

# HYPERTENSION NEWS

December 2024

## ISH in Colombia

Look back on our 2024 Scientific Meeting, hosted with characteristic Latin American energy and passion.



### IN THIS ISSUE:

- 2024 ISH award winners
- BP measurement technology
- The genetics of blood pressure
- War-induced stress and hypertension
- Hypertension and Alzheimer's disease
- A roadmap for blood pressure control in Australia



**International  
Society of  
Hypertension**

# IN THIS ISSUE

## 1 FROM THE PRESIDENT

## 2 ISH LEADERSHIP UPDATES

- 2 New ISH Council Members
- 3 Committee Chairs 2024-2026

## 5 ISH2024 IN REVIEW

- 5 ISH2024 in numbers
- 6 ISH Cartagena Declaration
- 8 2024 Awardees
- 12 Franz Volhard Award Lecturer:  
Translating the genetics of blood pressure
- 14 New Investigator Award Winners:  
Exploring the potential of renal denervation in heart failure therapy: new insights into right ventricular function and sympathetic nervous modulation  
Recommendations for home blood pressure measurement are inconsistent between international guidelines  
Effects of sodium nitrite on renal damage induced by renovascular hypertension
- 20 The ISH Capacity Building Network at ISH2024
- 22 The speed mentoring fostered immediate connections and set the groundwork for long-term mentorship opportunities
- 23 Membership committee at ISH2024
- 24 ISH2024 in pictures
- 26 Mitigating pre-eclampsia risk: an integrated approach
- 30 Innovations for improving hypertension and cardiovascular disease risk management in primary care

## 34 FROM THE NEWS DESK

- 34 New ISH position paper published on latest technology in BP measurement

## 36 NEW PAPERS

- 36 National Hypertension Taskforce of Australia: a roadmap to achieve 70% blood pressure control in Australia by 2030
- 40 War-induced stress and arterial hypertension: a prospective study among Ukrainian refugee women
- 43 The association between hypertension and Alzheimer's disease
- 45 Ethnic differences in knowledge, attitudes, and practices related to dietary salt intake and association with hypertension in Malaysia: a multi-center cross-sectional study
- 47 Antihypertensive treatment improves target organ damage in patients with masked hypertension

## 49 PERSPECTIVES IN HYPERTENSION

- 49 The incidence of new-onset hypertension and new-onset Type 2 diabetes during or after SARS-CoV-2 infection
- 52 The development of a 'chatbot' for management of hypertension in Pakistan

## 54 ISH COMMITTEE AND REGIONAL ADVISORY GROUP REPORTS

- 54 Reflecting on the successes of the Americas RAG



**International  
Society of  
Hypertension**

# INTRODUCTION FROM THE PRESIDENT

## GEORGE STERGIU

President, International Society of Hypertension



It is my great pleasure to introduce the first issue of the Hypertension News as ISH President, and the last one for 2024. I am writing this introduction while memories of our 2024 ISH Scientific Meeting in Cartagena, Colombia are still fresh. It was wonderful to see so many members of the ISH family travelling very long distances to join our highly successful meeting in the wonderful city of Cartagena.

A large part of this edition of Hypertension News looks back on ISH2024. We include reports from some of our excellent speakers, and tried to give a flavor of the energy and spirit of our meeting in Latin America through pictures – exemplified by a memorable image from the ISH2024 opening ceremony on our front cover. If you had the opportunity to attend ISH2024 in Cartagena, then enjoy re-living the unique experience. If you didn't, then these reports and photos will give you an idea of what to expect during our next ISH meeting in Dubai in 2026. We hope to see you all there!

Our 2024 ISH meeting is now over, and we are grateful to the local scientific community for their enthusiasm and commitment, and the excellent organization in hosting our meeting. And we are grateful to so many ISH members from around the world for their valuable participation. These were the key factors that made this meeting exceptional.

On a personal note, in Cartagena I had the honor to take over the Presidency of ISH. I was lucky to succeed Bryan Williams, who expertly led the ISH over the past two years and passed the baton on to me with our society in excellent health. I am also lucky as President to have incredibly capable

colleagues in the ISH Executive and Council, as well as in our ISH Regional Advisory Groups (RAGs) and Committees. Five members of our Council are new, representing Africa, Asia, and Latin America, and all are great people with proven efficiency and commitment in serving the ISH. All our six ISH RAGs now have new and great leaders, and we expect them to be instrumental for the effective communication of ISH with the world. We profile these key people within the ISH leadership in this issue of Hypertension News.

You will also find in this issue articles from our 2024 ISH Awards' winners, the Cartagena Declaration for improving adherence to antihypertensive medications, reports from several ISH Committees, and a list of interesting articles on timely issues from our members and friends.

In the 2024-2026 term we have several major projects initiated by Bryan Williams which we must complete, including our educational platform, the ISH Academy, and Guidelines for patients. We are also working on designing new ones, aiming at empowering healthcare professionals around the world and improving the control of hypertension globally. As we have completed the first 3 months of the new ISH term and the end of the year is now close, I am glad about the progress we made in making key decisions on what we wish to achieve in the next two years. With such a diverse, dynamic, and dedicated team, I am confident that ISH will continue to grow and will expand its influence to the world.

Season's greetings from all at ISH! Wherever you are in the world, have a wonderful time with your family and friends, and best wishes for a Super-Happy and Creative New Year!

George Stergiou – [president@ish-world.com](mailto:president@ish-world.com)

# ISH LEADERSHIP UPDATES

## New ISH Council Members

**The ISH was pleased to welcome five newly elected Council Members during the General Meeting at ISH2024 on 21st September in Cartagena.**

Brief biographies of the five ISH Members who will serve an initial four-year term (2024-2028) are provided below. All current Council members can be viewed on the last page of this issue.

### **Dagnovar Aristizabal** Colombia

Dagnovar Aristizabal, a Colombian physician, is dedicated to advancing the diagnosis and treatment of arterial hypertension through cardiac and arterial hemodynamic implementation in clinical practice. Dr. Aristizabal is the founder and scientific director of SICOR, a research and teaching center in Medellin, Colombia.



### **Hind Beheiry** Sudan

Hind Beheiry is an associate professor of Human Physiology with extensive experience in teaching and leadership in medical education. Currently, she is serving as the Director of the Educational Development and Research Centre and has held successful administrative and leadership roles as Associate Dean of the Faculty of Medicine and Dean of the Faculty of Nursing Sciences at the International University of Africa, Sudan.



### **Débora Colombari** Brazil

Débora Colombari is a professor of physiology and director of a basic research laboratory at the São Paulo State University (UNESP), Araraquara, Brazil. At UNESP, she became an Associate Professor of physiology in 2009 and a Full Professor of Physiology in 2023. From 2017-2020, she was the Director of the Joint Graduate Program in Physiological Sciences (UNESP), currently Débora is the Head of the Department of Physiology and Pathology.



### **Erika Jones** South Africa

Erika Jones is a clinician and associate professor at Groote Schuur Hospital and the University of Cape Town, South Africa. She has been involved with the International Society of Hypertension for the last four years, including as an active member of the Communications Committee and Lead for the monthly eBulletin. Erika is the Chair for the ISH Academy; an educational platform in development.



### **Yan Li** China

Yan Li is Professor of Cardiovascular Medicine at Shanghai Institute of Hypertension, at Ruijin Hospital - affiliated to Shanghai Jiaotong University School of Medicine, where she obtained her PhD in Cardiovascular Medicine. From 2004 to 2005, she studied as a visiting scholar on hypertension epidemiology in the Hypertension Unit, University of Leuven, Belgium.



# ISH LEADERSHIP UPDATES

## Committee Chairs 2024-2026

ISH2024 saw the confirmation of Committee Chairs for the next two years:

### Regional Advisory Groups (RAGs)

RAGs provide ISH representation globally, distil regional issues and encourage and enhance education, good clinical practice and biomedical research in the fields of hypertension and associated cardiovascular diseases.

We are pleased to introduce six new RAG Chairs for the 2024-2026 presidency.

**Muscha Steckelings** from Denmark will play a new role of RAGs coordinator with assistance from Hind Beheiry (Sudan) and Cesar Romero (USA).

#### Africa



**Alfred Doku**  
Ghana

#### Americas



**Dagnovar Aristizabal**  
Colombia

#### Asia Pacific (APAC)



**Yook-Chin Chia**  
Malaysia

#### Europe



**Maria Dorobantu**  
Romania

#### Middle East and North Africa (MENA)



**Abdullah Shehab**  
UAE

#### South and Central Asia (SACA)



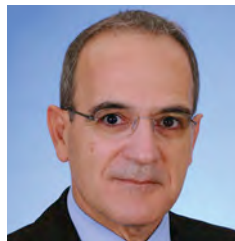
**Azra Mahmud**  
Pakistan

### Awards Committee



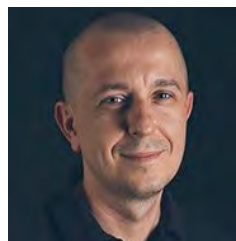
**Kazuomi Kario**  
Japan

### Corporate Liaison Committee



**George Stergiou**  
Greece

### ESH-ISH Journal of Hypertension



**Maciej Tomaszewski**  
UK, Co-chair,  
representing ISH

### Membership Committee



**Débora Colombari**  
Brazil, Chair



**Priscilla Prestes**  
Australia,  
Deputy Chair

---

### Research and Education Committee



**Tazeen Jafar**  
Singapore

### Mentorship and Training Committee



**Lebo Gafane-Matemane**  
South Africa

### Women in Hypertension Research Committee



**Yan Li**  
China

### New Investigator Committee



**Dean Picone**  
Australia, Chair



**Chloé Landry**  
Canada,  
Deputy Chair

---

## ISH Capacity Building Network

Co-chairs:



**Dean Picone**  
Australia



**Lebo Gafane-Matemane**  
South Africa



**Yan Li**  
China



**Niamh Chapman**  
Australia

---

## ISH Projects

### ISH Academy



**Erika Jones**  
South Africa, Chair



**Francine Marques**  
Australia,  
Deputy Chair

### Focus Group Blood Pressure Measurement



**Kazuomi Kario**  
Japan

### Patient Guidelines



**Bryan Williams**  
UK, Chair



**Niamh Chapman**  
Australia,  
Project Manager

# ISH2024 IN REVIEW

Thank you to everyone who was part of our 2024 Scientific Meeting in the beautiful city of Cartagena, Colombia. If you were not able to join us in 2024, we hope to see you in Dubai in 2026!

## ISH2024 in numbers...

# 4 days

Plus a 1-day pre-event symposium

# 1500+

Attendees

# 4

Scientific themes

# 107

Oral presentations

# 227

Poster presentations

# 27

Awards  
21 ISH Society awards and 6 meeting awards

# UP TO 6

parallel sessions each day

# 26

Sponsors

# 3

lunchtime 'speed mentoring' sessions for early and mid career researchers



# ISH2024 IN REVIEW

At ISH2024, Bryan Williams, ISH President 2022-2024, and Dagnovar Aristizabal, ISH2024 Chairman, signed the Cartagena Declaration – a call to action to improve adherence to antihypertensive medications globally. The declaration highlights the establishment of a **World Adherence Day**, the first of which will take place on **27 March 2025**.



## ISH Cartagena Declaration

### **A Call to Action to Improve Adherence to Antihypertensive Medications Across the World**

Hypertension is the major preventable cause of premature morbidity and mortality from cardiovascular diseases, affecting over 1.5 billion people world-wide, causing a substantial economic burden on health systems. The prevalence of hypertension globally has reached a critical level, prompting the World Health Organization (WHO) to declare it a public health crisis. Poor detection of hypertension remains a concern, but even when hypertension is detected and treated, global blood pressure control rates remain lamentably poor, averaging around 35% even in the most developed countries. Whilst it is accepted that it may be challenging to optimally control blood pressure in everybody, evidence from clinical studies has shown that it should be possible to control blood pressure much more effectively with existing treatments than is currently being achieved globally. We now recognise that one of the key barriers to improving blood pressure control is sub-optimal adherence to antihypertensive medications. This is not a new problem. Indeed, twenty years ago, the WHO identified poor adherence to treatment as “a worldwide problem of striking magnitude”. The problem of therapeutic adherence is magnified in patients with hypertension because it is generally an asymptomatic condition – the so called “silent killer”, that requires life-long treatment. Moreover, the treatment often produces no discernible symptomatic benefit for patients, may cause side effects, incurs chronic treatment costs and often requires treatment with multiple medications. That said, the treatment of hypertension is one of the most cost-effective interventions in medicine, with abundant evidence confirming the effectiveness of antihypertensive therapies at reducing the risk of heart diseases, stroke, kidney disease and vascular dementia. So, twenty years on from the WHO noting that poor medication adherence was a world-wide problem of striking magnitude, we want to use the occasion of the International Society of Hypertension Congress in Cartagena to frame the Cartagena Declaration as a call to action, to take up the challenge to improve therapeutic adherence for the treatment of hypertension across the world.

### **Integrating Scientific Knowledge with a Call for Action**

As a Scientific Society, the International Society of Hypertension will work with other like-minded Medical, Scientific and Patient Societies or Associations, to develop and coordinate action plans at policy, economic, scientific, behavioural, industrial, and all stakeholder levels. Recognising that the challenge of improving adherence to life-saving medicines is a multi-agency, multifaceted challenge, with the patient at the centre. As such, our work and the solutions must be relevant to our patients’ daily lives, considering their individuality, regional, economic, cultural and social contexts, to achieve our goals.



## Strengthening Commitment and Awareness

With this Cartagena declaration, we aim to highlight the importance and relevance of adherence to medicines for the treatment of hypertension in particular, and for cardiovascular disease prevention in general, amongst the wider population, patients, and all stakeholders in the health sector.

To this end, we recognise that other stakeholders in cardiovascular disease prevention share our common purpose to improve adherence to treatments that will improve the outcomes of patients with a wide range of cardiometabolic, renal and stroke risk factors or comorbidities.

A first meeting of stakeholders representing health care professionals, health and scientific societies, patients and industry, from across the world, met in London on September 2nd 2024 and agreed to work together to establish a World Adherence Day to highlight the importance of adherence to treatments that prevent disease. The date of this dedicated world day focussed on treatment adherence will be on March 27th 2025. The final name of the “Day” has yet to be agreed but it will reflect the main focus of this dedicated day, which is therapeutic adherence, consistent with the aims of this Cartagena Declaration.

It is anticipated that individual Medical, Scientific and Patient societies and associations will use that day to promote work in their own field, with a joint aim of highlighting the importance of treatment adherence to reduce the burden of cardiovascular and related diseases on a global scale.

### **Declaring March 27th 2025 as the first World Day focused on increasing awareness of the importance of Treatment Adherence to ensure optimal treatment of Arterial Hypertension and Cardiovascular Disease Prevention**

On the occasion of the International Society Congress in Cartagena, Colombia, on this day September 22nd 2024, in this place, let us commit to work together and with others, to give greater priority to highlighting the scale and importance of sub-optimal treatment adherence, to better understand the drivers of suboptimal adherence and to develop better ways to improve treatment adherence and thus, the effectiveness of treatment of hypertension, for our patients, across the world.



**Bryan Williams**  
OBE MD FMedSci  
President  
International Society of Hypertension



**Dagnovar Aristizabal**  
MD PhD  
Chairman  
ISH Congress 2024

# ISH2024 IN REVIEW

## 2024 Awardees

Congratulations to all the winners of the 2024 ISH awards presented at ISH2024



Meet the 2024 awardees:

### ISH Franz Volhard Award and Lectureship for Outstanding Research

Recipient: Stephen Harrap

The ISH Franz Volhard Award and Lectureship for Outstanding Research was awarded to Stephen Harrap, in recognition of his lifetime of global contributions made in hypertension research at the highest level and his outstanding service to the ISH.



Professor Harrap gave a lecture at the ISH Cartagena meeting entitled: "Translating the genetics of blood pressure" and gives a summary of this on page 12.



### ISH Robert Tigerstedt Lifetime Achievement Award

Recipients:

**Tomasz Guzik**  
UK



**Rhian Touyz**  
Canada



### ISH Developing World Award

Recipient:

**Patricio Lopez-Jaramillo**  
Colombia



### ISH Paul Korner Award

Supported by the High Blood Pressure Research Foundation

Recipient:

**Yoshitaka Hirooka**  
Japan



### ISH Distinguished Fellow Award

Recipient:

**Daniel Piskorz**  
Argentina



## ISH Outstanding Woman in Hypertension Research Award

Senior Award recipients:



**Louise Burrell**  
Australia



**Dulce Elena Casarini**  
Brazil



**Alta Schutte**  
Australia

Mid-Career Award recipients:



**Mariane Bertagnolli**  
Canada



**Mansi Patil**  
India



**Neusa Jessen**  
Mozambique

## ISH Emerging Leaders Awards

Recipients:

AFRICA

**Adekunle Fakunle**  
Nigeria

AMERICAS

**Yessica Giraldo**  
Colombia

ASIA PACIFIC (APAC)

**Kaylee Slater**  
Australia

EUROPE

**Konstantinos Kyriakoulis**  
Greece

SOUTH AND CENTRAL ASIA (SACA)

**Abhijit Suresh Chavan**  
India



## ISH New Investigator Oral Presentation Awards

**Recipient  
Basic Science:**

**Matúš Miklovič**  
Czech Republic

**Abstract:** Renal denervation improves right ventricular function, restores myocardial norepinephrine levels and reverses ventricular specificity of selected markers in hypertensive rats with heart failure induced by volume overload.



**Recipient  
Clinical Science:**

**Anne Myrthe Van Vliet**  
The Netherlands

**Abstract:** Daily urinary potassium excretion is not a fixed percentage of daily potassium intake.

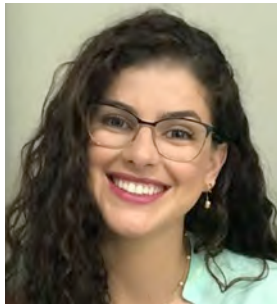


## ISH New Investigator Poster Presentation Awards

**Recipient  
Basic Science:**

**Jéssyca Milene Ribeiro**  
Brazil

**Abstract:** effect of sodium nitrite on renal damage from 2-Kidney, 1-Clip (2K-1C) hypertension in rats.



**Recipient  
Clinical Science:**

**Niamh Chapman**  
Australia

**Abstract:** Recommendations for Home Blood Pressure Measurement Are Inconsistent Between International Guidelines.





## Servier Medical Hub

Your global partner for medical updates  
in cardiometabolic and venous diseases



**HYPERTENSION**



**ANGINA**



**DYSLIPIDEMIA**



**HEART FAILURE**



**DIABETES**



**MULTIMORBIDITY**



**VENOUS DISEASE**



Scan the QR-code and  
join the community!

Looking to stay informed on the most recent medical updates  
in cardiometabolic and venous diseases?  
Servier presents a cutting-edge platform tailored to your needs:

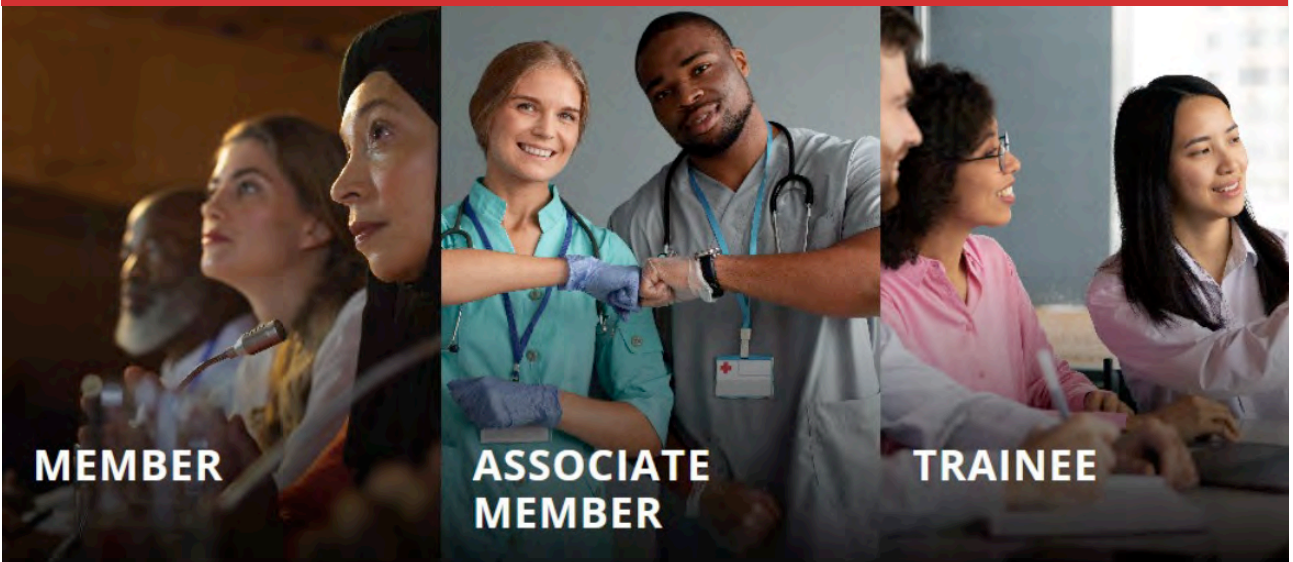
[www.serviermedicalhub.com](http://www.serviermedicalhub.com)

Access a wealth of updated medical content in these domains,  
featuring recordings from international congress symposia,  
global webinars, expert interviews, and educational programs.

Access for HCPs only - registration is free: scan the QR code now and create your personal account in 2 simple steps only!



## Not yet a member of the ISH?



**MEMBER**

**ASSOCIATE  
MEMBER**

**TRAINEE**

Explore membership options including our  
**FREE** Associate Membership category.

<https://ish-world.com/join-ish/>



**International  
Society of  
Hypertension**

# ISH2024 IN REVIEW

FRANZ VOLHARD AWARD LECTURER

## Translating the genetics of blood pressure

PROFESSOR EMERITUS STEPHEN HARRAP

Past President of the International Society of Hypertension  
Department of Anatomy and Physiology, The University of Melbourne, Australia



As much as 40% of blood pressure (BP) variability is “genetic”<sup>1</sup> and the genome is trying to tell us something about BP. There is an active “conversation” going on within the genome, between the genome and the body and with the external environment, but we need help in understanding what’s being said.

Of the two strategies for translating the genomic conversation, one attempts to decipher the raw text – the DNA – and the other pieces together the transcribed text – the RNA.

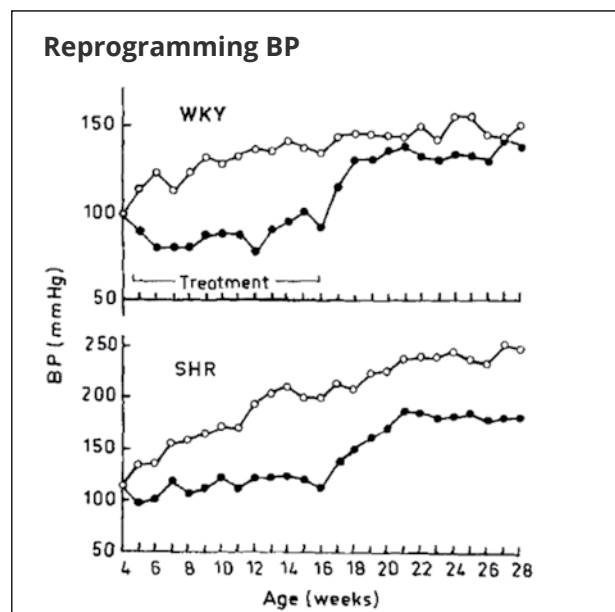
DNA studies, from the early candidate gene studies<sup>2</sup> to the modern genome-wide association analysis (GWAS),<sup>3</sup> have accumulated a compendium of changes in single letters of the genetic alphabet (single nucleotide polymorphisms – SNPs) that are associated with BP differences. However, other than the discoveries of major genetic mutations affecting BP,<sup>4</sup> reading one letter at a time reveals neither the nature of genetic influence on BP, nor the full extent of the conversation.

For common BP variation, SNPs are most often in the “noncoding” DNA outside the genes that make proteins. These SNPs are likely part of networks that control the time and place where genes are expressed – perfect vehicles for coordinating BP control. By their nature, networks are unlikely to be revealed by individual SNPs. Furthermore, the effect on BP of a network may be greater than the sum of its part because of amplification by interaction (known as epistasis). In this case, network SNPs may not be revealed individually but only when considered together. Evidence of such interaction exists from simple analyses of genes in the renin-angiotensin system (RAS).<sup>5</sup> However, more complex genome-wide searches of the DNA

text for networks present significant statistical and computational challenges.

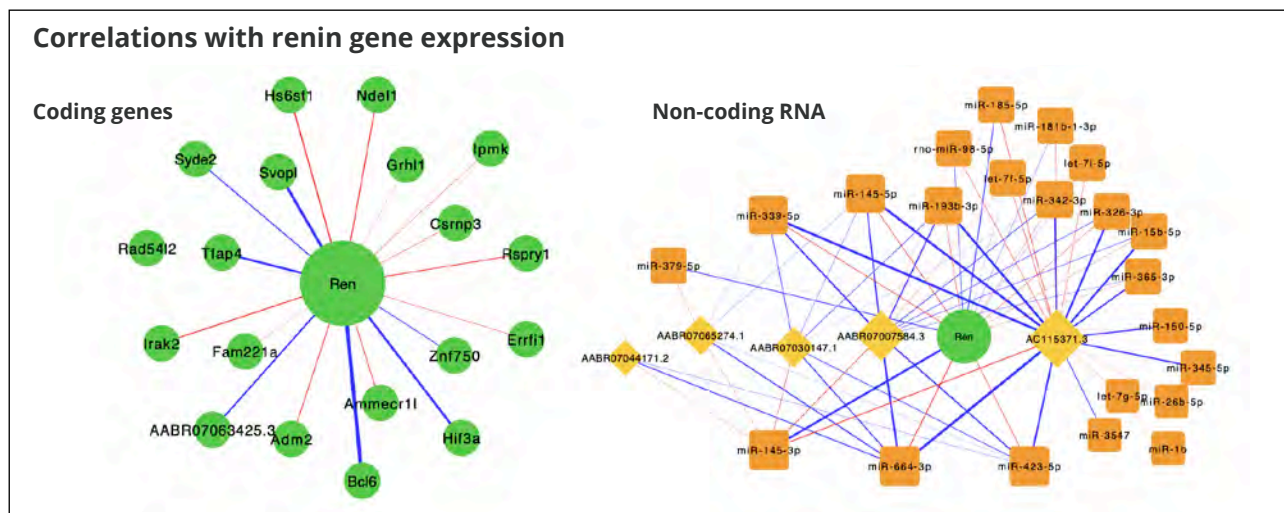
On the other hand, the advantage of studying the RNA transcript of the genome is that it can pinpoint the distilled genomic conversation. The challenge is that one must choose the appropriate tissue and stage of development in which an RNA network transcript is influencing BP. Here is an example.

The spontaneously hypertensive rat (SHR), the archetype of experimental genetic hypertension, exhibits a remarkable phenomenon: short-term treatment with a RAS blocking drug will lower the BP (**Figure 1**) for the life of the SHR.<sup>6,7</sup> This suggests that the genetic hypertensive program of SHR is reset to a lower BP by such treatment. This well-established paradigm is not seen with



**Figure 1.** Treatment of young WKY and SHR animals with perindopril is followed by a persistent reduction in BP only in SHR. From ref. 7

**Figure 2.** The long-term reduction in renal renin gene (Ren) expression after RAS blockade in SHR correlates with changes in expression of cognate genes and non-coding RNA. From ref. 9.



other antihypertensive drugs and the kidneys are centrally involved.<sup>8</sup> Fifty years on, focussing on genetic expression in the kidney, the mystery may have been solved.<sup>9</sup> RAS blockade induces very high renin gene expression during treatment, but in SHR this is followed by a persistent reduction in renin gene expression and protein levels in the renal cortex. A priori, the persistently lower BP would normally be expected to induce a homeostatic increase in renin. Instead, the lower renal renin is the likely cause of BP reduction. It was possible to define expression networks of genes and non-coding RNA (involved in controlling gene expression) that were altered long-term after RAS blockade and were associated directly with the reduced renal renin (**Figure 2**). These networks are known to have biological functions related to the kidneys, RAS and BP. It was also revealed that renin and other key network genes showed evidence of increased DNA methylation. This is a recognised epigenetic mechanism by which environmental exposure – in this case RAS blockade – can leave a legacy to lower gene expression. Finally, DNA sequence differences were identified in the SHR renin gene – many in putative binding site for transcription factors that control gene expression.

Such experimental strategies can uncover something of the integrated genetic language controlling BP including the interaction within the genome and between the genome and the environment. Let's keep our ears open!

**References:**

- Harrap SB, Stebbing M, Hopper JL, Hoang HN, Giles GG. Familial patterns of covariation for cardiovascular risk factors in adults - The Victorian Family Heart Study. *Am J Epidemiol.* 2000;152:704-715
- Wong ZYH, Stebbing M, Ellis JA, Lamantia A, Harrap SB. Genetic linkage of the  $\beta$ - and  $\gamma$ -subunits of the epithelial sodium channel with systolic blood pressure in the general population. *Lancet.* 1999;353:1222-1225
- Keaton JM, et al. Genome-wide analysis in over 1 million individuals of European ancestry yields improved polygenic risk scores for blood pressure traits. *Nat Genet.* 2024;56:778-791
- Lifton RP, Gharavi AG, Geller DS. Molecular mechanisms of human hypertension. *Cell.* 2001;104:545-556.
- Scurrah K, Lamantia A, Ellis JA, Harrap SB. Familial analysis of epistatic and sex-dependent association of genes of the renin-angiotensin-aldosterone system and blood pressure. *Circ Cardiovasc Genet.* 2017;10:e001595
- Giudicelli JF, Freslon JL, Glasson S, Richer C. Captopril and hypertension development in the SHR. *Clin Exp Hypertens.* 1980;2:1083-96.
- Harrap SB, Nicolaci J, Doyle AE: Persistent effects on blood pressure and renal hemodynamics following chronic converting enzyme inhibition with perindopril. *Clin Exp Pharm Physiol.* 1986;13:753-765
- Harrap SB, Wang B-Z, MacLellan DG: Transplantation studies of the role of the kidney in long-term blood pressure reduction following brief ACE inhibitor treatment in young spontaneously hypertensive rats. *Clin Exp Pharmacol Physiol* 1994;21:129-132
- Byars SG, Prestes P, Suphapimol V, Takeuchi F, De Vries N, Maier MC, Melo M, Balding D, Samani N, Allen AM, Kato N, Wilkinson-Berka JL, Charchar F, Harrap SB. Four-week inhibition of the renin-angiotensin system in spontaneously hypertensive rats results in persistently lower blood pressure with reduced kidney renin and changes in expression of relevant gene networks. *Cardiovasc Res.* 2024 Mar 19:cvae053.

# ISH2024 IN REVIEW

## NEW INVESTIGATOR AWARD WINNERS

### Exploring the potential of renal denervation in heart failure therapy: new insights into right ventricular function and sympathetic nervous modulation



**MATÚŠ MIKLOVIČ**

Center for Experimental Medicine, Institute For Clinical And Experimental Medicine, Prague, Czech Republic

Heart failure (HF) remains a highly prevalent and complex condition, marked by significant morbidity and hyperactive sympathetic nervous system that further deteriorates cardiac function. While renal denervation (RDN) is primarily known for its effects on lowering blood pressure, recent studies suggest its potential to impact the cardiac sympathetic nervous system, making it a promising candidate for HF therapy. However, the influence of RDN on HF, specifically on right ventricular (RV) function, has yet to be fully elucidated. This study aimed to fill this gap by examining the effects of RDN on RV performance, myocardial norepinephrine (NE) levels, and HF markers in a hypertensive rat model of HF induced by volume overload.

Our study utilized hypertensive Ren-2 transgenic rats with an aorto-caval fistula (ACF) to simulate HF with volume overload. RDN was achieved via phenol application to the renal arteries to reduce renal sympathetic nerve activity (both afferent and efferent). After a two-week period, RV function was evaluated through echocardiography and pressure-volume analysis, focusing on RV end-systolic and end-diastolic pressures and RV systolic function. NE concentrations were measured in the kidney, plasma, and RV to gauge the impact on sympathetic modulation, while molecular markers were analyzed to assess changes in oxidative stress and HF progression.

Our findings demonstrate that RDN significantly reduces both end-systolic pressure (ESP) and end-diastolic pressure (EDP) in the RV, and enhanced RV contractility with an increase in RV end-systolic elastance (Ees) and fractional area change (FAC), indicating a reduction in RV afterload and an improvement in overall RV function in this HF model.

To better understand the connection between RV improvement and sympathetic activity, we measured NE levels, which serve as a primary marker of sympathetic activation. RDN led to a significant decrease in NE concentrations in the kidney and plasma, suggesting a reduction in overall sympathetic tone. Interestingly, NE levels were partially restored and significantly increased within the RV myocardium, an effect potentially linked to the downregulation of monoamine oxidase A (MAO-A), an enzyme that degrades NE while producing reactive oxygen species (ROS).

Furthermore, our molecular analyses showed decreased expression of critical HF markers, including Nppa, Tgm2, and an improved Myh7/6 ratio, indicating a reduction in myocardial stress and fibrosis in the RV. We also observed increased expression of SOD2, an antioxidant enzyme that may contribute to reduced ROS-induced damage in the myocardium, offering additional protective effects.



In summary, this study sheds new light on RDN's potential beyond hypertension management by demonstrating its beneficial effects on RV function in HF. Through reductions in RV ESP and EDP, improvements in systolic function, modulation of NE levels, and downregulation of HF markers, RDN

may offer targeted protection against RV strain in volume-overloaded HF. These findings highlight the promise of RDN as a novel intervention for HF with RV involvement, warranting further investigation in larger models and clinical trials to confirm its therapeutic potential.

Matúš Miklovič – [matus.miklovic@ikem.cz](mailto:matus.miklovic@ikem.cz)

# SAVE THE DATE...



Photo: 72855359 | Dubai © Alexey Stiop | Dreamstime.com

# ISH2026

Dubai, 22-25 October 2026

# ISH2024 IN REVIEW

## NEW INVESTIGATOR AWARD WINNERS

### Recommendations for home blood pressure measurement are inconsistent between international guidelines



**ELEANOR CLAPHAM**

Menzies Institute for Medical Research, University of Tasmania, Australia

**NIAMH CHAPMAN**

School of Health Sciences, Faculty of Health and Medicine, University of Sydney, Australia and Menzies Institute for Medical Research, University of Tasmania, Australia

#### **Why compare guideline recommendations for home blood pressure across countries?**

Home blood pressure monitoring (HBPM) is recommended as an out of office measure because it has good prognostic value for cardiovascular disease and can be undertaken by the patient to inform BP management. HBPM is a key individual health behaviour for the self-monitoring of high BP which requires the patient to obtain a BP device, undertake standardised and routine BP measurement, and interpret, record and report BP readings.

HBPM has been shown to be more effective when delivered with patient education,<sup>1</sup> likely because patients must learn new skills to undertake HBPM. Patient education for HBPM should be based on evidence-based information, such as that in guidelines.

Initially, we undertook two studies to explore the quality of 1) online resources to support patients to undertake HBPM, and 2) HBPM among people in Australia. While undertaking this work we identified disparities in guideline recommendations which led us the research question: are recommendations for HBPM consistent across guidelines?

#### **How did we compare guideline recommendations for HBPM?**

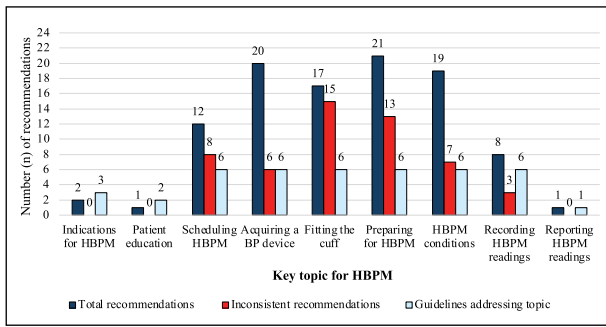
We extracted individual recommendations from six guideline documents: European Society of Hypertension (2021), International Society of Hypertension (2020), Hypertension Canada (2020), Japanese Society of Hypertension (2019), American Heart Association (2019) and the Australian Expert Consensus Statement (2015).

Next, we determined if recommendations were consistent through head-to-head comparison of each individual recommendation. A recommendation was classified as 'inconsistent' if it differed or contradicted in meaning with one or more recommendation in the same guideline or another guideline.

#### **What did we find?**

We identified 104 recommendations for HBPM across the six guidelines. Most recommendations focused on acquiring a BP device, preparing for HBPM and conditions for HBPM but few recommendations addressed patient education needs or reporting HBPM to inform clinical decision-making.

**Figure 1.** Guideline recommendations for the key topics of HBPM.



Half of the guideline recommendations (n=52, 51%) were classified as inconsistent with one or more recommendation.

More than half (n=29, 56%) of all recommendations classified as inconsistent contained a time parameter. For example, three different recommendations for the length of seated rest prior to BP measurement were made across the guidelines; at least five minutes, three to five minutes and one to two minutes.

### What does inconsistency in guideline recommendations mean for practice?

Inconsistent recommendations in guidelines may contribute to barriers to translate evidence into practice by causing confusion among health professionals or creating challenges for developing evidence-based educational resources.

We found that half of the recommendations classified as inconsistent included a time parameter. Interestingly, our recent study exploring HBPM quality among people in Australia found that time-based recommendations were the least commonly adhered to.<sup>2</sup> For example, less one third of participants avoided eating during the 30 minutes before BP measurement.

Eleanor Clapham – eleanor.clapham@utas.edu.au

Niamh Chapman – niamh.chapman@utas.edu.au

Conversely, most participants measured BP while seated with their arm supported, recommendations that were consistent across guidelines. In interviews, few participants recalled receiving advice from healthcare practitioners, and those who did revealed that health practitioners typically reiterated consistent recommendations such as “sit down, feet on the floor... arm at heart level, don't cross legs and relax”.<sup>2</sup> This mirrors previous research findings that GPs do not typically deliver complete patient education on HBPM.<sup>3</sup>

Our findings suggest that health practitioners are not given evidence-based direction on patient education strategies for HBPM and how to facilitate a two-way feedback system of HBPM readings between the patient and practitioner.

### Take home message

Our findings suggest that there may be a need to improve the consistency in recommendations made across international guidelines for HBPM. While national guidelines vary in recommendations regarding treatment thresholds/targets, such differences are typically due to variation in the prevalence of risk factors and associated cardiovascular outcomes. However, HBPM is a standardised process for patients to obtain high-quality BP measures to inform clinical management. Simple, consistent recommendations to guide HBPM may improve translation to clinical practice to improve BP control.

### References

1. Tucker KL, Sheppard JP, Stevens R, Bosworth HB, Bove A, Bray EP, et al. Self-monitoring of blood pressure in hypertension: A systematic review and individual patient data meta-analysis. *PLoS Med.* 2017;14(9):e1002389.
2. Clapham E, Picone DS, Carmichael S, Stergiou GS, Campbell NRC, Stevens J, et al. Home blood pressure measurements are not performed according to guidelines and standardized education is urgently needed. *Hypertension.* Accepted 07.11.2024.
3. McManus RJ, Wood S, Bray EP, Glasziou P, Hayen A, Heneghan C, et al. Self-monitoring in hypertension: a web-based survey of primary care physicians. *Journal of Human Hypertension.* 2014;28(2):123-7.

### Effects of sodium nitrite on renal damage induced by renovascular hypertension

JÉSSYCA MILENE RIBEIRO<sup>1</sup>, ALESSANDRA OLIVEIRA SILVA<sup>1</sup>, CAROLINA APARECIDA DE FARIA ALMEIDA<sup>1</sup>, FERNANDA MARQUES<sup>1</sup>, THAÍS VICTORINO RIBEIRO<sup>2</sup>, JOSÉ EDUARDO TANUS<sup>3</sup>, ELEN RIZZI SANCHEZ<sup>2</sup>, LARISSA HELENA TORRES<sup>1</sup>, CARLA SPERONI CERON<sup>4</sup>

1. Federal University of Alfenas, Alfenas-MG, Brazil
2. University of Ribeirão Preto, Ribeirão Preto, Brazil
3. University of São Paulo, São Paulo, Brazil
4. Federal University of Ouro Preto, Ouro Preto-MG, Brazil



Jéssyca Milene Ribeiro

Renovascular hypertension, characterized by increased oxidative stress and reduced nitric oxide (NO) bioavailability, represents a pathophysiological state with detrimental effects on kidney function. Nitrite, a metabolite involved in the NO cycle, has emerged as a potential therapeutic agent due to its ability to generate NO and exert antioxidant effects. However, the specific renal effects of sodium nitrite in the context of two-kidney, one-clip (2K1C) hypertension remain to be elucidated. This study aimed to evaluate the impact of sodium nitrite administration on renal injury associated with 2K1C hypertension.

Hypertension was induced in male Wistar rats via unilateral clipping of the left renal artery, creating the 2K1C model. Two weeks post-surgery, animals were orally treated (via gavage) with sodium nitrite at two doses: 1 mg/kg/day and 15 mg/kg/day, or a vehicle control, for four weeks. Blood pressure (BP) was measured weekly using tail-cuff plethysmography. Renal function was assessed by measuring plasma urea and creatinine levels. To investigate oxidative stress, catalase (CAT) and superoxide dismutase (SOD) enzyme activities were quantified, along with levels of reduced glutathione (GSH), lipid peroxidation, and superoxide anion (O<sub>2</sub><sup>-</sup>).

Sodium nitrite treatment at 15 mg/kg/day significantly reduced systolic BP in hypertensive 2K1C rats compared to untreated rats ( $p < 0.05$ , C:126.7±3.677; H:170.5±6.542; H15:162.4±6.712). Additionally, renal function, indicated by plasma urea and creatinine concentrations, markedly improved with the higher nitrite dose (urea  $p < 0.05$ ; C:36.71±4.553; H:76.37±24.53; H15:47.82±13.86; creatinine  $p < 0.05$ ; C:0.430±0.0600; H:0.540±0.105; H15:0.3550±0.117). In terms of oxidative stress markers, SOD activity was significantly reduced in untreated hypertensive rat kidneys ( $p < 0.05$ , C:0.7176±0.06426; H:0.636±0.0888; H1:0.703±0.0866; H15:0.648±0.173). CAT activity, which was impaired in 2K1C rats (0.2772±0.1837 U/mg protein), recovered with nitrite at the higher dose (CAT  $p < 0.05$ , C:0.651±0.255; H:0.2772±0.1837; H15:0.6654±0.1440). A significant reduction in GSH levels was observed in hypertensive rats (C:44.80±10.59), but these levels were restored following nitrite treatment (H15:44.25±10.07). Lipid peroxidation, a marker of oxidative damage, was elevated in 2K1C rats but reduced by treatment with 15 mg/kg/day nitrite ( $p < 0.05$ , C:0.314±0.158; C15:0.361±0.087; H:0.497±0.113; H15:0.278±0.084). Superoxide anion (O<sub>2</sub><sup>-</sup>) levels, which increased with hypertension ( $p < 0.05$ , C:3.695±0.9245; C15:0.3999±0.1667;

H:  $3.844 \pm 1.598$ ; H1:  $0.9643 \pm 0.2063$ ; H15:  $0.4431 \pm 0.1838$ , significantly decreased in all nitrite-treated groups.

These findings suggest that sodium nitrite exerts renoprotective effects in 2K1C-induced hypertension through its antioxidant activity. Treatment with 15 mg/kg/day sodium nitrite effectively mitigated oxidative stress by restoring CAT and GSH levels, decreasing lipid peroxidation,

and reducing superoxide anion concentrations. These improvements translated into enhanced renal function and lowered blood pressure. The results highlight the potential of sodium nitrite as a therapeutic agent for the treatment of renovascular hypertension and prevention of hypertension-induced renal damage. Further studies are needed to explore its long-term efficacy and mechanistic pathways.

Jéssyca Ribeiro – [jessyca.ribeiro@sou.unifal-mg.edu.br](mailto:jessyca.ribeiro@sou.unifal-mg.edu.br)

Advert from an ISH Corporate Member



OHEAPP-648

## Detecting Atrial Fibrillation with every measurement through an AI-developed algorithm

Find out in **10 minutes** how our **innovative algorithm** delivers **enhanced sensitivity** and **accuracy** in detecting AFib.



Sign up for free on  
**OMRON Academy**

[academy.omron-healthcare.com](https://academy.omron-healthcare.com)



# ISH2024 IN REVIEW

## The ISH Capacity Building Network at ISH2024

DEAN PICONE

Australia

NIAMH CHAPMAN

Australia

LEBO GAFANE-MATEMANE

South Africa



We are pleased to report back on several activities delivered by the ISH Capacity Building Network (CBN) at ISH2024, which proved a hit with attendees, including networking, how-to seminars and the launch of a scholarship for ISH2024 attendees.

At ISH2024, we were also pleased to welcome Yan Li from China, who will co-Chair the CBN alongside us for the next two years. Yan is taking over as Chair of the ISH Women in Hypertension Research Committee from Niamh, who is taking on a new role within the ISH as Project Manager of the ISH Patient Guidelines but will continue to co-Chair the CBN.

### ISH CBN Symposium

A one-day event was attended by over 50 ISH2024 delegates on 18th September. This was primarily aimed at early to mid-career researchers, designed to help delegates advance in their research career and followed by an evening networking and social event.



Sessions were included on:

- How to communicate your research effectively
- How to build your research network
- How to write a successful grant application



### ISH Collaboration Exchange Scholarship

The ISH Collaboration Exchange Scholarship valued at \$5,000 USD was launched at the symposium and advice was given on how to get involved. The aim of the ISH Collaboration Exchange Scholarship is to support junior members of ISH to develop collaborative relationships and/or activities with someone they met at the 2024 ISH meeting.

Applicants were eligible to apply if they are ISH members that attended the 2024 ISH meeting in Cartagena and are:

- EMCRs who have been awarded their PhD within the past 10 years and do not lead their own research team,
- PhD candidates, or
- Active trainee researchers that have at least 1 publication.

Hosts will be ISH members that are willing to host the applicant and support the proposed activities in 2025.

## Speed Mentoring Lunchtime Networking Events

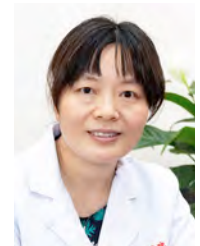
Three lunchtime mentoring sessions were held during the ISH2024 meeting where early career researchers were matched with mentors to seek career advice. These sessions were 'sell out' events with great uptake from both mentors and mentees with more than 30 attendees at each session. Positive feedback was received from many of those attending, indicating that the sessions were extremely worthwhile for providing opportunities to gain impactful advice and meet with potential collaborators.

## About the Capacity Building Network

The ISH CBN offers career development and networking opportunities for early and mid-career researchers and those from under-represented backgrounds. Launched in November 2023, it is a collaboration between three ISH committees:



the Women in Hypertension Research Committee (WiHRC), the New Investigator Committee (NIC), and the Mentorship and Training Committee (MTC).



The CBN is co-Chaired by Dean Picone (Australia), Niamh Chapman (Australia), Lebo Gafane-Matemane (South Africa) and Yan Li (China) – pictured above.

## Acknowledgements

Our thanks go to all those involved with the ISH2024 CBN events and who helped to make these initiatives a great success, including:

Olutope Arinola Akinnibosun (Australia), Dagnóvar Aristizábal (Colombia), Mariane Bertagnolli (Canada), Buna Bhandari (Nepal/ USA), Fadi Charchar (Australia), Débora Colombari (Brazil), Ruan Kruger (South Africa), Tazeen Jafar (Singapore), Neusa Jessen (Mozambique), Chloé Landry (Canada), Jose Patricio Lopez-Lopez (Colombia), Francine Marques (Australia), Karla Neves (UK), Mansi Patil (India), Daniel Piskorz (Argentina), Priscilla Prestes (Australia), Cesar Romero (USA), Alta Schutte (Australia), Ching Siew-Mooi (Malaysia), Muscha Steckelings (Denmark), George Stergiou (Greece), Bryan Williams (UK), all mentors that gave their time for the Speed Mentoring sessions.



# ISH2024 IN REVIEW

## The speed mentoring fostered immediate connections and set the groundwork for long-term mentorship opportunities



ZITANDILE MFONO

Mandela University, South Africa

**Zitandile Mfono, an emerging researcher writes about her experience of the Speed Mentoring session she attended at ISH2024.**

Before attending the ISH Congress in Cartagena, I received an email invitation to sign up for a speed mentoring session during the conference. Eagerly accepting, I saw this as a unique chance to engage with prominent speakers and leading public health researchers specializing in hypertension—a field that aligns closely with my research interests. Coming from a background in nutrition and dietetics, my work focuses on lifestyle interventions for better hypertension management. Therefore, meeting experienced researchers in this area was an exciting prospect.

During the speed mentoring session, I was pleased to discover that one of my mentors was a fellow South African researcher. This mentor shared their journey of establishing a career in hypertension research, emphasizing the role mentorship had played in their own success. Their experiences resonated deeply with me, reaffirming the value of mentorship in navigating the often-challenging world of research. Additionally, I connected with other early-career researchers from various countries, including a colleague from Mexico now based in the United States, who, like me, is working in nutrition and dietetics. Through these interactions, I realized that emerging researchers across borders often face similar challenges: securing funding, finding suitable mentors, and forming meaningful collaborations.

We also discussed the common feeling of “imposter syndrome” among early-career researchers, a theme that emerged frequently

in our conversations. Sharing these experiences with my peers and hearing others articulate similar struggles helped me feel more connected and less isolated in my journey. The one-on-one interactions throughout the session boosted my confidence and strengthened my engagement in the conference. One mentor mentioned a valuable piece of advice that stuck with me: experienced researchers are human too. We shouldn't hesitate to approach them, ask questions, or even seek out potential mentors. They encouraged us to seek mentors whose careers and research trajectories are not only inspirational but also strategically aligned with our professional goals. An experienced mentor, they emphasized, can help early-career researchers avoid common pitfalls and make better-informed decisions.

The speed mentoring session added a personal touch to the event, making it feel more engaging and accessible—particularly valuable since I attended alone. This setting offered an avenue for networking that extended beyond casual interactions, helping me build relationships that might not have developed otherwise. Following the advice from one of my mentors, I decided to approach a potential mentor in my field, and I successfully arranged a follow-up meeting after the conference. This step felt significant and empowering, representing a proactive move toward establishing a long-term mentorship.

Reflecting on this experience, I'm grateful for the Capacity Building Network initiative, which made this level of engagement possible. Without the additional support from this program, I may not have had the opportunity to interact as freely with these experienced researchers or to gain such invaluable insights. The speed mentoring session ultimately fostered both immediate connections and set the groundwork for long-term mentorship opportunities, underscoring its meaningful impact on my professional growth. It was a pivotal experience that not only enhanced my confidence but also equipped me with a clearer perspective on my path forward in hypertension research.

Zitandile Mfono – hlombezana@gmail.com



# ISH2024 IN REVIEW

## Membership committee at ISH2024

DÉBORA COLOMBARI

Chair ISH Member



The Membership Committee (MC) was present and very active in ISH2024, which was held in Cartagena/Colombia from September 25 to 29. The MC members were easily found as they were wearing custom-made T-shirts for ISH2024.

The MC's assistance to the delegates was a standout feature. They took the time to explain the nuances of the membership categories and their respective benefits. Furthermore, videos from Dr. Débora Colombari (MC Chair) and Dr. Priscilla Prestes (MC Deputy Chair) elaborating on these topics were recorded and will soon be shared on ISH social media.

The MC members were not just present but actively engaged in the activities promoted by the Capacity Building Network. Dr Ruan Kruger, for instance, chaired the Section: Building Your Profile and CV Workshop, where Dr Débora Colombari, MC Chair, shared insights on "How to write a CV".

Due to the strong participation of the MC in ISH2024, around 50 new members applied only during the meeting.

Another significant aspect was the proactive involvement of the MC members in the Capacity Building Network. Their strong participation was instrumental in aiding trainees and young investigators in their research and scientific path, a contribution we can all be proud of.

Débora Colombari – [debora@ish-world.com](mailto:debora@ish-world.com)



# ISH2024 IN REVIEW





# ISH2024 IN REVIEW

## Mitigating pre-eclampsia risk: an integrated approach

MARIANE BERTAGNOLLI

Cardiovascular Health Across the Lifespan Program, Research Institute of McGill University Health Centre, Montreal, Canada  
School of Physical and Occupational Therapy,  
Faculty of Medicine and Health Sciences, Montreal, Canada



Pre-eclampsia is a complex hypertensive disorder of pregnancy with significant risks to maternal and fetal health. It is the second leading cause of maternal morbidity and mortality worldwide<sup>1</sup> and is associated with adverse fetal outcomes, including preterm birth and intrauterine growth restriction.<sup>2,3</sup> The pathogenesis of pre-eclampsia involves complex interactions between the placenta, maternal vascular endothelium, and immune system.<sup>4,5</sup> Endothelial dysfunction is central to its development, characterized by impaired remodeling and reduced dilation of uterine arteries, compromising placental perfusion and triggering an exaggerated inflammatory response.<sup>4,6</sup> These disruptions often arise from abnormal placentation, where defective trophoblast invasion leads to insufficient remodeling of the uterine spiral arteries and placental ischemia. However, maternal factors such as cardiometabolic conditions and advanced maternal age can also contribute to impaired vascular function, exacerbating the risk of pre-eclampsia by hindering placental vascular development.<sup>7</sup> Effective risk mitigation therefore requires a deep understanding of this complex pathogenesis, an early identification of high-risk pregnancies, and personalized preventive strategies.

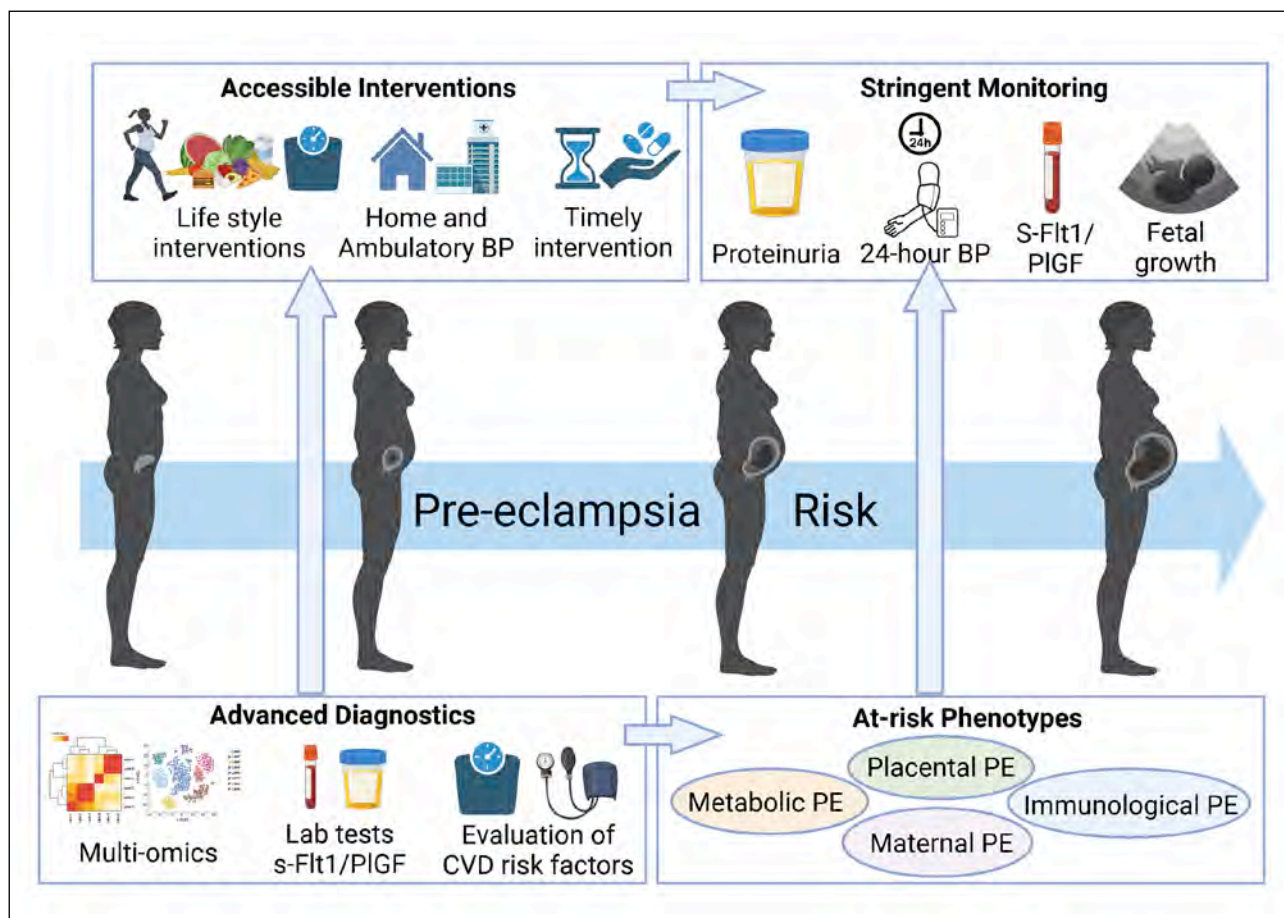
Placental ischemia induces the release of antiangiogenic factors like soluble fms-like tyrosine kinase-1 (sFlt-1) and soluble endoglin, which disrupt the balance with proangiogenic molecules such as vascular endothelial growth factor (VEGF) and placental growth factor (PlGF).<sup>8</sup> This imbalance leads to widespread endothelial damage, systemic inflammation, and multi-organ dysfunction, including renal,

hepatic, and neurological complications. Fetal growth restriction also commonly occurs due to compromised uteroplacental blood flow. Although these features are commonly present in most cases of pre-eclampsia, individual factors may also interplay with these or other mechanisms, adding complexity to its pathogenesis and influencing its clinical manifestations. This heterogeneity poses a significant challenge in discovering new treatments and reduces the effectiveness of current therapeutic options for managing hypertensive disorders of pregnancy in general. Taking this into account, the following critical points described below and illustrated in **Figure 1** must be considered in the pursuit of strategies to effectively mitigate pre-eclampsia risk.

### Identification of individuals at-risk

Pre-eclampsia is highly heterogeneous, presenting various clinical phenotypes based on onset (early or late), severity, and associated complications. Risk factors include chronic hypertension, obesity, diabetes, autoimmune diseases, advanced maternal age, and certain genetic predispositions. The phenotypes reflect a combination of maternal characteristics, placental pathology, and environmental factors. Identifying these phenotypes early allows better risk prediction and tailored preventive interventions. For example, women with a history of pre-eclampsia may benefit from closer surveillance, while those with a metabolic phenotype (e.g., obesity or insulin resistance) might benefit from lifestyle modifications alongside pharmacological support. These stratified approaches could ensure that treatment aligns with individual risk profiles, enhancing prevention and outcomes.

**Figure 1: Integrated strategies for understanding and mitigating pre-eclampsia risk.** BP, blood pressure; CVD, cardiovascular disease; PE, pre-eclampsia; PIGF, placental growth factor; s-Flt1, soluble fms-like tyrosine kinase-1.



Additionally, advances in systems medicine have opened new opportunities for understanding these different phenotypes and mitigating pre-eclampsia. By integrating clinical data with multi-omics insights, researchers can identify biomarkers and molecular signatures linked to increased risk.<sup>9</sup> For example, altered levels of sFlt-1 and PIGF are early predictors of pre-eclampsia, enabling timely diagnosis and intervention.<sup>10</sup> Systems medicine also supports personalized strategies, with multi-omics data and machine learning algorithms uncovering patient-specific risk patterns for more precise interventions.<sup>9,11</sup> This approach underscores the potential of precision medicine to transform the prediction and management of hypertensive disorders of pregnancy.

### Accessible interventions

Mitigating pre-eclampsia risk requires both advanced diagnostics and accessible interventions that can be implemented widely. While

biomarker-based tools and predictive models are essential, simple and practical measures can significantly reduce risks at the population level. Encouraging pregnant women to monitor their blood pressure at home or undergo periodic ambulatory monitoring can facilitate early detection of hypertensive changes. Although the BUMP1 randomized controlled trial did not show significantly earlier detection of hypertension with self-monitoring during pregnancy,<sup>12</sup> this approach empowered women by increasing awareness of raised blood pressure.<sup>13</sup> This underscores the importance of pairing self-monitoring with timely medical intervention, as highlighted in the POP-HT study, which demonstrated better postnatal outcomes when prompt intervention followed blood pressure changes.<sup>14</sup> Thus, a combination of closer monitoring and timely medical response and intervention during pregnancy may prove more effective in preventing pre-eclampsia. Additionally, lifestyle interventions including balanced nutrition, regular physical activity, and

weight management are crucial, particularly for women with metabolic risk factors.<sup>15,16</sup> Programs that promote healthy eating and exercise should be initiated early in pregnancy, especially for women with cardiovascular risk factors or advanced age, as they may substantially reduce the likelihood of developing pre-eclampsia.

### **Stringent blood pressure and abnormalities monitoring:**

Recent studies have also emphasized the importance of treating mild chronic hypertension during pregnancy, demonstrating the value of ambulatory blood pressure monitoring (ABPM) for identifying at-risk groups.<sup>17, 18</sup> Sustained and masked uncontrolled hypertension significantly increase the risk of pre-eclampsia, while controlled or white-coat hypertension do not.<sup>18</sup> Nocturnal hypertension is a particularly strong predictor of pre-eclampsia, underscoring the need for precise blood pressure monitoring. These findings advocate for ABPM to detect masked hypertension and recommend stringent 24-hour monitoring, especially nocturnal blood pressure, to improve diagnosis, management, and prevention. Pharmacologically treated women also need access to regular antenatal visits with screening for proteinuria, blood pressure monitoring, and ultrasonographic evaluation of fetal growth to detect early abnormalities.

In conclusion, pre-eclampsia requires a comprehensive prevention strategy. The combination of precision medicine, systems biology, timely interventions, and community health initiatives offers promising avenues to reduce risks. By leveraging big data and artificial intelligence, healthcare providers can refine risk stratification models and develop tailored therapeutics. However, these measures must be supported by investments in public health infrastructure to enable stringent monitoring, provide accessible lifestyle counseling, and raise awareness among expectant mothers. A holistic strategy, can help ensure safer pregnancies and improved maternal-fetal outcomes.

### **References:**

1. Collaborators GBDMM. Global, regional, and national levels of maternal mortality, 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388:1775-1812.
2. Magee LA, von Dadelszen P, Singer J, Lee T, Rey E, Ross S, Asztalos E, Murphy KE, Menzies J, Sanchez J, Gafni A, Helewa M, Hutton E, Koren G, Lee SK, Logan AG, Ganzevoort W, Welch R, Thornton JG, Moutquin JM and Group\* CS. The CHIPS Randomized Controlled Trial (Control of Hypertension in Pregnancy Study): Is Severe Hypertension Just an Elevated Blood Pressure? *Hypertension*. 2016;68:1153-1159.
3. Wu P, Chew-Graham CA, Maas AH, Chappell LC, Potts JE, Gulati M, Jordan KP and Mamas MA. Temporal Changes in Hypertensive Disorders of Pregnancy and Impact on Cardiovascular and Obstetric Outcomes. *The American journal of cardiology*. 2020;125:1508-1516.
4. Burton GJ, Charnock-Jones DS and Jauniaux E. Regulation of vascular growth and function in the human placenta. *Reproduction*. 2009;138:895-902.
5. Nieves C, Victoria da Costa Ghignatti P, Aji N and Bertagnolli M. Immune Cells and Infectious Diseases in Preeclampsia Susceptibility. *Can J Cardiol*. 2024.
6. Lyall F, Robson SC and Bulmer JN. Spiral artery remodeling and trophoblast invasion in preeclampsia and fetal growth restriction: relationship to clinical outcome. *Hypertension*. 2013;62:1046-54.
7. Phan K, Gomez YH, Gorgui J, El-Messidi A, Gagnon R, Abenhaim HA, Rahme E and Daskalopoulou SS. Arterial stiffness for the early prediction of pre-eclampsia compared with blood pressure, uterine artery Doppler and angiogenic biomarkers: a prospective cohort study. *BJOG : an international journal of obstetrics and gynaecology*. 2023;130:932-940.
8. Maynard S, Epstein FH and Karumanchi SA. Preeclampsia and angiogenic imbalance. *Annual review of medicine*. 2008;59:61-78.
9. Than NG, Posta M, Gyorffy D, Orosz L, Orosz G, Rossi SW, Ambrus-Aikelin G, Szilagyi A, Nagy S, Hupucz P, Torok O, Tarca AL, Erez O, Papp Z and Romero R. Early pathways, biomarkers, and four distinct molecular subclasses of preeclampsia: The intersection of clinical, pathological, and high-dimensional biology studies. *Placenta*. 2022;125:10-19.
10. Zeisler H, Llorba E, Chantraine F, Vatish M, Staff AC, Sennstrom M, Olovsson M, Brennecke SP, Stepan H, Allegranza D, Dilba P, Schoedl M, Hund M and Verlohren S. Predictive Value of the sFlt-1:PlGF Ratio in Women with Suspected Preeclampsia. *The New England journal of medicine*. 2016;374:13-22.

References continued on next page.

11. Mizuno S, Wagata M, Nagaie S, Ishikuro M, Obara T, Tamiya G, Kuriyama S, Tanaka H, Yaegashi N, Yamamoto M, Sugawara J and Ogishima S. Development of phenotyping algorithms for hypertensive disorders of pregnancy (HDP) and their application in more than 22,000 pregnant women. Scientific reports. 2024;14:6292.

12. Tucker KL, Mort S, Yu LM, Campbell H, Rivero-Arias O, Wilson HM, Allen J, Band R, Chisholm A, Crawford C, Dougall G, Engonidou L, Franssen M, Green M, Greenfield S, Hinton L, Hodgkinson J, Lavallee L, Leeson P, McCourt C, Mackillop L, Sandall J, Santos M, Tarassenko L, Velardo C, Yardley L, Chappell LC, McManus RJ and Investigators B. Effect of Self-monitoring of Blood Pressure on Diagnosis of Hypertension During Higher-Risk Pregnancy: The BUMP 1 Randomized Clinical Trial. *Jama*. 2022;327:1656-1665.

13. Chisholm A, Tucker KL, Crawford C, Green M, Greenfield S, Hodgkinson J, Lavallee L, Leeson P, Mackillop L, McCourt C, Sandall J, Wilson H, Chappell LC, McManus RJ and Hinton L. Self-monitoring blood pressure in pregnancy: evaluation of women's experiences of the BUMP trials. *BMC Pregnancy Childbirth*. 2024;24:800.

14. Kitt J, Fox R, Frost A, Shanyinde M, Tucker K, Bateman PA, Suriano K, Kenworthy Y, McCourt A, Woodward W, Lapidaire W, Lacharie M, Santos M, Roman C, Mackillop L, Delles C, Thilaganathan B, Chappell LC, Lewandowski AJ, McManus RJ and Leeson P. Long-Term Blood Pressure Control After Hypertensive Pregnancy Following Physician-Optimized Self-Management: The POP-HT Randomized Clinical Trial. *Jama*. 2023;330:1991-1999.

15. Perry A, Stephanou A and Rayman MP. Dietary factors that affect the risk of pre-eclampsia. *BMJ Nutr Prev Health*. 2022;5:118-133.

16. Mottola MF, Davenport MH, Ruchat SM, Davies GA, Poitras V, Gray C, Jaramillo A, Barrowman N, Adamo KB, Duggan M, Barakat R, Chilibeck P, Fleming K, Forte M, Korolnek J, Nagpal T, Slater L, Stirling D and Zehr L. No. 367-2019 Canadian Guideline for Physical Activity throughout Pregnancy. *Journal of obstetrics and gynaecology Canada : JOGC = Journal d'obstetrique et gynecologie du Canada : JOGC*. 2018;40:1528-1537.

17. Salazar MR, Espeche WG, Leiva Sisniegues BC, Balbin E, Leiva Sisniegues CE, Stavile RN, March CE, Grassi F, Santillan C, Cor S and Carbajal HA. Significance of masked and nocturnal hypertension in normotensive women coursing a high-risk pregnancy. *Journal of hypertension*. 2016;34:2248-52.

18. Salazar MR, Espeche WG, Minetto J, Carrera PR, Cerri G, Leiva Sisniegues CB, Leiva Sisniegues CE, Balbin E, Soria A, Torres S, Grassi F, Santillan C and Carbajal HA. Uncontrolled and masked uncontrolled blood pressure in treated pregnant women with chronic hypertension and risk for preeclampsia/eclampsia. *Hypertension research : official journal of the Japanese Society of Hypertension*. 2023;46:2729-2737.

Mariane Bertagnolli – mariane.bertagnolli@mcgill.ca

## Check out the last editions of HYPERTENSION NEWS



Visit: <https://ish-world.com/ish-hypertension-news/>



# ISH2024 IN REVIEW

## Innovations for improving hypertension and cardiovascular disease risk management in primary care



ANDRES ROSENDE AND PEDRO ORDUNEZ

Pan-American Health Organization, Washington D.C. USA

Cardiovascular diseases (CVDs) continue to be the leading cause of death in the Americas, claiming the lives of 2 million people annually. Hypertension is its main risk factor and affects over one-third of adults in the region.<sup>1</sup> Poor blood pressure control is determined in CVD mortality. Despite advances in treatment, hypertension control rates remain suboptimal, with a diagnostic gap greater than 30% and a control rate among treated patients that barely exceeds 60%. This results in less than one-third of people with hypertension in the Americas having their blood pressure values at target.<sup>2</sup>

The Pan American Health Organization (PAHO) coordinates the implementation of HEARTS in the Americas, as a regional adaptation of the World Health Organization's (WHO) global HEARTS initiative. This initiative addresses the challenge of improving cardiovascular prevention through a comprehensive approach focused on primary health care. HEARTS in the Americas has expanded rapidly, with 33 countries in Latin America and the Caribbean committed to integrating it into their primary care networks and over 6,500 PHC centers currently implementing the model that reaches over 4.5 million people in treatment.<sup>3</sup>

The program is based on eight key drivers, which include accurate blood pressure measurement, cardiovascular risk assessment, a standardized treatment protocol, treatment intensification, follow-up frequency, team-based care, medication refill frequency, and a system for performance

evaluation.<sup>4</sup> These drivers are integrated with the recommendations of the WHO Guideline for the pharmacological treatment of hypertension in adults and other top-level international guidelines.<sup>5</sup>

The instrument for implementing these actions is the HEARTS Clinical Pathway, a decision support tool that guides health professionals in the comprehensive management of hypertension and CVD risk.<sup>6</sup> This clinical pathway promotes a pragmatic and standardized approach for most people with hypertension, simplifying the risk stratification process, therapeutic interventions, and continuity of care. First, the HEARTS Clinical Pathway includes a standardized protocol for blood pressure measurement and recommends the use of clinically validated automated blood pressure measuring devices. While the HEARTS Clinical Pathway keeps recommending the WHO CVD-risk charts to classify patients, it introduces a pragmatic approach considering diabetes, chronic kidney disease, and established CVD as high-risk equivalents.<sup>7</sup> The hypertension treatment protocol included in the center of the clinical pathway recommends starting pharmacological treatment immediately after the diagnosis of hypertension and use combinations of medications in a single pill, defining specific drugs and doses in each step of the protocol, in order to reduce clinical inertia and inappropriate variability in practice. The HEARTS Clinical Pathway also recommends the use of moderate-intensity treatment with statins in high-CVD risk patients in primary prevention, while prescribes aspirin and high-intensity therapy



Figure 1. HEARTS Clinical Pathway

# HEARTS Clinical Pathway

## A ACCURATE BLOOD PRESSURE MEASUREMENT

MEASURE BLOOD PRESSURE IN ALL ADULTS AND AT ALL VISITS

- 1 Don't have a conversation
- 2 Support arm at heart level
- 3 Put the cuff on bare arm
- 4 Use correct cuff size
- 5 Support feet
- 6 Keep legs uncrossed
- 7 Empty bladder first
- 8 Support back

Whenever available, use validated automatic devices for the arm.

## B CARDIOVASCULAR RISK

KNOW YOUR RISK OF CARDIOVASCULAR DISEASE AND HOW TO MODIFY IT

### CARDIOVASCULAR RISK CALCULATOR

Use the HEARTS App to assess your cardiovascular risk

Scan code to access the cardiovascular risk calculator

This App does not replace clinical judgment.

## C TREATMENT PROTOCOL

START TREATMENT IMMEDIATELY AFTER CONFIRMING HYPERTENSION

Blood Pressure  $\geq 140/90$  mmHg in all **HYPERTENSIVES**.  
 Systolic Blood Pressure  $\geq 130$  mmHg in **HIGH-RISK HYPERTENSIVES**  
 (Established cardiovascular disease, Diabetes, Chronic Kidney Disease, Risk score  $\geq 10\%$ )

Cardiovascular risk	All Hypertensives	HIGH-RISK Hypertensives	
		WITH established cardiovascular disease	WITHOUT established cardiovascular disease
Blood Pressure <b>TARGET</b> $<140/90$ mmHg	✓		
Systolic Blood Pressure <b>TARGET</b> $<130$ mmHg		✓	✓
ASPIRIN 100 mg/daily		✓	
High-dose statins: ATORVASTATIN 40 mg/daily		✓	
Moderate-dose statins: ATORVASTATIN 20 mg/daily			✓

Avoid alcohol consumption

Body mass index between 18.5 and 24.9

Avoid foods high in sodium

- 1

**1 Tablet of Telmisartan/Amlodipine 40/5 mg**

1 MONTH
- 2

**Patient above target after repeat measurement**  
**1 Tablet of Telmisartan/Amlodipine 80/10 mg**

1 MONTH
- 3

**Patient above target after repeat measurement**  
**1 Tablet of Telmisartan/Amlodipine 80/10 mg**  
**+ ½ Tablet of Chlorthalidone 25 mg**

1 MONTH
- 4

**Patient above target after repeat measurement**  
**1 Tablet of Telmisartan/Amlodipine 80/10mg**  
**+ 1 Tablet of Chlorthalidone 25 mg**

1 MONTH

Patient above target:  
 Refer to the next level of care

Do 30 minutes of physical activity daily

Keep a healthy diet

No smoking

Patients under control	Minimum 6-MONTH follow-up	Minimum 3-MONTH follow-up	Supply medicines for 3 MONTHS	Vaccination		
				Influenza	Pneumococcus	COVID
All Hypertensives	✓		✓			✓
HIGH-RISK Hypertensives		✓	✓	✓	✓	✓



HEARTS

Proposal of Standard Clinical Pathway developed by the HEARTS in the Americas Team

\*The medications serve as examples and can be replaced with any two medications from any of the three drug classes (ACEis/ARBs, CCBs or thiazide/thiazide-like diuretics). Start with a single-pill combination (fixed-dose combination) or two individual pills if FDC is not available. Atorvastatin serve as an example and can be replaced for other statins.

ASSESS TREATMENT ADHERENCE AT EACH VISIT

TAKE ALL MEDICATIONS AT THE SAME TIME EVERY DAY

This protocol is NOT INDICATED in WOMEN of CHILDBEARING AGE

with statins in secondary prevention. Lastly, this clinical pathway includes a vaccination chart acknowledging the relevance that influenza, pneumococcus and COVID vaccines have as strategies for CVD prevention. So far, 28 countries in the Americas have adopted and adapted the HEARTS Clinical Pathway according to their own local resources and guidelines, while raising the standard of care with minimal variation between countries.<sup>8</sup>

Thus, PAHO continues to work with governments, health professionals, and communities in the Americas to redouble their efforts in the fight against hypertension and CVD. HEARTS in the Americas provides a proven and effective framework to strengthen primary care systems and improve cardiovascular health in the population. Even in developed countries, expanding this program is crucial to improve hypertension control, enhance CVD prevention in an integrative manner, and finally achieve the Sustainable Development Goal target of reducing premature mortality from NCDs by one-third by 2030.<sup>9</sup>

## References

1. Martinez R, Soliz P, Campbell NRC, Lackland DT, Whelton PK, Ordunez P. Association between population hypertension control and ischemic heart disease and stroke mortality in 36 countries of the Americas, 1990-2019: an ecological study. *Rev Panam Salud Publica*. 2022 Sep 16;46:e143. doi: 10.26633/RPSP.2022.143.
2. World Health Organization (September 19, 2023). Global report on hypertension: the race against a silent killer. Available at: <https://www.who.int/publications/item/9789240081062>
3. Ordunez P, Campbell NRC, DiPette DJ, Jaffe MG, Rosende A, Martinez R, et al. HEARTS in the Americas: Targeting Health System Change to Improve Population Hypertension Control. *Curr Hypertens Rep*. 2024 Apr;26(4):141-156. doi: 10.1007/s11906-023-01286-w.
4. Brettler JW, Arcila GPG, Aumala T, Best A, Campbell NR, Cyr S, et al. Drivers and scorecards to improve hypertension control in primary care practice: Recommendations from the HEARTS in the Americas Innovation Group. *Lancet Reg Health Am*. 2022 May;9:None. doi: 10.1016/j.lana.2022.100223.
5. Campbell NRC, Paccot Burnens M, Whelton PK, Angell SY, Jaffe MG, Cohn J, Espinosa Brito A, Irazola V, Brettler JW, Roccella EJ, Maldonado Figueredo JI, Rosende A, Ordunez P. 2021 World Health Organization guideline on pharmacological treatment of hypertension: Policy implications for the region of the Americas. *Lancet Reg Health Am*. 2022 May;9:None. doi: 10.1016/j.lana.2022.100219.
6. Rosende A, DiPette D, Brettler J, Rodríguez G, Zuniga E, Connell K, et al. HEARTS in the Americas appraisal checklist and clinical pathway for comprehensive hypertension management in primary care. *Rev Panam Salud Publica*. 2022;2(46):e125. <https://doi.org/10.26633/RPSP.2022.125>.
7. Ordunez P, Tajer C, Gaziano T, Rodriguez YA, Rosende A, Jaffe MG. The HEARTS app: a clinical tool for cardiovascular risk and hypertension management in primary health care. *Rev Panam Salud Publica*. 2022 Mar 28;46:e12. doi: 10.26633/RPSP.2022.12. PMID: 35355690; PMCID: PMC8959249.
8. Rosende A, DiPette DJ, Martinez R, Brettler JW, Rodriguez G, Zuniga E, et al. HEARTS in the Americas clinical pathway. Strengthening the decision support system to improve hypertension and cardiovascular disease risk management in primary care settings. *Front Cardiovasc Med*. 2023;10:1102482. <https://doi.org/10.3389/fcvm.2023.1102482>.
9. Campbell NRC, Ordunez P, Giraldo G, Rodriguez Morales YA, Lombardi C, Khan T, et al. WHO HEARTS: A Global Program to Reduce Cardiovascular Disease Burden: Experience Implementing in the Americas and Opportunities in Canada. *Can J Cardiol*. 2021 May;37(5):744-755. doi: 10.1016/j.cjca.2020.12.004.

Andres Rosende – [rosendeand@paho.org](mailto:rosendeand@paho.org)

Pedro Ordunez – [ordunezp@paho.org](mailto:ordunezp@paho.org)

Should this now say 'Platinum Corporate member'?

# Medtronic

**Symplicity™**  
blood pressure procedure

This is the  
turning point  
in hypertension care

## Now U.S. FDA approved!

**Take action** with the Symplicity blood pressure procedure

U.S. healthcare professionals

International healthcare professionals

# FROM THE NEWS DESK

## New ISH position paper published on latest technology in BP measurement

KAZUOMI KARIO

ISH Secretary, President of Japanese Society of Hypertension, Chairman, Division of Cardiovascular medicine, Department of Medicine, Jichi Medical University School of Medicine, Tochigi, Japan

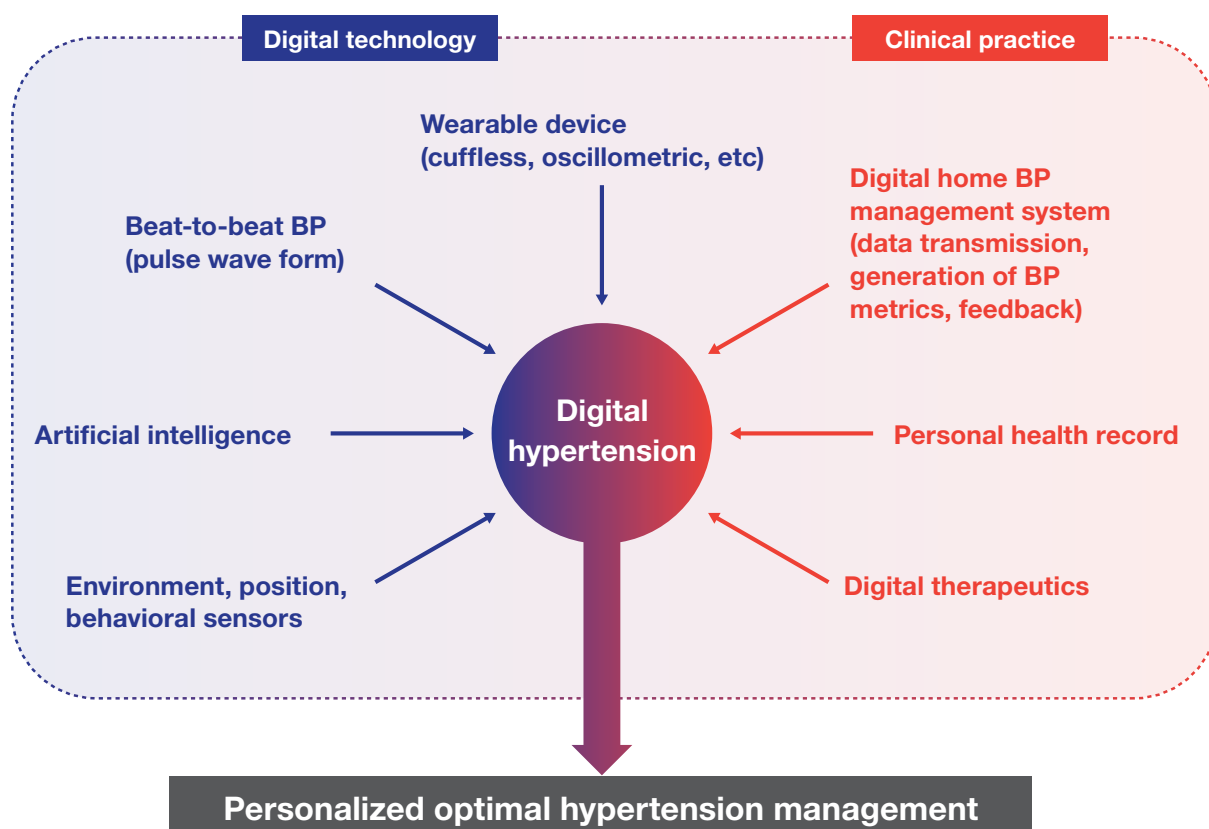


Blood pressure is a very important factor in maintaining our health. It is known that blood pressure fluctuates with each heartbeat due to various factors and is significantly related to the risk of organ damage and cardiovascular diseases. However, traditional blood pressure measurements in clinics are conducted in quiet environments, making it difficult to capture the variations in blood pressure that occur in our daily lives. Recent hypertension guidelines have

emphasized the importance of measuring blood pressure outside the office, taken by either home blood pressure monitoring or ambulatory blood pressure monitoring (ABPM) during daily activities.

As we advance into the digital era, there is an explosion of various biometric data in the healthcare and medical fields. In this context, digital technology is also undergoing innovation, and it is anticipated that hypertension treatment

**Figure 1.** Integration of new technology into clinical practices, resulting in the personalised optimal management of hypertension. BP, blood pressure.



will evolve from solely relying on measurements taken in the examination room to utilizing information about blood pressure fluctuations obtained from our daily lives.

Recently, research has been progressing using new digital technologies such as cuffless blood pressure monitoring, wearable health devices, digital therapeutics, and AI-driven telemedicine. Numerous academic papers have been published on these topics (Figure),<sup>1-5</sup> and I have a strong interest in this field and continue to conduct research. However, there is still no clear consensus on how useful these innovative technologies are and whether they can be reliably used in clinical practice.

In light of this situation, the International Society of Hypertension has compiled the "Innovations in Blood Pressure Measurement and Reporting Technology: International Society of Hypertension Position Paper."<sup>6</sup> This paper is supported by the World Hypertension League, the European Society of Hypertension, the Asian Pacific Society of Hypertension, and the Latin American Society of Hypertension. I believe this will help us understand the current status and limitations of cutting-edge digital hypertension research and care, as well as future prospects.

As outlined in the position paper, I feel that these innovations have the potential to revolutionize our blood pressure management. In particular, the ability to monitor blood pressure in real time and share that data with healthcare providers is expected to lead to better management and treatment. However, ease of use and accuracy are extremely important when implementing new technologies. I hope that as research continues and these challenges are overcome, we patients will be able to manage our blood pressure health based on reliable data, leading to "zero" cardiovascular events.

## References

1. Kario K. Management of Hypertension in the Digital Era: Small Wearable Monitoring Devices for Remote Blood Pressure Monitoring. *Hypertension*. 2020;76:640-650.
2. Stergiou GS, Mulkamala R, Avolio A, Kyriakoulis KG, Mieke S, Murray A, Parati G, Schutte AE, Sharman JE, Asmar R, McManus RJ, Asayama K, De La Sierra A, Head G, Kario K, Kollias A, Myers M, Niiranen T, Ohkubo T, Wang J, Wuerzner G, O'Brien E, Kreutz R, Palatini P; European Society of Hypertension Working Group on Blood Pressure Monitoring and Cardiovascular Variability. Cuffless blood pressure measuring devices: review and statement by the European Society of Hypertension Working Group on Blood Pressure Monitoring and Cardiovascular Variability. *J Hypertens*. 2022;40:1449-1460.
3. Kario K, Harada N, Okura A. Digital Therapeutics in Hypertension: Evidence and Perspectives. *Hypertension*. 2022;79:2148-2158.
4. Khan NA, Stergiou GS, Omboni S, Kario K, Renna N, Chapman N, McManus RJ, Williams B, Parati G, Konradi A, Islam SM, Itoh H, Mooi CS, Green BB, Cho MC, Tomaszewski M. Virtual management of hypertension: lessons from the COVID-19 pandemic-International Society of Hypertension position paper endorsed by the World Hypertension League and European Society of Hypertension. *J Hypertens*. 2022;40:1435-1448.
5. Kario K. Digital hypertension towards to the anticipation medicine. *Hypertens Re*. 2023;46:2503-2512.
6. Kario K, Williams B, Tomitani N, McManus RJ, Schutte AE, Avolio A, Shimbo D, Wang JG, Khan NA, Picone DS, Tan I, Charlton PH, Satoh M, Mmopi KN, Lopez-Lopez JP, Bothe TL, Bianchini E, Bhandari B, Lopez-Rivera J, Charchar FJ, Tomaszewski M, Stergiou G. Innovations in blood pressure measurement and reporting technology: International Society of Hypertension position paper endorsed by the World Hypertension League, European Society of Hypertension, Asian Pacific Society of Hypertension, and Latin American Society of Hypertension. *J Hypertens*. 2024;42:1874-1888.

Kazuomi Kario – [kkario@jichi.ac.jp](mailto:kkario@jichi.ac.jp)

# NEW PAPERS

## National Hypertension Taskforce of Australia: a roadmap to achieve 70% blood pressure control in Australia by 2030

### PROFESSOR ALTA SCHUTTE

Co-Chair National Hypertension Taskforce,  
Professor of Cardiovascular Medicine,  
University of New South Wales, Sydney.  
The George Institute for Global Health, Australia

### PROFESSOR MARKUS SCHLAICH

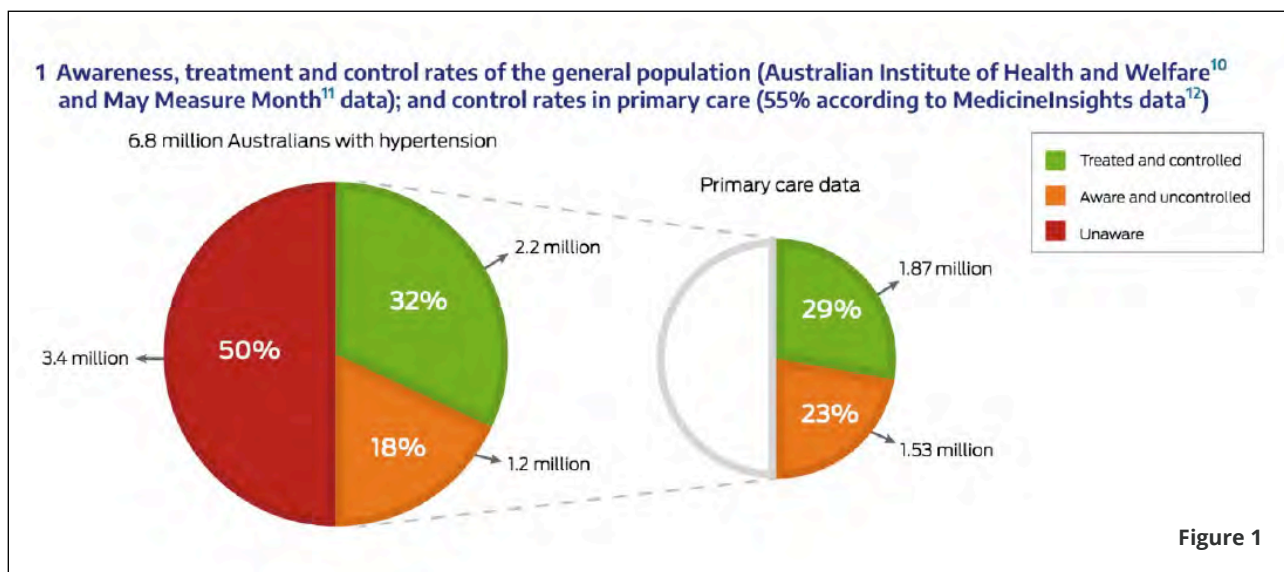
Co-Chair National Hypertension Taskforce,  
Professor, Dobney Chair in Clinical Research,  
University of Western Australia, Perth, Australia



In Australia, raised blood pressure is the leading risk factor for preventable deaths from stroke, heart disease, kidney disease, and dementia,<sup>1,2</sup> contributing to over 25,000 deaths annually.<sup>2-4</sup> What's most alarming is that only 32% of Australians with hypertension have their blood pressure controlled to below 140/90 mmHg (**Figure 1**). This puts us far behind other high-income countries like Canada, where control rates have reached 68%.<sup>5-7</sup>

To address this urgent issue, we published a Call to Action in the Medical Journal of Australia<sup>8</sup> in 2022, leading to the establishment

of the National Hypertension Taskforce ([www.hypertensiontaskforce.au](http://www.hypertensiontaskforce.au)), launched by the Hon Mark Butler MP, Minister for Health and Aged Care of Australia. The Taskforce was founded by the Australian Cardiovascular Alliance (ACvA) and Hypertension Australia, with significant support from the National Heart Foundation and the Stroke Foundation as co-founding organisations. To ensure wide-ranging impact and nationwide uptake it was essential for the Taskforce to include all relevant stakeholders. We therefore have representation from key organisations such as the Royal Australian College of General Practitioners (RACGP), Australian Primary Health Care Nurses



Association (APNA), the Pharmacy Guild of Australia, Pharmaceutical Society of Australia (PSA), Kidney Health Australia, Endocrine Society of Australia (ESA), Cardiac Society of Australia and New Zealand (CSANZ), Australian and New Zealand Stroke Organisation (ANZSO) and consumers.

The first major activity of the Taskforce was to bring together key stakeholders to identify priority areas to improve blood pressure control and to inform development of a national Roadmap. From the outset, our vision has been to unite the sector in addressing all of the contributing factors. The Roadmap,<sup>9</sup> published in 2024, is the result of numerous consultative workshops held with National Hypertension Taskforce members and other key stakeholders such as the NSW Office for Health and Medical Research, Australian Government Department of Health and Aged Care and NPS MedicineWise.

This Roadmap marks a significant milestone – a testament to collective efforts and a path forward towards our ambitious goal to increase the control rate from 32% to at least 70% by 2030. Achieving this target will make Australia a global leader in blood pressure management.

The Roadmap, published in the Medical Journal of Australia, is built on three pillars to (A) prevent; (B) detect; and (C) effectively treat raised blood pressure (**Figure 2**). For prevention, we're focusing on population-wide strategies to promote target blood pressure levels below 130/80 mmHg. This includes supporting initiatives from the National Preventive Health Strategy and developing economic tools to make healthy choices more affordable.

Detection is crucial, as about half of Australians with hypertension are unaware of their condition. We're advocating for systematic screening in general practices, with at least annual testing for all patients. We also want to expand community screening programs and raise public awareness about the importance of knowing and understanding your blood pressure numbers.

For effective treatment, we're adopting and tailoring the well-established World Health Organization's HEARTS technical package. This includes healthy lifestyle counselling, promoting

evidence-based treatment protocols, improving access to essential medicines and blood pressure devices, risk-based cardiovascular disease management, and advocating for implementation of team-based care approaches and systems for monitoring hypertension control nationally.

Embedded within the three pillars of prevention, detection and effectively treating raised blood pressure, we have identified ten key priority areas. One of these is developing simplified, one-page blood pressure treatment protocols for healthcare providers to help overcome clinical inertia and improve blood pressure control. We're also advocating for policy changes to allow single-pill combinations as first-line treatment, which can improve medication adherence and blood pressure control.

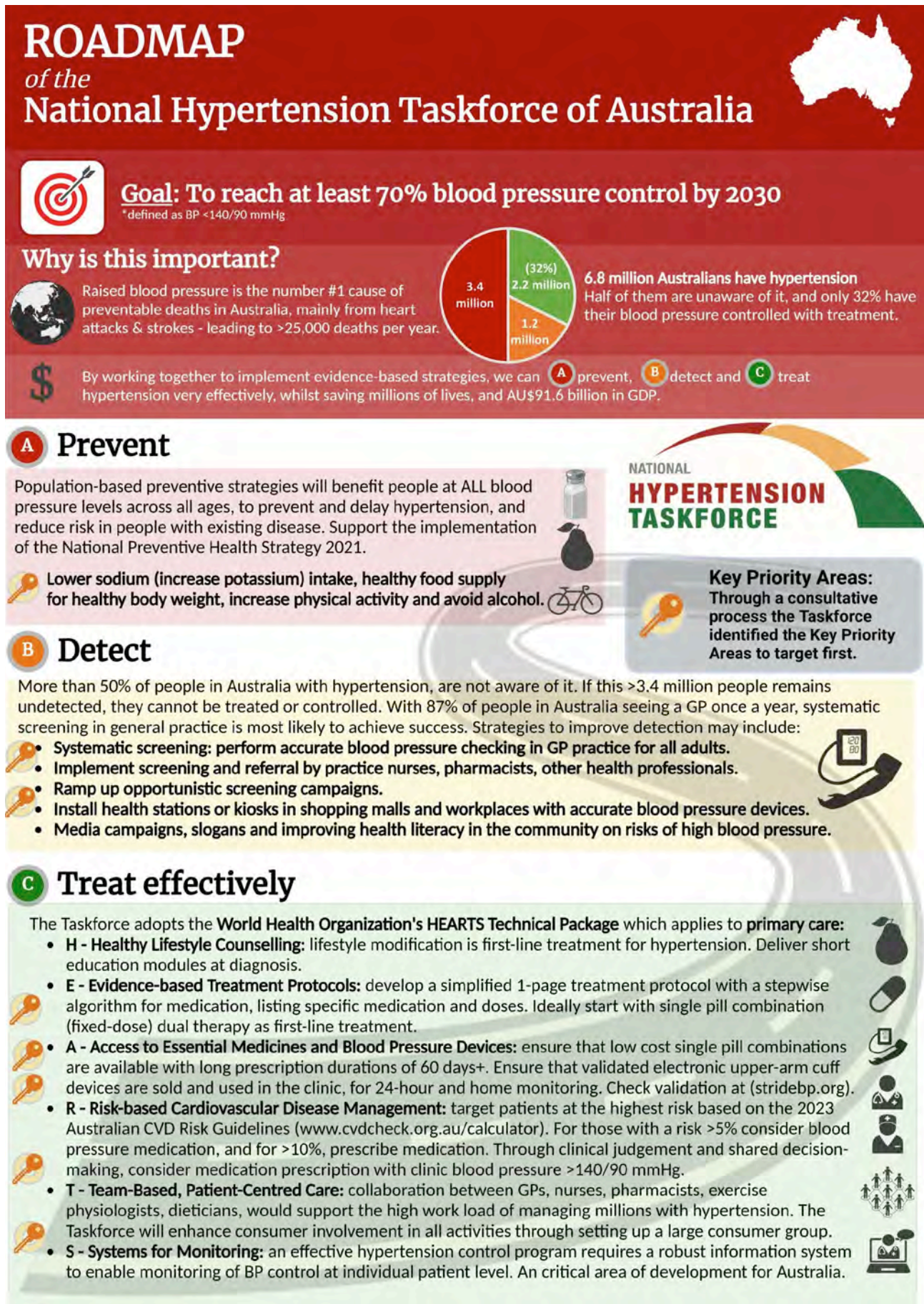
Annual and accurate blood pressure measurement is essential and will be the most likely route to successfully detect 90% of people with hypertension, so we're recommending the government incentivises systematic annual blood pressure checks in Primary Care settings. We're also developing protocols for standardised measurement and interpretation of blood pressure, including automated office blood pressure (AOBP) and home blood pressure measurement.

Team-based care is a cornerstone of our approach. We're recommending evaluation and implementation of effective models that coordinate care among general practitioners, pharmacists, nurses, and other health professionals. This increased capacity can lead to improved patient follow-up, medication management, and adherence support.

A major challenge we face is the lack of a comprehensive national blood pressure monitoring system. We need better data capture and availability of primary care data to track our progress and identify areas for improvement. We're advocating for a coordinated national effort, with government leadership, to address this gap.

Implementing this Roadmap will not be easy. We face substantial barriers at the community, patient, provider, and system levels. However, the potential benefits are enormous. If we can reduce

Figure 2





hypertension prevalence by 25% and effectively treat everyone with hypertension, we could save \$91.6 billion in gross domestic product over the working lifetime of the population.<sup>10</sup>

As we move forward, we're strongly committed to ongoing clinical and pre-clinical research and wide-ranging collaboration to design and implement actions that are feasible, acceptable, cost-effective, and scalable for the Australian setting.

In addition to empowering the community to take charge of their health, we will also establish a large consumer group of people with lived experience to co-design our prevention, detection, and treatment initiatives.

The ten priorities in listed in the Roadmap equip us with the tools necessary for improved blood pressure management in Australia. This isn't just about improving a statistic – it's about preventing thousands of deaths, reducing the burden of chronic conditions and disabilities, and improving the quality of life for millions of Australians.

As we implement this Roadmap, we'll be continually evaluating our progress and adapting our approach based on what we learn. We're calling on all stakeholders – healthcare providers, policymakers, researchers, and the public – to join us in this crucial effort.

We welcome any interest and collaboration, and acknowledge the contributions of Kayla Viney, the Executive Officer of the National Hypertension Taskforce of Australia and our national and international advisors (admin@hypertensiontaskforce.au).

Kayla Viney – admin@hypertensiontaskforce.au

## References:

1. Institute of Health Metrics and Evaluation. Disability adjusted life years attributable to raised systolic blood pressure, Australia. 2019. <https://vizhub.healthdata.org/gbd-results/> (viewed June 2024).
2. Xu X, Islam SMS, Schlaich M, Jennings G, Schutte AE. The contribution of raised blood pressure to all-cause and cardiovascular deaths and disability – adjusted life-years (DALYs) in Australia: analysis of global burden of disease study from 1990 to 2019. *PLoS One* 2024; 19: e0297229.
3. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet* 2020; 396: 1223-1249.
4. Institute of Health Metrics and Evaluation. Global burden of disease. Deaths by risk factor in Australia. IHME, 2019. <https://ourworldindata.org/grapher/number-of-deaths-by-risk-factor?country=-AUS> (viewed Apr 2024).
5. Schutte AE, Webster R, Jennings G, Schlaich MP. Uncontrolled blood pressure in Australia: a call to action. *Med J Aust* 2022; 216: 61-63. <https://www.mja.com.au/journal/2022/216/2/uncontrolled-blood-pressure-australia-call-action>
6. NCD Risk Factor Collaboration. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. *Lancet* 2021; 398: 957-980.
7. World Health Organization. Global report on hypertension: the race against a silent killer. 2023. ISBN 978-92-4-008106-2. <https://www.who.int/publications/i/item/9789240081062> (viewed Apr 2024).
8. Schutte AE, Webster R, Jennings G, Schlaich MP. Uncontrolled blood pressure in Australia: a call to action. *Med J Aust* 2022; 216: 61-63. <https://www.mja.com.au/journal/2022/216/2/uncontrolled-blood-pressure-australia-call-action>
9. Schutte, A.E., Bennett, B., Chow, C.K., Cloud, G.C., Doyle, K., Girdis, Z., Golledge, J., Goodman, A., Hespe, C.M., Hsu, M.P., James, S., Jennings, G., Khan, T., Lee, A., Murphy, L., Nelson, M.R., Nicholls, S.J., Raffoul, N., Robson, B., Rodgers, A., Sanders, A., Shang, C., Sharman, J.E., Stocks, N.P., Usherwood, T., Webster, R., Yang, J. and Schlaich, M. (2024), National Hypertension Taskforce of Australia: a roadmap to achieve 70% blood pressure control in Australia by 2030. *Med J Aust*, 221: 126-134. <https://doi.org/10.5694/mja2.52373>
10. Hird TR, Zomer E, Owen AJ, et al. Productivity burden of hypertension in Australia. *Hypertension* 2019; 73: 777-784.

# NEW PAPERS

## War-induced stress and arterial hypertension: a prospective study among Ukrainian refugee women

SHALIMOVA A.<sup>1</sup>, STOENOIU M.S.<sup>2</sup>,  
CUBAŁA W.J.<sup>1</sup>, BURNIER M.<sup>1,3</sup>, PERSU A.<sup>2</sup>,  
NARKIEWICZ K.<sup>1</sup>

1 Medical University of Gdańsk, Gdańsk, Poland;  
2 Université catholique de Louvain, Brussels, Belgium;  
3 University of Lausanne, Lausanne, Switzerland

Growing evidence supports the impact of psychological factors such as traumatic lifetime experiences that may result in Post-Traumatic Stress Disorder (PTSD) on the incidence of arterial hypertension (AH) and cardiovascular diseases (CVD). The war in Ukraine is exposing a million inhabitants to traumatic stressors. Millions of Ukrainians (mostly women and children) left the country to escape war. The prevalence of PTSD in refugees is extremely high, usually in the range of 20-40%<sup>1</sup> compared to an estimate lifetime prevalence of PTSD ~6% in the US population.<sup>2</sup>

As stated by the World Health Organization (WHO), “one in five (22%) people, who have experienced war or other conflict in the previous 10 years, will have depression, anxiety, post-traumatic stress disorder.” In applying these estimates to Ukraine, WHO expects that approximately 9.6 million people in Ukraine will develop a mental health condition. If unaddressed, this latter will contribute to a high burden of chronic diseases in the next decades, particularly cardiovascular diseases and hypertension.<sup>3</sup>

However, to our knowledge, the association between hypertension and PTSD has not been investigated in refugees, particularly among women.

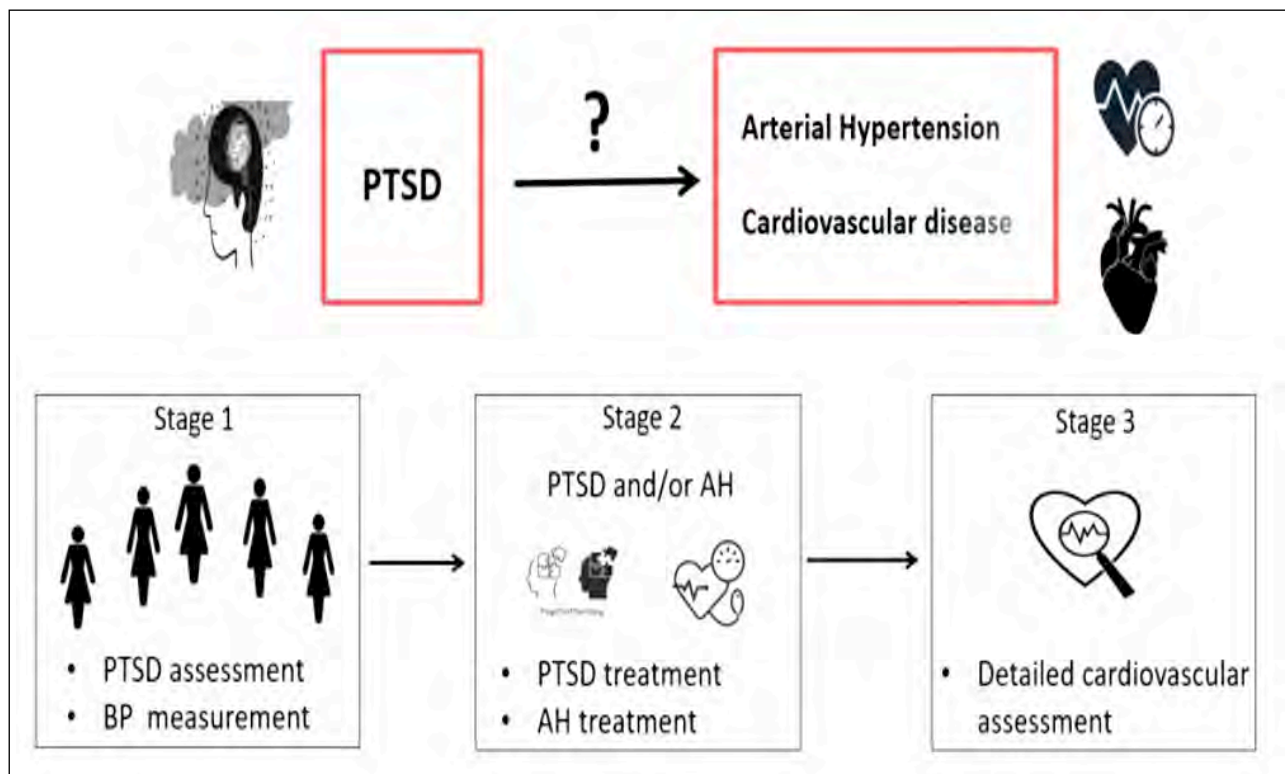
We are conducting a scientific project named: “The impact of war-induced stress on the development and progression of arterial hypertension and



cardiovascular disease in Ukrainian female refugees” in the Clinic of Hypertension and Diabetology of the Medical University of Gdansk (Poland). The project (No 2022/45/P/NZ5/02812) is co-funded by the National Science Centre and the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement (No 945339).<sup>4</sup>

In this study we test the hypothesis that trauma and psychological stress exposure contribute to BP elevation and progression of CVD in female refugees and that cardiovascular complications could be prevented by the early management of these women. Results will provide new evidence on the effect of integrated management, including psychological therapy, on BP and cardiovascular risk. Such an approach may be further tested and

**Figure 1.** Hypothesis and stages of the study



extrapolated to other populations exposed to war and chronic violence, migrants and refugees around the world. Overall, about 500 Ukrainian women will be enrolled in the study in Poland and compared to women who stayed in Ukraine.

Our study consists of 3 stages:

- At Stage 1, we assess the prevalence of AH and PTSD among Ukrainian refugees and estimate the impact of war-related trauma exposure on these parameters. Data on BP will be compared to data already collected in STEPS data 2019 and May Measurement Month 2021 in Ukraine, matched for age and sex.
- Stage 2 will involve subjects diagnosed with HTN and/or PTSD referred for management and follow-up of these conditions. Psychologic targeted therapies will be offered to subjects with confirmed PTSD, with a periodical reassessment of the severity of PTSD-associated symptoms and of its impact on HTN and cardiovascular health. Clinical history and characteristics will be compared among three groups: subjects with HTN and PTSD, with HTN without PTSD, with PTSD but without HTN.

- Stage 3 will involve a subgroup among those screened in Stage 1, with the objective of investigating the biological mechanisms underlying the relation between HTN and trauma exposure, identifying early signs of subclinical target organ damage in subjects with HTN with/without PTSD.

Detailed information about our study “The impact of war on the development and progression of arterial hypertension and cardiovascular disease: protocol of a prospective study among Ukrainian female refugees” was published in *Frontiers in Cardiovascular Medicine*.<sup>5</sup>

The first results of our project were published in the October issue of *Hypertension*. In our research letter entitled “Association of high blood pressure with post-traumatic stress disorder in Ukrainian female refugees”, we have presented the data of the first-year-war refugees enrolled in our project.<sup>6</sup> Among 55 refugees, 30 women were hypertensive and 25 women were normotensive. Hypertensive and normotensive patients did not differ in terms of level of education, socio-economic conditions, social support, area of origin, or direct exposure to war. However, a significant difference was noted in the prevalence and severity of PTSD, as well as in the emotional safety in the study groups.

The multivariate logistic regression performed to ascertain the effects of PTSD, age, and obesity on the likelihood of hypertension was statistically significant ( $p < 0.0001$ ).<sup>6</sup>

In this analysis of 55 Ukrainian female refugees in Poland, the main findings were the following:

- the prevalence of PTSD in refugees (22%) was 7-fold higher than in Ukrainian women before the war (3%)<sup>7</sup> but in the expected range compared to that documented in exiles and refugees from other countries<sup>8</sup>
- PTSD composite scores were much higher and PTSD diagnosis was 9-fold more frequent in hypertensive than in normotensive women, in parallel with a persistent lower sense of safety.

We assume that the higher feeling of persistent unsafety and increased prevalence of PTSD despite similar exposure to war-related trauma may result from differences in emotion coping mechanisms.

Our assumptions will be clarified after analysing the results of a detailed cardiovascular assessment, re-evaluation of stress questionnaires and psychiatric consultation. By collaborating with research centers from three regions of Ukraine with different levels of military actions (Kharkiv, Kyiv and Ivano-Frankivsk), we plan to organize a prospective assessment of the state of the cardiovascular system and the severity of PTSD in women who remained on the territory of Poland since the beginning of the war compared with Ukrainian women who remained on the territory of Ukraine.

By implementing our project, we have a mission to draw the attention of the wider scientific community, stakeholders and patients to the human, psychological and social aspects of the war-induced stress problem that requires a complex solution. This will ensure that significant progress is made and that data and tools from this initiative will be made available to other disease areas.

This study also provokes hypothesis on the combined impact of bio-psycho-social factors on the long-term general health with modifiable mental health factors impacting cardiovascular morbidity.

## References

1. Blackmore R, Boyle JA, Fazel M, Ranasinha S, Gray KM, Fitzgerald G, Misso M, Gibson-Helm M. The prevalence of mental illness in refugees and asylum seekers: A systematic review and meta-analysis. <https://doi.org/10.1371/journal.pmed.1003337>.
2. Stewart IJ, Sosnov JA, Howard JT, Orman JA, Fang R, Morrow BD, Zonies DH, Bollinger M, Tuman C, Freedman BA, Chung KK. Retrospective analysis of long-term outcomes after combat injury: a hidden cost of war. *Circulation*. 2015;132:2126–2133. doi: 10.1161/CIRCULATIONAHA.115.016950.
3. WHO: Scaling-up mental health and psychosocial services in war-affected regions: best practices from Ukraine: World Health Organization; 2022 [updated 16.12.2022. Available from: <https://www.who.int/news-room/feature-stories/detail/scaling-up-mental-health-and-psychosocial-services-in-war-affected-regions--best-practices-from-ukraine>.
4. <https://warscar.mug.edu.pl/>
5. Shalimova A, Stoenoiu MS, Cubała WJ, Burnier M, Persu A, Narkiewicz K. The impact of war on the development and progression of arterial hypertension and cardiovascular disease: protocol of a prospective study among Ukrainian female refugees. *Frontiers in Cardiovascular Medicine*. 2024;10.
6. Shalimova A, Stoenoiu MS, Manolache N-G, Cubała WJ, Burnier M, Narkiewicz K., Persu A. Association of High Blood Pressure With Post-Traumatic Stress Disorder in Ukrainian Women Refugees. *Hypertension*. Vol. 81, N 10, October 2024; P. e128-e131.
7. WHO: Ukraine Hypertension Fact Sheet, 2019 [Available from: [https://cdn.who.int/media/docs/default-source/country-profiles/hypertension/ukr\\_en.pdf?](https://cdn.who.int/media/docs/default-source/country-profiles/hypertension/ukr_en.pdf?)
8. Blackmore R, Gray KM, Boyle JA, Fazel M, Ranasinha S, Fitzgerald G, et al. Systematic Review and Meta-analysis: The Prevalence of Mental Illness in Child and Adolescent Refugees and Asylum Seekers. *J Am Acad Child Adolesc Psychiatry*. 2020;59(6):705-14.

Anna Shalimova – [anna.shalimova83@gmail.com](mailto:anna.shalimova83@gmail.com)

# NEW PAPERS

## The association between hypertension and Alzheimer's disease

MATT LENNON

Conjoint Lecturer at the Center for Healthy Brain Ageing, University of New South Wales, Australia



Hypertension affects an estimated 1.3 billion persons worldwide<sup>1</sup> and is the leading cause of strokes and cerebrovascular disease<sup>2</sup>. There is good evidence that it increases risk of vascular dementia (VaD)<sup>3</sup> and now emerging evidence is strongly indicating that hypertension is also an important risk factor both in mid- and late-life for Alzheimer's dementia, which makes up around 70% of all dementia cases. The lack of current effective treatment makes the targeting of modifiable risk factors such as hypertension all the more important. The 2024 Lancet Commission on Dementia highlighted that approximately 40% of dementia cases were potentially modifiable, through the targeting of these risk factors.

### Research Connecting Hypertension and Dementia

Our recent research has begun to uncover the critical relationship between high blood pressure and dementia. In a 2019 meta-analysis, our team found a clear link between mid-life hypertension and Alzheimer's disease (AD), with stage 1 hypertension (systolic blood pressure [SBP] >140 mmHg) associated with an 18% increased risk of AD, and stage 2 hypertension (>160 mmHg) linked to a 25% increased risk<sup>4</sup>. In 2020, another meta-analysis confirmed that mid-life hypertension increased the risk of all-cause dementia by 19% to 55%<sup>5</sup>.

However, the relationship between late-life hypertension and dementia remains more complex. Longitudinal studies on older adults have shown mixed results, with some suggesting a neutral or even protective effect of high blood

pressure in later years. This disparity highlights the importance of understanding how treatment status affects dementia risk.

### New evidence on Untreated versus Treated Hypertension

Our recent research (2023–2024)<sup>6,7</sup> has provided clearer answers regarding hypertension's role in dementia. In two individual-participant data (IPD) meta-analyses, involving 34,519 participants aged 60 and over from 15 countries, our team found that untreated hypertension was associated with a significantly increased risk of both dementia (+42%) and Alzheimer's disease (+36%) compared to individuals without a history of hypertension. However, individuals who had their hypertension treated exhibited no elevated risk for dementia or AD. In fact, those treated for hypertension had a substantially lower risk of dementia (–26%) and AD (–42%) compared to untreated individuals. These findings held true across different age groups, including those in their 70s and 80s, underscoring the importance of blood pressure management even in older populations.

Interestingly, the study also included underrepresented populations from countries like Nigeria and the Republic of Congo. The results showed no significant moderating effects based on race or sex, suggesting that effective blood pressure treatment could be equally beneficial across diverse populations.

While the studies were observational and subject to confounding factors, the results are consistent with findings from clinical trials, including a 2022

meta-analysis of five randomized controlled trials, which found that antihypertensive treatment reduced dementia risk by 13%<sup>8</sup>. These findings also align with the 2024 Lancet Commission report, which highlighted that untreated hypertension increases dementia risk by 20%<sup>9</sup>.

## The Path Forward

Despite its high prevalence, hypertension remains underappreciated as a risk factor for dementia. Traditionally, high blood pressure has been primarily associated with heart disease and stroke, with limited public awareness of its connection to cognitive decline. This lack of awareness is one of the key challenges in improving hypertension diagnosis and treatment, particularly as hypertension is often considered a "normal" part of aging, especially in the elderly.

In a [recent survey](#) of Australians attending an outpatient clinic, dementia was the second most feared disease, having been listed as the primary worry for 29.3% of respondents, compared to only 7.3% and 3.7% who replied with "coronary heart disease" and "cerebrovascular disease" respectively. We anticipate that this greater concern for dementia diagnosis compared to heart disease or kidney impairment is similar around the globe. The growing evidence base connecting high blood pressure and dementia will change the way that patients see blood pressure and may modify the way they think about risk of non-detection and non-compliance with treatment.

As of 2022, nearly 50% of people with hypertension in Australia are undiagnosed, while a further 18% have their condition under control but inadequately treated. Among those over 65 years old, the rates are even more alarming: 34% have been diagnosed with hypertension, but 39% have poorly controlled blood pressure. Alarming, the rates of high blood pressure in the community have worsened, rising from 21.5% in 2011–12 to 23.3% in 2022. Improving public understanding of the relationship between hypertension and dementia will be a crucial step in addressing the burgeoning public health crisis of aging and cognitive decline.

## References

1. World Health Organization (WHO). Global Report on Hypertension. 2023.
2. Murray CJL, Aravkin AY, Zheng P, et al. Global burden of 87 risk factors in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet* [online serial]. Elsevier; 2020;396:1223–1249. Accessed at: [https://doi.org/10.1016/S0140-6736\(20\)30752-2](https://doi.org/10.1016/S0140-6736(20)30752-2).
3. Emdin CA, Rothwell PM, Salimi-Khorshidi G, et al. Blood Pressure and Risk of Vascular Dementia: Evidence From a Primary Care Registry and a Cohort Study of Transient Ischemic Attack and Stroke. *Stroke*. United States; 2016;47:1429–1435.
4. Lennon MJ, Makkar SR, Crawford JD, Sachdev PS. Midlife Hypertension and Alzheimer's Disease: A Systematic Review and Meta-Analysis. *J Alzheimers Dis*. Netherlands; 2019;71:307–316.
5. Ou Y-N, Tan C-C, Shen X-N, et al. Blood Pressure and Risks of Cognitive Impairment and Dementia. *Hypertension* [online serial]. American Heart Association; 2020;76:217–225. Accessed at: <https://doi.org/10.1161/HYPERTENSIONAHA.120.14993>.
6. Lennon MJ, Lam BCP, Lipnicki DM, et al. Use of Antihypertensives, Blood Pressure, and Estimated Risk of Dementia in Late Life: An Individual Participant Data Meta-Analysis. *JAMA Netw Open* [online serial]. 2023;6:e2333353–e2333353. Accessed at: <https://doi.org/10.1001/jamanetworkopen.2023.33353>.
7. Lennon MJ, Lipnicki DM, Lam BCP, et al. Blood Pressure, Antihypertensive Use, and Late-Life Alzheimer and Non-Alzheimer Dementia Risk: An Individual Participant Data Meta-Analysis. *Neurology*. United States; 2024;103:e209715.
8. Peters R, Xu Y, Fitzgerald O, et al. Blood pressure lowering and prevention of dementia: an individual patient data meta-analysis. *Eur Heart J*. Epub 2022.:1–11.
9. Livingston G, Huntley J, Liu KY, et al. Dementia prevention, intervention, and care: 2024 report of the *Lancet* standing Commission. *Lancet* [online serial]. Elsevier; 2024;404:572–628. Accessed at: [https://doi.org/10.1016/S0140-6736\(24\)01296-0](https://doi.org/10.1016/S0140-6736(24)01296-0).

# NEW PAPERS

## Ethnic differences in knowledge, attitudes, and practices related to dietary salt intake and association with hypertension in Malaysia: a multi-center cross-sectional study



YOOK-CHIN CHIA

Founding President of MyWASSH,  
Department of Medical Sciences, Sunway University, Malaysia

My country Malaysia is a relatively small country in Asia. We have a multi-ethnic population of 3 races namely Malay who make up 70% of the total population of approximately 33 million, Chinese around 20% and Indians 9% and other smaller ethnic minorities in the states of Sabah and Sarawak in East Malaysia.

We are very fortunate in many ways, with economic, social and political stability but on the flip side we have a high prevalence of cardiovascular disease (CVD) risk factors and CVD mortality. What has been noted is that there are differences in the CV risk factors between the ethnic groups where hypertension seems to be higher for example in Malays (32.2%) than the Indians (30.6%) and Chinese 28.1%.<sup>1</sup> Similarly prevalence of hypercholesterolaemia is highest in the Malays (43.5%) while diabetes is highest in the Indians (18.5%) versus Chinese of 8.5%.

While genetic factors play a role in the different prevalences seen, social-economic, cultural and behavioural factors may also contribute to these differences between the ethnic groups.

A group of us founded an NGO called MyWASSH (Malaysian Society for World Action on Salt, Sugar and Health) in Nov 2021 with the aim to provide education on reduction of salt intake to help reduce the prevalence of hypertension in Malaysia. This was something we wanted to do to support WHO's nine targets announced in 2013 to reduce NCDs, one of which was to reduce prevalence of

hypertension by 25% and another was reduction of population salt intake by 30%. Both prevalence of hypertension and salt intake are high in Malaysia (30% and 7.9 gm per day respectively).

We felt that any educational materials we develop or use to encourage reduction in salt intake will have to be culturally sensitive, given the very different and varied cuisine, food choices, eating and cooking styles of the three ethnic groups. Hence, we wanted to examine and identify differences, if any, of the knowledge, attitude and practice of the three ethnic groups towards salt intake.

We surveyed 5128 adults as part of a blood pressure screening campaign. The 3 races were well represented and women formed more than half (59.6%) of the participants. Having enough women in the survey is important, as often women are the ones who usually make the food choices in shopping as well as being responsible for the cooking of meals at home. Furthermore, we also had more than half (56.7%) being under 40 years old, again an important target group for educational intervention as they eat out more often, and being parents of younger children, perhaps may be more receptive to making changes to ensure better health for their children.

Our results showed that overall, knowledge that eating too much salt causes hypertension was good but it was not good about eating too much salt causing stroke or heart failure, and

there was no difference between the races. A question we asked, which we believe has never been asked in any other studies about knowledge, attitudes and practices (KAP) about salt intake, was prompted from our observations and discussions with patients with hypertension. Many patients believed that drinking more water can neutralise the detrimental effects of a high salt intake. And when asked this question in the survey, nearly two-thirds believed that this was the case and there was a difference between the ethnic groups. What this tells us is that in any educational materials, we need to explicitly state this wrong belief.

Another question we asked was whether participants know the difference between sodium and salt and here only a third said they knew, and again differences were seen between the races with more Indians knowing the difference than Malay and Chinese. This to us is another important piece of information we need to know. Labelling of salt contents on manufactured food has been as sodium but recently we noticed that in the UK, they have changed the labelling to salt and no longer using sodium. I personally believe it should be salt as when we inform the public about the optimal amount to take, we often express it as 5 grams of salt per day and not 2 grams of sodium. Salt to me would be more suitable for the public as we often refer to the 5 grams of salt as a teaspoon of salt and this is easier for the public to visualise. While I acknowledge that salt/sodium chloride is not the only source of sodium we eat, 90% of the sodium we eat is in the form of sodium chloride (salt). I also think that countries should give more thought to the way we label sodium on manufactured foods and come to an agreement about the common term to use, as many countries manufacture and export food to each other. Having different terms for labels will cause confusion to the public.

We found a very positive attitude towards reducing salt intake among the participants where nearly 80% said that it was important or very important to do so. Each of the ethnic groups also had nearly the same positive attitude.

However, when it came to practice it was much poorer. Only about a third read salt labels, with Indians doing better at this. When asked for the amount of sodium/salt they were consuming, more than half said it was the right amount when in reality the mean intake in the country is high. More Chinese compared to the other 2 ethnic groups felt they were eating too much salt.

In many ways it is not surprising that the good knowledge and positive attitude is not translated into practice. There are of course many reasons for that, one of which for example is that currently many manufactured foods in Malaysia do not have sodium label and hence the practice is not to read sodium labels. Malaysia this year has made it compulsory for all manufactured foods to have salt labels and we will now have to do more education on the reading of salt labels.

Overall, our survey showed that Indians generally had relatively high KAP with regard to salt intake relative to the other two major ethnic groups.

We also found that individuals with diagnosed hypertension generally exhibited better knowledge of the health impacts of a high salt diet and understood the importance of lowering salt in their diet.<sup>2</sup>

To conclude, we still have a lot of work to do to reduce salt intake in Malaysia. There is currently a positive will particularly in the Ministry of Health to work faster towards reducing salt intake in the nation by 30%. All stakeholders will need to get on the bandwagon if we are to achieve this goal.

## References

1. National Health and Morbidity Survey Malaysia Technical Report on Non-communicable diseases Volume 1. Ministry of Health Malaysia. 2019;[http://iku.moh.gov.my/images/IKU/Document/REPORT/NHMS2019/Report\\_NHMS2019-NCD\\_v2.pdf](http://iku.moh.gov.my/images/IKU/Document/REPORT/NHMS2019/Report_NHMS2019-NCD_v2.pdf).
2. Chia YC, Ching SM, Chew MT, Devaraj NK, Ooi JEK, Lim HM, et al. Ethnic differences in knowledge, attitudes, and practices related to dietary salt intake and association with hypertension in Malaysia: a multi-centre cross-sectional study. Hypertension Research. 2024.

Yook-Chin Chia – [ycchia@sunway.edu.my](mailto:ycchia@sunway.edu.my)



# NEW PAPERS

## Antihypertensive treatment improves target organ damage in patients with masked hypertension

YAN LI AND JI-GUANG WANG

Department of Cardiovascular Medicine,  
Shanghai Institute of Hypertension,  
Shanghai Jiaotong University School of Medicine,  
Shanghai, China



Masked hypertension is a special subtype of hypertension characterized by a normal office blood pressure (BP) but elevated out-of-office BP. Its prevalence varies from around 10-15% in the general populations up to 30-40% in patients with diabetes mellitus or chronic kidney diseases.<sup>1</sup> Plenty of studies have demonstrated that masked hypertension, irrespective of its subtype, was associated with target organ damage and increased risk of cardiovascular mortality and morbidity.<sup>2,3</sup> Therefore, current hypertension guidelines recommend an active strategy of intervention in masked hypertension. For untreated patients with masked hypertension, early and active improvement of lifestyle and the initiation of antihypertensive drug treatment are proposed. For treated patients with masked uncontrolled hypertension, antihypertensive treatment should be intensified. However, all these recommendations largely rely on previously-published observational studies and expert wisdom without direct evidence from clinical trials.

The antihypertensive treatment for target organ protection in patients with masked hypertension (ANTI-MASK trial, NCT02893358) is a multicentre, double-blind, placebo-controlled trial.<sup>4</sup> Untreated outpatients aged 30-70 years with an office BP of <140/<90 mm Hg and 24-hour, daytime or nighttime ambulatory BP of  $\geq 130/\geq 80$ ,  $\geq 135/\geq 85$ , or  $\geq 120/\geq 70$  mm Hg, respectively, were enrolled in 15 Chinese hospitals from February, 2017 to October, 2020. Patients had at least 1 sign

of target organ damage (TOD), including electrocardiographic left ventricular hypertrophy (LVH), arterial stiffness defined as an elevated brachial-ankle pulse wave velocity (baPWV)  $\geq 1400$  cm/s, or microalbuminuria defined as a urinary albumin-to-creatinine ratio (ACR)  $\geq 3.5$  mg/mmol in women and  $\geq 2.5$  mg/mmol in men. After stratification for centre, sex and the presence of nighttime hypertension, eligible patients were randomly assigned (1:1) to active antihypertensive treatment or placebo. The active antihypertensive treatment started with allisartan 80 mg daily, titrated to allisartan 160 mg daily at month 2, and combined with amlodipine 2.5 mg per day at month 4, if ambulatory BP had not been controlled. Matching placebos were used likewise in the control group. The primary outcome was the improvement of TOD, defined as the normalisation of baPWV, urinary ACR or LVH below the thresholds or a  $\geq 20\%$  reduction in baPWV or urinary ACR over the 1-year follow-up.

Among the 320 randomized patients (43% women; mean age 54 years) in the ANTI-MASK trial, 7.8%, 12.5% and 97.5% had LVH, microalbuminuria or arterial stiffness at baseline, respectively. The office, 24-hour, daytime, and nighttime BPs averaged 130/81, 136/84, 140/87, and 126/78 mm Hg, respectively. In the intention-to-treat analysis, the TOD improvement was observed in more ( $P < 0.0001$ ) patients on active antihypertensive treatment (79 patients [51.6%, 95% CI 43.7% to 59.5%]) than those on placebo (49 [29.3%, 95% CI 22.1% to 36.5%]). The office, 24-hour, daytime and

nighttime BPs decreased on average by 8.8/4.2, 10.1/6.4, 10.2/6.4, and 9.4/6.1 mm Hg, respectively, in 153 patients on active treatment and by 0.3/1.2, 1.3/1.0, 1.4/1.2, and 0.9/0.9 mm Hg, respectively, in 167 patients on placebo. Per-protocol and subgroup analyses produced confirmatory results. Adverse events were generally mild and occurred in a similar incidence rate between the two groups. In conclusion, antihypertensive treatment improved TOD and reduced office and ambulatory blood pressure in patients with masked hypertension. Our study provided supportive evidence to the guidelines in the active antihypertensive treatment of masked hypertension, albeit long-term benefit of treatment in the prevention of cardiovascular complications still needs to be established.

Yan Li – [liyanshcn@163.com](mailto:liyanshcn@163.com)

## References

- 1 Huang QF, Yang WY, Asayama K, Zhang ZY, Thijs L, Li Y, O'Brien E, Staessen JA. Ambulatory blood pressure monitoring to diagnose and manage hypertension. *Hypertension*. 2021;77:254-264.
- 2 Stergiou GS, Kyriakoulis KG, McManus RJ, Andreadis EA, Jula A, Kollias A, Lindroos A, Ntineri A, Schwartz C, Niiranen TJ. Phenotypes of masked hypertension: Isolated ambulatory, isolated home and dual masked hypertension. *J Hypertens*. 2020;38:218-223.
- 3 Zhang DY, Guo QH, An DW, Li Y, Wang JG. A comparative meta-analysis of prospective observational studies on masked hypertension and masked uncontrolled hypertension defined by ambulatory and home blood pressure. *J Hypertens*. 2019;37:1775-1785.
- 4 Huang JF, Zhang DY, An DW, Li MX, Liu CY, Feng YQ, Zheng QD, Chen X, Staessen JA, Wang JG, Li Y; ANTI-MASK Investigators. Efficacy of antihypertensive treatment for target organ protection in patients with masked hypertension (ANTI-MASK): a multicentre, double-blind, placebo-controlled trial. *EClinicalMedicine*. 2024;74:102736.

# Interested in writing for Hypertension News?



We are particularly interested in proposals about recent studies in hypertension, or perspectives on current issues in hypertension.

Contact us with your proposal: [comms@ish-world.com](mailto:comms@ish-world.com)



Photo 145667887 © Golubovy | Dreamstime.com

# PERSPECTIVES IN HYPERTENSION

## The incidence of new-onset hypertension and new-onset Type 2 diabetes during or after SARS-CoV-2 infection

ABHINAV GUPTA

Professor Department of Internal Medicine,  
Acharya Shri Chander College of Medical Sciences and Hospital, Jammu, India.



This review explores the intricate connection between COVID-19 and the emergence of new-onset hypertension and type 2 diabetes (T2D). The COVID-19 pandemic has had a sweeping impact on global health, introducing not only immediate clinical challenges but also long-term health risks that remain incompletely understood.<sup>1</sup> While initially recognized for its respiratory complications, SARS-CoV-2 has since been linked to a broad range of systemic issues, including cardiovascular and metabolic disorders.

Mounting evidence suggests that COVID-19 may lead to or reveal new-onset hypertension and T2D, both during the acute infection phase and in the post-COVID-19 period. Understanding these implications is essential, as they could guide clinical management strategies and enhance patient outcomes.

To systematically investigate this relationship, a comprehensive literature search was conducted using trusted databases like PubMed/MEDLINE and Google Scholar. By focusing on keywords such as acute COVID-19, post-COVID-19, new-onset hypertension, and new-onset T2D in adults over 18, data was gathered from studies conducted between December 2019 and August 2022. This literature review synthesizes findings on the prevalence, risk factors, and underlying mechanisms connecting COVID-19 to these new-onset conditions.

### Incidence of New-Onset Hypertension

Numerous studies highlight the incidence of new-onset hypertension among COVID-19 patients. The

review includes key findings, such as a retrospective cohort study by Chen et al., which found that 61% of COVID-19 patients experienced significant blood pressure increases during hospitalization. The research points to elevated angiotensin-II levels as a potential factor in this rise, as SARS-CoV-2 interacts with angiotensin-converting enzyme 2 (ACE2), leading to an imbalance in the renin-angiotensin system (RAS).<sup>2</sup> (Fig 1)

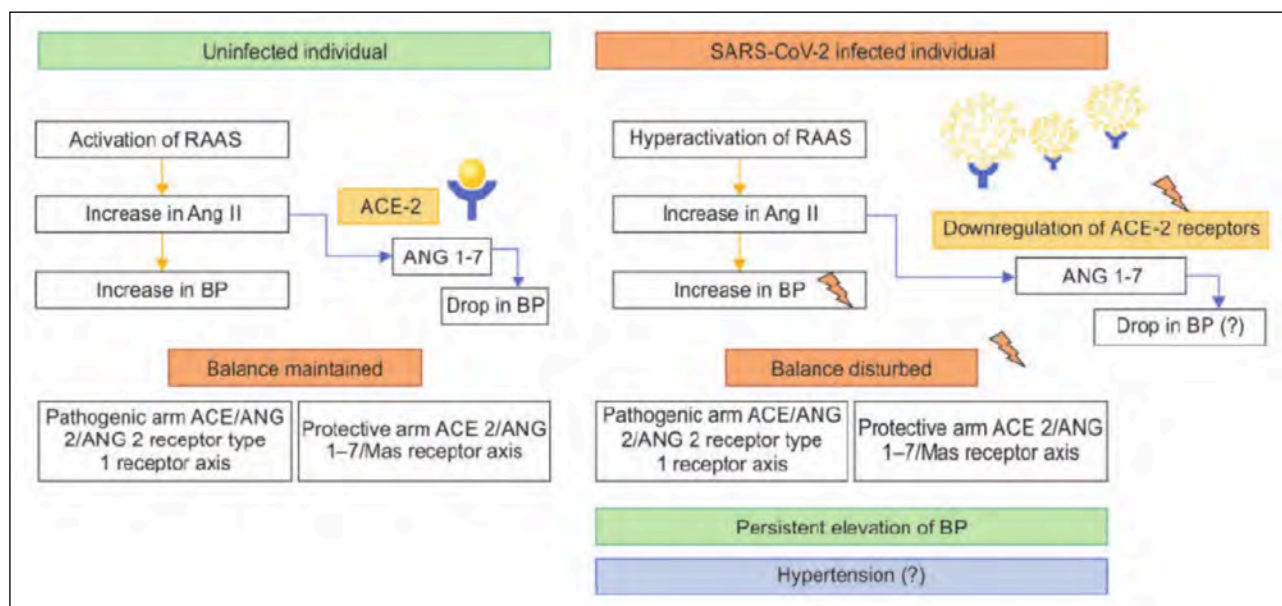
Additionally, indirect evidence suggests a possible link between mRNA COVID-19 vaccinations and hypertension-related adverse events. A case series has reported instances of severe hypertension following immunization.<sup>3</sup> While further research is required to fully understand this association, these cases hint that the immunological and inflammatory responses triggered by both SARS-CoV-2 and its vaccines might contribute to blood pressure irregularities.

### Incidence of New-Onset Type 2 Diabetes

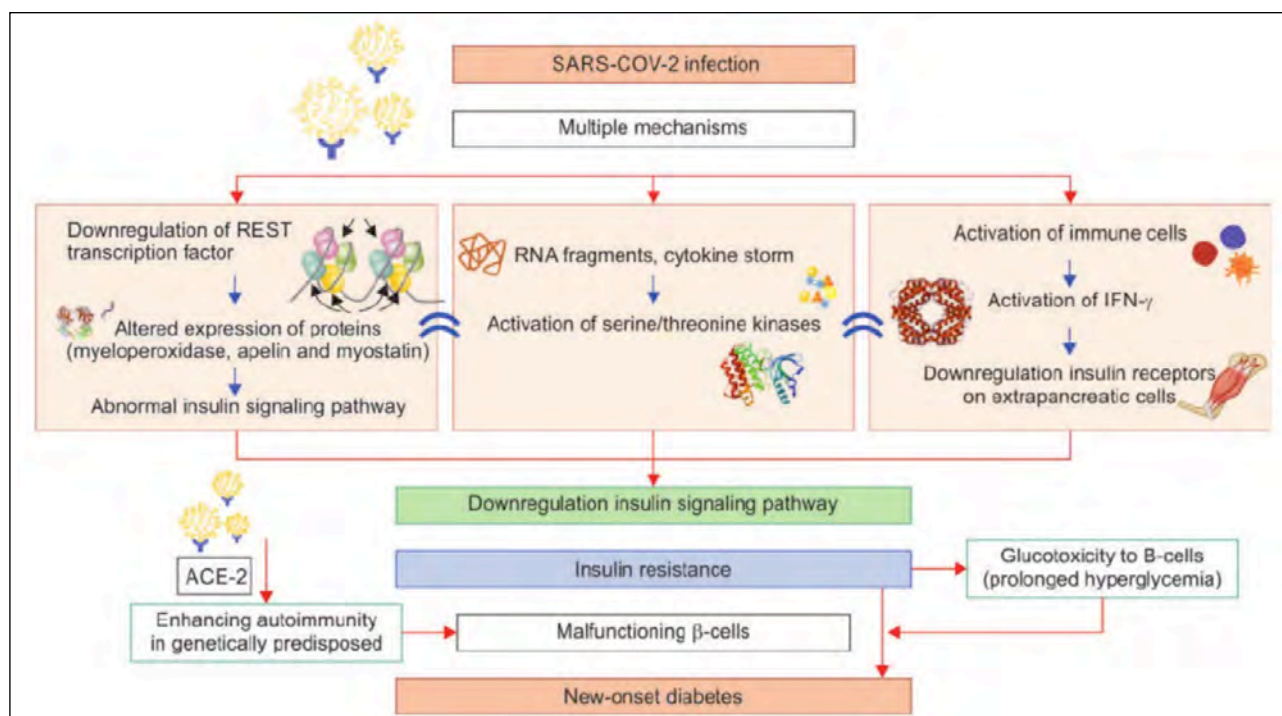
Evidence also points to a concerning rise in new-onset diabetes associated with COVID-19. For example, a meta-analysis by Shrestha et al. found that 19.7% of individuals developed new-onset diabetes following COVID-19 infection. Many studies reviewed were retrospective observational studies, showing varying percentages of patients with newly diagnosed diabetes, which strengthens the hypothesis of a potential link between COVID-19 and new-onset T2D.<sup>4</sup>

The mechanisms behind this connection likely involve viral-induced  $\beta$ -cell dysfunction and insulin

**Figure 1:** Proposed mechanisms for SARS-CoV-2 infection-induced new-onset hypertension



**Figure 2:** Proposed mechanisms for SARS-CoV-2 infection-induced NOD



resistance, further intensified by immune system and renin-angiotensin system (RAS) dysregulation. There's also evidence that the hypothalamic-pituitary-adrenal (HPA) axis might contribute by increasing counter-regulatory hormones, which can worsen metabolic control in infected patients. <sup>5</sup> (Fig 2)

**Risk Factors and Screening Recommendations**

Currently, no specific predictive risk factors for new-onset hypertension or diabetes related to COVID-19 have been identified in the literature. However, it is essential to closely monitor patients

who have had COVID-19, as they may show higher rates of multi-organ dysfunction after discharge. This calls for proactive screening during and post-recovery to facilitate timely intervention and reduce the risk of long-term complications. <sup>6</sup>

With new-onset diabetes reportedly occurring more frequently than hypertension, prioritizing diabetes screening in post-COVID-19 patients could be beneficial. <sup>4</sup> In newly diagnosed patients, especially those with very high blood glucose levels, infection screening is recommended, as individuals

with new-onset diabetes post-COVID-19 may face higher risks of adverse outcomes, including increased mortality.<sup>7</sup>

In conclusion, there is a pressing need for healthcare providers to recognize and address the potential for new-onset hypertension and diabetes linked to COVID-19. Evidence suggests that these conditions may appear during both the acute and post-acute phases of infection, posing significant risks of unexpected health complications.

### Why was the work done?

The growing emergence of new-onset hypertension and diabetes among COVID-19 patients underscores the need to better understand how SARS-CoV-2 might trigger or exacerbate these conditions. This work is crucial, as both hypertension and T2D significantly increase the risk of cardiovascular disease, kidney complications, and mortality, particularly when left undiagnosed or unmanaged. Given the global impact of COVID-19, identifying whether these conditions are directly related to the virus—or if they reveal underlying vulnerabilities that SARS-CoV-2 aggravates—is essential for public health.

Furthermore, as COVID-19 has highlighted the interconnectedness of various health systems within the body, this research provides insights that go beyond immediate clinical care. It aims to help healthcare professionals recognize potential long-term sequelae in COVID-19 survivors, informing approaches to preventive care and management strategies that could alleviate future health burdens on patients and healthcare systems.

### What should be done next?

To address remaining uncertainties, future research should focus on long-term cohort studies and randomized controlled trials that could clarify the mechanisms linking SARS-CoV-2 to new-onset hypertension and T2D. These studies can investigate viral effects on organs like the pancreas, cardiovascular system, and central nervous system, all of which contribute to metabolic and blood pressure regulation. Additionally, researchers could explore genetic and environmental factors that may predispose certain individuals to these new-onset conditions, helping to identify those at higher risk.

Developing clear screening guidelines for post-COVID-19 patients would also be a valuable next step. Implementing regular monitoring for blood pressure and blood glucose levels among those recovering from COVID-19, particularly those with severe cases, may prevent complications and ensure early intervention. Public health strategies could further benefit from comprehensive educational initiatives on the risks of COVID-19-related hypertension and diabetes, promoting awareness among patients and clinicians alike.

Ultimately, advancing this body of research will aid in building robust, evidence-based frameworks for managing COVID-19's long-term health impacts, equipping healthcare systems to meet the needs of those affected by post-COVID-19 conditions effectively.

### References:

1. Mithal A, Jevalikar G, Sharma R, Singh A, Farooqui KJ, Mahendru S, et al. High prevalence of diabetes and other comorbidities in hospitalized patients with COVID-19 in Delhi, India, and their association with outcomes. *Diabetes Metab Syndr*. 2021;15(1):169–75.
2. Chen G, Li X, Gong Z, Xia H, Wang Y, Wang X, et al. Hypertension as a sequela in patients of SARS-CoV-2 infection. *PLoS One*. 2021;16(4):e0250815.
3. Meylan S, Livio F, Foerster M, Genoud PJ, Marguet F, Wuerzner G, et al. Stage III Hypertension in Patients After mRNA-Based SARS-CoV-2 Vaccination. *Hypertens Dallas Tex* 1979. 2021 Jun;77(6):e56–7.
4. Shrestha DB, Budhathoki P, Raut S, Adhikari S, Ghimire P, Thapaliya S, et al. New-onset diabetes in COVID-19 and clinical outcomes: A systematic review and meta-analysis. *World J Virol*. 2021 Sep 25;10(5):275.
5. Sathish T, Anton MC. Persistence of new-onset diabetes in the post-acute phase of COVID-19. *Int J Diabetes Dev Ctries*. 2023 Feb 1;43(1):118–9.
6. Ayoubkhani D, Khunti K, Nafilyan V, Maddox T, Humberstone B, Diamond I, et al. Post-covid syndrome in individuals admitted to hospital with covid-19: retrospective cohort study. *BMJ*. 2021 Mar 31;372:n693.
7. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes—2018 | Diabetes Care | American Diabetes Association [Internet]. [cited 2024 Oct 24]. Available from: [https://diabetesjournals.org/care/article/41/Supplement\\_1/S13/30088/2-Classification-and-Diagnosis-of-Diabetes](https://diabetesjournals.org/care/article/41/Supplement_1/S13/30088/2-Classification-and-Diagnosis-of-Diabetes).

# PERSPECTIVES IN HYPERTENSION

## The development of a 'chatbot' for management of hypertension in Pakistan

MOHAMMAD ISHAQ

Patron, Pakistan Hypertension League (PHL), Fellow ISH



The role of artificial intelligence (AI) in cardiovascular medicine & hypertension has been highly recognized.<sup>1-3</sup>

AI is the science and engineering of developing machines that are capable of simulating human thought process & learning based on applying complex algorithms & advanced computational power to large amounts of data, referred to as big data.<sup>1</sup>

Based on these principles PHL introduced a 'chatbot' project at its 27th annual symposium in September 2024. This project is supported by a leading Pakistani Pharma Pharmevo.

Cardiovascular diseases are the leading cause of death globally with hypertension its major risk factor. In Pakistan 44% of the population aged between 30-79 years suffer from hypertension, out of which 56% remain undiagnosed, and 65% known hypertensives are not receiving treatment, highlighting a critical gap in healthcare. Only 11% have their BP under control.

### Challenges in hypertension management

Challenges in hypertension management in Pakistan include:

- A high prevalence of hypertension, but low diagnosis & control rates.
- A lack of adherence to treatment and awareness of the complications of hypertension.
- The need for national guidelines & clear blood pressure (BP) control targets.

The objective of the PHL chatbot project is to raise awareness and improve management of hypertension in alignment with WHO recommendations, through the use of the chatbot.

### Heart line Chatbot

An AI powered 'Heart line Chatbot' was launched to guide hypertensive patients from initial diagnosis to treatment pathways. It was available in both English and Urdu to ensure easy accessibility and to reach a wider audience across Pakistan. The chatbot not only educates but also connects patients with healthcare providers through a geo-tagging feature. One thousand family physicians will be geo-tagged on Google Maps, enabling patients to easily locate and connect with doctors in their vicinity for timely management of their hypertension.

### Heart Line Chatbot impact

The chatbot aims to be an AI-driven solution, addressing gaps in patient education and self-care.

It aims to provide step by step guidance for hypertensive patients, encouraging proactive management.

We are developing a mass awareness initiative for both patients and healthcare providers around the chatbot, enhancing the success of the chatbot.

## Public awareness and education

PHL will run an awareness and education campaign, which will involve social media outreach to 40 million people, public information sessions, and mass screening of the population for the early detection of hypertension. We will also promote home BP monitoring to the public.

## Healthcare provider training

We will run a training programme around the chatbot for family physicians based on hypertension guidelines, as well as training for non-physician staff who were trained as hypertension counsellors. We will also put details of 1,000 family physicians on Google Maps, so that patients could find these physicians via the chatbot.

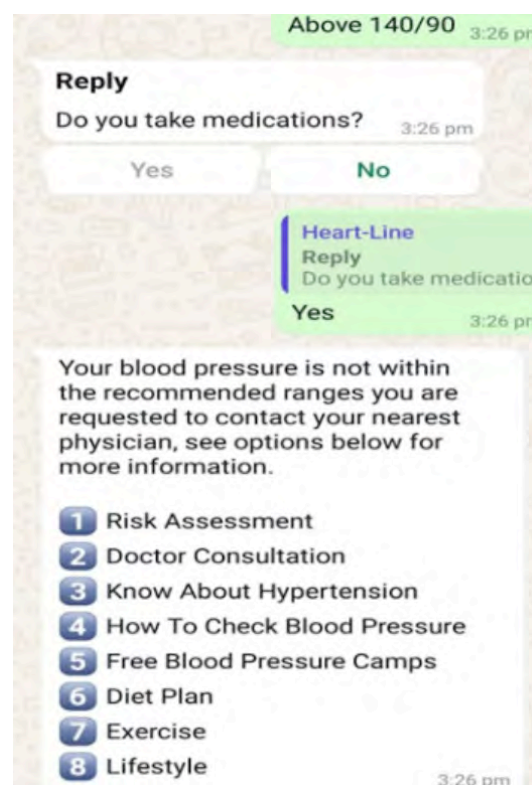
## Expected outcomes by 2040

Our project aims to save 839,000 lives through improved hypertension control and to enhance patient engagement in management of hypertension. We aim to train and build capacity in 1,000 family physicians and 100 hypertension counsellors, and to develop new national hypertension guidelines aligned with the WHO which include reference to the chatbot.

## References

1. Krittanwong C, et al. AI in precision CV medicine. JAC 2017 69:2657-266.
2. Johnson KW et al. AI in cardiology, JAC 2018; 71:2668-2679
3. Krittanwong C, et al. Future direction for using AI to predict & manage Hypertension. Curr Hypertense Rep 2018; 20:75

Mohammad Ishaq – khyber50@yahoo.com



# ISH COMMITTEE AND REGIONAL ADVISORY GROUP REPORTS

## Reflecting on the successes of the Americas RAG

CESAR ROMERO

ISH Treasurer, Emory University, Atlanta, USA



As my four-year term as Americas RAG Chair has now come to a close, I find myself with immense gratitude on this journey. For some members of the Committee, it's been a four-year adventure together, from 2020 to 2024, and what a magnificent way to end this chapter – with the ISH meeting in Latin America (LATAM), truly a celebration of the Latin spirit.

The energy of the meeting reflected the vibrancy we're seeing throughout our region – a region that is both clinically and scientifically active, with an ever-growing number of members and exciting initiatives.

In the last four years, as a Committee, we surpassed our original goal of reaching 100 new members in LATAM. Before the ISH2024 meeting, we stood at 144 LATAM members, and now, we've exceeded 200 new members in the region – a growth of over 240%!

Our committee's activities over the past few years haven't just been about numbers; we've been involved in more than 12 initiatives across the

region, bringing countries into the fold that had previously been underrepresented. I hope that this spirit of inclusion and progress continues for years to come.

I want to extend my heartfelt thanks to each member of the Americas RAG for their collaboration, participation in conferences and webinars, contributions to writing articles, and, most importantly, for being there to offer advice, propose ideas, and contribute whenever needed. Their dedication has been invaluable.

As part of ISH's tradition, no one should remain in the same committee leadership role for more than four years, and the time has come for me to step down as the Americas RAG Chair after the Cartagena meeting. I'm pleased to announce that the ISH President and the ISH Council have appointed Dagnovar Aristizabal – a fellow Americas RAG member and the President of the Cartagena meeting – as the next RAG Chair for the upcoming term. I've had the pleasure of working closely with Dagnovar during these years, and I have no doubt



ISH members were part of the Brazilian Society of Hypertension Meeting held in São Paulo, Brazil, from 25 to 27 July 2024.



ISH President George Stergiou and Deputy Chair of the Americas RAG attended the highly successful 30th Meeting of the Argentine Society of Hypertension from 18th to 20th April 2024.



that he will do a fantastic job leading the Americas region forward.

Dagnovar has earned great admiration for his tireless work in the Society, and he was recently elected as a Council member of the ISH – a testament to his dedication.

As for myself, I'm honored to have been invited by the new ISH President, George Stergiou, to serve as ISH Treasurer and be part of the ISH Executive Committee, a role I will embrace with great enthusiasm.

These are exciting times for the Americas region – and I'm excited to see what happens next. I'm looking forward to seeing even more progress in the Americas region in the coming years, thanks to the passion and enthusiasm of those in the region.

Thanks to all those ISH Affiliated Societies that have collaborated with the ISH from 2020-2024 and continue to collaborate with the Society - including.

- American College of Cardiology (ACC)
- Argentine Federation of Cardiology
- Argentine Society of Arterial Hypertension (SAHA)
- Artery LATAM
- Bolivian Nephrology Society
- Brazilian Society of Cardiology

- Brazilian Society of Hypertension
- Central American and Caribbean Society of Arterial Hypertension and Cardiovascular Prevention
- Colombian Association of Internal Medicine (ACMI)
- Colombian Heart Foundation
- Colombian Society of Cardiology
- Inter-American Society of Cardiology (SIAC)
- Inter-American Society of Hypertension (IASH)
- Latin American Society of Hypertension (LASH)
- Pan American Health Organization (PAHO) – HEARTS initiative

## 2022-2024 Americas RAG Members

**Chair:** Cesar Romero (USA/Argentina)

**Deputy Chair:** Daniel Piskorz (Argentina)

### Members:

Phillip Levy (USA)

Elizabeth Muxfeldt (Brazil)

Raven Voora (USA)

Mayra Ayala (Bolivia)

Dagnovar Arsitizabal (Colombia)

Dawson Calixte (Haiti)

Candace McNaughton (Canada)

Pablo Nakagawa (USA)

Cesar Romero – [cesar@ish-world.com](mailto:cesar@ish-world.com)

# ISH COUNCIL MEMBERS



**George Stergiou (Greece)**  
ISH President



**Hiroshi Itoh (Japan)**  
ISH Vice President



**Kazuomi Kario (Japan)**  
ISH Secretary



**Cesar Romero (USA)**  
ISH Treasurer



**Erika Jones (South Africa)**  
ISH Officer-at-Large



**Bryan Williams (UK)**  
ISH Immediate Past President



**Dagnovar Aristizabal**  
(Colombia)



**Hind Beheiry**  
(Sudan)



**Myeong-Chan Cho**  
(South Korea)



**Débora Colombari**  
(Brazil)



**Yan Li**  
(China)



**Tazeen Jafar**  
(Singapore)



**Ulrike (Muscha)  
Steckelings**  
(Denmark/Germany)

## Affiliated Sponsors



## Platinum Corporate Members

**Medtronic**

## Silver Corporate Members



The opinions expressed by contributors in this issue of Hypertension News do not necessarily reflect or represent the opinions or policy positions of ISH or its Council of Trustees. ISH is a registered charitable incorporated organisation in England and Wales (no. 1204969).

[www.ish-world.com](http://www.ish-world.com)

Email: [secretariat@ish-world.com](mailto:secretariat@ish-world.com)