



**SOCIETATEA ROMÂNĂ  
DE CARDIOLOGIE**

*International Symposium*

# **UPDATE IN CARDIOLOGY 2015**

**Bucharest (Romania), April 16 - 18, 2015**

**Organized by**

University of Medicine and Pharmacy Carol Davila, Bucharest, Romania  
Romanian Society of Cardiology

**Promoted by**



FONDAZIONE  
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## **ABSTRACT BOOK**

The Royal Palace – National Museum of Art



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## ABSTRACT BOOK

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## **A BRIEF HISTORY OF THE UNIVERSITY OF MEDICINE AND PHARMACY CAROL DAVILA**

*The medical and pharmaceutical higher education in Bucharest dates back more than 150 years. Carol Davila, a Romanian physician of French origin, in collaboration with Nicolae Kretzulescu founded the medical education in our country by establishing in 1857 the National School of Medicine and Pharmacy. Despite all hardships, it developed gradually and in November 1869 the founding of the Faculty of Medicine in Bucharest became possible, the first faculty of medicine of the University of Bucharest, and of our country.*

*The defending of the first doctorate theses takes place in 1873, and on 1<sup>st</sup> of January 1875, at the initiative Nicolae Manolescu (1850-1910) the Medical Students' Society in Bucharest was founded.*

*The Faculty of Medicine was inaugurated on 12<sup>th</sup> of October 1903. The statue of Carol Davila was also unveiled in October 1903, initiative that belonged to the participants in the first national medical conference, held in Bucharest in October 1884. The statue was cast in bronze in the workshops of the School of Arts and Crafts in Bucharest. Among the notable professors who contributed, along with Carol Davila, to the initial education development in the Faculty of Medicine in Bucharest are included Iacob Felix, founder of the School of Hygiene; Alexandru Marcovici, initiator of the medical clinic; Nicolae Turnescu and Constantin Dumitrescu-Severeanu, founders of the surgical clinic; Zaharia Petrescu, founder of medical therapeutics and Alexandru Sutzu, who lays the foundation of legal medicine and psychiatry. An important event in the orientation of Romanian therapeutics and pharmacy was the issuance, in early 1863, of the first Romanian Pharmacopoeia. In addition to its initiator, Carol Davila, a particular merit in achieving this national work belonged to the scholar pharmacist Constantin C. Hepites. 1887 marked a milestone in the development of the Faculty of Medicine in Bucharest and a memorable date in the history of Romanian science – three scholars have been invited to teach and were appointed in the management of key departments of the faculty.*

*This is Victor Babeș, one of the great bacteriologists and pathologists of his time; George Assaky, founder of the school of experimental surgery and Nicolae Kalinderu, eminent clinician and initiator of the clinical anatomical orientation in the Romanian medicine. After 1890, other scholars complement the teaching staff of the Faculty of Medicine in Bucharest: in 1895 – Thoma Ionescu, founder of Romanian modern surgery, innovator in the field of spinal anesthesia; in 1899 – Gheorghe Marinescu, founder of the Romanian school of neurology; in 1901 – Ion Cantacuzino, bacteriologist, biologist, immunologist and epidemiologist, creator of the Romanian school of experimental medicine.*

*After World War I, the departments of the Faculty of Medicine are occupied by other leading figures, who consolidated the institution's prestige: Ion Nanu Muscel, clinician and school founder; Anibal Theohari, creator of experimental therapeutics and balneology; Ernest Juvara, innovator in surgical and instrumental technique; Alexandru Obregia, innovator in the science of psychiatry; Mina Minovici, creator and scientific organizer of forensic medicine in Romania; Francisc Rainer, scholar anatomist and anthropologist; Constantin I. Parhon, promoter endocrinology and biochemistry; Dimitrie Bagdasar, founder of the school of neurosurgery; Constantin Ionescu-Mihăiești, representative of the Romanian school of microbiology, organizer of the practice of sera production and one of the founders of Dr. I. Cantacuzino Institute.*

*In 1898 the School of Pharmacy becomes part of the Faculty of Medicine, recognizing its nature as higher education institution. It functions under the Faculty of Medicine until 1923, when the Faculty of Pharmacy is founded as a separate institution, within the University of Bucharest. An important role in the creation of the Faculty of Pharmacy and in stimulating pharmaceutical scientific research played the Professor Ștefan Minovici.*

## **THE UNIVERSITY OF MEDICINE AND PHARMACY CAROL DAVILA BUCHAREST IN FIGURES**

- 1669 teachers (161 professors, 189 associate professors, 374 senior lecturers and 945 assistants and tutors);
- 9562 students;
- 7983 Romanian students: 4809 at the Faculty of Medicine, 1621 at the Faculty of Dentistry, 1040 at the Faculty of Pharmacy and 513 at the Faculty of Midwifery and Nursing;
- 1579 foreign students: 1160 at the Faculty of Medicine, 273 at the Faculty of Dentistry and 146 at the Faculty of Pharmacy;
- 1502 doctoral students: 1284 at the Faculty of Medicine, 134 at the Faculty of Dentistry and 84 at the Faculty of Pharmacy;
- 200 doctoral supervisors;
- 389 doctorate theses defended publicly in 2013;
- 700 articles in extenso published in publications with impact factor in 2013;
- 32 projects won in national competitions and 8 in international competitions in progress in 2013;
- 210 books published by national publishers and 41 international publishers in 2013.

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## **In-vivo Diffusion Tensor Imaging in Human Hearts**

Dudley Pennell

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Hypertrophic cardiomyopathy (HCM) is the most common inherited cardiomyopathy. Histologically, HCM manifests as fibrosis, microvascular abnormalities, myocyte hypertrophy and myocyte disarray. Disarray may play a key role in the genesis of the substrate responsible for malignant ventricular arrhythmias and myocardial contractile dysfunction, but to date, insights into the extent and spatial distribution of myocyte disarray have been derived largely from small post-mortem series examining hearts obtained after sudden cardiac death. These studies have considerable selection bias and as a result, the in-vivo prevalence and functional consequences of disarray in HCM remain unknown. Furthermore, the diagnostic utility of disarray in HCM is unclear as the phenomenon has also been described in a variety of congenital and acquired myocardial diseases. Cardiovascular magnetic resonance (CMR) is assuming an increasingly important role in the diagnosis and evaluation of HCM.<sup>7</sup> 1 It allows the accurate assessment of hypertrophy;<sup>2</sup> the detection and quantification of fibrosis through late gadolinium enhancement (LGE) imaging and T1-relaxometry;<sup>3</sup> and the identification of microvascular dysfunction through first-pass perfusion imaging.<sup>4</sup> The assessment of disarray however has proved more challenging. The emerging CMR-based technique of cardiovascular diffusion tensor imaging (cDTI) may afford this opportunity<sup>5</sup> and could have diagnostic utility in the differential diagnosis of left ventricular hypertrophy. This technology has been successfully applied to assess nerve fibre architecture in the central nervous system.

The orientation of nerve tracts is inferred by assessing the diffusivity of water molecules which preferentially occurs parallel to the nerve fibres.<sup>6</sup> However, the in-vivo application of such techniques to the myocardial architecture has been limited by the challenge of resolving the molecular diffusion of water molecules in the presence of bulk motion of the heart due to cardiac contraction and respiratory motion.<sup>7</sup> Studies in animal models have suggested that this technique may give useful insights into disarray in HCM, <sup>8</sup> but to date there is only one previous in-vivo human pilot study of 5 HCM patients. <sup>9</sup> We have described the development of a novel pulse sequence for cDTI which draws on technical improvements and 3T imaging in normal subjects.

Cardiac diffusion tensor imaging (cDTI) is a unique technique which can characterise myocardial microstructure in-vivo.<sup>10,11</sup> Recent technical advances have enabled robust in-vivo cDTI of the human heart.<sup>12,13</sup> The ability to interrogate the microarchitecture non-invasively has the potential to advance our understanding of the link between cardiovascular disease and microstructural integrity.

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## **Atrial Fibrillation: When Drugs Fail**

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Non-pharmacologic treatment of atrial fibrillation (AF) can include the use of electrical cardioversion, catheter ablation or surgical ablation. Guidelines for such therapy are well outlined in a 2014 AHA/ACC/HRS consensus statement (1) and are updated every several years. My cardiothoracic surgery practice has largely focused on the evolving surgical treatment of drug-refractory AF, with the understanding that previously ineffective anti-arrhythmic drugs can become quite effective after surgical or catheter ablation.

This talk is organized into a framework that first distinguishes the key features of different available surgical approaches in order to highlight their specific strengths and weaknesses. The indications for the use of these procedures are better understood in this context. We then go back to the elements of the 2014 AHA/ACC/HRS consensus statement to address which surgical procedure make sense with which patient.

Surgical therapy of AF and atrial flutter has evolved from a cut and sew era in which the only ablative energy available was nitrous oxide cryoablation with primitive hand-pieces. There are now multiple ablative energy sources available, each with specialized delivery tools. Placement of transmural contiguous linear lesions based on directly visualized anatomic landmarks can be easily accomplished with surgical techniques and can be decisive in the ablation of atrial arrhythmias.

Surgical lesion patterns have also evolved from the original Maze 3. This is due in part to a better understanding of the fundamental role of pulmonary vein (PV) triggers in the development of paroxysmal atrial fibrillation (PAF). Subsequent investigators have attempted to deconstruct the Maze 3 into component lesions that address specific failure mechanisms, such as left atrial (LA) macro-reentry flutters, while incorporating pulmonary vein isolation.

This appreciation of the essential versus non-essential lesions has led to the development of minimally invasive surgical procedures in selected patients, and allowed optimal deployment of surgical ablation tools in open chest procedures.

Lesion patterns in surgery are created with attention to visual anatomical landmarks. This is an important distinction from catheter ablation which relies on a combination of fluoroscopic imaging and electro-anatomic mapping. The prototypical bi-atrial lesion pattern is the Maze 3, developed by Cox and Schuessler (2,3). This operation was designed as a cut and sew procedure with adjunctive cryoablation. The key elements of the Maze 3 are bilateral pulmonary vein isolation, a mitral isthmus lesion, posterior left atrial connecting lesions, left atrial appendectomy and a right atrial cavo-tricuspid isthmus lesion.

These building block lesions can be found in the Maze 4 (4), in the Radial Procedure (5,6), and in some left atrial lesion patterns (7,8) that are paired with a cavo-tricuspid isthmus ablation.

There are two stand-alone lesion sets that have been used for epicardial ablation:

1. Bilateral PV isolation, with (9,10) or without (11) non-isthmus connecting lesions. Ganglionated plexus identification and ablation is also performed at some surgical centers as an adjunct to epicardial ablation (12,13).

2. A “box lesion” which runs anterior to the 4 pulmonary veins (14,15).

These approaches represent two different ways to isolate muscle sleeve triggers located in the pulmonary veins. Each has limitations that may lead to treatment failures. Unusual trigger locations, such as in the posterior left atrium or superior vena cava may be unrecognized and not effectively isolated by simple pulmonary vein isolation. With respect to the box lesion, it can in theory isolate triggers located in the posterior left atrium along with the pulmonary veins, but in practice it is quite difficult to achieve reproducible transmural ablation (16) or freedom from AF (15).

In our center, the preferred approach for patients with persistent AF, failed previous catheter ablation or paroxysmal AF with large left atrium is a “hybrid” of catheter ablation and minimally invasive surgical ablation using pericardioscopy, known as the Convergent Procedure.

Pericardioscopy adopts a novel entry site into the pericardial space through the central tendon of the diaphragm, with access above the left lobe of the liver via a 2 cm subxiphoid incision. The pericardioscope can access the posterior and lateral left atrium and a specially designed saline irrigated radiofrequency ablation probe can then deliver epicardial lesions to surfaces not covered by pericardial reflections (17). Lesion transmuralty is assessed before and after lesion delivery using Carto electroanatomical fractionation mapping. Complete PV isolation requires either same setting or prior percutaneous ablation of regions not accessible by the pericardioscope.

Compared to standard catheter ablation, the Convergent Procedure reduces procedure time, improves lesion transmuralty, and aids in eliminating atrial tachyarrhythmias arising from prior left atrial ablation. It has a lower incidence of minor and major complications compared to trans-pleural surgical approaches. It is contraindicated in patients with prior cardiac procedure or history of pericarditis. Current results at our institution and a summary of results at other centers will be given.

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## **Percutaneous interventions in structural heart disease: All that a clinical cardiologist should know but is afraid to ask**

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Percutaneous interventions for structural heart disease represents a new branch of cardiology covering a wide range of congenital and acquired diseases that were previously treated surgically or simply not addressed. The term structural heart disease is commonly used to refer to non-coronary heart diseases ranging from congenital defects to acquired valvular diseases. This new branch requires a multidisciplinary approach that includes cardiac imaging specialists, clinical cardiologists, interventional cardiologists, anesthesiologists, and cardiac surgeons. In this lecture, I will talk mostly about the recent advances in treatment of aortic valve stenosis and mitral regurgitation.

Aortic stenosis is a very common problem affecting up to 4% of people over 80 years of age. A significant proportion of these elderly patients have significant comorbidities making them poor surgical candidates for aortic valve replacement. Transcatheter Aortic Valve Replacement (TAVR) involves treating a patient with symptomatic severe aortic stenosis (AS) by displacing and functionally replacing the native aortic valve with a bioprosthetic valve delivered on a catheter via a percutaneous transarterial approach through a peripheral artery (eg, the femoral, subclavian artery, transcaval), a direct aortic approach through a limited sternotomy, or a transapical approach through a limited lower thoracotomy.

Two devices, the Edwards' SAPIEN (balloon expandable) and the Medtronic CoreValve (self expandable) prostheses, are currently approved in the United States for clinical use. The driving force for TAVR approval in the United States was the PARTNER trial.



The trial enrolled 358 inoperable patients (Cohort B) and 699 high-risk patients (Cohort A; 348 TAVR vs 351 surgical aortic valve replacement) with severe symptomatic AS. In Cohort B, TAVR substantially reduced all-cause mortality by nearly 50% and the composite of all-cause mortality and repeat hospitalization by 55% compared with standard therapy at 1-year follow-up. In Cohort A, TAVR was not inferior to surgical AVR for all-cause mortality at 1 year (24.2% vs 26.8%). Similar results in favour of TAVR were reproduced in the pivotal US trial for Medtronic CoreValve.

Many other second and third generation devices are undergoing evaluation in clinical trials throughout the world with the aim of reducing the profile of the devices and to improve the performance of the valves.

Mitral regurgitation is the most common type of heart valve insufficiency in the United States. Approximately 4 million people have significant mitral valve insufficiency, with an annual incidence of 250,000. Approximately 50,000 of these patients undergo surgery each year in the United States. Prevalence and incidence are similar in Europe, where it's the second most common type of heart valve disease.

A significant number of patients are not referred for surgery because of comorbidities and increased risk of complications from surgery. Till recently, medical therapy for palliation of symptoms was the only option for such patients.

Recently, percutaneous mitral valve repair using Mitraclip has been shown in a randomized control trial to be an effective and safe alternative to surgery in such high surgical risk patients.

Mitraclip is now available in Europe for clinical use and FDA approved in the USA for use in patients considered to be at high surgical risk who have degenerative mitral valve disease causing severe mitral regurgitation.

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## Bioresorbable Vascular Scaffolds

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Bioresorbable scaffolds (BRS) have the potential to revolutionize the treatment of coronary artery disease. These devices allow vascular remodelling they do not impair vasomotion and leave the option for bypass surgery in the treated coronary segment.

To date, limited trial data demonstrated favourable short-term and late clinical outcomes up to 5 years. However these observations have been limited to patients with simple coronary lesions. Outcomes following BRS use in complex lesions have been described by a few registries but remain poorly characterized. We report the clinical outcomes of our “real-world” experiences following BRS implantation in a patient cohort that includes a high prevalence of complex lesions.

### Experience

A retrospective analysis was conducted of 204 consecutive patients who underwent PCI with BRS (ABSORB; Abbott Vascular, Santa Clara, CA) in 2 centers in Milan between May 2012 and November 2014 on 287 lesions. The mean age was  $63.1 \pm 10.8$  years. The prevalence of diabetes mellitus was 25.5%, and of chronic kidney disease (estimated glomerular filtration rate  $< 60$  ml/min/1.73<sup>2</sup>) was 19.5%. 14.0% of patients presented with an acute coronary syndrome. With regards to lesion characteristics, BRS were implanted to CTO (5.6%), bifurcations (42.2%), in-stent restenosis (5.2%), and left main coronary artery (2.1%). The main target vessel was the left anterior descending artery (62.4%). The mean SYNTAX score was  $15.3 \pm 9.9$ . Meticulous lesion preparation and postdilatation was recommended for all cases with pre- and postdilatation performed in 97.4% and 99.6%, respectively. A scoring balloon was utilized in 14.0%. Intravascular imaging (IVUS or OCT) was utilized in 87.3% of patients to guide therapy.

The median follow-up period was 353 (interquartile range 150 to 503) days. The incidence of major adverse cardiac events (MACE; defined as a combination of all-cause death, follow-up myocardial infarction and target vessel revascularization) occurred in 8.6% at 1-year follow-up (calculated with Kaplan–Meier analysis). All-cause death occurred in 1 patient (non-cardiac death). The incidence of target lesion revascularization (per lesion) and vessel revascularization were 7.3% and 7.7%, respectively. Definite scaffold thrombosis occurred in 2 patients (1.2%). One was acute scaffold thrombosis after BRS implantation for STEMI, the other was late scaffold thrombosis in a patient that prematurely stopped clopidogrel 2 months after BRS implantation.

### **Conclusions**

Our “real-world” BRS experience that included a high prevalence of complex lesions demonstrated excellent clinical outcomes at 1-year. Notably, the incidence of scaffold thrombosis was low (1.2% at 1-year). Meticulous lesion preparation with non-compliant or scoring balloons and IVUS-guided BRS implantation are likely to be important factors in optimizing outcomes and reduce clinical events.

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## **Serum Uric acid and hypertension: a new route for prevention?**

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The demonstration that elevated levels of serum uric acid (SUA) can increase the risk of cardiovascular disease requires a mechanistic interpretation of the possible role of additional risk factors that might promote such a deleterious association. Among them, arterial hypertension (HTN) is playing the most relevant role and a strict relationship has been repeatedly described between elevated levels of SUA and the progressive increase in blood pressure values. All these evidence support a possible role of serum uric acid as an independent risk factor for cardiovascular disease and suggest the importance of a more extensive investigation with the aim to increase the possibility of effectively reduce the impressive burden of cardiovascular diseases. A direct association between SUA levels and HTN has been described in animal models where a progressive increase in blood pressure values can be induced by increasing the plasma levels of uric acid. Conversely such a inducible blood pressure response can be entirely prevented by the pharmacological blockade of uric acid production with a xanthine oxidase inhibitor as febuxostat. In humans the relationship between SUA and hypertension is already evident in the pediatric as well as in the adolescent population where the average blood pressure values are reported to be significantly elevated in presence of increased SUA levels. These observations support the challenging hypothesis that the increase in serum uric acid levels can antedate the development of hypertension and can play a pathogenetic role in the development of cardiovascular disease by promoting vascular abnormalities leading to a worsen blood pressure control. The sequential progression from hyperuricemia to hypertension is also supported by the results of a pivotal observational study, the Bogalusa Heart Study, where a significant correlation has been found between the plasma levels of UA during the adolescence and the systolic and diastolic blood pressure

values recorded 20 years later during the adulthood. In particular the condition of oxidative stress associated with the activity of xanthine-oxidase that is involved in the production of uric acid, is leading to a reduced endothelium-dependent vasodilating response as well as to an increase in renal vascular resistance. The systemic vascular involvement contributes to an increase in total peripheral vascular resistance while the renal vasoconstrictive response is associated with an exaggerated salt-sensitivity that is resulting in a volume-dependent hypertension that persists when the sensitivity to salt intake is returned to the baseline levels. The progressive nature of the link between SUA and hypertension clearly supports the possibility of a prevention of the hypertensive disease in subjects with hyperuricemia. In particular any possible strategy aimed at controlling the plasma levels of SUA, particularly in the younger population (e.g. reducing the ingestion of fructose-added beverages, beer, etc) might prevent the blood pressure increase and the future development of hypertension. In adolescent subjects with SUA levels outside the normal range, the administration of the non selective xanthine-oxidase modulator allopurinol has been associated with a significant decrease of both systolic and diastolic blood pressure values and this has been confirmed in patients with mild hypertension where the plasma levels of SUA are usually not considered in the management of the hypertensive disease. More recently some interesting evidence has been provided supporting the possibility that the presence of elevated levels of SUA can significantly reduce the efficacy of the antihypertensive treatment with a worst blood pressure control in patients with uric acid levels outside the normal. These might explain the observation that the prevalence of hyperuricemia is directly correlated with the degree of severity of the hypertensive disease in the general population where the extent of blood pressure control is the final result of the interaction between the mechanism promoting the blood pressure increase and the individual efficacy of the antihypertensive treatment.

All the above information clearly support a massive effect of serum uric acid on blood pressure control in humans and identify the management of



hyperuricemia as one of the future strategies for the prevention of hypertension and correlated cardiovascular disease.

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## Genomics and arterial hypertension

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Human primary or essential hypertension is a complex, polygenic trait with some 50% contribution from genes and environment. Richard Lifton and colleagues provided elegant dissection of several rare Mendelian forms of hypertension, exemplified by the glucocorticoid remediable aldosteronism and Liddle's syndrome. These discoveries illustrate that a single gene mutation can explain the entire pathogenesis of severe, early onset hypertension as well as dictating the best treatment.

The dissection of the much more common polygenic hypertension has proven much more difficult.

Early studies used a single polymorphic marker such as the I/D polymorphism in the ACE gene and small numbers of cases and controls. Candidate gene studies have been largely non-informative and non-reproducible. These were followed by linkage studies, which used approximately 300 microsatellite markers distributed across the genome. These studies resulted in large peaks covering regions with 50-100 genes, with no easy way to quickly focus on a few genes of causal relevance.

The real breakthrough came with the initiation of the genome wide association studies (GWAS) characterised by a much more thorough coverage of the genome with thousands single nucleotide polymorphisms (SNPs). Typically 500,000 – 2,500,000 SNPs have been used for the big, collaborative GWAS for hypertension. These studies resulted in several “hits” or signals with a genome-wide significance and a high level of reproducibility between studies. These “hits” have been used successfully to calculate genetic risk scores for cardiovascular complications such as left ventricular hypertrophy, stroke and coronary artery disease. Intragenic signals, such as for example

Uromodulin, are being used to examine new pathways for cardiovascular protection and possibly new targets for drug discovery.

The next steps in genomic medicine belong to a combination of the next generation sequencing (NGS) and its linkage with electronic health records, including preferably the real time clinical data, biochemistry, imaging, histology as well as longitudinal health outcomes. These modalities of stratified or precision medicine are ready for the prime time now.

## **How to treat hypertensive patient with erectile dysfunction?**

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Erectile dysfunction (ED) is more prevalent in hypertensive than normotensive individuals, but available information mostly concerns men. The prevalence of erectile dysfunction in hypertensive men is as high as 35%. The vascular origin of ED is now widely accepted in the vast majority of cases. ED is considered to be an independent CV risk factor and an early diagnostic indicator for asymptomatic or clinical organ damage. Hence, a full history should include ED.

Therefore, the management of erectile dysfunction in hypertensive patients is of paramount importance. Unfortunately, ED remains under-reported, under-recognized, and under-treated in hypertensive patients, mainly due to the lack of familiarity with this clinical entity by treating physicians.

Traditionally, hypertension has been known to exert its negative influence on erectile function via the administered antihypertensive medication. Impairment of sexual function attributable to the antihypertensive agents, real or perceived, is one of the most predominant causes for non-adherence and discontinuation of antihypertensive therapy. The significance of this fact in clinical practice, with all the longitudinal negative consequences regarding patients' health, overwhelms the attention paid in various studies. So far, ED has never been defined as a primary end-point in a large clinical trial.

Lifestyle modification may ameliorate erectile function. Available data show that older classes of antihypertensive agents are inferior to the newer regarding erectile function. In particular, the negative influence of beta-blockers has been repeatedly confirmed. Only vasodilating beta-blockers have neutral or even beneficial effects on sexual function. Nebivolol has been reported to exert beneficial effects, possibly due to nitric oxide modulation.

Diuretics are considered to impair erectile function as well, even when used as adjunct therapy. Although data regarding calcium antagonists and ACE-inhibitors are not yet definitive, a neutral effect on erectile function has been attributed.

On the contrary, ARBs seem to positively affect erectile function, and have thus been recommended as first-line treatment in patients with pre-existing ED or as substitution therapy in cases with antihypertensive drug-induced erectile dysfunction. Remarkably, the ONTARGET/TRANSCEND trials have not proven any benefits of ARBs on erectile function. It has to be noted, however, that ARBs were added on top of previous multidrug regime in high-risk patients.

Phospho-diesterase-5 inhibitors may be safely administered to patients with hypertension, even those on multiple drug regimens (with the possible exception of alpha-blockers and in absence of nitrate administration) and may improve adherence to antihypertensive therapy.

Remarkably few are the data regarding the widely prescribed antihypertensive combinations, thus rendering unsound the extraction of conclusions. Finally, only a well-designed, randomized, double-blind, large, prospective trial may resolve questions about the specific effects of various drug classes on ED.

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## **Hypertension to heart failure: road frequently travelled**

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Approximate 1 billion people worldwide are afflicted with hypertension; as a result it is the most pervasive and clinically relevant cardiovascular condition of the last 50 years.

Among the most troubling consequence of hypertension is heart failure. This lecture will help define the pathologic processes involved with the progression from hypertension to heart failure.

The common physiology between these conditions provides a framework for prevention, diagnosis and therapeutic interventions.



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