

# ESC/EACTS myocardial revascularization Guidelines 2014

**The joint Guidelines have been published in *European Heart Journal*,<sup>1</sup> on the ESC Website, ([www.escardio.org/guidelines](http://www.escardio.org/guidelines)) in *EuroIntervention* and in *European Journal of Cardio-Thoracic Surgery*<sup>2</sup> and are discussed by the Task Force joint chairmen**

The new edition of the ESC/EACTS revascularization Guidelines—presented at the ESC Congress by joint Task Force Chairs Professor Stephan Windecker (Switzerland) of the European Society of Cardiology (ESC) and Professor Philippe Kolh (Belgium) of the European Association for Cardio-Thoracic Surgery (EACTS)—discusses in detail the indications of revascularization procedures in patients with coronary artery disease (CAD).

Previous ESC/EACTS Guidelines on myocardial revascularization were published in 2010.<sup>3</sup> As part of their updated recommendations, the Task Force performed a systematic review of the evidence including 100 trials in 93 553 patients with 262 090 patient-years in the field of coronary revascularization. The key finding was that among patients with stable CAD, coronary artery bypass grafting (CABG) reduces the risk of death, myocardial infarction and repeat revascularization compared with medical treatment. They also observed that all stent-based coronary revascularization technologies reduced the risk of repeat revascularization, whereas new-generation drug-eluting stents (DES) but no other percutaneous revascularization technology improved survival compared with medical treatment.

The SYNTAX score—an angiographic score to quantify the anatomical complexity of CAD—has been found instrumental in the selection of the appropriate revascularization procedure (CABG vs. PCI). In this version of the Guidelines, a useful guide is provided, which facilitates calculating the SYNTAX score. Moreover, this is the first time ever that the Guidelines suggest a time frame during which revascularization procedures should be performed. Thus, revascularization should be implemented within 2 weeks in highly symptomatic patients, whereas all other procedures should be performed within 6 weeks.

The indications for revascularization are generally based on symptomatic and prognostic grounds. As compared with the previous 2010 edition, percutaneous coronary intervention (PCI) now assumes a similar Class and level of evidence as CABG in patients with proximal LAD disease (IA), simple left main disease (syntax score  $\leq 22$ ; IB) and simple three-vessel disease (syntax score  $\leq 22$ , IB). Conversely, PCI is not recommended for patients with complex three-vessel disease (syntax score  $> 22$ , IIIB) and left main disease (syntax score  $> 32$ , IIIB). Among diabetic patients with multivessel CAD and acceptable surgical risk, CABG is now the favoured revascularization therapy (IA) based on the results of the FREEDOM trial and recent meta-analyses.

In the new Guidelines, DESs are favoured over bare-metal stents (BMSs) in nearly all patients and lesion subsets. The most notable change is among patients with ST-segment elevation myocardial infarction (STEMI) undergoing primary PCI in whom DESs now assume a Class I indication.

The Guidelines also provide an extensive update on antithrombotic therapy following revascularization, which constitutes the largest chapter. The duration of dual-antiplatelet therapy (DAPT) following DES implantation allows for individualization and can be reduced to 6 months in patients with stable CAD while extending the duration in patients with high ischemic and low bleeding risk. In patients with NSTEMI-ACS, pre-treatment with prasugrel before PCI is no longer recommended following the results of the ACCOAST trial. In patients with STEMI, bivalirudin is no longer preferred over unfractionated heparin and has been downgraded from a Class I to a Class IIa recommendation. This was based on the consistent observation from several STEMI trials including HORIZON-AMI, EUROMAX, HEAT and BRAVE 4 that the lower risk of bleeding associated with bivalirudin was offset at least in part, by the higher risk of peri-procedural stent thrombosis, although there appeared to be no impact on mortality and myocardial infarction.

A new chapter on the volume–outcome relationship for revascularization procedures has been added. It provides, for the first time, guidance on minimal numbers of PCI and CABG procedures for physicians and institutions, plus recommendations for training to ensure high quality of care.

Professor Kolh concluded: ‘Revascularization requires input from cardiologists, surgeons and interventionalists and our Task Force brought together experts in these fields. We hope the Guidelines help clinicians make the best use of the revascularization techniques currently available and improve quality of care across Europe’.



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## The ‘Ten Commandments’ of the ESC guidelines 2014 for myocardial revascularization



- (1) Revascularization through coronary artery bypass grafting (CABG) or percutaneous coronary intervention (PCI) is recommended for patients with angina symptoms despite optimal medical therapy, patients who prefer PCI to medical therapy, and for those with lesions that have a proven survival benefit.
- (2) CABG is recommended in patients with a primary indication of aortic or mitral valve surgery and coronary artery diameter stenosis of more than 70%.
- (3) Risk stratification and scores: STS score, EuroSCORE II, and Syntax II factor into assessing patients undergoing revascularization. However, clinical judgment and a heart team decision in complex cases are mandatory. Patients should be adequately informed of short-term risk and long-term benefits of revascularization procedures.
- (4) Fractional flow reserve during diagnostic angiography often changes management decisions; nearly 50% of coronary artery stenosis in the intermediate range is functionally misclassified.
- (5) Owing to long-term survival benefit, CABG is preferred in cases of complex coronary artery disease.
- (6) Patients with proximal left anterior descending coronary disease in whom revascularization is recommended can be revascularized with PCI. The CABG option should be offered and the exchange of a higher early morbidity vs. a lower rate of repeat revascularization should be discussed.
- (7) Multiple arterial grafts are recommended for younger patients undergoing revascularization with CABG.
- (8) Optimal medical treatment should accompany revascularization with focus on risk factor reduction.
- (9) Graft flow measurement may be useful in patients with haemodynamic instability or inability to wean from extracorporeal circulation.
- (10) Off-pump surgery does not seem to improve short- or long-term outcomes for most patients and is associated with inferior early and late graft patency rates.

For more information, see <http://www.escardio.org/guidelines-surveys/esc-guidelines/Pages/essential-message-slideset.aspx>.

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## ESC Education Committee

**The European Society of Cardiology plans to become the post-graduate Academy of Cardiology and sub-specialties. This explains the role of education and, as a consequence, the importance of the education committee in the activities of the ESC.**

What are the current assets of the ESC education committee?

- 1) The ESC core curriculum: the educational offering is mapped on the ESC core curriculum which was published in the *European Heart Journal* in 2013. The core curriculum aims for what is optimal. It is acknowledged that there are differences in training and resources throughout Europe; this means that not every training system will be able, or want, to adopt the full core curriculum.
- 2) Educational tools: as a general principle, the ESC aims to provide educational materials of high quality based on the ESC Guidelines/Textbook, which is easily accessible, interactive, and

affordable. Finally, we should always bear in mind for all the educational tools; that information is different from education.

The main education tools are as follows:

- A) Guidelines into practice tracks: introduced in 2012 to bring the essentials of the ESC Congress for each recently published guideline, by putting together sessions from 'top to bottom' that is to say, main guidelines sessions, main sessions dedicated to specific guidelines, highlights, the most relevant symposia, meet the experts and FOCUS sessions. They are available on the Guidelines and Education website in addition to ESC Congress 365.
  - B) ESC webinars: these are case-based and allow interaction with key opinion leaders. They use a brand-new enhanced studio format, and are mobile compliant and free of charge. The webinars in general cardiology add to the sub-speciality webinars, they can be looked at live but are also available later on the website. They may provide teaching material for trainers in institutions and may also be the basis for collective sessions in hospitals. Finally, the webinars have the potential for translation.
  - C) Clinical cases: the case-based learning systematically focus on the new ESC guidelines and help to produce more interactive cardiovascular flashlights. A new template was fully integrated allowing for a stepwise display of questions and an 'ask your question to the authors' option. 'The ESC clinical cases gallery' which is a common portal for all ESC associations and working groups, will be launched during the ESC congress in 2014. There will also be cross-linking to online journals and the *European Heart Journal*.
- 3) The ESC eLearning platform:
- The learning platform was initiated by Lino Goncalves. It aims at being a mechanism to harmonize training throughout Europe. The ESC platform is available to ESC constituent bodies as well as national and affiliated cardiac societies, to complement the training and lifelong learning requirements of their members.
- The first iteration of the platform was dedicated to sub-specialities to provide certification after assessing knowledge, skills, and professionalism. Now, thanks to the enormous effort from all the ESC Associations who populate the platform over 130 courses are available with more than 1000 multiple choice questions (MCQs).
- The newest step of the platform is the development on general cardiology. This is led by Peter Kearney with the enthusiastic participation of all members of the education committee and the expertise of Cork University. The programme will be launched in the first half of 2015. A demonstration outlining skills, training, and professional development will be available during the ESC congress 2014. There will be data exchange with the European Union of Medical Specialties (UEMS) cardiology section for the European cardiology certification programme.
- It is understood that national societies have different training patterns; some national societies require a knowledge model, while others require skills tracking models. The platform must adopt a modular approach.
- 4) The ESC courses: the education programmes at the Heart House each focus on one topic from the core curriculum and are

interactive case-based courses. The update courses (Davos, Dubrovnik, and Rome) cover the core curriculum and recently published guidelines. Finally, the ESC member courses, such as the ESC in Maghreb, allow guidelines to be discussed in a regional context.

- 5) Examination in general cardiology: this is a collaborative initiative between the ESC, the national societies and the cardiology section of the UEMS. The examination in general cardiology is an education tool but is not a passport to accreditation as a cardiologist in any national jurisdiction.

## What is next?

The aim of the education committee is to provide needs-driven education. Initially, this requires assessing the needs and challenges. A pilot initiative is introduced to build a course on 'stroke prevention and management in atrial fibrillation'. EHRA will provide the scientific expertise in collaboration with continued medical education (CME) and continuing professional development experts (AXDEV) and European Universities (UCCASERT, Cork) for learning technology.

The ESC also wants to offer education which is relevant for the different stakeholders, i.e. national societies, universities, and other medical and paramedical individuals, including industry representatives.

Finally the educational offer should not only aim at providing CME but also improve patients' outcomes, which requires performance-focussed outcome measurements.

To be successful it is key for all work together. In this regard, the ESC education committee organized an education conference last year. The aim is to create a link with national societies for the development and dissemination of the ESC educational offering; to understand national constraints and needs; to engage national societies in the production of educational products, localization, modern approaches, etc. The first conference was held last December and over 40 countries made this first step very successful.

Overall we are aiming for a 'virtuous circle': The guidelines are the first step, from there, gap analysis and needs assessment should be performed, learning objectives defined and educational programmes built on these learning objectives. Finally registries, such as the EURObservational Research Programme (EORP), allow for outcome measurements and gap analysis which will help to promote new research and write even better guidelines. The final goal is to increase knowledge, change clinical practice, and improve patient outcomes.

Progress has been made but there is still plenty of room for improvement and this will be our task during the coming years.

As a final word I would like to thank the fantastic teamwork and collaborative efforts of all the members of the Education Committee, the webinar speakers, the MCQ writers, the online course contributors, the learning technicians, and the behavioural science experts and, of course, a special thanks to the educational team at European Heart House led by Celine Carrera.



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# Sustainable Development Goals and the future of cardiovascular health

## A statement from the Global Cardiovascular Disease Taskforce

We are on the cusp of a new era in global health policy that could transform the lives of millions worldwide. Whether cardiovascular health is part of this transformation will be largely determined within the next few months, when the United Nations (UN) will debate and decide upon Sustainable Development Goals (SDGs) for 2015 and beyond. The membership and volunteers across our respective organizations therefore have a rare opportunity to convince international bodies to devote appropriate resources to curb the rise of non-communicable diseases (NCDs), including cardiovascular diseases (CVD) and stroke. As global advocates of cardiovascular health, we have a responsibility to generate and secure this political backing to further our collective mission of preventing cardiovascular disease morbidity and mortality, and improving health. This article highlights why the SDGs are crucial to our combined efforts to prevent and control cardiovascular disease and other NCDs.

## Putting the heart into the Sustainable Development Goals

The UN Global Development Agenda sets the focus for funding and policy-making by governments in all 193 Member States. In 2000, world leaders signed the Millennium Declaration and committed to achieving its eight international Millennium Development Goals (MDGs) by 2015.<sup>1</sup> The MDGs reflect the widespread understanding that health is central to human, social, and economic development. The MDG platform encourages progress in three areas: *targets and milestones* which allow us to measure progress in developing countries; *funding from developed countries* to implement programmes; and *implementation* which has been coordinated with the help of multilateral institutions such as the World Health Organization (WHO), the World Bank, and the Global Fund to Fight AIDS, TB, and Malaria. Missing, however, was acknowledgment of the growing burden of CVD and other NCDs across the globe.

The expiry date of the current MDGs is fast approaching and with it a chance to finally bring NCDs to the fore. The focus of the original MDGs on communicable diseases and maternal and child health has been enormously successful: when individuals think of diseases afflicting developing countries, they predominantly consider infections and the nutritional needs of mothers and babies. Yet more people die each year due to CVD than from any other single cause: CVD causes 30% of deaths any given year, more than all infectious and parasitic diseases combined.<sup>2</sup> Moreover, CVD is a significant cause of premature death and the primary driver of morbidity for all NCDs, the largest burden occurring in low and middle income countries. Globally, it is estimated that between 2011 and 2025 the economic burden of NCDs will be USD \$7 trillion, with CVD accounting for most of that expense.<sup>3</sup>

In the face of the effective MDG-driven campaigns against infectious disease, NCDs have received too little political attention and too few resources since 2000. Considering the magnitude of the global CVD burden, we must ensure collectively that cardiovascular health becomes a focal point of the future development agenda, for the good of all society.

The last UN Open Working Group (OWG) session in July 2014 produced a set of proposed goals and targets upon which to base the forthcoming SDGs.<sup>4</sup> Among these was a goal for health: 'Ensure healthy lives and promote wellbeing for all at all ages'. Proposed sub-targets consider outcomes and means of implementation. The target on NCDs is: 'by 2030 reduce by one-third premature mortality from non-communicable diseases (NCDs) through prevention and treatment, and promote mental health and wellbeing'. This is an extrapolation of the WHO's '25 × 25' goal, adopted by the World Heart Federation (WHF) and its Global CVD Task Force in 2011.<sup>5,6</sup>

A preliminary benefit–cost assessment of the proposals put forward by the OWG rates a reduction in NCD prevalence as a 'phenomenal' social good, meaning that its potential impact on society and its cost-effectiveness are both extremely high.<sup>7</sup> Realistic targets and interventions against specific NCDs—such as CVD, where there are known means to reduce the burden of disease—will lead to significant improvements in health worldwide.

## The role of the cardiovascular community

It is promising that NCDs have been explicitly targeted under the proposed SDGs. This is essential for generating the political will and significant financial commitments from governments that will be necessary to mobilize various sectors to contribute to cardiovascular health. We cannot over-emphasize the importance of these goals in their consequences for global health: the complete absence of non-communicable diseases from the original MDGs ensured that cardiovascular health was overlooked by major global health funders for over a decade.

Negotiations on the SDGs now fall to ministries of foreign affairs, for whom health is one of the many competing priorities. As a community we must be active in our countries to ensure that CVD and NCDs remain at the fore of our governments' negotiations. The World Heart Federation and every member of the Global CVD Task Force can provide toolkits and talking points on how to advocate, and to whom.

Our message is clear: we want to protect the right to health for every individual regardless of their ability to pay. We want to provide accessible, affordable, quality CVD care, by ensuring that every country's health plan includes an essential package of prevention and treatment services. We want to promote a life course



approach to good health and healthy behaviour at all ages. And we want to ensure that the WHO '25 × 25' targets regarding risk factors are included in all national plans, an area around which the WHF and its members are focusing resources and attention. Therefore, we support the proposed SDG health goal, 'Ensure healthy lives and promote wellbeing for all at all ages', to achieve these results.

In our efforts to secure a health goal with a CVD focus, we must recognize that the health sector is just one among many contributors to healthy life expectancy. Our work in areas such as agriculture, transport, environmental, and fiscal policies, as well as international trade agreements, will have an equally strong impact on diet, physical inactivity, and tobacco consumption. We must cooperate and collaborate across sectors and disciplines to advance and affirm a positive return of investment in CVD health; only then will we influence countries and businesses to devote crucial resources to our collective goal, which is vital to human health and well-being across the world.

## Conclusion

As the SDG are negotiated, the CVD community approaches a crucial juncture. Now is the time to use our evidence-based science and advocacy capacity to ensure that health is at the heart of the forthcoming UN Global Development Agenda. As representatives of the CVD community, we must lift our collective voices on behalf of the countless patients we serve, the survivors we hope to

create, and the population at large. We call on governments to ensure a strong focus on health, NCDs, and the other areas critical to the global prevention and control of cardiovascular disease and stroke. It is only through these efforts that human development will be realized and sustainable.

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# PanVascular medicine: the next level

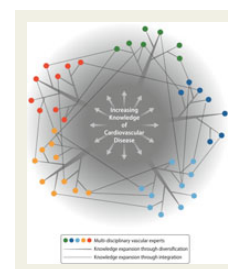
## Peter Lanzer MD introduces a new electronic comprehensive textbook of cardiology

Treatment of vascular diseases requires a multidisciplinary approach. While textbooks usually deal with specific, mainly organ-related vascular disorders, the comprehensive interdisciplinary perspective is rare. The 2nd edition of PanVascular Medicine, volumes 1–4 published in Springer's Reference Series in October 2014 pursues this concept.

Similar to the first edition (Lanzer and Topol, Springer 2002) the textbook covers the entire spectrum of vascular topics ranging from molecular biology to neurovascular surgery. Clinical topics are reviewed in separate chapters by organ specialists, interventionists, and surgeons. Compared with the first edition's almost 2000 pages divided into 133 chapters written by 200 authors, the new edition has nearly doubled. The expansion is due to three factors; first, new topics such as genetic embryology, diabetic vascular diseases, stem cell therapy for peripheral vascular disease, endovascular therapy of venous disorders, and others have been included; second, several topics have been now treated in far more detail and in depth manner such as, the pathophysiology of vascular disorders; third, new sections have been added including sections on panvascular management strategies and teaching.

The new edition provides the readers with a state-of-the-art review of all topics spanning the entire field of current knowledge

about vascular diseases. Interdisciplinary, face-to-face presentation of individual topics advocating specialty-based treatments and strategies assures balanced presentations and allows the readers to discover a large number of important common trends and some, as yet unresolved controversies. However, given the multifaceted presentation, the growing interdisciplinary approach in the vascular field becomes convincing and in many cases self-evident.



Several chapters on the increasing strategic importance of hybrid operating rooms are a point in case. Employing the peer-review principle, 29 section editors have assured that all contributions are of state-of-the-art quality. Owing to the professional expertise of the authors, all chapters are comprehensive and concise. Chapters on catheter-based interventions and surgery are detailed, summarizing both descriptive and

procedural knowledge, matched only perhaps by cookbook recipes.

While the first edition has been textbook-based and consequently static, the new edition is primarily based on electronic data accessed by internet and therefore dynamic. <http://link.springer.com/referencework/10.1007/978-3-642-37393-0>.

This established electronic library, perhaps the largest available on interdisciplinary vascular medicine, will be continually updated. Periodically, a printed volume will be published to explore the expansion of vascular knowledge and to capture coherence.

PanVascular medicine is an open on-going project; active participation by readers is invited.

**Conflict of interest:** P.L. is the editor of *PanVascular Medicine*, second edition.



## Anatomical intelligence is helping cardiologists with interventions and diagnoses

### The virtual aortic root guides valve size decisions and navigation during TAVI, while 2D ultrasound images speed up LV function measurements

Anatomical intelligence is helping cardiologists conduct interventions and make diagnoses. The technology uses a library of past patient information to read and assess images and is a way of automating image analysis.

Philips has used hundreds of multimodality images from different patients and put them together to create base anatomic structures such as a normal heart and a dilated heart. Over time the library increases in power as more images are added.

As a first step, in what is called knowledge-based identification, the technology uses the base models to examine global aspects of an image and assess whether the heart is normal, dilated, or severely dilated, for example.

Dr Ivan Salgo, head of Global Cardiology, Ultrasound Imaging at Philips Clinical Care Systems, says: 'It's not a blind machine learning technique. There is a structural model that's averaged over many types of normal and abnormal hearts and that is what's used for the knowledge based identification'.

In the second phase, called patient-specific adaptation, the technology examines features specific to an individual patient.

Philips launched an aortic root model earlier this year, which is called the HeartNavigator II. The model can be used to create automatic segmentation of the aortic root, first from a CT scan. The next step is to use it for device selection and planning in transcatheter aortic valve reimplantation (TAVR), also known as transcatheter aortic valve implantation (TAVI).

Salgo says: 'With TAVR, during the procedure it's very important to localise the new heart valve device in the aortic root appropriately. And so key stages for image guided intervention are, planning and actual navigation in the procedure room'.



**Phillips Heart Navigator II virtual device images**

A virtual aortic root is created for the patient and then different virtual size valves can be tested to see which one is likely to fit best. In the procedure room the CT and aortic root model can be localized with fluoroscopy in a live overlay.

Before fusion imaging and anatomic intelligence, operators were trying to figure out how to co-localize measurements from the CT scan on the same image using fluoroscopy and then plan the procedure.

Salgo says: 'It was a very cumbersome process. The feedback we're getting is this helps simplify the process and adds confidence because now a computer can be used to move all of the images together in one place for the physician to look at'.

He adds: 'Whether it's CT, X-ray, fluoroscopy, and then moving on to ultrasound, we can move towards fusing image modalities and clarify for the clinician what all the orientation and the views are for that particular patient'.

In addition to image-guided intervention, anatomic intelligence is used in diagnostic cardiology, for example to measure left ventricular function. Using anatomic intelligence the ultrasound system has knowledge of how a left ventricle should look in a 2D image and it puts the left ventricular boundary automatically on the overlay. Users can accept it without any interaction, or do quick edits.

Salgo says: 'In the old paradigm users would have to freeze an image, then they'd have to click to find anatomic points, they'd have to do tedious traces on an image and that would take time. And there was also user variability. "Anatomic intelligence" is much more efficient because they don't have to do the tedious tracing'.

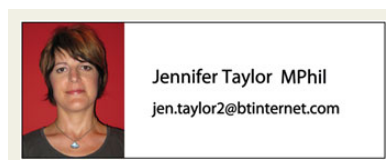
The big goal for anatomic intelligence is to improve reproducibility of exams across operators. 'That's where the field is headed', says Salgo,

citing studies published in the literature in which operators assessing ejection fraction using the same image had 10–20% variability or more, depending on the study. 'As hospitals are being asked to do more patients in less time they also have variability of operators because they're trying to bring more operators on line to help throughput'.

As computers get faster and faster, and imaging is able to provide more and more data, users are becoming inundated with data. 'These types of techniques help them organise and turn the data into useful information', says Salgo.

Philips is working on organ modelling and fusing imaging modalities. A full model of the heart with all of the chambers is on the way, as well as models of the aorta, carotid, liver, etc. Salgo says: 'As imaging modalities provide more and more slices, this can help consolidate and make the process easier for physicians to use these images'.

**Conflict of interest:** Dr Ivan Salgo is an employee of Philips Healthcare.



## People's corner: Professor Francesco Maisano new appointment



### Dr Francesco Maisano is the new Head of Cardiovascular Surgery at Zurich University Hospital and a full professor (*ordinarius*) of cardiac surgery

On 1 October 2014 Francesco Maisano took over the helm as Head of Cardiovascular Surgery at Zurich University Hospital, Switzerland. As a specialist for minimally invasive heart valve surgery, Francesco is a representative of the new era of surgeon in heart valve replacements.

A medical graduate from Rome, Francesco also finished his cardiac surgery training in Rome before leaving Italy for a 12-month fellowship at the University of Alabama, Birmingham, USA.

Returning to Turin, Italy, in 1995 he became Senior Cardiac Surgeon at San Raffaele Hospital, Milan, in 2009, a position he held until moving to Zurich University Hospital in 2013 as department director and TAVI team leader.

Francesco is a hybrid surgeon with a large hands-on experience in transcatheter valve treatments (MitraClip, TAVI, etc.). As an innovator he has introduced several new techniques and

technologies into clinical practice, mainly in the field of valve therapy. He is a strong believer in the heart team concept and in the multidisciplinary team approach. He believes the strength of his international network relationship has been important in supporting his work and that of his team.

He plans to bring an innovative approach into modern cardiac surgery fostering a strong collaboration with cardiovascular medicine. A future task will be to innovate while maintaining the tradition and preserving the humanitarian nature of the medical profession.

He states that Zurich has been the ideal landing zone for him to pursue this effort because of its great tradition as a hub for innovation and to the unique opportunity offered by an active, stimulating, and international environment.

At home he believes he is a good father and husband and hopes he will also be a good teacher and a good chief. But above all, he hopes to help patients to live longer and healthier.