



Alta E. Schutte, President of ISH 2018-2020

Professor Alta Schutte, PhD has recently been elected President of ISH for 2018-2020. She will take up office at the end of the ISH Meeting in Beijing in September 2018.



Alta is Professor of Physiology at the Hypertension in Africa Research Team (HART) of the North-West University in South Africa. She is also the Director of the Unit for Hypertension and Cardiovascular Disease of the South African Medical Research Council. Alta has published more than 200 scientific papers in high ranking medical journals and has been cited more than 3000 times.

Alta Schutte has been a constructive and hard-working young member of the ISH Scientific Council since 2012 and Vice President of the Society since 2016. As Chair of the Membership Committee since 2014, she has improved the recruitment of new ISH members considerably. Alta has also established two new membership categories ('Clinical Members' and 'Emerging Leaders'). As Vice President, she has actively participated in many of the on-going activities including MMM 2017. She has also contributed to the work of the 'Young ISH Investigators' and is a founding member of the 'Women in Hypertension' group.

As before, the ISH President-Elect will tell us where she wants to take the Society, after taking up office. This will be in the October 2018 issue of HT News. Until then, the current President, Neil Poulter chairs the Scientific Council and the Executive!

Warmest congratulations from the HT News team,
Alta!

Lars H Lindholm

Editor

lars.h.lindholm@umu.se



Join us in Beijing next year!



HYPERTENSION

BEIJING 2018 | CHINA

20-23 September 2018

www.ish2018.org

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From the ISH President (2016-2018) - Neil Poulter



ISH continues to progress inexorably in the right direction. We enjoyed successful meetings (social and academic) at ESH in Milan where several new members joined the ISH and we received huge global support in conducting the May Measurement Month (MMM) campaign in over 100 countries.

Dedicated MMM staff and our volunteer statistician (Cono Ariti), ably assisted by several data handlers and data cleaners in London and around the world, are still in the process of preparing the MMM data for entry onto the database and for analysis. So - more of that and the results in my next report! Suffice it to say that we plan to repeat the exercise in 2018!

Join us for MMM18!

Please email us at mmminfo@ish-world.com and we'll make sure that you are kept up to date with the campaign.



We are arranging for the Hypertension training programme (Certified Course in Hypertension Management) developed for primary care doctors in India (a collaboration between the PHFI and CCDC in India, ISH and the BIHS) to be transferred to the Pan African Society of Cardiology (PASCAR) who will coordinate the dissemination of a revised, modified, version of this modular programme throughout Africa. Meanwhile, the course continues to great effect in India. *See page 18*

The plan thereafter will be to take the course, modified as required, to Latin America, the Caribbean and South America, in collaboration with the relevant local societies.

The ISH President Election took place recently. Three outstanding candidates were nominated and agreed to stand, and I am delighted to confirm that Professor Alta Schutte has been declared the winner of the election. She will take up her Presidential term during the ISH Beijing Scientific Meeting (20-23 September 2018).



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Plans for the next ISH Biennial Scientific Meeting to take place in Beijing (September 20-23 2018 - www.ish2018.org) are well underway and a meeting of the ISH subcommittee responsible for the Beijing meeting and the local organising committee took place in Shanghai on 21st September to thrash out key aspects of the programme.

Please put the 2018 meeting dates in your diary now!

We very much hope to produce a meeting which will appeal to a broad range of interests, from basic science through clinical medicine and epidemiology to public health strategy, and that non-clinicians and clinicians, whether medically qualified or not, will attend in large numbers. Given the reality that most hypertension exists in the developing world, it is hoped to incorporate a suitably large proportion of the programme to reflect that fact. Furthermore arrangements to enable, encourage and facilitate visitors from the developing world to attend the meeting are planned.

Between now and the end of the year I have plans to visit several cardiovascular and/or hypertension society meetings around the world on behalf of ISH, including the Hungarian Hypertension Society, the Asian-Pacific Congress in Hypertension (Singapore), the Latin American Society of Hypertension (Dominican Republic), the Japanese Society of Hypertension and the American Heart Association (AHA).

Hopefully these visits will help to foster continued and expanding interests in ISH and its activities, and to expand the societies' membership.

- Neil Poulter



The Secretary's Voice:

Maciej Tomaszewski

Dear Readers,

The summer holiday period has been busy for the ISH Executive Committee and the Council.

Collaboration with WHO & CDC

We have continued our close collaboration with the World Health Organisation (WHO) and Centers for Disease Control and Prevention (CDC) on the HEARTS Technical Package that will support cardiovascular disease management in primary care. I am very grateful to the members of our ISH Science, Research and Education Committee who have provided a very thorough revision of the first draft of the protocols. The Committee has reviewed some of the core modules of the HEARTS Technical Package (evidence-based treatment, risk-based management) and WHO and CDC have been provided with the important feedback. The goal is to finalise and post the Technical Package on the WHO website in February 2018. Several countries including Barbados, China, Colombia, Ethiopia, India, Iran, Nepal, The Philippines, Tajikistan, Thailand and Uganda are currently piloting the scheme.



Technical package for cardiovascular disease management in primary health care

Global Summit on Circulatory Health

I represented the Society and the President at the Global Summit on Circulatory Health in Singapore on 12-13 July 2017. One of the major conclusions from this meeting was a consensus that to reduce premature mortality from cardiovascular disorders by 25% by 2025 we will need to improve partnership across international, regional and national organisations involved in circulatory health. To this end, our partner, World Heart Federation, will lead on the Global Coalition for Circulatory Health that will bring together professional organisations involved in the prevention and management of cardiovascular disease.

ISH Events - APCH Congress, Singapore

Following the success of the networking initiatives at the European Society of Hypertension meeting in Milan in June 2017, Professor Fadi Charchar and his team from the Mentorship and Networking Committee are busy organising the mentoring event at the 13th Asian-Pacific Congress of Hypertension in Singapore on 6-8 October 2017. If you are attending this meeting and/or looking for a mentor, please get in touch with our Secretariat to secure a place at the Mentorship event.



Picture from left to right:

Fadi Charchar, Ruan Kruger, Mark Caulfield

Dr Ruan Kruger and his New Investigator Committee are working hard on the New Investigator Programme for the 13th Asian-Pacific Congress of Hypertension in Singapore on 6-8 October 2017. The session for new investigators has been integrated into the main programme of the conference and I am delighted to confirm that Professor Mark Caulfield will be the keynote speaker. Professor Caulfield has been a strong supporter of the New Investigator Committee from its inception and we are delighted to see him deliver the keynote address for young investigators.



Join us at the ISH

New Investigator Programme

(Symposium / Mentorship and Networking Event)

6 October 2017, Singapore

www.ish-world.com



ISH Beijing 2018 Scientific Meeting

The preparations for our bi-annual scientific meetings are underway. The Beijing 2018 Programme Committee joined the Organising Committee at a meeting in Shanghai in September. The ISH is committed to working closely with the Organising Committee with the goal of creating the finest and most intellectually stimulating programme possible for our forthcoming meeting.

Women in Hypertension Research Committee

Professor Rhian Touyz and her team at the Women in Hypertension Research Committee have completed an internet survey to solicit feedback on the framework of their activities over the next few years. A number of ISH members have responded with overwhelming support for Professor Touyz's initiatives. The results of the survey were discussed during the Executive call on 11th September 2017 and Professor Touyz has kindly agreed to share the results with the wider membership shortly.



ISH Appointments

I am delighted to confirm that Dr Dylan Burger has been appointed as Deputy Editor-in-Chief of Hypertension News. Many congratulations to Dylan and we wish him the best of luck in his new appointment. *See right for more information.*

Dr. Richard Wainford, a member of the ISH Scientific Council, has joined our Communications Committee. This appointment was ratified by the Council at the meeting in Milan in June 2017. Many congratulations to Richard on this appointment, we wish him all the best in his new role.



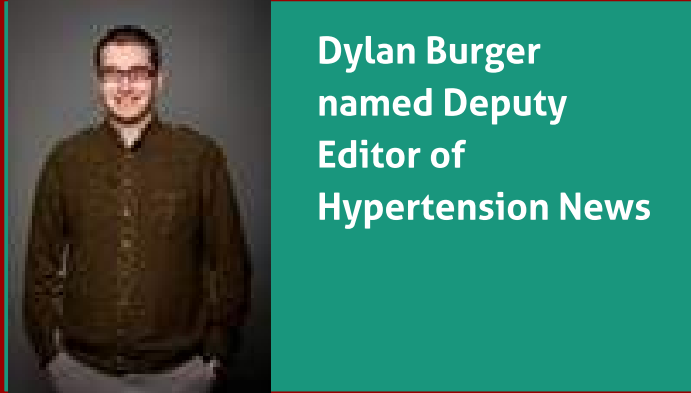
Last but not least I am thrilled to inform you that following the voting of ISH Council members, Professor

Alta Schutte, the current Vice-President, and Chair of the Membership Committee, is the new ISH President-Elect. *See more information on page 1 of the newsletter.*

Many congratulations to Alta, we wish her every success in continuing the mission of ISH during her Presidency in 2018-2020. Alta will take up the Presidential position at our bi-annual meeting in Beijing in 2018.

- Maciej Tomaszewski

Refer a colleague to join ISH
If you have a colleague who would like to become a member of ISH please ask them to send their CV to membership@ish-world.com.



Dr. Dylan Burger has been named deputy editor of Hypertension News. Dr. Burger is a Scientist and Assistant Professor at the Ottawa Hospital Research Institute, University of Ottawa in Canada. His appointment follows several years of working alongside the editorial board for Hypertension News, where he has contributed to the expansion of coverage for basic science and young investigators.

Dr. Burger has also spearheaded efforts to establish online identifiers for Hypertension News content including ISSN registration and CrossRef membership. He has been an active member of the ISH since 2010, having previously sat on the New Investigator Committee where he served as media working group lead until 2016. Dylan says that he is honoured to accept this position and is strongly committed to developing the already excellent already excellent content in the "Voice of the ISH". I am so glad to have him and his knowledge of basic science in hypertension.

- Lars H. Lindholm



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Results confirm benefit of SGLT2 inhibitors on cardiovascular outcome in diabetic patients

Drugs that inhibit the sodium–glucose cotransporter 2 (SGLT2 inhibitors; gliflozins) decrease renal glucose reabsorption. The increase in urinary glucose excretion will reduce blood glucose levels and SGLT2 inhibitors were developed to improve glucose control in patients with type 2 diabetes. The randomized placebo-controlled cardiovascular outcome trial of the SGLT2 inhibitor empagliflozin (EMPA-REG OUTCOME), reported on in a previous issue of *ISH Hypertension News*, demonstrated a modest improvement in glucose control [1,2]. More important, however, the authors reported a lower rate of the primary composite cardiovascular endpoint (cardiovascular mortality, non-fatal myocardial infarction and non-fatal stroke), and of all-cause mortality in patients with type 2 diabetes. A recent publication by Neal and collaborators [3] now reports results that suggest that this benefit on cardiovascular outcome by SGLT2 inhibitors may be a drug class effect.

The CANVAS program integrated results from two studies with 10,142 patients with type 2 diabetes and high cardiovascular risk, randomized to receive the SGLT2 inhibitor canagliflozin or placebo, with a mean observation time of 3.6 years [3]. The two studies (CANVAS and CANVAS-R) had similar inclusion criteria and were intended to be analysed together, but CANVAS-R in addition assessed effects on albuminuria. The mean age was 63 years, the duration of diabetes 14 years, two thirds had a history of cardiovascular disease, and one fourth had microalbuminuria. Approximately 30% of the participants discontinued the assigned treatment during the course of the study, similar in both groups. Patients in the canagliflozin groups had on average about 0.6% lower haemoglobin A1c values, 4/1 mm Hg lower blood pressure, and lost 1.6 kg more in weight.

The primary outcome (a composite of cardiovascular mortality, non-fatal myocardial infarction, and non fatal stroke) occurred in 26.9 vs 31.5 patients per 1000 patient years, with a hazard ratio and 95% confidence interval in favour of active treatment of 0.86; 0.75 to 0.97. Active treatment also appeared to reduce the progression of renal dysfunction assessed as albuminuria (hazard ratio 0.73; 0.67 to 0.79), and the composite of deterioration of glomerular filtration rate, renal replacement therapy, and mortality from renal causes (hazard ratio 0.60; 0.47 to 0.77). Also heart failure hospitalizations were reduced. Somewhat unexpected, the risk of primarily distal amputation was higher in the group randomized to active treatment (hazard ratio 1.97; 1.41 to 2.75). As previously reported for SGLT2 inhibitors, adverse events with genital infections, volume depletion, and diuresis were more common in the group treated with canagliflozin.

The results of the CANVAS program suggest that the positive effects on cardiovascular outcome initially observed with empagliflozin [1] might be a general class effect of SGLT2 inhibitors. This is indirectly supported by a recently published observational analysis from the Nordic countries (Denmark, Norway, and Sweden) [4]. By use of individual patient level data from the Prescribed Drug Registers, Cause of Death Registers, and National Patient Registers, all patients with filled prescriptions for glucose lowering drugs between 2012 and 2015 were followed until the end of 2015. Matched SGLT2 inhibitor (94% dapagliflozin, 5% empagliflozin, and 1% canagliflozin) and other glucose lowering drug groups (1:3 propensity score matching) show a decreased risk for cardiovascular mortality (hazard ratio 0.53; 0.40 to 0.71) and major cardiovascular events (hazard ratio 0.78; 0.69 to 0.87) in favour of the SGLT2 inhibitor group.

These results taken together are important as they

suggest a class of glucose lowering drugs that can reduce cardiovascular morbidity and mortality in high-risk type 2 diabetic patients. However, the reductions in haemoglobin A1c were modest and it is unlikely that this change in glycaemic control could affect cardiovascular events within such a short period of time. The rapid effects of SGLT2 inhibitors on blood pressure, body weight (likely to reflect fluid loss and reduced tissue mass), and cardiovascular events suggest that hemodynamic effect contributes to the benefit observed with SGLT2 inhibitors. However, several mechanisms may be important for the beneficial effects on cardiovascular outcome [5-7]. SGLT2 inhibitors were developed to improve glucose control in diabetic patients. It will be interesting to see the results of ongoing studies, examining the effects of SGLT2 inhibitors on cardiovascular events in patients with cardiovascular disease but with no diabetes. These and other studies will eventually clarify if SGLT2 inhibitors should be considered glucose lowering drugs for diabetic patients with additional cardiovascular protective effects, cardiovascular (antihypertensive and/or diuretic) drugs with additional glucose lowering properties, or renal protective drugs with additional cardiovascular and glucose lowering effects. The issue is not trivial, for patients, care providers, regulatory authorities, and

for the pharmaceutical industry.

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- Thomas Kahan

Hot Off the Press



Dylan Burger

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Increased salt consumption induces body water conservation and decreases fluid intake

Rakova et al. (2017) *J Clin Invest* 127(5) 1932-1943

DOI: [10.1172/JCI88530](https://doi.org/10.1172/JCI88530)

This particular article made [international headlines](#) in May when the New York Times and other media outlets highlighted how the results could change our understanding of the body's handling of sodium ¹. Current dogma is that increased salt intake leads to increased thirst which stimulates fluid intake. However there had been prior studies which have questioned this relationship ². This study, and other related ones from the same study cohort, are quite comprehensive and could be the subject of much larger and more comprehensive summaries. I will restrict my summary to the major highlights of the study.

The primary goal of this study was to examine the relationship between salt intake and urine volume and the authors took a very innovative approach.

The authors took advantage of two simulated Mars missions being conducted by the European Space Agency and the

Russian Institute for Biomedical Problems (IBMP) ³. The interest in sodium/water balance for such a mission likely stems from the potential need for extreme water conservation during a prospective mission to Mars.

Mars 105 consisted of 12 men in simulated space flight for 105 days while Mars 520 had men in flight for 520 days.

For the Mars 105 study salt intake was followed over 105 days with sodium successively adjusted from 12 g/day to 9 g/day and then 6 g/day after intervals of at least 29 days. On the Mars 520 study (conducted over 205 days) the intake was adjusted from 12 g/day to 9 g/day and 6 g/day and then back to 12 g/day, again with the interval between changes being at least 29 days. Subjects had access to fluids (tap water, tea, coffee, juice and milk) in an unrestricted fashion but calories were controlled and nutrients were described as being "maintained constant throughout the study". Urine was collected over 24 hours. The authors excluded subjects from analysis when their weekly urinary sodium recovery was repeatedly less than 80% of sodium intake or when the subjects did not adhere to the daily menu plans. The strict criteria for inclusion resulted in the exclusion of 2/14 subjects from the study.

Consistent with what would be expected, the authors observed that higher intake of salt led to more salt in the urine. By contrast, with respect to water intake what was observed was a decrease as dietary salt increased which is counterintuitive based on existing paradigms. As an explanation, the authors looked at free water generation and showed that at higher salt concentrations free water generation also increased. Furthermore, increased cortisol levels were associated with greater urine volume without increased water intake which suggests that the increased urine volume was due to endogenously created water.

The authors proposed three hypothesis to explain their results.

Hypothesis 1: Increasing salt intake promotes accrual of endogenous water.

Hypothesis 2: Dietary salt modulates endogenous infradian-rhythmical control of osmolyte and water accrual and release.

Hypothesis 3: High salt intake induces glucocorticoid-driven metabolic water production.

Like all studies, the data shown here need to be replicated in larger populations (if such a study is even possible), however the methodology appears to be rigorous and, as such, the results do call into question current views on sodium and water balance.

Finally, a provocative aspect of this manuscript was the fact that the authors called into question the validity of sodium/salt excretion as a surrogate for intake. In referencing prior work from the same study population ⁴ the authors quite provocatively stated that "We are not convinced that epidemiological studies and information policy, which rely on associations among food intake, beverage consumption, and salt content in the urine to study a functional relationship among salt intake, soft drink consumption, and obesity in populations, rest on valid physiological and methodological assumptions". These are strong words coming from a study of 12 individuals, but perhaps do need to be given some consideration.

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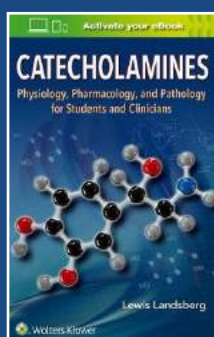
2 Luft FC *et al.* (1983). The effect of dietary sodium and protein on urine volume and water intake. *J Lab Clin Med* 101(4) 605-610.

3 http://www.esa.int/Our_Activities/Human_Spaceflight/Mars500/Mars500_study_overview

4 Lerchl K *et al.* (2015) Agreement between twenty-four hour salt ingestion and sodium excretion in a controlled environment. *Hypertension* 66(4) 850-857.

- Dylan Burger

Catecholamines – Physiology, Pharmacology, and Pathology for Students and Clinicians



Dr. Lewis Landsberg (Chicago) has written a new booklet on catecholamines (Wolters Kluwer, 2017 pp 1-147), which kept me company on a recent long flight. It is a comprehensive and clinically relevant monograph, which provides an authoritative summary of how catecholamines regulate bodily functions in health and disease, as well as how this knowledge has generated an extensive pharmacopeia of widely-used drugs. It gave me solid information and guidance on these complex hormones and helped me understand the sympathoadrenal system better than before. The booklet is indeed worth reading and I recommend you do so! Dr. Landsberg (former Professor at Harvard Medical School and former Dean of North Western Medical School in Chicago) is the chairman of the Board of Management of the Journal of Hypertension.

Lars H Lindholm, Editor



HYPERTENSION
BEIJING 2018 | CHINA
20–23 September 2018



Call for Abstracts

ABSTRACT SUBMISSION DEADLINE: 28 FEBRUARY 2018

The program committee of the 27th Scientific Meeting of the International Society of Hypertension welcomes the submission of abstracts in the field.



Abstract Topics

Basic Science

1. Genetics, genomics, proteomics and metabolomics
2. Sympathetic nervous system activation and neural and reflex mechanisms in hypertension
3. Experimental pharmacology/Emerging therapeutics
4. Experimental hypertension/Animal models of hypertension
5. Inflammation/Immunity in hypertension
6. Recent update in renin angiotensin system
7. Arterial remodeling/Microcirculation/Endothelium
8. Molecular biology/Receptors, channels and transporters
9. Vascular biology
10. Miscellaneous

Population Science

1. How to manage hypertension in low resource settings
2. Primary prevention strategy for dyslipidemia in hypertension
3. Lifestyle modification in hypertension
4. Epidemiology of hypertension
5. IT technology in hypertension
6. Cerebrovascular disease/Stroke
7. Dementia and cognitive dysfunction
8. Public health/Pharmacoconomics
9. Salt and hypertension
10. Psychosocial stress and hypertension
11. Community control
12. Liquor spirits alcohol
13. Miscellaneous

Clinical Science

1. Elderly hypertension
2. Secondary hypertension
3. Hypertension in pregnancy/Women and hypertension
4. Pediatric/Adolescent hypertension
5. Hypertension in chronic kidney disease/Post renal transplantation
6. Pharmacologic treatment of hypertension
7. Traditional Chinese Medicine/Herb Medicine
8. Cardiovascular risk assessment strategy in hypertension
9. Hormone and Endocrinology
10. Obesity/Metabolic syndrome and cardiovascular disease
11. Central blood pressure/Large artery
12. Target organ damage in hypertension
13. Recent advances in non-pharmacologic treatment of device
14. Recent advances in non-pharmacologic treatment of resistant Hypertension
15. Renovascular in hypertension
16. Sleep disorder/Obstructive sleep apnea
17. Heart failure
18. Blood pressure measurements: office and out of office
19. Biomarkers
20. Atherosclerosis
21. Clinical trials
22. Treatment adherence
23. Atrial fibrillation
24. Sports/Exercise and hypertension
25. Imaging modalities
26. Miscellaneous

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With over a billion people with raised blood pressure, how do we set our priorities straight?



Alta Schutte (1 - left) and Peter Nilsson (2 - right)

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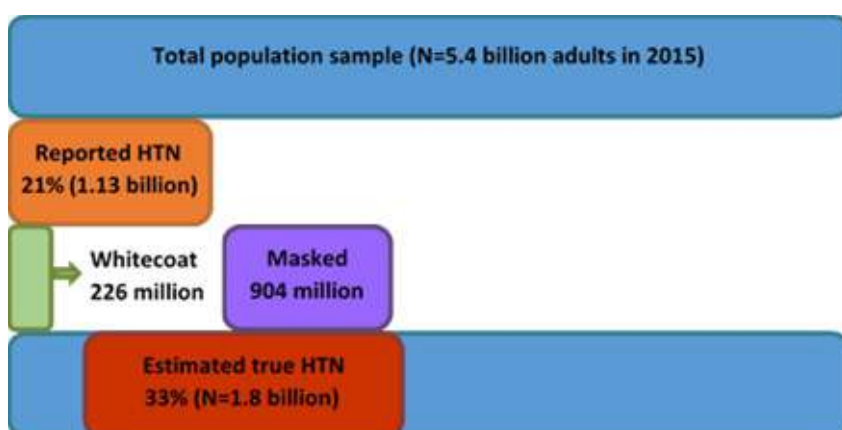
The NCD Risk Factor Collaboration reported recently that 1.13 billion adults had raised blood pressure in 2015.¹ The Global Burden of Disease Study Collaborators compared numerous behavioural, environmental, occupational and metabolic risk factors, and found raised systolic blood pressure to be the largest contributor to global disability-adjusted life-years (DALYs).² These reports raise alarm that the burden of disease is shifting more towards low and middle income countries (LMICs), such as Russia and Sub-Saharan Africa. Nevertheless, a significant chunk of the burden remains in high-income countries.

When trying to get some perspective in the presence of such an overwhelming global health burden, it is important to set our priorities straight.

How will we be able to manage and take control of this massive burden? Is it even possible to eat this elephant?

[1] The ISH has done well in prioritizing a global awareness campaign of hypertension, with ISH President, Neil Poulter, being the driver of the May Measurement Month initiative in 2017 (MMM17).³ This is a very obvious starting point in light of evidence that more than half of persons with hypertension are unaware of it.⁴ The campaign was particularly successful in LMICs where the project was met with great enthusiasm by local healthcare workers and community members, possibly due to the global support and guidance. MMM is likely to continue from strength-to-strength in 2018 and onwards.

[2] The elephant in the room, however, remains the numbers reported in global estimates for raised blood pressure. Epidemiological studies generally report blood pressure figures based on conventional clinic blood pressures. Anyone working in the field of hypertension would know very well that it is not possible for such figures to include the burden of *masked hypertension* – referring to patients with normal blood pressure in the clinic, but with out-of-office hypertension. If we thus firstly wish to have a starting point on the actual scope of the burden of hypertension, we need to at least try to incorporate the reality that hundreds of millions of adults with masked hypertension are not accounted for in these figures. Herewith a simplified attempt, assuming that 20% of the estimated 1.13 billion adults¹ with raised blood pressure had *white-coat* hypertension,⁵ and a conservative 20% of the remaining 4.5 billion adults had *masked* hypertension.⁶⁻⁸ (Bearing in mind that white-coat hypertension does not seem to carry similar risk as true hypertension,⁹ whereas masked hypertension does¹⁰).



The potential implications of these figures are widespread. It not only demonstrates that there is a gross underestimation on the global burden of hypertension of approximately 670 million people (21% vs ~33%), but it should also create a new line of thought in terms of global interventions, the implication for the pharmaceutical industry, and implementing new methodology to detect masked hypertension.

What can be done?

[1] Since effective antihypertensive therapy are cheap and widely available as generics, the challenge remains increasing awareness as already discussed, but *also* detection of masked hypertension. This affects all populations – LMICs but also high income countries. Although the best method to detect masked hypertension is by out-of-office blood pressure measurement, it is impractical to suggest population-wide ambulatory or home blood pressure monitoring. Several authors have described a higher frequency of masked hypertension in certain populations (e.g. prehypertensives, youth, diabetes, renal disease, African ancestry) whereas some have developed a clinic blood pressure index to use in detecting masked hypertension.¹¹ This knowledge should encourage novel initiatives in finding cost effective solutions to detect masked hypertension globally.

[2] In a broader sense, and as highlighted by the Lancet Commission on Hypertension (2016),¹² cardiovascular disease results from a lifetime exposure to cardiovascular risk factors, and thus the development of raised blood pressure should also be viewed in the context of lifetime risk of an entire population from conception onwards. We may urgently need fast-acting solutions to curb hypertension and its consequences, but should not delay better implementation of population-based approaches by creating health-promoting environments. By doing so, we may be able to avoid or delay early vascular aging¹³ on a large scale and thereby improve the whole lifecourse trajectory of cardiovascular risk. This could potentially result in a reduced burden of masked and sustained hypertension. Also, these interventions may have cross-cutting benefits to prevent or delay several non-communicable diseases, such as type 2 diabetes. Counting against these approaches, is the lack of evidence on the effectiveness of population-based interventions (e.g. salt reduction, smoke-free policies, sin taxes) to reduce cardiovascular and all-cause mortality, where the outcome of such trials are eagerly awaited (such as the China Salt Substitute and Stroke Study). Furthermore,

the concept of population-based interventions of low-dose antihypertensive therapy in individuals at intermediate cardiovascular risk remains an option, despite the HOPE-3 trial unable to show no significant benefit in terms of cardiovascular events of blood pressure lowering treatment (in this case an angiotensin-receptor blocker and thiazide).¹⁴ This encourages further trials with different designs and in different populations.

To conclude, we need better tools to detect (masked) hypertension, we need to increase awareness of hypertension, and we need to implement population-based prevention and treatment strategies if we were to make a dent in the global burden of raised blood pressure – and its devastating consequences.

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CARIM – A unique Dutch academic institution in cardiovascular research

In 2013 CARIM celebrated its 25th anniversary with a special, festive edition of the traditional yearly scientific CARIM symposium focussing on its local, national and international context, with recognized Dutch and international speakers and, of course, the traditional Rob Reneman lecture.



CARIM Day 2015: Stéphane Hatem, Paris, receives the Rob Reneman Lecture Award. From left: Thomas Unger, Rob Reneman, Stéphane Hatem

CARIM (the acronym means “Cardiovascular Research Institute of Maastricht”) was founded in 1988 by Professor Rob Reneman, a renowned Maastricht physiologist and pioneer in vascular research. In those days, a “School for Cardiovascular Diseases” at any university was by no means a common institution. Not only that it should assemble and coordinate those researchers following cardiovascular themes but also that it might cross the borders of research specialties in physiology and pharmacology, biochemistry and pathology, cardiology, cardiac and vascular surgery, hypertension and other disciplines in an interdisciplinary fashion beyond the departmental units. That this idea can be considered today’s commonplace is one of the merits of CARIM which has not only survived the storms and floods of almost three decades but developed continuously and is

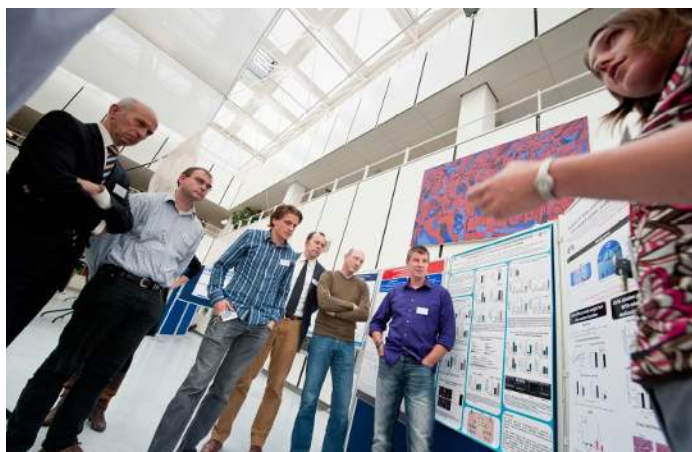
now one of the leading European institutions of its kind with a high international reputation. CARIM belongs to the Faculty of Health, Medicine and Life Sciences (FHML) of Maastricht University as one of the six thematically distinct “research schools” and is embedded within the Maastricht University Medical Center+ (MUMC+). With more than 250 researchers and staff in 22 PI groups (including about 120 PhD students) and an annual budget of over €21 Mill, CARIM is one of the largest cardiovascular research institutes in Europe, producing more than 500 scientific articles and around 40 PhD dissertations per year.



University of Maastricht; CARIM combines basic and clinical research under one roof.

Scientifically, CARIM deals with three major themes: Thrombosis & Hemostasis, Arrhythmias & Heart Failure, and Vascular Medicine. In each of these topics CARIM has contributed to historical landmarks in cardiovascular research, connected with names like Coen Hemker in thrombosis research, Maurits Allesie, Frits Prinzen and Harry Crijns in cardiac arrhythmia, basic vascular research with Rob Reneman, the experimental and clinical hypertension team with Harry Struijker Boudier and Peter de Leeuw, and the unique Maastricht Study with Coen Stehouwer. A group of younger PIs and senior postdocs, highly ambitious and motivated, is currently rushing to

the front to replace the “old” PIs and to carry the flag of CARIM into the future.



CARIM rhythmologist Frits Prinzen (left) in a Poster session at one of the numerous scientific events held by CARIM

During the almost thirty years of its existence CARIM has been “governed” by only four fully-endowed scientific directors: Rob Reneman was followed by Harry Struijker Boudier (Pharmacologist), Mat Daemen (Pathologist) and myself (Pharmacologist). Since April 2017 this position has been held by Tilman Hackeng, an internationally respected biochemist.

My own experience as CARIM’s scientific director for five years was extremely positive. When I came to Maastricht in 2012, I was given a warm welcome and treated with respect and great friendliness in an atmosphere of comradeship that I had not experienced in the years before. In this system of research schools, CARIM’s scientific director is more or less a *primus inter pares*, helped by a “Daily Board” of scientific theme leaders and a CARIM office team led by the financial director, but in the end, he is responsible for the welfare of the institution. The principal investigators (PIs), mostly department leaders or clinic directors, personally report to the scientific director once a year in so-called “planning & control” talks, the scientific director reports twice a year to the Dean of the faculty, who in turn reports to the president (and to the rector) of the university. In between, almost daily contact between all players completes a tight, complex system of mutual control and observation, which may sometimes stress the freedom-loving researcher but, on the other hand, guarantees a high degree of transparency and constant high-quality scientific output.

Through its scientific directors, theme leaders and its financial director, CARIM has always been well adapted to the challenges of the time. To improve academic education and the opportunities for students, a training programme for MD’s, Master and PhD students has been introduced, and – among many others - in 2016 a

Marie Curie Innovative Training Networks (ITN) programme “INTRICARE” on “Vascular Calcification” coordinated by CARIM has recently been granted within the EU program “Horizon 2020” between Maastricht, Aachen, Stockholm and London, aimed at joined doctorates between the institutions. Another CARIM-led ITN initiative on “Hypertension” with researchers from Dublin, Glasgow, Madrid, Maastricht, Padua and Paris is currently in preparation.

The newly established tenure track program of CARIM, as well as the *toptalent* program of the university, allows advanced young scientists to permanently enter academic rank and files, although the criteria of quality in research and teaching to obtain a professorship and/or permanent position are extremely challenging and not met by all candidates.



Joyful CARIM researchers at their best

To further improve scientific quality, collaborations and exchange professorships between Maastricht and numerous other national and international academic institutions are tradition. They have recently been intensified or newly established, especially with some German neighbour universities like the RWTH Aachen or the universities of Mainz and Münster.

Particular progress has been made in the field of cardiogenetics/-genomics and thrombosis/hemostasis by establishing joint professorships for mutual programs. A firm asset is the “Maastricht Study” mainly organized and run by CARIM scientists since 2009, a longitudinal observation trial, aimed at comparing 5000 diabetic versus 5000 non-diabetic patients from the region in an extensive investigative protocol. Clinicians and basic researchers can both exploit a host of relevant data including, of course, those on hypertension in a unique interdisciplinary, translational approach.

The implementation of the Maastricht Cardiovascular Center (CVC) with outstanding patient care and hospital organization together with the scientific background provided by CARIM, will give Maastricht University Medical Center (MUMC+) a unique chance to excel in translational medicine, a buzzword of our days. One of

CARIM's principal investigators has recently entitled an interview "You have to get out of your comfort zone". While this is certainly correct and necessary to meet the challenges of today's international biomedical science, CARIM does offer some comfort, too. The quality and enthusiasm of its researchers, the firm embedding in the scaffold-providing academic scene, a flat hierarchy and the help of the Dean's office and the administrators that one can enjoy here in Maastricht, compensate to a certain degree for the many mishaps and frustrations that accompany a scientific career as much as the moments of success and celebration.

- Thomas Unger

The Lancet Commission on Hypertension: Update



Michael Hecht-Olsen

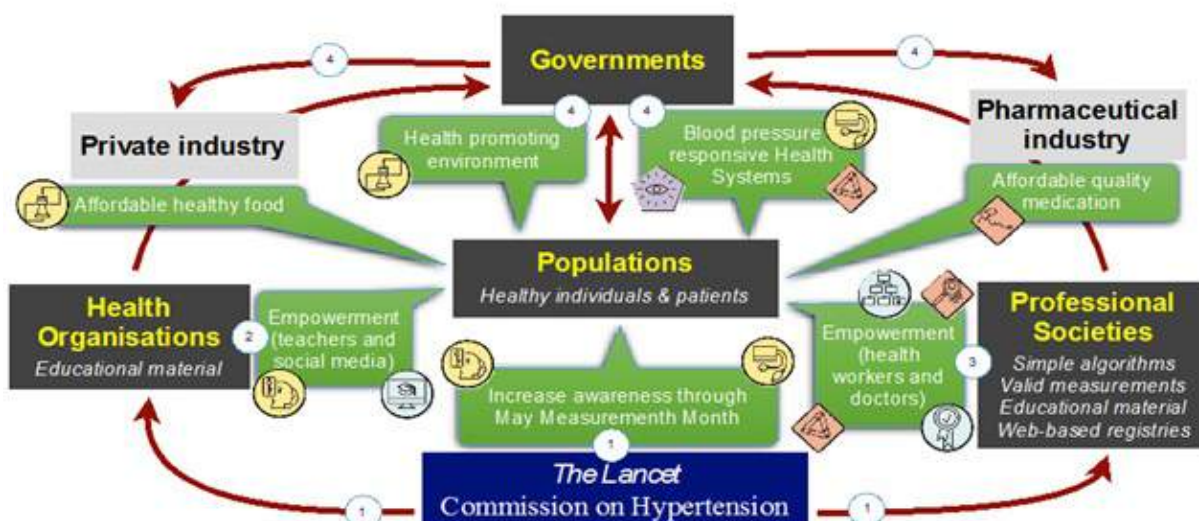
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The Lancet Commission on Hypertension (LCH) report: "A call to action and a life-course strategy to address the global burden of raised blood pressure on current and future generations" (1) was well received at the launch in Seoul, South Korea, September 2016. In the report itself, and at the launch, a campaign including two technical packages for prevention and treatment was promised (please see below).

- **Prevention-related technical package**
 - Improved public understanding of unhealthy and healthy lifestyles as well as elevated BP and its consequences
 - Policy and environmental strategies to promote health and support healthy behaviors
 - Improved access to effective health care delivery systems
- **Treatment-related technical package**
 - Standard protocols for investigation, treatment and monitoring
 - Team-based care, task sharing and workforce development
 - Access to affordable medications, technology and health care
 - Surveillance, patient registries and information systems

It is obvious that many of the key actions listed above call for a multi-sectorial strategy involving LCH group, health organizations, professional societies, governments and industries, as illustrated in the figure shown below.



1. **LCH group:** **Increase awareness through participation in May Measurement Month**
Facilitate research focused on improving BP control in low resource settings
Develop standardized educational material
2. **Health organizations:** **Empower people through teachers and social media to improve lifestyle and influence governments**
3. **Professional societies:** **Empower patients through health workers and doctors to improve lifestyle and treatment and influence governments**
4. **Governments:** **Create health-promoting environments and blood pressure-responsive health systems**
Influence pharmaceutical and private industry to facilitate affordable quality medication and affordable healthy foods

In relation to prevention, the LCH group has been active during the International Society of Hypertension initiated May Measurement Month 2017 (MMM17) in order to increase public awareness of hypertension. Furthermore, the LCH group will in collaboration with Jacqui Webster from the World Health Organization (WHO) Collaborating Centre on Population Salt Reduction at The George Institute for Global Health in Australia a) investigate whether the estimated global salt intake in the paper by Mozaffarian D *et al* in 2014 (2) is indeed an accurate estimation of salt intake compared to values based on 24-hour urine Na⁺ excretion measured after 2011, b) identify the barriers for reduction in salt intake in low resource settings, and c) assess the possibilities in low resource settings for combining reduction in salt intake with healthy dietary changes. Such information will be helpful for politicians in low resource settings and for health professionals who will contribute to MMM18 and MMM19.

Considering treatment, the LCH group has collaborated closely with Centers for Disease Control and Prevention (CDC) and WHO to align the LCH group campaign with the global HEARTS initiative and create synergy in both the preparation of the HEARTS tool kits as well as the implementation of HEARTS. Based on existing guidelines and the HEARTS tool kits, the LCH group is aiming to create an application ("app") to deliver decision support to health professionals and improve health education of patients. In addition, the LCH group is currently working on identifying high quality, low cost devices for reliable blood pressure measurements in low resource settings. Furthermore, the LCH group is reaching out to endocrinologists and nephrologists to create guidelines for screening and evaluation of secondary hypertension and/or kidney disease in low resource settings. Finally, the LCH group is working on a systematic review and meta-analysis on the blood pressure-reducing effect of different antihypertensive interventions in low resource settings.

The information from all of these projects will be used in the different implementation projects of the LCH group. The largest and most progressed project is "Prevention and Management of Diabetes and hypertension in Indian villages" (ManDit-India). LCH group is looking for projects in Africa, South America and China, and will soon initiate another project in Nepal to test the effect of a locally-adjusted "app" delivering decision support to health professionals and to improve health education of patients with hypertension and/or diabetes. The project in Nepal is an addition to an ongoing study named "Community-Based intervention for hypertension in Nepal (COBIN)", which is a community-based implementation research project exploring the potential of community health workers for prevention, control and management of hypertension in rural Nepal. The project is a collaboration between Nepal's Ministry of Health, Aarhus University and Nepal Development Society. Two feasibility studies (3, 4) have revealed that Female Community Health Volunteers were ready to receive a new training on hypertension prevention and control, and a recent cluster-randomized controlled trial (5) has showed statistically significant lower blood pressures in subjects receiving risk factor counselling by Female Community Health Volunteers. Recently the research group has started another cluster-randomized trial on exploring the potential role of FCHV for diabetes diagnosis and prevention at community level with support from World Diabetes Foundation and Aarhus University, Denmark.

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Council's Corner: Hypertension Issues - a personal view

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Hypertension is never alone



The social and clinical problem of hypertension is well known all over the world. A recent publication in Lancet (1) clearly showed the progressive increase in the prevalence of hypertension all over the world and, in particular, in developing countries where an increase in the rate of the disease is associated with a parallel increase in morbidity and mortality. In most of the many millions of patients with hypertension, the elevated blood pressure values co-exist with some additional conditions responsible for a significant increase in the risk of cardiovascular disease.

A remarkable prevalence of hypertension has been described in the presence of clinical conditions intrinsically responsible for an increase in CV risk, such as diabetes, lipid disorders (either high LDL-C or triglycerides) and obesity. The relationship between hypertension and elevated levels of serum uric acid is twofold, with an increase in the prevalence of new-onset hypertension in subjects with hyperuricemia who also experience a larger relative risk of disease in the presence of established hypertension. In addition, hypertension (or a history of hypertension) is a common feature of patients with many overt cardiovascular diseases including coronary artery disease, atrial fibrillation, congestive heart failure (particularly with preserved ejection fraction) and cerebrovascular disease. Finally, a significant excess in the prevalence of hypertension has been described in patients with COPD, rheumatologic disorders, and chronic inflammatory

bowel diseases that affect a remarkable number of patients and again contribute to the burden of disease associated with hypertension. This concomitance of clinical conditions with hypertension has several important implications, since the presence of elevated BP values can negatively affect the prognosis of the primary disease and, at the same time, the treatment of hypertension can be more difficult in patients undergoing a complex treatment schedule.

Despite its importance and despite the large number of patients involved, this problem is often underestimated by the many factors involved in the management of hypertension - the physicians, the patients and the system of evidence as well.

The **physicians** are used to considering hypertension as an increase in blood pressure values, since this is easy to measure and to use as an estimate of successful or unsuccessful treatment. But hypertension also means glucose abnormalities in over 30% of patients, dyslipidemia in about 35%, hyperuricemia in more than 25% with multiple risk factors in the same patients (2) and a close correlation with the severity of hypertension. Any approach based exclusively on blood pressure control is limiting the potential impact of any preventive strategy against hypertension, by restricting the benefit to the reduction of the hemodynamic risk, without affecting the residual cardiovascular damage that is responsible for a significant increase in the rate of major CV complications also seen in patients where blood pressure values are normalized. A more comprehensive approach to the disease should be promoted with the aim of increasing the sensitivity for the whole universe of hypertensive disease, whose underestimation is probably responsible for a remarkable number of preventable cardiovascular and renal complications in the hypertensive population.

As far as the **patients** are concerned, they have some resistance to being treated for a disease that is often apparently asymptomatic, and this certainly contributes to the low levels of adherence currently observed in

hypertensive patients undergoing blood pressure lowering treatment. In addition, the administration of antihypertensive drugs is often associated with a significant incidence of untoward adverse events that further reduces the propensity for good adherence to treatment with important clinical implications beyond the disease. However, poor adherence to therapy is only a part of the poor patient-hypertension interaction that also involves the underestimation of the personal risk of cardiovascular diseases. Some experiences based on the administration of multiple choice questionnaires have clearly shown the low reliability of any self-assessment of CV risk in the population, with a large proportion of either under- or overestimation. The largest proportion of subjects who underestimate their CV risk was found among the subjects who had never measured their blood pressure values, and whose answers were based only on a sensation of well-being. Therefore, one of the next steps for the future would be to increase the individual perception of the cardiovascular risk correlated with hypertension, by a population approach that can explain the central role of high blood pressure in the identification of a multifaceted system where the increase in blood pressure values is the most accessible of a series of features requiring active control.

Finally, the position of the **system of evidence**. This has certainly promoted and supported interesting clinical research resulting in the identification of new treatment strategies that can significantly improve the management of patients with cardiovascular diseases in general and with hypertension in particular. The most typical examples are drugs like the direct oral anticoagulants (DOAC), or the recently developed PCSK-9 inhibitors, CETP-inhibitors or the SGLT-2 inhibitors that have been tested in large randomized clinical trials and have shown the capacity to reduce the rate of major CV complications in different populations of patients at risk. The successful results of such trials are certainly based on the innovative treatment strategies, but also on the characteristics of the involved populations that usually include a large proportion of hypertensive patients. Hypertension was present in over 80% of the patients involved in the trials on DOAC (3), while the percentage of patients with high blood pressure ranged from 80% to over 95% in the studies addressing the efficacy of PCSK-9 and SGLT-2 inhibitors. This implies that the benefit observed in all these studies should primarily apply to patients

with hypertension that are usually not considered as a primary component of a successful end-point, but as the expression of the natural history of the index underlying disease. This implies that when we talk about the effectiveness of these innovative treatments in terms of evidence we are usually referring to diabetic, hypercholesterolemic and "arrhythmic" patients, but no system of evidence is used to underpin the fact that most of them are, first of all, hypertensive. The consequences of such a simplistic approach is that hypertensive patients are usually excluded from specific recommendations, with the eventual result that while other diseases are getting the spotlight, arterial hypertension is always the Cinderella responsible for doing the dirty work. This significantly reduces the perception of the role of hypertension as a crucial risk factor, reduces the opportunity of promoting a campaign of prevention based on the central role of hypertension and its integration with the other promoters of CV risk, and, finally, reduces the interest in the preventive impact of blood pressure control in patients with important co-morbidities.

Last, but not least, the consideration of hypertension simply as an unavoidable feature of the population at risk of CV disease can significantly compromise the interest of pharmaceutical companies in research into this very important field. It is a matter of fact that no drugs are currently in the clinical stage of development for hypertension, despite very active research activity looking for possible targets for treatment in the field of neuro-humoral systems and genetic analysis. The most sensational results in terms of blood pressure control have been the increase in SBP observed with some CETP-inhibitors (and even the most successful among them, anacetrapib, has some minor problems with blood pressure control) and the unexpected reduction in both SBP and DBP observed with the two SGLT-2 inhibitors (empagliflozin and canagliflozin) in the recently published pivotal mortality-morbidity studies. On the other hand, the same motivation can result in a quantifiable reduction of financial contributions for the organization of the major hypertension meetings since patients with elevated blood pressure values are not currently identified as a "commercial" target for innovative cardiovascular prevention.

In conclusion, there are many reasons to believe that the actual role of arterial hypertension is currently underestimated in the comprehensive perception of what are the most appealing modifiable risk factors for cardiovascular disease. One of the most important

factors to remember is, however, that hypertension is almost never alone and in many cases, can represent the most suitable and cheap driver for the understanding of who should be treated, and how. This approach will emphasize the importance of blood pressure measurement and monitoring while justifying an aggressive policy for stricter blood pressure control that could result in a direct (hemodynamic) and indirect (residual risk profile) reduction in the still elevated risk of cardiovascular disease in the general population.

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- Claudio Borghi

Award for Public Health Foundation of India (PHFI)

In recognition of the Public Health Foundation of India's outstanding contribution to skill building initiatives and advancement of knowledge in the Indian healthcare sector, the Quality Council of India (QCI) has awarded to the Public Health Foundation of India the prestigious QCI-DL Shah Platinum Award for skill building of primary care physicians in chronic conditions.



Left to Right: Professor D. Prabhakaran, Professor K. Srinath Reddy, Shri. Baijayant Panda, Honourable Member of Parliament (Lok Sabha), Shri. Amitabh Kant, CEO Niti Aayog and Dr Sandeep Bhalla, Programme Director, Trainings, Centre for Chronic Conditions and Injuries, PHFI

The Platinum Award was presented to PHFI by Shri. Baijayant Jay Panda, Honourable Member of Parliament (Lok Sabha) and Shri Amitabh Kant, CEO, Niti Aayog, Government of India during the inaugural session of the 12th National Quality Conclave at Le Meridien hotel. With this additional recognition, PHFI wins the topmost award for Quality and completes the Grand Slam of Skill Development Awards.

The training division at the Centre for Chronic Conditions and Injuries led by Professor Prabhakaran and Dr. Sandeep Bhalla has trained more than 20,000 primary care physicians across the country through their various capacity-building initiatives.

Winning the prestigious QCI-DL Shah Platinum Award in addition to other leading awards in skill development is a testimony to our endeavour and commitment to working towards a healthier India. Our health systems can be effective and equitable only when primary health care is widely accessible and scientifically of sound quality. The award exemplifies PHFI's Mission which is to contribute to the better-quality healthcare of all citizens, especially through skill development and knowledge advancement in primary health care.

We would like to thank the International Society of Hypertension for all the support extended in making this achievement possible. We look forward to continuing to work towards a healthier India through this wonderful association.

Dr. Arun P. Jose, Program Manager
Certificate Course in Management of Hypertension (CCMH), Public Health Foundation of India

Sadayoshi Ito

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Perspectives of hypertension management in Japan



Hypertension is the most common modifiable cause of cardiovascular disease. In Japan, the prevalence of hypertension is high, probably due to an ageing society, high salt intake and an increased number of subjects with metabolic syndrome. Awareness is not an issue because of mandatory annual health check-ups (Japanese law) and the common practice of home blood pressure measurement. On the other hand, the rates of treatment and control are way below expected levels. In order to combat hypertension, it is essential for us to have integrative approaches involving not only patients and healthcare providers but also government and industries. I anticipate that "Hoken-shi", local healthcare nurses, will be a bridge between doctor and patients/residents and contribute to improvement of hypertension management.

Hypertension is a major modifiable risk factor for cardiovascular disease and dementia. Despite significant scientific advancements in the diagnosis and treatment of hypertension in recent years, neither the prevalence of hypertension nor the rate of uncontrolled hypertension has declined. The Prospective Urban Rural Epidemiology (PURE) study reported that prevalence and awareness of hypertension were about 40% and 45% respectively, and that of those who were aware of the diagnosis, the majority (87.5%) were receiving pharmacological treatments but only a minority of those receiving treatment were controlled (about 30%) (1). The results indicate that only 12-13% of hypertensive patients are adequately controlled to their target blood pressure levels. Multiple factors contribute to the poor control of hypertension, including ageing society, social economic situations etc. These factors may vary from country to country. In this article, I would like to describe the unique

features/problems of hypertension management in Japan.

In Japan, lifestyle-related diseases such as hypertension, obesity, diabetes and cancer have recently become huge burdens on the nation's welfare and economy. Recognizing this problem, the Japanese government established Health Promotion Law in 2001 and adopted "Kenkou Nippon 21 (Healthy Japan 21)", a national health care act. Along with already existing laws, this law has made a comprehensive annual health check-up mandatory for almost every resident (including school children) in Japan. In addition, devices for home blood pressure monitoring are widely used (almost all households possess one). Therefore, most Japanese people know their blood pressure levels, so awareness is not an issue. However, the prevalence of hypertension is high (60% for men and 45% for women), and the rates of treatment (about 53% for both men and women) and control (32% for men and 42% for women) are not satisfactory (2). Various factors contribute to these problems, such as an ageing population, high salt intake, increased number of subjects with metabolic syndrome and insufficient understanding/perception in the general population about hypertension as a risk of cardiovascular diseases.

Perception of the general public and the role of "Hoken-shi"

Despite efforts by academic organizations (such as the Japanese Society of Hypertension) and local and central governments, the perception of

the general population regarding the importance of hypertension treatment is rather disappointing. In Japan, there are unique healthcare professionals called "Hoken-shi". They are nurses employed by local governments, who monitor the health status of individual residents of local communities and consult and give advice about better healthcare at the individual level. According to a survey by a group of Hoken-shi and nutritionists (led by Ms. Kumagai), many hypertensive subjects did not take medication or stopped medication because of poor understanding or misperception about the importance of hypertensive treatment. For example, they did not take their medications because they had no symptoms, or because they were told that once medication was started, it was for life and could not be stopped. Thus, in order to improve treatment and control rates, it is imperative to have hypertensive subjects understand the real value and goal of hypertension treatment, that is, to promote healthy life by protecting the important organs (brain, heart and kidney), and not merely to reduce blood pressure itself.

Strain vessel for an explanation of the importance of hypertension management

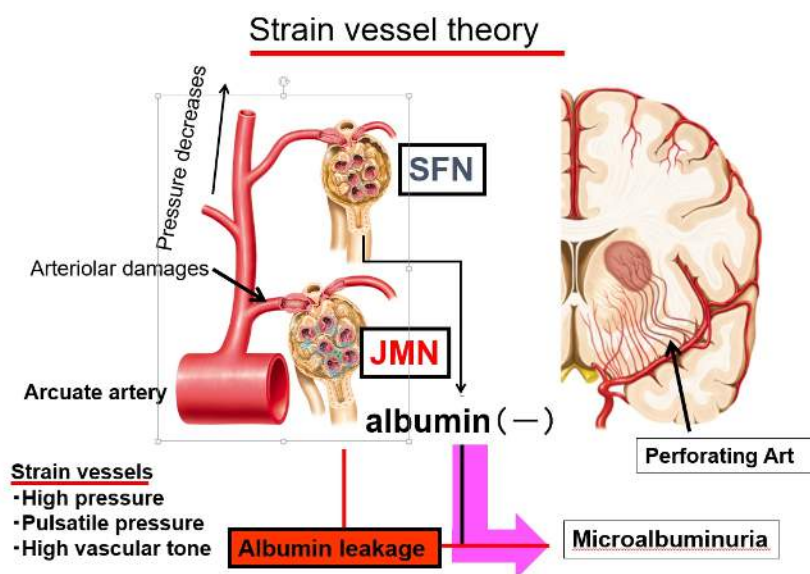


Figure 1: Strain vessels in the kidney and brain (ref. 4)

Based on the unique vascular structures observed in important organs (brain, heart and kidney), we have proposed the strain vessel theory for a mechanism of hypertension-induced organ damage (Figure 1) (3,4). In general circulation, larger arteries gradually divide into smaller arteries, so that pressure inside the arteries also gradually declines as they get smaller. However, in crucial sites for survival, such as the brain stem, blood is supplied by small arteries (perforating arteries in the brain) which branch off directly from large high-pressure arteries. These small vessels (strain vessels) are exposed to high and pulsatile pressure and they have to maintain high vascular tone in order to create large pressure gradients between large arteries and capillary beds. Thus, hypertension would cause great impacts on strain vessels. We and Ms. Kumagai's group use this theory to explain to hypertensive subjects and local residents how important blood pressure control

is, in order to protect these life-saving and tiny vessels, as small as one-tenth of a hair.

Strain vessel theory would also explain close linkages between albuminuria and cardiovascular diseases. While glomerular afferent arterioles in the deep nephrons are strain vessels, those in the superficial nephrons are not, because intra-arterial pressure drops gradually along the long interlobular arteries. Thus, hypertension /arteriosclerosis would first injure deep nephron glomeruli and substantial amounts of protein leak out of these glomeruli, while more superficial glomeruli are spared. This would result in microalbuminuria in final urine; however, it indicates injury to life-saving strain vessels. This theory may also be easier in helping the general population to understand how important albuminuria is as an index of organ damage.

In order to improve the rates of treatment and control of hypertension, it is imperative to convey messages that are concise, persuasive and easy to understand, particularly regarding the mechanisms of hypertension and hypertension-induced organ damage. People act only when they understand and accept the importance and value of actions.

Japanese Society of Hypertension, Healthcare professionals, government and food industries

We cannot emphasize enough the importance of the doctor-patient relationship for the successful management of hypertension. Interviewing patients and doctors in Asian countries, Rahman et al concluded that doctors may provide better care by aligning with their patients on a common understanding of successful hypertension management, and that the willingness of the doctor to adjust their patient interaction style to form a 'doctor-patient team' is important (5). In addition to medications, modification of

lifestyle is essential to achieve successful hypertension management, for which healthcare nurses such as Hoken-shi would play an important role, because they listen to the real voice of patients.

Salt intake in Japan is 11g/day on average, which is high compared with most western countries. Major sources of salt intake are processed foods, not soy sauce or miso soup. In order to promote salt reduction, the Japanese Society of Hypertension (JSH) has recently established a national salt-reduction day – the 17th of each month - and also made a mascot figure “Yoshio-kun” (Good salt) for campaign use (fig 2). The JSH has also acted on the Japanese government to indicate salt content rather sodium content on food labels. We are also calling upon food industries to produce delicious low-salt foods. However, the sale of low-salt foods is going up rather slowly, so more public awareness of the low-salt foods is needed. In this regard, organizations that have direct contact with local residents, such as Hoken-shi, could play a significant role in the dissemination of correct and useful information.



Figure 2: Yoshio-kun
All copy right: Japanese Society of Hypertension

Figure 2: Yoshio-kun, a mascot figure for promotion of salt reduction

Secondary hypertension may be one factor in the poor control of hypertension. Although hypertension guidelines recommend screening for secondary hypertension in the initial phase of hypertension management, secondary hypertension seems to be underdiagnosed. This is particularly true in the case of primary aldosteronism (the most common form of secondary hypertension comprising up to 10% of all hypertensive patients), because the majority of patients have no characteristic clinical features (such as hypokalemia). Physicians may overlook this disease. Even if they suspect it they may hesitate to fully screen and diagnose this disease, because of the many steps and long time before final diagnosis, primarily due to the time required for hormone assay (several days). We have recently developed methods to measure plasma aldosterone concentration and active renin concentration in about 10 minutes (6). These methods enable us to complete screening and confirmatory tests virtually in a couple of days. Spreading such methods in general practice may also help to improve hypertension management.

Conclusions

In order to combat hypertension, it is essential for us to have integrative approaches involving patients and their families, schools, community, media, academic organizations, government, insurers, food and beverage industries, health care providers, and the general public. I anticipate that “Hoken-shi” will be an important bridge between doctors and patients/residents and contribute to improvement of hypertension management.

Particularly, overcoming high salt intake is an important and difficult task in Japan. In Japan, major sources of salt intake are processed foods, not soy sauce or miso soup. In order to achieve salt reduction, the strong commitment of the government and food industries is essential, as in the case of the United Kingdom.

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- Sadayoshi Ito

ISH Member Reports from the European Society of Hypertension, June, Milan Meeting: 27th European Congress on Hypertension and Cardiovascular Protection



We are delighted that the following ISH members have contributed reports on stand out sessions that they attended during the June 27th European Congress on Hypertension and Cardiovascular Protection.



Mike Ionov

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27th European Congress on Hypertension and Cardiovascular Protection in Milan. A place where fashion, grandeur and science come together like The Three Graces.

This was my second ESH meeting and there was a “hot welcome” given by Milan to participants of the ESH Annual Congress (the average temperature was about 81°F in the shade till evening!) ‘Hot’ issues were also discussed during traditionally scheduled morning and plenary sessions, oral and poster reports, meetings with experts, workshops and training courses with a wealth of information given from the fundamental aspects of studying the mechanisms of hypertension to results of large-scale clinical trials.

Pending new ESC/ESH Hypertension Guidelines to be published in 2018, a lot of speakers hit the spots mainly on BP cut-offs, measurement techniques, differences in office, ABPM, HBPM, patient adherence, early single pill combinations, and changes in target organ damage.

A stand-alone symposium was devoted to a rapidly-developing and promising area of healthcare, i.e. the use of information and communication technologies. Professor G. Parati (Milan, Italy) with colleagues from Greece and China presented their reports showing significant increase in patients' adherence and target BP achievement with the joint use of telemedicine programs and home blood pressure monitoring. It emphasizes the essential role of emerging technologies in establishing doctor-patient partnerships and reducing therapeutic inertia, and provides the patient with multiple opportunities to hear critical messages and potentially

reduce the treatment costs. In his lecture, M. Azizi (France) also noted a degree of impact that a telemedicine (provided by mobile SMS) has on support of adherence. As there is an increasing diffusion of smartphones (more than 3.5 billion users to date) and more than half of them have already downloaded at least one mobile health application, it seems to be correct saying that mHealth is a “potential game-changer” (from a recently published paper by G. Parati, S. Omboni, et al.) Nevertheless, this needs more control, because legal aspects and the difficulty of technical implementation remain major barriers to the widespread incorporation of telehealth tools. The first official 2015 FDA Guidance on mobile health applications was encouraging news, along with the final release of the updated ESH official mobile BP telemonitoring application (ESH App). It seems to call for national hypertension societies to take note of innovations and to be proactive in pilot projects along with RCTs.

A terrific debate on topical issues was traditionally presented at the final plenary session. Discussing target BP level issues Professor M. Burnier (Lausanne, Switzerland) advocated intensive treatment with more stringent thresholds. He introduced brilliant clarity in favor of aggressive treatment, providing options for the same risks for MI and CVD death BUT lowering the risks of stroke, and reminded everybody to stand in the patient’s shoes.

Professor S. Kjeldsen (Oslo, Norway) was his opponent and parried with an artful answer, convincing the audience that in some cases conventional strategy is more advantageous in preventing MACEs and being crucial in frail elderly patients, people with extremely high baseline BP levels, etc. With great humour he talked about ‘real things’ like excessive diuretic usage or ‘lost to follow-up’ patients. As a decisive, kinky, argument Prof. Kjeldsen cited a comparison of Norwegian and Swiss cheeses. The latter, because of the much larger size of holes, is more likely to be eaten by rodents (like

an error in intensive BP lowering theory), also bigger cheese holes are reflection of gaps in the aggressive treatment hypothesis.

The debates and sessions this year turned out to be not only interesting and useful from a practical point of view, but an excellent example for scientists of how important it is to act sophisticatedly, to be more logical, and to be on reasonable ground even if it differs from the orthodox view.

- Mike Ionov

techniques to measure microcirculatory changes for hypertension management in the future.

The conference also featured a networking event hosted by the International Society of Hypertension in a picturesque terrace near the Duomo (city centre). This fantastic evening presented new investigators with a wonderful opportunity to interact with their mentors and peers from around the world. Another impressive recurring theme throughout the conference was the multitude of teaching workshops throughout the day that allowed attendees to become familiar with the newer concepts pertaining to hypertension and associated cardiovascular diseases.

The conference was well received, with the offered travel awards encouraging new investigators to come from many parts of the world. The next conference is scheduled to be held next year in Barcelona, Spain.

-Oneeb Mian



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The European Society of Hypertension Annual Meeting for 2017 was held in June in the vibrant city of Milan, Italy. The conference showcased several intriguing sessions on blood pressure measurement, discussions on upcoming guideline updates and, of most interest to me, novel microcirculatory markers of hypertension and vascular diseases.

Sophie Saxton from Dr. Heagerty's lab presented data indicating that the anti-contractile effect of perivascular adipose tissue from obese mouse mesenteric arteries is lost, compared to healthy counterparts. This was attributed to downregulation or desensitization of beta3-adrenergic receptors in obese mice, which could play a role in the development of hypertension. There were also several interesting presentations on the usefulness of retinal microvascular measurements in the detection and management of hypertension in patients. Of note, Dr. Dabrowska described the relationship between retinal microcirculation and large arteries in patients with essential hypertension. Central pulse pressure was found to be significantly correlated with retinal microperfusion and lumen diameter, and pulse wave velocity with perfusion. Dr. Gallo presented another study showing that retinal wall-to-lumen-ratio (WLR) is increased in masked versus control treated arterial hypertensive patients. Increase in anti-hypertensive therapy decreased retinal WLR concomitantly with improved home blood pressure control. These studies bode well for greater utilization of non-invasive



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In 2016 I defended the doctoral thesis "The role of genetic, hemodynamic and metabolic mechanisms in the development of comorbid pathology – essential hypertension and type 2 diabetes". My main scientific interests are related to comorbid pathology, genetic aspects of hypertension and type 2 diabetes, metabolic syndrome.

Thanks to the accommodation grant from ESH I had the opportunity of taking part in the prestigious 27th European Meeting on Hypertension and Cardiovascular Protection. It was a great honor for me to make an Oral Presentation in Poster Area at this Scientific Meeting.

One of the most important sessions for me was the satellite symposium "Improving management of hypertension: is early use of combinations the solutions?" (Chairpersons: G. Parati, B. Williams).

In his introduction, Prof. B. Williams stressed the importance of the timely prescription of combination treatment, in which drugs affect the various pathogenetic mechanisms underlying the development and

progression of hypertension.

Prof. C. Borghi presented the report "Pitfalls in hypertension management: a case study illustration", in which he summarized different ways to maximize the expected clinical benefit of combination treatment, and outlined strategies for improvement of blood pressure control and reduction of cardiovascular risk.

In the presentation "Optimal management of hypertension: key learning from past years" Prof. J. Brguljan paid special attention to compliance, safety and the effectiveness of fixed-dose combinations of antihypertensive agents.

Prof. K. Narkiewicz presented the report "Better

management means also choosing the right drugs" in which the importance of development of new and additional approaches to cardiovascular diseases management was noted. Prof. Narkiewicz underlined the important role of molecular and clinical synergies of antihypertensive drugs and noted the benefits of prescribing single pill combinations.

In conclusion, Prof. G. Parati summarized that "optimal cardiovascular protection by antihypertensive treatment can best be obtained through early start of effective and well tolerated drug combinations, at adapted doses".

-Anna Shalimova



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Even though until recently it was mostly large vessel alterations that were considered as target organ damage, there has been growing interest during the past years regarding the importance and the role of microcirculation in global cardiovascular risk assessment. The retina represents an open and easily accessible window for the in-vivo study of microcirculation in the human body, providing useful information for cardiovascular risk stratification in hypertensive patients or even the prediction of hypertension itself in healthy individuals.

During the 2017 ESH meeting, in the relevant "Microcirculation and Small Vessels" session, Professor Rizzoni presented the achievements in retinal vasculature

assessment techniques over time and discussed their possible role in cardiovascular risk assessment. Traditionally, retinal vessel evaluation is based on fundoscopy. The invention of the non-mydratic cameras, in combination with the development of computerized, automated systems for processing retinal photography, revolutionized the field. It is therefore feasible to easily and rapidly evaluate subtle retinal vascular changes in thousands of participants in large epidemiological studies. The measurement of Central Retinal Artery (CRAE) and Vein (CRVE) Equivalent and their ratio (AVR, Arterio-Venous Ratio), even with their methodological limitations, have been studied thoroughly, predicting independently cardiac events in women and stroke in the general population. Recently, low cost adaptors and accessories have enabled quick, easy and widespread retinal photography with the use of a single smartphone. In the last few years, expensive but innovative techniques such as adaptive optics have become available. Images of retinal vessels of an impressively high resolution can be acquired, enabling the measurement of the wall-to-lumen ratio of the retinal arteries, a promising new index of cardiovascular health in hypertensive patients.

- Areti Triantafyllou



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Alta Schutte

ISH President-Elect
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Africa

Report on the Joint ISH-ESC
Session during the Congress
of the European Society of
Cardiology, Barcelona,
Spain (26-30 August 2017)



In 2016 at the ESC Meeting in Rome, the European Society of Cardiology and International Society of Hypertension held, for the first time, a joint session on addressing some of the most important challenges facing hypertension. It was important to take this joint initiative further during the second ISH-ESC Joint Session, held in Barcelona. The session titled, *Population-wide blood pressure lowering – Theory and practice* was chaired by the World Heart Federation President-Elect, Professor Karen Sliwa-Hahnle (South Africa) and ISH Council Member, Professor Thomas Unger (Netherlands). The opening lecture by Professor Torben Joergenson from Denmark reviewed the general principles of population-based interventions – in essence the benefits highlighted by Geoffrey Rose, namely that shifting the population distribution of a risk factor, in this case raised blood pressure, will prevent more burden of disease than targeting those people at increased risk. He also highlighted the challenges in implementing such interventions, such as the political will of global bodies and governments, and interference by industry.

The presentation linked well to a presentation by

Professor Alta Schutte (South Africa) who focused on the dramatic shift in burden of hypertension from high income countries to LMICs, as recently published by the NCD Risk Factor Collaboration. Since control of hypertension is very low in LMICs, population-based strategies targeting the whole life-course seems the best approach over the long term – aligned with the report of the Lancet Commission on Hypertension. She discussed examples of success stories, such as the sugar taxes in Mexico, and legislation enforcing mandatory reduction in the sodium content of processed foods in South Africa.

Professor Neil Poulter (United Kingdom) gave a detailed overview of the May Measurement Month 2017 campaign of the ISH and World Hypertension League. This global awareness and screening programme for hypertension was the largest ever performed. The ISH supported over 100 countries in joining this initiative by providing online support, detailed training materials, information in five different languages (please view www.maymeasure.org) and with the support of Omron UK also provided blood pressure devices to resource-poor settings. Even during August the ISH still received thousands of data entries being submitted from participating countries, which will ultimately form part of a tremendous global database. Further participation was also encouraged for the MMM2018 campaign.

The final presentation was delivered by Professor Niels Graudal from Denmark on salt and diet in the context of blood pressure. Based on recent Cochrane as well as systematic reviews and meta-analyses he challenged the notion that salt reduction below 5.8 grams/day will yield population-wide benefits in blood pressure lowering. His findings showed that salt restriction in normotensive populations will have little effect, and salt intake of less than 5.8 grams/day may only benefit hypertensive patients with a high salt intake. Many debates on this topic have been prominent at recent scientific meetings, and this presentation was no different, with several scientists from the audience disagreeing. The session was ended with this lively discussion, even continuing after the conclusion of the session.

-Alta Schutte

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THREE COMMENTS on the article written by Nadia Khan in the June issue of ISH Hypertension News:

"Expanding the Workforce in Hypertension: A Focus on Pharmacists " ([Click here to read this report](#))



Comment 1

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Expanding The Work Force in Hypertension: A Focus on Pharmacists - A rejoinder

Background

A recent article by Nadia Khan in the ISH Newsletter is highly commendable and appears to be more relevant in the developing countries where the burden of high blood pressure is greatest.

In 2000, **972 million** people had HBP with a prevalence rate of 26.4%, **333 million** in economically developed countries and **639 million** in economically developing countries. It is projected that by 2025 a total of **1.54 billion** people accounting for 30% of the World population would be hypertensive with **75% of these from the developing countries and regions**.¹

In contrast to global trends, the prevalence of hypertension in most countries in Africa is increasing:

In 1990, less than 20% of the adult African population had hypertension. In 2010, more than 30% had hypertension. The prevalence rates of hypertension are amongst the world's highest in some African countries. Self-medication from ignorance and scarcity of healthcare personnel and facilities immensely contributes to the poor control rates. Individuals need to have a minimum level of knowledge and education to be able to benefit from self-medication. A major issue is the observed low awareness and relatively low control rates for hypertension in Africa as compared with the more economically advanced countries^{1,2,3}.

Need for collaboration in addressing poor control of high blood pressure

These observations call for the contributions and collaboration of all health professionals to improve on the noted deficiencies in hypertension control in Africa,

and globally. Concerted efforts towards improving high blood pressure as an important cardiovascular risk factor are encouraged^{3,4,5}. The Pan-African Society of Cardiology Task Force on Hypertension was inaugurated and given the task of proffering measures aimed at reducing hypertension burden in the African Region⁶. They have made considerable progress in this⁶. Pharmacists have not been appropriately involved in hypertension globally even though they can, indeed do, do a lot to improve drug compliance by hypertensive individuals. This awareness of the capabilities of healthcare professionals apart from medical doctors in high blood pressure control appears to be growing. At the eighth International Society of Hypertension African Hypertension Teaching Seminar held in Maputo, Mozambique (April 2016), a pharmacist and a nurse were included as participants and both presented papers. The pharmacist's paper was on "Adherence of hypertensive patients to therapy..." – a study carried out by her and her pharmacist colleagues in two tertiary health institutions.⁷ She highlighted the role of pharmacists in promoting hypertension management and control. Nadia Khan was, indeed correct when she stated that "team-based models of care that leverage the full scope of pharmacists' and other health professionals' skills are an untapped solution whose time has come".

Roles specification

The role of the pharmacist should indeed be to work together with primary care physicians as well as other specialized healthcare personnel to ensure better control of high blood pressure. Roles should, however,

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be specified based on the training and experience of each professional group. The roles for pharmacists, as mentioned in the article, are quite in order and should be strictly maintained to improve control of high blood pressure. Pharmacists' roles should not be to support self-medication as mentioned in a recent paper by Fakeye et al⁸. Self-medication should be discouraged especially in an environment of low awareness and poor knowledge of effects and untoward actions of certain medications. Individuals identified as having high blood pressure should be encouraged or aided to see a primary care physician or any available specialist. Other healthcare team members would be very useful on follow-up (as mentioned by Nadia Khan) and creating and improving awareness which is currently very low in Africa and other developing countries^{5,6}.

Conclusion

Team-based models of approach are necessary to combat the scourge of the high global burden of high blood pressure with special reference to the developing economies where the burden is greatest, and where human and material resources remain scarce and below expectations. However, there is a need for roles specification and adherence.

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-Basden Onwubere



Comment 2

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Telemedicine may help to implement effective physician-pharmacist collaborative practice for hypertension management

Community pharmacists are integral members of the hypertension team management. The current model of a community pharmacy-based hypertension management includes three levels of intervention [1]. (i) The promotion of a healthy lifestyle in the population for cardiovascular prevention through health education. (ii) The early detection of hypertension by measuring blood pressure and referring possible hypertensive subjects to the

primary care doctor. (iii) The management of treated hypertensive individuals with regular blood pressure measurement in the pharmacy, the counselling and provision of information on drug treatment and drug safety, the reporting of possible drug-related problems to the general practitioner.

The pharmacy is usually within walking distance of

Continued on next page..

home or workplace, is open 6 to 7 days a week, no appointment is generally required to be seen for a blood pressure measurement, and basic services are usually delivered at lower costs compared with other primary care settings, such as general practitioner clinics. For all these reasons, pharmacies may help to expand patient access to care in collaboration with the general practitioner, the hypertension specialist and other healthcare professionals.

Multidisciplinary approaches, and particularly those including a community pharmacist, may improve high blood pressure detection, enhance blood pressure control, increase adherence to therapy and improve outcome [2,3]. Team-based care such as a physician-pharmacist collaboration also appears also to be a cost-effective strategy for managing hypertension, particularly for high-risk patients [4]. However, several aspects should be taken into consideration for the implementation of the hypertensive management model in the pharmacy. Thus, team-based care is efficient if adequate training on guidelines and on practical aspects of disease management is guaranteed and achievement of adequate expertise is verified. Accreditation programmes should be established in individual countries, taking into account education, licensing requirements, regulatory issues, scope of practice and responsibilities [5]. Defining clear tasks and roles pertinent to the respective educational backgrounds, and establishing an efficient communication between the team members may help to improve the quality and effectiveness of care and integration between various healthcare professionals involved in the management of the hypertensive patient.

The use of health information technologies may help in creating telehealth networks involving various healthcare professionals and providing patient-centered comprehensive disease management and preventive care. A physician, a nurse, a pharmacist, and an electronic communication system should constitute the minimum team. In the context of such a model the pharmacist may share some tasks with the doctor, reducing the general practitioner workload and inappropriate referral of patients to doctors.

Web-based telemedicine platforms may be used to provide home or 24-hour ambulatory blood pressure monitoring through community pharmacies, extending the screening for hypertension and providing quick, accurate and professional feedback and adjustment of care plans in treated hypertensive patients, with the support and supervision of the general practitioner or the specialist [6]. The effectiveness of such a telemedicine-based approach for hypertension management has been demonstrated. In the Electronic

Communications and Home Blood Pressure Monitoring (e-BP) study, involving 778 uncontrolled hypertensive patients, blood pressure control at 12 months significantly improved from 31 to 56% in patients who experienced the pharmacist care management delivered through web communication and home blood pressure telemonitoring compared with usual care-treated patients [7]. Severe hypertensive patients at baseline had the major benefit from this study. The benefit of the pharmacist-led care persisted at least 1 year after the completion of intervention [8]. In another randomized controlled study, the Hyperlink, home blood pressure telemonitoring and pharmacist case management allowed achieving better blood pressure control compared to usual care during 12 months of intervention in 450 hypertensive patients with a wide range of comorbidities and hypertension severity [9]. Also in this study the effect of the intervention persisted during 6 months of post-intervention follow-up.

In Italy and other countries community pharmacists are allowed independently to provide counselling on healthy lifestyle, monitor adverse events and provide support in the proper use of antihypertensive drugs prescribed by the doctor. In recent years national regulations have allowed web-based centres to provide blood pressure telemonitoring services with medical reporting and advice to patients through the community pharmacies. In this national setting we have set up an observational, cross-sectional, multicentre study (TEMPLAR, TELeMonitoring of blood Pressure in Local phARmacies). The study aims at assessing the potential advantage of 24-hour ambulatory blood pressure telemonitoring in community pharmacies for screening of potential hypertensive subjects and follow-up of treated patients [10]. In the nearly 18,000 patients seen so far 24-hour blood pressure was controlled (24-hour average <130/80 mmHg) in 52% of those untreated (representing 84% of the sample) and in 59% those receiving any antihypertensive medication (16% of the sample). Such a picture suggests that there is still much to do to achieve adequate blood pressure control in the community.

Thus, evidence from randomized or observational studies suggests that carefully organized, structured physician-pharmacist collaborative intervention based on e-health technologies (and particularly blood pressure telemonitoring plus patient education on lifestyle, drug therapy and cardiovascular risk factor control) may facilitate high blood pressure screening and detection, and may be particularly effective for improving blood pressure control in treated hypertensive patients.

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-Stefano Omboni

Comment 3



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(Pictured from left to right)

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The prevalence of cardiovascular disease has decreased dramatically during the past decades. For example, in Sweden the number of individuals suffering from a myocardial infarction was 39,182 in 1987 and 26,602 (fatal events decreased from 18,408 to 6,640) in 2015 [1], despite a concomitant increase in the population of almost 1.5 million. Also for stroke, reassuring data on incidence and mortality are available [2]. Physicians'

efforts regarding drug treatment for individual patients have probably contributed largely to this favourable development.

Hypertension is the most common chronic disease diagnosis in Swedish primary care and every physician needs to master antihypertensive drug treatment, as hypertensive patients occur at all levels of care.

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Unpublished recent data from a primary care centre serving about 10,000 patients in Sweden indicate that more than 70% of patients 65 years or older with a planned visit to any physician at the centre during one month had hypertension. Upon assessing the drug treatment quality in these patients, by a physician with specialist competence in family medicine, and taking each patient's condition into account, the majority had appropriate cardiovascular drug treatment. Only one immediate change (withdrawal of nifedipine due to the fact that the patient had no reasonable indication) and few longer term changes (for example, one patient was treated with both felodipine and carbamazepine, a combination which may reduce the effect of the calcium blocker) were suggested upon the physician quality assessment.

For hypertension and cardiovascular disease, easily accessible SCORE risk charts and treatment guidelines constitute valuable tools guiding physicians during the patient consultation, especially those not specialized within the therapeutic area. Indeed, prescribing guideline booklets are appreciated among general practitioners [3]. Evidence-based tools are applicable at a general level, and may come well to hand during the physician-patient encounter. Nevertheless, all treatment needs to be individualized according to medical history, physical examination, laboratory test, and patient preferences. Thus, drug treatment is an integrated part of the process of diagnosing and follow-up of the patient.

Computerized decision support systems, for example alerting potential drug interactions, drugs with renal elimination in patients with reduced kidney function, and potentially inappropriate medications in the elderly [4, 5], may also have contributed to good prescribing practices. Such systems may facilitate the physician to adjust the treatment to the specific patient. Drug treatment is a complex task, where diagnostic skills need to be combined with pharmacologic knowledge and patient communication. The importance of professional learning concerning drug treatment in medical school has been emphasized [6]. In Sweden, efforts to facilitate the process of learning for medical students are ongoing [7]. In addition, efforts by the National Board of Health and Welfare may have contributed to the favourable development regarding drug treatment. Indeed, they have produced several web-based educational programs, and have clarified in national statutes that basic and expanded medication reviews are part of the attending physician's professional responsibilities [8].

The National Board of Health and Welfare has also developed indicators of prescribing quality, for example for benchmarking [9]. Although these

indicators may reflect quality to a limited extent and the applicability at the individual level may be questioned [10-13], they constitute a quick guide to what experts consider current best practice. Further, they enable feedback to physicians, and provide a basis for collegial discussion on drug treatment, a valuable type of continuous medical education [14]. Out of 63 nationally established diagnosis-specific indicators of prescribing quality, four concern hypertension. Two indicate potentially inappropriate drug treatment, both concerning diltiazem/verapamil, and two indicate rational treatment, both including angiotensin converting enzyme inhibitors.

Cardiovascular drugs constituted the most frequently dispensed prescription drugs in Sweden, measured in defined daily doses (DDD), in 2005 [15]. Of note, 69 (20%) out of 338 studies published in 2005-2014 using the Swedish Prescribed Drug Register as a data source concerned cardiovascular drugs, which was the second most studied therapeutic area after psychiatric disease [16]. The publications were primarily descriptive (n=27; 39%) or analytic (n=35; 51%), providing information on prescribing patterns, patient adherence, factors underlying treatment practices, and effects of drug exposure.

Decades of efforts and developments across a variety of levels may have contributed to better drug treatment in patients with cardiovascular disease and improved health outcomes. Thus, it may not be surprising that routine involvement of a third party in drug treatment matters, such as pharmacist participation in medication reviews, has not been shown to improve patient outcomes [17-21]. Senior colleagues may be consulted in complicated cases, and pharmacists upon pharmaceutical issues. However, it is the responsibility of attending physicians at all levels to integrate drug treatment in their daily patient work, taking advantage of available tools and applying their medical and pharmacological knowledge for the benefit of the patient.

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-Susanna M Wallerstedt, Naldy Parodi Lopez,
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Author Reply: Expanding the Workforce in Hypertension: A Focus on Pharmacists

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Thank you to my colleagues Drs. Onwubere, Omboni, and Wallerstedt et al, for their thoughtful comments. I agree with Dr. Onwubere who highlights that it may be particularly advantageous to leverage skills of other health professionals, including pharmacists, in developing countries. As Dr. Onwubere points out, the prevalence of hypertension in Africa and other low and middle-income regions of the world are escalating rapidly, fuelled by urbanization and an aging population. The hypertension and consequent cardiovascular epidemic is outpacing the scarce resources in these regions for screening and management (1). Pharmacists are currently focused on drug dispensing. Pharmacy reform to provide more patient centered care may enhance lower cost access to hypertension screening and control especially among those living in poverty or rural areas (2).

Dr. Omboni also discusses the potential merits of team-based care including a pharmacist-physician as a cost effective solution to advancing hypertension awareness and control. Dr. Omboni also rightfully cautions that to establish team

Continued on next page..

based care, several key considerations must be met. I fully agree that accreditation programs for pharmacists must be developed to ensure expertise in screening and managing hypertension. Of note, Hypertension Canada developed an educational program with considerable interest from pharmacists. Dr. Omboni further emphasizes that health information technologies such as tele-health may be utilized as a part of effective communication strategies between pharmacists, nurses and physicians. In Dr. Omboni's Templar study, pharmacies include 24 ABPM tele-monitoring for screening and control (3). Dr. Omboni notes while there was improvement, sub-optimal control of hypertension remained. Having an enlarged scope of practice with pharmacists that include prescribing in addition to tele-monitoring may help further close this control gap.

Dr. Wallerstedt and colleagues rightfully assert that it is the responsibility of primary care physicians to diagnose and treat hypertension, and there are numerous tools designed to improve the ability of physicians to do so. In their comment, Dr. Wallerstedt et al., state that routine involvement of pharmacists in medication review was not effective in improving patient outcomes. However, a systematic review of all pharmacy interventions beyond medication reconciliation, demonstrates an overall reduction of blood pressure in patients (4). Further, when pharmacists also have a prescribing role with ongoing physician management, blood pressure is significantly reduced compared with physician care alone (5). Despite available tools, it remains challenging for primary care physicians to achieve high rates of BP control. In Canada, where hypertension awareness and control rates are among the highest in the world, 17% of the population with hypertension remain unaware and 20% of those diagnosed and treated for hypertension are uncontrolled (6). Many of the unaware population are working aged and likely do not access physician care routinely. Non-adherence rates for patients under the care of their physician in Canada are as high as 50% (7). While primary care should be commended for dramatically improving hypertension awareness and control in Canada and other countries, to achieve optimal control rates, additional interventions are needed. The evidence indicates that pharmacist care is an effective intervention for advancing hypertension control.

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