical hands-on demonstrations of their devices during the breaks on Friday, May 19 according to the following schedule.

11:05-11:20 AM **Fukuda USA:** VaSera model VS-2000
12:35-12:50 PM **UNEX Corporation:** UNEX EF
12:55-1:10 PM **Uscom Inc.:** Uscom BP+ & USCOM 1A
3:05-3:20 PM **Hitachi Healthcare:** Diagnostic Imaging Devices
3:25-3:40 PM **IEM GmbH:** Mobil-O-Graph®
3:45-4:00 PM **Cardiovascular Engineering:** NIHem-WF system
3:45-4:00 PM **AtCor Medical:** SphygmoCor® system

Exhibits, Refreshment Breaks & Lunches
Michele Thompson Room C, Second Floor
All meal functions and refreshment breaks, except the dinner and breakfast, will take place in the exhibit hall.

Friday, May 19, 2017

Refreshment Breaks	11:00 to 11:30 AM 3:00 to 4:30 PM
Lunch	12:30 to 1:30 PM

Saturday, May 20, 2017

Refreshment Break	10:25 to 11:25 AM
Lunch/Poster Presentations	12:55 to 2:05 PM

Participants' Reception—Friday, May 19, 2017
NAA's Participant's Reception, co-hosted by the University of Illinois at Chicago will take place from 6:50 to 7:30 PM in Michele Thompson Room C. All participants are invited to attend.

Networking Dinner—Friday, May 19, 2017
NAA's Networking Dinner will take place from 7:35 to 9:00 PM at the UIC College of Nursing Event Center, which is less than a 5-minute walk away. Tickets will be collected at the door, so please be sure to bring the ticket you received at the time of registration with you.

Headquarters Hotel
Chicago Marriott at Medical District/UIC
625 South Ashland Avenue at Harrison Street
Chicago, Illinois 60607 USA
Telephone: +1-312-491-1234

The hotel is less than a mile from the Student Center West building.

Overnight Valet Parking – $45.00 daily

Free shuttle service to UIC is provided by the hotel from 6:00 am to 10:30 pm. Shuttles leave every 1/2 hour. Please see the Front Desk for more information.

Conflict of Interest Disclosure
North American Artery strives to ensure balance, independence, objectivity, and scientific rigor in its educational activities. Faculty members have disclosed financial relationships, in existence over the past 12 months, with commercial interests or with manufacturers with products associated with or discussed in their presentation. All Disclosure Statements are available to meeting attendees in the Program Book.

Seventh Annual Meeting Sponsors
North American Artery thanks the following Sponsors for their generous support of the meeting.

We encourage all participants to visit with our sponsors' exhibit booths during the breaks.

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AGENDA—MAY 19, 2017

7:30 - 8:55 am **Keynote Breakfast Lecture**

Moderator: Christopher Broadbridge, Manager of Sales & Marketing, Vascular Products Fukuda USA

7:30 am Breakfast

8:05 - 8:55 am **CAVI (Cardio-Ankle Vascular Index) in Risk Prediction with Evidence from Longitudinal Studies**

Raymond R. Townsend, MD, University of Pennsylvania

CAVI is a complementary procedure to standard CF PWV studies.

There is a growing longitudinal database of CAVI demonstrating robust utility in CV prediction.

Many of the studies of CAVI are in Asian populations but its use in the US and Canada is growing.

The Breakfast and Keynote Lecture is sponsored by Fukuda USA

8:55 am **Welcome Remarks**

Bo Fernhall, PhD, University of Illinois at Chicago

Gary L. Pierce, PhD, University of Iowa

President's Opening Statement

Raymond R. Townsend, MD

9:00 - 9:40 am **Opening Plenary Lecture**

Moderator: Raymond R. Townsend, MD

History of the Study of Arterial Stiffness

John Cockcroft, MD, Wales Heart Research Institute

Dr. Cockcroft will provide his personal views on the history of the study of arterial stiffness, including what he considers to be landmark studies.

9:40-11:00 am **Controversies and Methodologies in Blood Pressure and Arterial Stiffness**

Moderator: Gary L. Pierce, PhD

9:40-10:00 am Controversies in Protocols for Arterial Stiffness

Daniel Duprez, MD, PhD, University of Minnesota

10:00-10:20 am Controversies in Clinic Measurement of Blood Pressure

Martin Myers, MD, Sunnybrook Health Sciences Centre

Blood pressure readings as recorded in routine clinical practice are inaccurate and subject to a white coat effect. With the disappearance of the mercury sphygmomanometer, physicians are left to choose between aneroid devices, which lose accuracy unless re-calibrated and electronic devices. There is now considerable evidence showing that recording multiple BP readings in the office with a fully automated, electronic sphygmomanometer produces readings which are more accurate than manual BP and not subject to the white coat effect, provided that the patient is resting alone in a quiet place. This technique is called 'automated office BP' and is currently recommended in Canada as the preferred method for recording BP in the office.

In order to avoid over-diagnosis of hypertension and over-treatment, physicians should obtain one of the validated AOBP devices for use in their office. There is no reason to have medical staff present near a patient while BP is being recorded.

10:20-10:40 am **Static versus Ambulatory Central Pressure**

Julio A. Chirinos, MD, PhD, University of Pennsylvania Perelman School of Medicine

- Various ambulatory devices now provide the ability to assess central pressures from cuff measurements of wristwatch-mounted tonometers.
- Various determinants of PPA change throughout the day, which may lead to differences in central vs brachial 24 hour BP
- The incremental prognostic value of central BP measurements is being investigated
- Additional value may be found in ambulatory pulse wave analysis, regardless of central SBP per se.

10:40-11:00 am **Measurement & Interpretation of Ambulatory Blood Pressure in Adults vs. Pediatrics**

Elaine M. Urbina, MD, MS, Cincinnati Children's Hospital Medical Center

1) Guidelines for measurement of Ambulatory BP are similar in Adult & Pediatric patients but interpretation varies considerably.
2) There are specific conditions where ABPM is likely to change patient care especially in subjects with obesity or T2DM and borderline BP.
3) There is a strong relationship between ABP measures and Hypertensive Target Organ Damage and studies show treatment to control Ambulatory BP lead to improvements.
4) More widespread use of ABP may be more cost effective and lead to better patient care.

11:00 - 11:30 am Refreshment Break, Poster and Exhibits Viewing

11:05-11:20 am Practical Hands-on Product Demonstration: **Fukuda USA**

11:30 am-12:30 pm Sleep and Cardiovascular Risk

Moderator: Michael D. Brown, PhD, University of Illinois at Chicago

11:30-11:50 am **Dipping**

William B. White, MD, University of Connecticut

- Epidemiologic studies show that the circadian profile of blood pressure (dipping, non-dipping, reverse dipping) predicts cardiovascular outcomes.
- The level of nocturnal blood pressure is more reproducible than the circadian profile (non-dipper).
- The focus of therapy should be on the level of nocturnal blood pressure rather than the lack of decline in sleep BP.

11:50-12:10 pm **Sleep Apnea and Vascular Risk**

Julio A. Chirinos, MD, PhD

1) OSA is an independent modifiable risk factor of hypertension
2) Treatment of OSA reduces BP modestly, but the effect appears to be larger is resistant hypertension
3) The benefit of CPAP treatment most likely to be observed in HTN patients with more severe OSA who have > 4-5 hr/day PAP adherence
4) An unequivocal cause effect-relationship between OSA and insulin resistance, inflammation or dyslipidemia has not been established in humans.
5) Treatment of OSA should be comprehensive and include life-style intervention targeted to weight loss along with CPAP.

12:10-12:30 pm **Sleep Quality/Quantity and Cardiovascular Risk**

Virend K. Somers, MD, PhD, Mayo Clinic

Reduced sleep duration may be associated with significant increased caloric intake without any accompanying increase in calorie expenditure. This may predispose in the long term to weight gain and increased cardiometabolic risk.

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AGENDA—MAY 19, 2017

12:10 - 1:30 pm **Lunch with Exhibitors—Poster and Exhibits Viewing**

12:35-12:50 pm Practical Hands-on Product Demonstration: UNEX Corporation

12:55-1:10 pm Practical Hands-on Product Demonstration: Uscom Inc.

1:30 - 3:00 pm **The Brain**

Moderator: Tina Ellis Brinkley, Wake Forest School of Medicine

1:30-1:50 pm Methodology of Cerebrovascular Function and/or Blood Flow

Oliver Wieben, PhD, University of Wisconsin-Madison

Flow-sensitive Magnet Resonance Imaging allows for anatomical and hemodynamic assessment of extra- and intracranial arteries and veins, including measures of vessel diameter, velocity profiles, flow, and pulsatility indices. Novel 4D Flow MRI can provide these measures over multiple vessels in a large imaging volume in a single acquisition during rest and functional challenges such as exercise, hypoxia, or hypercadnia.

1:50-2:10 pm Blood Pressure or Blood Pressure Variability in the Brain

Gary F. Mitchell, MD, Cardiovascular Engineering, Inc.

Hypertension, particularly in midlife, is a well-known risk factor for various brain insults, including micro and macro vascular infarcts, mild cognitive impairment and dementia. However, mechanisms linking hypertension to brain damage are complex. While casual blood pressure is associated with cerebral pathology, short- and long-term variability in blood pressure may also contribute to cerebrovascular pathology. This presentation will examine relations of of blood pressure and blood pressure variability with cerebral vascular insults and cognitive function and will present potential mechanisms and interventions that may modulate those relations.

2:10-2:30 pm Vascular Function in the Brain

Timothy Hughes, PhD, Wake Forest School of Medicine

- Arterial stiffness is emerging as an important potential risk factor for late life dementia.
- Greater arterial stiffness is associated with evidence of various aspects of dementia-related pathology including: cerebral small vessel disease, β-amyloid deposition and brain atrophy in AD-prone regions.
- Future studies need to characterize the mechanical and metabolic pathways linking aortic, peripheral and cerebral arterial hemodynamics to cerebral dementia pathology.

2:30-2:50 pm Effect of Physical Activity and Exercise on Cognitive Function

Michelle W. Voss, PhD, University of Iowa

Although greater physical activity and cardiorespiratory fitness are known to delay age-related cognitive decline and decrease risk of Alzheimer's Disease, there is a lack of understanding of how physical activity and fitness protect the aging brain. I will summarize the data showing that physical activity and cardiorespiratory fitness reduce risk of age-related cognitive decline and dementia, and I will summarize the potential neural and neurovascular mechanisms for such protection. At the end of the talk, you should be able to (a) describe the effects of physical activity and fitness on disease risk and cognition in older adults, and (b) describe the effects of physical activity and fitness on brain structure and function in older adults.

2:50-3:00 pm Panel Discussion with Audience Participation

3:00 - 4:00 pm **Refreshment Break—Poster and Exhibits Viewing**

3:05-3:20 pm Practical Hands-on Product Demonstration: Hitachi Healthcare

3:25-3:40 pm Practical Hands-on Product Demonstration: IEM GmbH

3:45-4:00 pm Practical Hands-on Product Demonstration: Cardiovascular Engineering Inc.

4:05-4:20 pm Practical Hands-on Product Demonstration: AtCor Medical (USA), Inc.

4:30 - 6:00 pm Oral Abstract Presentations—Session I

Moderator: Elaine M. Urbina, MD, MS

4:30 pm
OR-01

Nicotinamide Riboside Supplementation Reduces Aortic Stiffness and Blood Pressure in Middle-Aged and Older Adults

CHRISTOPHER R. MARTENS[1], Blair A. Denman[1], Melissa R. Mazzo[1], Michael Armstrong[2], Nichole Reisdorph[2], Matthew B. McQueen[1], Michel Chonchol[3], Douglas R. Seals[1]
[1]Department of Integrative Physiology, University of Colorado Boulder, Boulder, CO, USA, [2]Department of Pharmaceutical Sciences, Skaggs School of Pharmacy and Pharmaceutical Sciences, University of Colorado Anschutz Medical Campus, Denver CO, USA, [3]Division of Renal Diseases and Hypertension, University of Colorado Anschutz Medical Campus, Denver CO, USA

4:45 pm
OR-02

Greater Aortic Stiffness and Systolic Blood Pressure Are Associated with Reduced Processing Speed and Executive Function in Lower but Not Higher Cognitive Reserve

[1]LYNDSEY E. DUBOSE, [2]David J. Moser, [1]Taylor Stecklein, [2]Emily Harlynn, [1,3,4]Gary L. Pierce
[1]Department of Health and Human Physiology; [2] Department of Psychiatry, [3]Center for Hypertension Research, [4]Abboud Cardiovascular Research Center, University of Iowa, Iowa City, IA

5:00 pm
OR-03

Acute Estrogen Infusion Augments the β_2 - Adrenergic Receptor Mediated Vasodilation in Young Women

SUSHANT M. RANADIVE [1], Gabrielle A. Dillon [1] and Michael J. Joyner [1]
[1]Department of Anesthesiology, Mayo Clinic, Rochester MN

5:15 pm
OR-04

Resistance Exercise and Incident Hypertension

DUCK-CHUL LEE[1], Angelique G. Brellenthin[1], Xuemei Sui[2], and Steven N. Blair[2]
[1]Iowa State University, Ames, IA; [2]University of South Carolina, Columbia, SC

5:30 pm
OR-05

Influence of Sex and Fitness on the Vascular Response to Acute Inflammation

ELIZABETH C. SCHROEDER[1], Abbi D. Lane-Cordova[2], Sushant M. Ranadive[3], Tracy Baynard[1], FACSM, Bo Fernhall[1], FACSM
[1]University of Illinois at Chicago, Chicago, IL [2]Northwestern University, Chicago, IL [3]Mayo Clinic, Rochester, MN

5:45 pm
OR-06

Diastolic Carotid Artery Longitudinal Wall Motion Is Sensitive to Both Aging and Coronary Artery Disease Status Independent of Arterial Stiffness

JASON S. AU[1], Sydney E. Valentino[1], Patrick G. McPhee[2], Maureen J. MacDonald[1]
[1]Department of Kinesiology, McMaster University, Hamilton, Canada, [2]School of Rehabilitation Science, McMaster University, Hamilton, Canada

(Con nued on page 12)

AGENDA—MAY 19, 2017

6:00 - 6:50 pm **Debate 2017: The Cardiovascular Risk of White-Coat Hypertension: Does it Really Exist?**

Moderator: John Cockcroft, MD

Pro

Elaine M. Urbina, MD, MS

1) White coat hypertension is associated with target organ damage.
2) White coat hypertension may predict subjects more likely to progress to sustained hypertension.
3) White coat hypertension is not a benign condition.

Con

Stanley S. Franklin, MD, University of California, Irvine

We conclude from this study that (1) the white-coat effect (WCE) is related to aging, not to cardiovascular disease (CVD) risk; and (2) the CVD risk in the great majority of the WCH population is no greater than their age and cohort-matched normotensive population.

This was based on a mean 10.6-year follow-up period, during which time there was an excess of 22 new CVD events in the 653 persons with WCH: i.e. 3.4% of the entire WCH population beyond their age and cohort-matched normotensive population.

We hypothesized that this small number of subjects with new CVD events represented: (1) very elderly persons with (2) high risk of cardiometabolic disease who were (3) mistaken for persons with WCH when in reality they were persons with isolated systolic hypertension (ISH). We conclude that persons with WCH may be referred to as having a "white coat phenomenon" rather than white coat hypertension.

6:50 - 7:30 pm **Participants' Reception (Michele Thompson Room C)**

NAA and the University of Illinois at Chicago invite all participant's to attend this popular annual event.

7:35 - 9:00 pm **Networking Dinner—*Ticketed Event* (UIC College of Nursing Event Center)**

Tickets will be collected at the door, so please be sure to bring the ticket you received at the time of registration with you. If you did not originally register and pay for the dinner , but would like to attend, please visit the registration desk.

8:30 pm Introduction of Newly Elected Officers

Saturday, May 20, 2017

7:30 - 8:25 am **Breakfast**

8:25 - 9:25 am **NAA and LATAM ARTERY Co-Sponsored Symposium**

Environment and Hypertension

Moderator: Julio A. Chirinos, MD, PhD, Vice President –elect, NAA

8:25 - 8:50 am Hemodynamics in Special Populations

Pedro Forcada, MD, Buenos Aires University, Buenos Aires, Argentina

President, LATAM ARTERY

Arterial Stiffness, Central Pressure and Haemodynamics may be widely different according to age, sex and ethnicity. It is very important to be aware of these differences when planning investigations or interpreting results or evaluating therapeutic interventions. Dietary factors such as high fructose corn syrup promote vascular stiffening.

8:50 - 9:10 am Sodium Intake and Hypertension

Luis Maria Pupi, MD, Clinica del Sol, Buenos Aires Argentina

Secretary, LATAM ARTERY

1) Do the correct measurement at office (take care of cuff size).
2) Exclude WC-HTN with the use of AMBP.
3) Try to detect high sodium intake.
4) Investigate for non-adherence.
5) See if the patient is receiving the correct medications at the correct dose and if not… change it.
6) Re check BP with AMBP and if it is still high…
7) Think about Resistant Hypertension and its causes.

9:10 - 9:25 am LATAM ARTERY Update and Future Collaborations with NAA

Pedro Forcada, MD and Julio A. Chirinos, MD, PhD

9:25 - 10:25 am **Autonomic Regulation of Vascular Function**

Moderator: David G. Edwards, PhD, University of Delaware

9:25 - 9:45 am Sympathetic Regulation of Endothelial Function

Italo O. Biaggioni, MD, Vanderbilt University School of Medicine

Sympathetic activation contributes to hypertension and endothelial dysfunction in obesity and can be targeted in the treatment of these patients.

9:45 - 10:05 am Sympathetic Regulation of Arterial Stiffness

Gary L. Pierce, PhD, University of Iowa

1) Preliminary results suggest that acute elevations in muscle sympathetic nerve activity (MSNA) increase carotid femoral pulse wave velocity (CFPWV) and reduce carotid artery compliance independent of blood pressure (BP) in young adults, but additional studies are needed in older adults.
2) Tonically higher MSNA is associated with elevated CFPWV and lower carotid compliance independent of BP in women but not men, however a larger sample is needed to clarify the influence of age on the MSNA/stiffness relation
3) Additional investigations are needed in persons with chronically elevated MSNA (e.g., hypertension, obesity, heart failure) to determine whether MSNA acutely or chronically modulates aortic and carotid stiffness in these groups at high CVD risk.

(Con nued on page 14)

10:05 - 10:25 am **Sympathetic Regulation of Blood Pressure**

Paul J. Fadel, PhD, University of Texas at Arlington

The technique of microneurography has been used extensively to obtain direct recordings of muscle sympathetic nerve activity (MSNA) in both healthy and diseased populations. Much less commonly studied, however, is the transduction of MSNA into changes in arterial blood pressure (BP). Recently, our laboratory, as well as others, have begun to employ experimental methodologies to better understand the ability of MSNA to dynamically modulate vascular tone and BP on a beat-by-beat basis under resting conditions (i.e., resting sympathetic transduction). Collectively, our results indicate that normal variations in spontaneous MSNA burst activity are systematically followed by transient and robust responses of forearm and leg vasoconstriction, leading to subsequent elevations in BP, that are mediated via α-adrenergic receptor mechanisms.

10:25 - 11:25 am **Refreshment Break— Posters and Exhibits Viewing**

11:25 am-12:55 pm **Health Disparities and Cardiovascular Risk**

Moderator: Michael D. Brown, PhD

11:25 - 11:45 am **Disparities in Cardiovascular Risk**

Keith C Ferdinand, MD, Tulane University School of Medicine

In the United States, overall health and the burden of cardiovascular disease (CVD) has continued to improve over the last several decades. Specifically, there were fewer age-adjusted deaths per 100,000 during 2015 compared with 1999, among blacks and whites. Nevertheless, despite the narrowing of disparities in death rates for blacks and whites, disparities in the leading causes of deaths, especially for CVD for blacks compared with whites remain large and persistent and more prominent below the age of 65 years of age, with higher death rates than whites for all-cause mortality in all age groups. Much of these disparities appear driven by the social determinants of health with Blacks having significantly lower educational attainment and almost twice the proportion of households below the poverty level compared with whites. Hypertension is the primary cause of disparate CVD in African Americans, with disparities in mortality via hypertension related factors, access and health care utilization. Universal risk factor control–especially for hypertension control, and targeted primary prevention interventions are needed to reduce black-white health disparities.

Takeaway Message: Hypertension control, with intensive blood pressure reduction, including therapeutic lifestyle and optimal antihypertensive medication, is essential to reduce and eventually, eliminate disparities in cardiovascular disease and the black-white death gap.

11:45 am-12:05 pm **Disparities in Response to Treatment**

Keith C Ferdinand, MD

Several factors have been proposed to explain differences in the prevalence of hypertension and response to therapy among African Americans and whites. Although there is speculation about possible differences in etiology and pathophysiology, no single, unique cause of hypertension has been identified that explains the high prevalence of hypertension in African Americans. However, the prevalence of various pathophysiologic changes, such as higher levels of salt sensitivity, low levels of plasma renin, and higher peripheral vascular resistance, appear to be higher in African Americans than in other racial/ethnic groups. There are data demonstrating disparities in the management of hypertension in African Americans. White-black response differences indicate greater response in blacks for diuretics and CCB's. ALLHAT Trial implications **suggest diuretics should be choice initial HTN therapy and in Blacks, ACEI's should be considered second-line therapy. Among the first three first-step drugs recommended in the 2014 U.S. guidelines and other guideline documents for Blacks include a diuretic, calcium channel blocker, as compared to RAS blockers (ACE inhibitor or ARB)**. Standardized treatment protocols can help reduce disparate outcomes and Kaiser Permanente Southern California **across all ages, races, and sexes, has HTN control exceeding 80%**.

Takeaway Message: Hypertension control is essential especially among African Americans who are at highest risk for CVD/CKD. Potentially effective pharmacotherapy includes first-step diuretics/CCB's and combination therapy in most patients to reduce and eventually eliminate CVD disparities.

12:05 - 12:25 pm — Disparities in Response to Exercise
Kevin Heffernan, PhD, Syracuse University

12:25 - 12:45 pm — Disparities in Blood Pressure Response to Stress
Bruce Alpert, MD, University of Tennessee

There are physiologic differences, based on genetic SNP's, which control the hemodynamics of stress responses. The AA population has excessive vasoconstriction vs higher cardiac output to explain higher BP responses than occur in Caucasians. This may be able to lead to the development of preventive intervention strategies starting in childhood or adolescence.

12:45 - 12:55 pm — Panel Discussion with Audience Participation

12:55 - 2:05 pm — Lunch, Exhibits Viewing and Poster Presentations

1:20 - 2:05 pm — Poster Presentations

2:05 - 3:20 pm — Oral Abstract Presentations—Session II

Moderator: Gary L. Pierce, PhD

2:05 pm
OR-07

Home-Based Aerobic Exercise Improves Resistance Artery Function in Multiple Sclerosis Patients

GARETT GRIFFITH[1], Rachel E. Bollaert[2], Sang Ouk Wee[1], Robert W. Motl[3], Tracy Baynard[1], Bo Fernhall[1]

[1]INTEGRATIVE PHYSIOLOGY LABORATORY, UNIVERSITY OF ILLINOIS AT CHICAGO, [2]Exercise Neuroscience Research Laboratory, University of Illinois at Urbana-Champaign, [3]UAB/Lakeshore Research Collaborative, University of Alabama Birmingham

2:20 pm
OR-08

Reference Standards for Peak Exercise Blood Pressure: The Friend Registry

AHMAD SABBAHI, PT, MA[1]; Ross Arena, PhD, PT, FAHA[1]; Leonard A. Kaminksy[2], PhD; Jonathan Myers, PhD, FAHA[3]; and Shane A. Phillips, PhD, PT, FAHA[1]

[1]Department of Physical Therapy and the Integrative Physiology Laboratory, College of Applied Health Sciences, University of Illinois at Chicago, Chicago, IL, [2]Clinical Exercise Physiology, Ball State University, Muncie, IN, [3]Cardiology Division, VA Palo Alto Health Care System, Palo Alto, CA

2:35 pm
OR-09

Sex Differences in Carotid Strain Following Resistance Exercise

GEORGIOS GRIGORIADIS, A.J. Rosenberg, Sang Ouk Wee, Elizabeth C. Schroeder, Kanokwan Bunsawat, Garett Griffith, Tracy Baynard.

Integrative Physiology Laboratory. Department of Kinesiology and Nutrition, University of Illinois at Chicago, Chicago, IL.

2:50 pm
OR-10

Long-Term Optimal Clinical Factors and Progression in Arterial Stiffness: The Multi-Ethnic Study of Atherosclerosis

YACOB G. TEDLA, PHD[1], Joseph Delaney, PhD[2], Adam Gepner, MD[3], James H. Stein, MD[3], Mercedes Carnethon, PhD[1], Philip Greenland, MD[1]

[1]Feinberg School of Medicine, Northwestern University; [2]School of Public Health, University of Washington; [3]School of Medicine and Public Health, University of Wisconsin Madison.

(Continued on page 16)

3:05 pm
OR-11

Longitudinal Age-Related Changes of Aortic Characteristic Impedance with Aging in a Community Dwelling Population

MATT OBERDIER[1], Ahmed Hatw[2], Ahmed ElSaidi[2], Mohamed Motawea[2], Omar Mahmoud[2], Ahmed Abouhamda[1], Zaydoon Obeid[1], Stephanie Studenski[1], Julio Chirinos[3], Patrick Segers[4], Luigi Ferrucci[1], Edward Lakatta[1], Majd AlGhatrif[1,2]

[1]National Institute of Aging; Baltimore, MD, [2]Johns Hopkins University; Baltimore, MD, [3]University of Pennsylvania; Philadelphia, PA, [4]Ghent University; Ghent, Belgium

3:20 - 4:00 pm **Closing Plenary Lecture**

Moderator: Elaine M. Urbina, MD, MS, President-elect

The Future Directions and Assessment of Blood Pressure and Vascular Parameters

Kennedy Cruickshank, MD, King's College London
President, Association for Research into Arterial Structure and Physiology (ARTERY)

4:00 - 4:10 pm **Awards Presentations**

Best Abstract and Young Investigator Awards

4:10 - 4:20 pm **Concluding Remarks**

EXHIBITORS

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EXHIBITORS

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BRUCE S. ALPERT, MD received his B.A. degree with honors in Chemistry, summa cum laude from Dartmouth College and his MD degree from Johns Hopkins University. He then completed his pediatric residency at Johns Hopkins, followed by a fellowship in cardiology at the Hospital for Sick Children in Toronto, Canada. He has served on the faculties of the Medical College of Georgia and University of Tennessee Health Science Center (UTHSC). During this time, he was a recipient of Outstanding Young Faculty Award. Dr. Alpert has held several leadership positions including the Director of the Catheterization and Exercise labs at Medical College of Georgia; Program Director of UTHSC General Clinical Research Center; and Chief of the Division of Cardiology at UTHSC, where he also held the Plough Foundation Chair of Excellence in Pediatrics. He has had a life-long interest in blood pressure reactivity as a marker and/or mechanism of hypertension development, especially in minority populations and has been the principal investigator on a series of RO1 NIH grant awards studying markers and mechanisms of hypertension evolution in African-American population. Dr. Alpert is Associate Editor of Pediatric Exercise Medicine, and serves on the editorial boards of American Journal of Cardiology, Blood Pressure Monitoring, and Ethnicity & Disease.

ITALO BIAGGIONI, MD is Professor of Medicine and Pharmacology, Division of Clinical Pharmacology and Associate Director, Clinical Research Center at Vanderbilt University in Nashville TN. He attended medical school and completed his residency in Internal Medicine at Cayetano Heredia University in Lima, Peru. He was a Merck International Fellow in Clinical Pharmacology at Vanderbilt University where he also served as Associate Director of the Autonomic Dysfunction Center. Dr. Biaggioni' s research focus is on autonomic metabolic interactions involved in cardiovascular regulation. He has been the recipient of NIH funding for 25 years and has authored over 280 publications.

JULIO A. CHIRINOS, MD, PhD is an Associate Professor of Medicine at the Perelman School of Medicine, University of Pennsylvania. He is also an Adjunct Faculty Member of the Center for Magnetic Resonance and Optical Imaging at Penn and a Visiting Professor at Ghent University, Belgium. Dr. Chirinos earned his MD from the Catholic University of Santa Maria, Arequipa, Peru, and his PhD in Biomedical Sciences from the University of Ghent, Belgium. He is a Fellow of the American Heart Association and the European Society of Cardiology.

His research interests include the non-invasive assessment of arterial function and ventricular-vascular coupling and its role in left ventricular remodeling, dysfunction and heart failure risk. Dr. Chirinos has a particular interest in the role of arterial dysfunction in heart failure and normal ejection fraction as well as in the role of arterial stiffness and central arterial pressures as predictors of cardiovascular risk. He is also interested in the cardiovascular consequences of obstructive sleep apnea.

JOHN R. COCKCROFT, MD is visiting Professor in the Department of Cardiology at Columbia Presbyterian Hospital New York and adjunct Professor in the Australian School of Advanced Medicine, Macquarie University, Sydney, Australia.

His major research interests focus on endothelial function and arterial stiffness in health and disease. Recently he has become interested in the mechanisms of vascular calcification especially in patients with renal disease. He is currently researching the relationship between osteoporosis and vascular calcification. Most recently with colleagues from Columbia Presbyterian he has been investigating the effects of decreased pulsatility on arterial haemodynamics and stiffness in subjects with continuous flow LVADs. He has published over a 250 peer reviewed articles and has co-authored books on hypertension and coronary heart disease. He is a founding member of the Association for Research into Arterial Structure and Physiology (ARTERY) and is co-organiser of the Association's conferences. He gave the MacDonald Lecture at ARTERY 15. Currently, he is the past president of ARTERY and Secretary of The European Association of Clinical Pharmacology and Therapeutics (EACPT).

Professor Cockcroft's clinical interests focus on hypertension and cardiovascular disease prevention and he was a member of the committee which produced the Welsh National Service Framework for cardiovascular disease. He is especially interested in patient empowerment and promoting more informed involvement with their care and treatment, and has lectured widely to patient groups

on hypertension and cardiovascular disease. Indeed, 4 years ago he established the first patient self referral clinic in the UK, which has proved extremely popular with patients interested in establishing their own cardiovascular risk and learning more about cardiovascular risk factors in general. He has also run mobile cardiac vascular risk factor screening clinics Wales wide and also in England.

Professor Cockcroft is a member of the British, European, American and International societies of Hypertension the British Cardiac Society and also the European Association for the Study of Diabetes. Most recently, he has been elected Secretary of The European Association of Clinical Pharmacology and Therapeutics.

J. KENNEDY CRUICKSHANK, BSC, MBCHB, MSC, MD, FRCP has been Professor of Cardiovascular Medicine & Diabetes in the Diabetes & Nutritional Sciences division at King's College, and Consultant physician at St. Thomas' & Guy's Hospitals, London since 2011. He previously held a chair in Cardiovascular Medicine & Clinical Epidemiology at the University of Manchester and Consultant Physician at Manchester Royal Infirmary, He was born & raised in Jamaica, did an intercalated Physiology BSc during medical school at the University of Birmingham, UK. His MD compared hypertension and diabetes among Caribbean people between Britain & Jamaica. He did epidemiological training via the MSc in Epidemiology at the London School of Hygiene & Tropical Medicine. That led to a 4-year Wellcome Clinical Epidemiology fellowship, at the MRC Epidemiology & Medical Care Unit with Prof George Miller & Clinical Research Centre, Northwick Park Hospital in N-W London, finishing training as a senior registrar in medicine. Field studies on vascular disease in glucose intolerance & high blood pressure and a clinical trial included seminal work measuring arterial stiffness by pulse wave velocity. He spent a further year as visiting Senior Lecturer and Consultant at the University of the West Indies & Queen Elizabeth Hospital, Barbados, before being recruited to Manchester. He coordinated an EU study on nutritional origins of high BP & diabetes in African-origin populations between rural & urban Cameroon, Jamaica & Manchester. He spent a sabbatical at the US Bogalusa Heart study

His research continues on the origin of ethnic differences in high blood pressure, diabetes and cardiovascular disease, particularly via arterial function and stiffness through the life course. He founded the Cardiovascular Trials Unit in Manchester and runs similar Trials based in the Clinical Research Facility in St. Thomas' Hospital. He is a founder member of the British Hypertension Society, has been on its executive and its working parties. He sat on the Tropical Medicine & Public Health panel for the Wellcome Trust (a major funder for research in the tropical world) and is President, 2016-2018 of the Artery Society, http://www.arterysociety.org , dedicated to research in arterial function and disease.

DANIEL DUPREZ, MD, PhD is the holder of the Donald and Patricia Garofalo Endowed Chair in Preventive Cardiology, Professor of Medicine at the School of Medicine at the University of Minnesota in Minneapolis. He is Professor in Epidemiology and Community Health at the School of Public Health of the University of Minnesota. He is currently Director of the Lipid Clinic, Director of Research of the Rasmussen Center for Cardiovascular Prevention. He is cardiologist at the University of Minnesota Medical Center, Fairview. He received his medical degree and PhD in Cardiology from the University of Ghent in Belgium, where he also completed his residency and a fellowship in cardiology. He did a further fellowship in cardiovascular physiology at the Mayo Clinic in Rochester, Minnesota. He served as a Professor of Cardiovascular Diseases at the University of Ghent in Belgium before joining the staff at the University of Minnesota.

Dr. Duprez is a Fellow of the American Heart Association, the American College of Cardiology, European Society of Cardiology, American Society of Hypertension, and National Lipid Association (NLA). He is the President of the Midwest Chapter of NLA. He is a member of the Heart Disease and Stroke Prevention Minnesota Statewide Steering Committee. He is the vice-president of the International Society of Vascular Health and Aging. Dr. Duprez has extensive experience with clinical scientific work and multi-center studies. His research focus is to improve early detection of cardiovascular disease, leading to new effective therapeutic approaches. One of his expertise areas is to study biomarkers, structural and functional markers and their predictive value for cardiovascular morbidity and mortality in several

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study cohorts like MESA, CARDIA and HIV study populations (SMART and START study). He has published over 310 articles in peer-reviewed publications and 57 book chapters and is currently involved in several cardiovascular clinical research studies as well NIH sponsored research studies.

PAUL J. FADEL, PhD is Associate Dean for Research, Professor in Kinesiology, in the College of Nursing and Health Innovation at the University of Texas at Arlington. His primary research interests revolve around the neural control of the circulation at rest and during exercise in human health and disease with a specific emphasis on the sympathetic branch of the autonomic nervous system. A particular area of interest is studying the underlying mechanisms contributing to sympathetic overactivity and impaired vascular function known to be present in aging and many disease states. The goal is to identify targets for the development of therapeutic strategies aimed at minimizing and protecting against the deleterious consequence of high sympathetic outflow and vascular dysfunction. Current research studies are performed on normal healthy young and older subjects as well as patients with various pathophysiological conditions including Type 2 Diabetes and Chronic Kidney Disease. Dr. Fadel has published over 110 peer reviewed original research articles along with several book chapters. His research is funded by the American Heart Association and the National Institutes of Health.

KEITH C. FERDINAND, MD, FACC, FAHA, FNLA, FASH is Professor of Medicine at the Tulane University School of Medicine and the Tulane Heart and Vascular Institute in New Orleans, Louisiana. He was previously Professor of Clinical Pharmacology at Xavier University, New Orleans and Clinical Professor of Medicine at Emory University, Atlanta, Georgia. Dr. Ferdi-

(Con nued on page 24)

nand received his medical degree from the Howard University College of Medicine in Washington, DC. He is board-certified in internal medicine and cardiovascular disease, certified in the subspecialty of nuclear cardiology, and a specialist in clinical hypertension certified by the American Society of Hypertension.

Dr. Ferdinand is past Chair of the National Forum for Heart Disease and Stroke Prevention and has served as Chief Science Officer and past chair of the Association of Black Cardiologists. He has also served as a board member of the American Society of Hypertension, the Southwest Lipid Association, and the International Society of Hypertension in Blacks.

As an investigator, Dr. Ferdinand has conducted numerous trials in the fields of cardiology, cardiovascular disease, lipids and cardiometabolic risk, especially in racial and ethnic minorities. Dr Ferdinand's participation in research has been published in peer-reviewed journals including the New England Journal of Medicine, Journal of the American College of Cardiology, the Journal of Clinical Hypertension, the American Journal of Cardiovascular Drugs, Clinical Lipidology, and the journal Cardiorenal Medicine, and Hypertension.

Dr. Ferdinand serves on the editorial review board of Hypertension, Journal of Clinical Hypertension, the Journal of the American Society of Clinical Hypertension, Cardiorenal Medicine, as well as The Medical Roundtable -CV. He has lectured nationally and internationally on topics including cardiovascular disease in the African American population, heart failure, hypertension, diabetes, dyslipidemia, and racial and ethnic disparities in cardiovascular outcomes. In 2004, Dr. Ferdinand received the Louis B. Russell, Jr. Memorial Award of the American Heart Association and the Walter M. Booker Community Service Award of the Association of Black Cardiologists. In 2010, he was recognized by the Congressional Black Caucus Health Trust with an award for journalism, as well as the Charles Drew award for medical excellence in conjunction with the National Minority Quality Foundation. Most recently, in 2015, Dr. Ferdinand was inducted into the Association of University Cardiologists.

PEDRO JOSE FORCADA, MD, PhD is a cardiologist and a specialist in Hypertension and Cardiovascular Mechanics. Dr. Forcada is the Head of Non-Invasive Vascular Laboratories in DIM and Cardio Arenales, which are both private cardiovascular centers. He is an Associate Professor at Buenos Aires University and Austral University in Argentina.

Dr. Forcada is a member of Argentinean Societies of Cardiology and Hypertension, ARTERY, and the Pan-American College of Endothelium. A former Fellow of American Heart Association and foreign member of HBP Council, Dr. Forcada currently serves as President of Artery Latin America (LATAM) and the Argentinean Chapter of the Pan-American College of Endothelium.

STANLEY S. FRANKLIN, MD, FACP, FACC is Clinical Professor of Medicine at the University of California, Irvine and lnvestigator with the Framingham Heart Study. His main research interests are the epidemiology of hypertension in the elderly and the value of ambulatory BP monitoring is measuring cardiometabolic risk. He has more than 220 peer-reviewed original articles and chapters in the literature. The European Society for Artery Research has honored him with their 2013 "Lifetime Research Achievement Award."

KEVIN HEFFERNAN, PhD is an Assistant Professor, Director of the Human Performance Laboratory, and Member of the SU Institutional Review Board at Syracuse University. He earned his MS from Columbia University, his PhD from the University of Illinois at Urbana-Champaign, and completed his Post-Doctoral Fellowship at Tufts Medical Center, Molecular Cardiology Research Institute. He is the director of the Human Performance Laboratory (HPL) which is fully equipped to probe numerous aspects of systemic vascular structure and function in vivo.

Professor Heffernan's research examines the interaction of diet, nutritional supplementation and exercise (with an emphasis on resistance exercise) on vascular function in health, disease and disability throughout the human lifespan. He has published extensively on the role of exercise in modulating vascular function. He received the New Investigator Award from the American College of Sports Medicine in 2010 and the North American Artery Society in 2013. Professor Heffernan serves as an external grant reviewer for the American Heart Association and the American College of Sports Medicine.

TIMOTHY M. HUGHES, PhD, MPH is Assistant Professor, Gerontology and Geriatric Medicine at Wake Forest School of Medicine in Winston-Salem, NC. He earned his MPH from the University of Pittsburgh and his PhD degree from the University of Pittsburg School of Medicine. Dr. Hughes is a neuroepidemiolgist and his research focuses on identification of cardiometabolic risk factors for vascular cognitive impairment and Alzheimer's disease. The goal of his research is to develop strategies aimed at preventing dementia and general brain aging. Dr. Hughes is nationally recognized for his work on the vascular contributions to Alzheimer's pathology.

GARY F. MITCHELL, MD is a cardiologist and internationally acknowledged leader in the field of vascular stiffness and pulsatile hemodynamics. He received his medical degree from Washington University in St. Louis and completed his training in Medicine and Cardiology at Brigham and Women's Hospital in Boston, where he served as a staff cardiologist until 1998. He left the Brigham in 1998 to become founder and president of Cardiovascular Engineering, Inc., which is an NIH-funded small business that designs and develops innovative devices that measure arterial stiffness and uses those devices to examine genetic and environmental correlates of arterial stiffness and the role that arterial stiffness plays in the pathogenesis of hypertension and target organ damage. He joined the Framingham Heart Study as a Framingham Investigator in 1999 and became a collaborator on the AGES-Reykjavik study in 2006 and the Jackson Heart Study in 2010. Using devices designed and built by Cardiovascular Engineering, Dr. Mitchell has performed detailed assessments of arterial stiffness and pulsatile hemodynamics in more than 20,000 research participants, including participants in all 3 generations of the Framingham Heart Study as well as participants in the AGES-Reykjavik study, the REFINE study and the

(Con nued on page 26)

Jackson Heart Study.

MARTIN G. MYERS, MD, FRCPC is a Consultant Cardiologist at Sunnybrook Health Sciences Centre in Toronto, Ontario and a Professor of Medicine at the University of Toronto. He has been involved in hypertension research and clinical practice for several decades, with his main interest during the past 15 years being in 'blood pressure measurement'. Dr. Myers founded the Canadian Hypertension Society and has served in various executive positions, including as President. He introduced 24-hour ambulatory BP monitoring into Canada in 1985 and has performed much of the research into automated office BP measurement. He was responsible for the Canadian guidelines in 2005 recommending 24-hour ABPM as the best method for diagnosing hypertension. His research has also contributed to automated office BP now being the preferred method for recording BP in the office in Canada, with manual BP no longer being recommended.

GARY L. PIERCE, PhD, FAHA GARY L. PIERCE, PhD, FAHA is an Assistant Professor in the Department of Health and Human Physiology at the University of Iowa with secondary faculty appointments in the Abboud Cardiovascular Research Center, Center for Hypertension Research and the Fraternal Order of Eagles Diabetes Research Center. Dr. Pierce obtained his Ph.D. in Applied Physiology and Kinesiology at the University of Florida in 2005 with an emphasis in cardiovascular exercise physiology. At the University of Florida, he worked with Dr. Wilmer Nichols and Randy Braith investigating effects of chronic exercise training on vascular endothelial function, arterial stiffness and central blood pressure

hemodynamics in patients with heart failure and heart transplantation. Dr. Pierce performed postdoctoral research training in the lab of Dr. Doug Seals in the Department of Integrative Physiology at the University of Colorado Boulder where he studied the mechanisms by which select pharmacological interventions or habitual aerobic exercise improved vascular endothelial function in middle aged and older adults. Dr. Pierce's current research examines the integrative mechanisms by which aging, obesity, hypertension, COPD, chronic anxiety and preeclampsia contributes to large and small artery dysfunction in humans and pharmacological and lifestyle interventions to improve arterial function and hemodynamics. Dr. Pierce is a member of the North American Artery Society, American Physiological Society and a Fellow of the American Heart Association.

LUIS MARIA PUPI, MD, a Specialist in Cardiology, Hypertension, and Clinical Pharmacology leads the Department of Hypertension, Clinica del Sol. He is Assistant Professor of Pharmacology and Internal Medicine at the School of Medicine at the University of Buenos Aires (U.B.A) in Argentina.

Dr. Pupi is Past President of the Buenos Aires Society of Cardiology and of the National Scientific Committee of Hypertension of the Argentine Federation of Cardiology (FAC). He is a member of the Argentine Society of Cardiology, the Argentine Federation of Cardiology, the Argentine Society of Hypertension and the Argentine Society of Gerontology and Geriatrics, and ARTERY. Dr. Pupi currently serves as Secretary of ARTERY LATAM.

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VIREND K. SOMERS, MD, PhD is a consultant in the Division of Cardiovascular Diseases, Department of Internal Medicine at Mayo Clinic in Rochester, with joint appointments in the Division of Nephrology and Internal Medicine and the Department of Physiology and Biomedical Engineering. Dr. Somers also directs the Cardiovascular Facility and the Sleep Facility within the Center for Clinical and Translational Science. He holds the academic rank of professor of medicine, Mayo Clinic College of Medicine, and is recognized with the distinction of a named professorship, the Alice Sheets Marriott Professorship.

Dr. Somers earned the M.B. Ch.B. degree at the University of Natal in South Africa. He completed internships at the University of Natal and King Edward Hospital. He also served as registrar in anesthesiology in South Africa and completed a residency in general, neurosurgical, obstetric, pediatric and cardiac anesthesia at King Edward Hospital. Subsequently, he received a Nuffield Dominions Scholarship to Oxford University where he obtained his Doctor of Philosophy degree. He then completed a residency in internal medicine at the University of Iowa and a fellowship in cardiovascular disease at University of Iowa Hospitals and Clinics.

Dr. Somers' translational research program focuses on the role of the autonomic nervous system in cardiovascular regulation, with an emphasis on normal and disordered sleep. The team also studies vascular biology and physiology, examining how changes in neural mechanisms may influence the local control of blood vessels and adipocyte function. His research utilizes an integrated physiologic approach to studying cardiovascular function relevant to sleep, obesity and cardiovascular disease. He has given many international and national presentations and has authored numerous peer-reviewed articles, book chapters, editorials, abstracts and letters. He also serves as associate editor, editorial board member and reviewer for prominent medical publications.

Throughout his career, Dr. Somers has received many honors and awards, including the Outstanding Investigator Award, conferred by Mayo Clinic Dept. of Medicine; the Distinguished Scholar Award, conferred by the University of Iowa; the Lifetime Achievement Award, conferred by the South African Society of Sleep Medicine; the Robert M. Berne Distinguished Lectureship Award, conferred by the American Physiologic Society, and was recently named the CHEST 2017 Distinguished Scientist Honor Lecturer in Cardiopulmonary Physiology.

In addition to his clinical and research activities, Dr. Somers holds full faculty privileges in Neuroscience, Mayo Graduate School, and actively serves in professional organizations, including the International Society of Hypertension, American Academy of Sleep Medicine, American Physiological Society, American Heart Association, and American Thoracic Society. In addition, he is a fellow of the American College of Chest Physicians and American College of Cardiology, and he serves on the Sleep Disorders Research Advisory Board of the National Institutes of Health. He has been elected to membership of the American Society of Clinical Investigation and the Association of University Cardiologists.

RAYMOND R. TOWNSEND, MD, is a Professor of Medicine and an Associate Director of the Center for Human Phenomic Science/CTSA at the University of Pennsylvania. He is currently a Research Investigator on a 7-center U01 grant (DK-060984) to evaluate the role of demographic, phenotypic, humoral and genetic factors in the progression of kidney disease and the development and progression of cardiovascular disease in patients with chronic kidney disease. His formal certifications are in internal medicine (ABIM), nephrology (ABIM), clinical pharmacology (ASCP) and hypertension (ABIM). He is a fellow in the American Heart Association and a fellow of the Council for High Blood Pressure Research. Research interests include role of vascular dysfunction in progression and the incidence/development of CVD in CKD. He was named the American Heart Association's Physician of the Year for 2016.

ELAINE M. URBINA, MD, MS is Professor of Pediatrics (Cardiology) and Director of Preventive Cardiology at Cincinnati Children's Hospital Medical Center. Her clinical activities and industry sponsored grants focus on prevention (obesity, hypertension and dyslipidemias) while her research is funded by (AHA, NIH) and training in epidemiology allow her to [illegible] non-invasive methods of assessing [illegible] organ damage in youth related to CV risk factors. She has over 25 years of experience in non-invasive imaging of CV structure and

function in large epidemiologic studies such as the Bogalusa Heart Study and is a member of the International Childhood CV Cohorts Consortium. She also directs Ambulatory BP and Vascular Core activities for many multicenter pediatric studies studying CV risk in obesity, diabetes, dyslipidemia, hypertension and congenital heart disease. She is PI of an AHA Strategically Focused Network in HTN grant that will be exploring population, clinical and epigenetic determinants of target organ damage in hypertensive youth. She is a Fellow of the American Society of HTN, American College of Cardiology and American Heart Association and past chair of the Atherosclerosis, Hypertension and Obesity in Youth committee of the CV Disease in the Young council of AHA.

MICHELLE VOSS, PhD, Assistant Professor in the Department of Psychological and Brain Sciences at the University of Iowa, received a Ph.D. degree in Psychology from the University of Illinois at Urbana-Champaign in 2011. She was a Beckman Institute Predoctoral Fellow in 2008 and 2009, and was awarded the Paul D. Doolen Scholarship for the Study of Aging in 2009. She directs the Health, Brain, and Cognition Lab at the University of Iowa. Her lab investigates the effect of interventions, such as physical activity, exercise, and cognitive engagement, on brain health and performance in order to learn what steps we can take to keep our mind functioning well as we age. Her research is also hoping to uncover solutions to help the brain adapt to neurological disease and brain injury. Her research draws on theoretical frameworks of cognition and aging and on neuroimaging techniques, such as structural and functional magnetic resonance imaging.

WILLIAM B. WHITE, MD, FACP, FAHA, FASH is Professor of Medicine and Chief of the Division of Hypertension and Clinical Pharmacology in the Calhoun Cardiology Center at the University of Connecticut School of

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Medicine where he has worked for 39 years. In addition, he is lead physician for the Hypertension and Vascular Diseases faculty practice in the Cardiology Center at the John Dempsey Hospital in Farmington, Connecticut. Dr. White is a Fellow of the American College of Physicians, a Fellow of the Council for High Blood Pressure Research of the American Heart Association, a Fellow of the International Society for Hypertension in Blacks and a charter member of the American Society of Hypertension. Dr. White was the President of the American Society of Hypertension from 2012-2014.

Dr. White has a longstanding interest in clinical hypertension and pharmacology, particularly in the areas of ambulatory blood pressure monitoring, clinical trials of antihypertensive drugs, and the impact of non-cardiac drugs (e.g., diabetes medications, NSAIDs, neuropsychiatric agents, analgesics) in cardiovascular disorders. He is the author of over 450 original articles and 90 book chapters in the field of cardiovascular medicine and pharmacology. Dr. White has published 6 medical textbooks, including *Blood Pressure Monitoring in Cardiovascular Medicine and Therapeutics* (Springer Science) and *Hypertension and Related Disorders* (CV Mosby Press). To support this work, Dr White has been the recipient of research funding from the National Institutes of Health, the American Heart Association, the Donaghue Research Foundation, and the pharmaceutical industry.

During the past 25 years, Dr White has been highly involved in major clinical trials in cardiovascular medicine, including as member of the Steering Committee of the CONVINCE trial which evaluated cardiovascular outcomes in at risk patients using chronotherapy, BLISS which evaluated the cardiovascular effects of low dose testosterone therapy in post-menopausal women, the CARES trial which evaluates the cardiovascular safety of gout therapies, EXAMINE, which assessed the impact of the DPP-4 inhibitor aloglitpin in patients with type 2 diabetes and acute coronary syndromes, and the EnLigHTN trials which is assessing the effects of renal denervation in patients with treatment resistant hypertension.

OLIVER WIEBEN, PhD, is an Associate Professor in the Departments of Medical Physics, Radiology, and Biomedical Engineering at the University of Wisconsin-Madison, where he currently also serves as the Vice Chair of Research – Medical Physics and Co-Director of the International Center for Accelerated Medical Imaging. He received his undergraduate degree (Vordiplom) in Electrical Engineering from the University of Hanover, Germany, his Masters of Science degree (Diplom-Ingenieur) in Electrical Engineering from the University of Karlsruhe (TH), Germany, and his doctorate in Electrical Engineering from the University of Wisconsin-Madison. He has worked as a scientist at the University Hospital in Freiburg, Germany and joined the faculty at the University of Wisconsin in Madison in 2008. Dr. Wieben is interested in the development of rapid cardiovascular imaging methods for non-invasive magnetic resonance imaging (MRI) and their application to improve clinically relevant diagnosis. His research focuses on the investigation of methods to improve the data acquisition and image reconstruction for more rapid MR imaging as well as post-processing methods to facilitate comprehensive, non-invasive hemodynamic assessment of the vascular system.

Bruce S. Alpert, MD
Speakers Bureau: SunTech Medical Inc.

Italo O. Biaggoini, MD
Consultant: Theravance, Lundbeck

Julio A. Chirinos, MD, PhD
Consultant: BMS, OPKO, Fukuda-Denshi, Microsoft, Vital Labs, Merck, Sanifit

Grant/Research Support: NIH, ACRIN, Fukuda-Denshi, BMS, Microsoft, CVRx, device loans from AtCor Medical

Other: Named as inventor in patent application for the use of inorganic nitrates in HFPEF

John Cockcroft, MD
Consultant: IEM

J. Kennedy Cruickshank, MD
Honoraria: Merck (Germany) - metformin

Daniel Duprez, MD, PhD
Speakers Bureau: Amgen
Grant/Research Support: NIH, Regeneron, Pfizer, Astra-Zeneca
Honoraria: Amgen, Akcea Therapeutics

Paul J. Fadel, PhD
No conflict of interests to disclose

Keith C. Ferdinand, MD
Consultant: Amgen, Sanofi, Boehringer Ingleheim, Novartis, Quantum Genomics

Pedro Forcada, MD, PhD
Honoraria: Amgen, Novartis, Servier, and other local companies

Stanley S. Franklin, MD
No conflict of interests to disclose

Kevin Heffernan, PhD
Nothing reported

Timothy M. Hughes, PhD
No conflict of interests to disclose

Gary F. Mitchell, MD
Consultant: Novartis, Servier

Grant/Research Support: NIH, Novartis

Stock Shareholder (self-managed): Cardiovascular Engineering Inc.

Full-time Employee: Cardiovascular Engineering Inc.

Martin Myers, MD
No conflict of interests to disclose

Gary L. Pierce, PhD
Consultant: Iowa State University

Grant/Research Support: NIH, Novartis

Luis Maria Pupi, MD
No conflict of interests to disclose

Virend K. Somers, MD, PhD
Consultant: GlaxoSmithKline, Dane Garvin, Biosense Webster, Price Waterhouse Coopers, Sorin Inc., ResMed, Respicardia, Philips, Rhonda Grey, Bayer and U Health

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Raymond R. Townsend, MD
No conflict of interests to disclose

Elaine M. Urbina, MD, MS
No conflict of interests to disclose

Michelle W. Voss, PhD
No conflict of interests to disclose

William B. White, MD
Consultant: Non-hypertension safety consultant for: Astra-Zeneca, Roche, Takeda, Teva

Grant/Research Support: National Institute on Aging (NIH)

Oliver Wieben, PhD
Grant/Research Support: GE Healthcare

Mission Statement

The Mission of North American Artery Society is to:

- Support education on arterial structure and function appropriate to the various medical communities, such as scientific researchers, clinical specialists, primary care specialists, medical students, and pharmaceutical researchers, as well as the patient community;
- Develop mechanisms and venues for disseminating information on the understanding and application of arterial structure and function and its measurement among the various medical communities;
- Participate in and encourage the study of improved application of technologies in the measurement of arterial structure and function;
- Participate in and encourage clinical trials that develop the understanding of how arterial structure and function and its measurement can guide and inform patient selection and treatment;
- Guide and support efforts to standardize arterial structural and functional measurements for clinical practice and clinical/scientific studies;
- Direct efforts to include arterial structure and function measurements in appropriate national guidelines;
- Formulate a consensus statement regarding what is known in regards to arterial structure and function.

Society Objectives

North American Artery is a non-profit, non-partisan professional society dedicated to the encouragement, support, and understanding of vascular structure and function and its application to clinical medicine, research and pharmaceutical and medical device development. The Society Objectives are to:

- Support education on arterial mechanics appropriate to the various medical communities, such as scientific researchers, clinical specialists, primary care specialists, and pharmaceutical researchers, as well as the patient community;
- Develop mechanisms and venues for disseminating information on the understanding and application of arterial mechanics and its measurement among the various medical communities;
- Participate in and encourage the study of arterial mechanics in basic and applied research to further especially the clinical applications derived from an improved understanding of arterial mechanics;
- Participate in and encourage clinical trials that develop the understanding of how arterial mechanics and its measurement can guide and inform patient treatment;
- Guide and support efforts to standardize arterial mechanics measurements for clinical practice and clinical/scientific studies;
- Direct efforts to include arterial mechanics measurements in appropriate national guidelines;
- Provide the knowledge for the critical understanding and application of technologies to measure arterial mechanics.

JOIN OUR EXCITING ORGANIZATION TODAY!

An active membership to this growing and influential research community is extremely beneficial to anyone associated with or interested in arterial research. As a member of North American Artery, you can view our member database, participate in our forum, as well as enjoy a host of other benefits.

Membership is open to all individuals and organizations that have a research, clinical, or scientific interest in arterial mechanics and hemodynamics. There are three (3) classes of membership:

- Individual Voting Members - $60.00
  All dues-paying individuals, are voting members.
- Sponsor Member Organizations - $500.00
  This membership permits an organization to identify up to five (5) individuals from its organization to be Individual Voting Members. Additional members may be added according to guidelines developed by the Executive Committee. An organization may have an unlimited number of members.
- Student Members – Free
  This membership is open to all individuals who are currently still in training (residents, fellows, post-doctoral candidates). Student Members are non-voting members. A letter from the training director is required to be submitted with the application for membership.

Membership in NAA is based on a calendar year (July 1 – June 30). Payments of dues at any time during the year are considered dues for that calendar year. Membership renewal invoices are sent on June 1 and due by July 1.

MEMBERSHIP BENEFITS

Here are seven specific reasons why you should join North American Artery Society (NAA) today.

1. On-line subscription to ARTERY RESEARCH. ARTERY, the Association for Research into Arterial Structure and Physiology, is a European society with similar goals and objectives to NAA; ARTERY RESEARCH is its peer-reviewed journal featuring articles, case studies, meeting abstracts and other relevant publications on arterial structure and function. The on-line subscription comes with NAA membership. Without a membership, the purchase price of the journal on-line is $31.50 per article.

2. Be an active participant. NAA is active in developing a multidisciplinary approach to research in and applications of arterial structure and function. We recognize the value of many voices, opinions, and disciplines, and invite you to get involved.

3. Enjoy reduced registration fees. Membership in NAA provides you with significant savings on registration fees for all NAA sponsored events.

4. Join the Forum. Membership in NAA makes you part of the conversation on artery research and applications. You can contribute to and learn from presentations in workshops, seminars, on-line videos, and other avenues of sharing information.

5. Make key connections. Participation in NAA provides a focal point for developing working relationships with others active in the field.

6. Lead the pack. NAA will be leading the development of consensus positions on a number of related issues, and participating in the design of upcoming studies in the field of artery research.

7. Become a decision maker. NAA is an organized voice in the development of clinical applications of arterial research, including setting validation standards and application guidelines. As a member, you can be part of our voice to both the pharmaceutical as well as the device manufacturing industries.

Membership Application

Name & Principal Mailing Address **(please type or print legibly and complete ALL information requested)**

Last Name:_____First Name:_____MI:____ Degree:_____

Affiliation:_____

Address:_____

City:_____State/Province:_____Postal Code:_____

Country (if not U.S.)_____ Telephone:_____Fax:_____

E-mail:_____

Please indicate Specialty

Physician Specialty: ☐ Cardiology ☐ Family Practice ☐ Endocrinology ☐ Nephrology

☐ Internal Medicine ☐ Other_____

☐ Physiologist (Exercise) ☐ Allied Health Professional ☐ Scientist ☐ Physician Assistant

☐ Other _____

Membership Category

☐ Individual Voting Member - $60.00

☐ Sponsor Member Organization - $500.00 (Includes up to five (5) Voting Members. List names below.)

If applying for Sponsor Member Organization membership, please include up to four (4) additional individuals who will also be Voting Members.

1) Name: _____ Email Address: _____

2) Name: _____ Email Address: _____

3) Name: _____ Email Address: _____

4) Name: _____ Email Address: _____

Payment Information: No CASH or BANK TRANSFERS. Membership dues may be paid with VISA, MasterCard, American Express, Check or Money Order. Checks and money orders must be drawn on American Banks and must be in US Dollars.

Payment Method: ☐ VISA ☐ MasterCard ☐ American Express ☐ Check payable to North American Artery

Cardholder's Name:_____ Exp. Date:_____

Credit Card Number Card:_____ Verification Code:_____

Cardholder's Billing Address:_____

Cardholder's Signature:_____

Return this form to: North American Artery Society, c/o Hansen Global Event Management, LLC, 68 Carlton Terrace, Stewart Manor, NY 11530 or fax the form to 866-383-6027.

Contact Matthew Hansen with any questions at 516-361-4415 or via email to naa@hansenglobalevents.com.

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