

CARDIAC SURGERY in 2030

30th Two-Day in Cardiology 2020

P. Chartibus M.D.

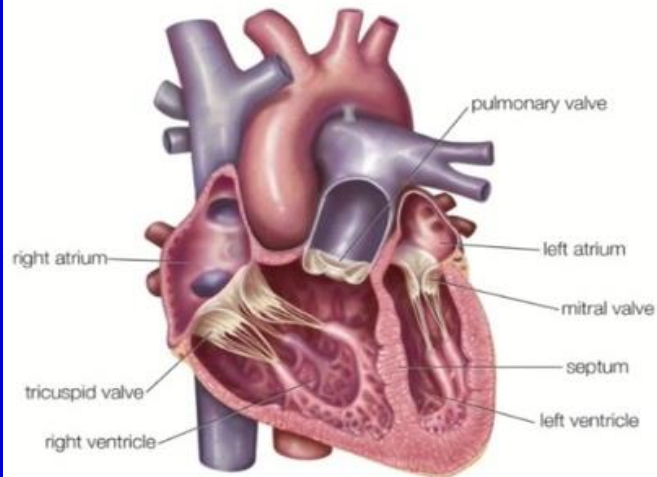
The Future

**“The best way
to predict
the future
is to
create it.”**

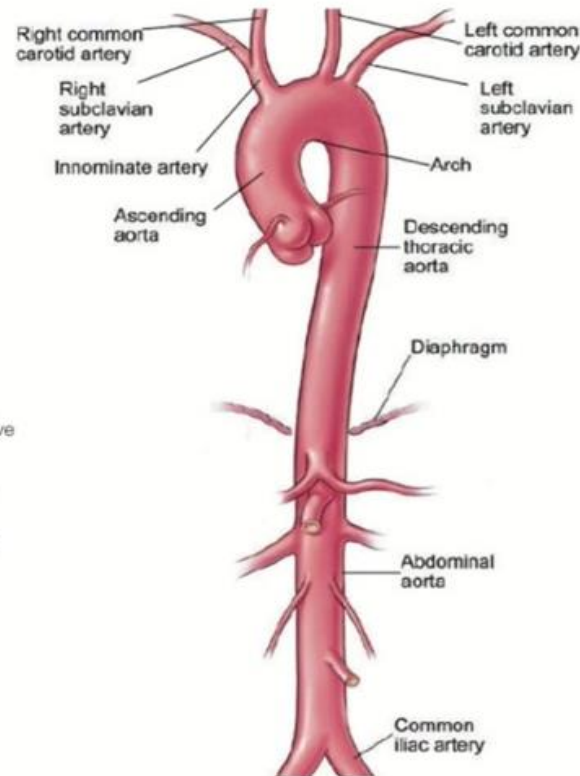
Abraham Lincoln



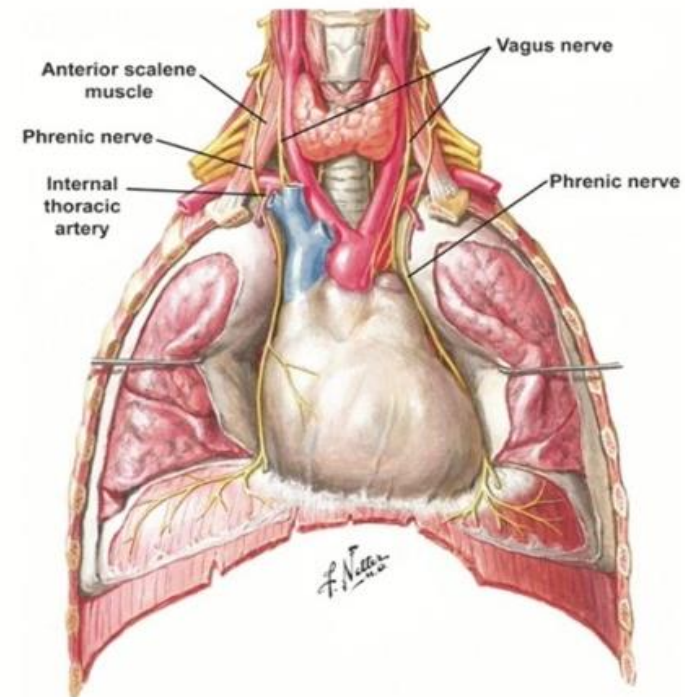
Cardio



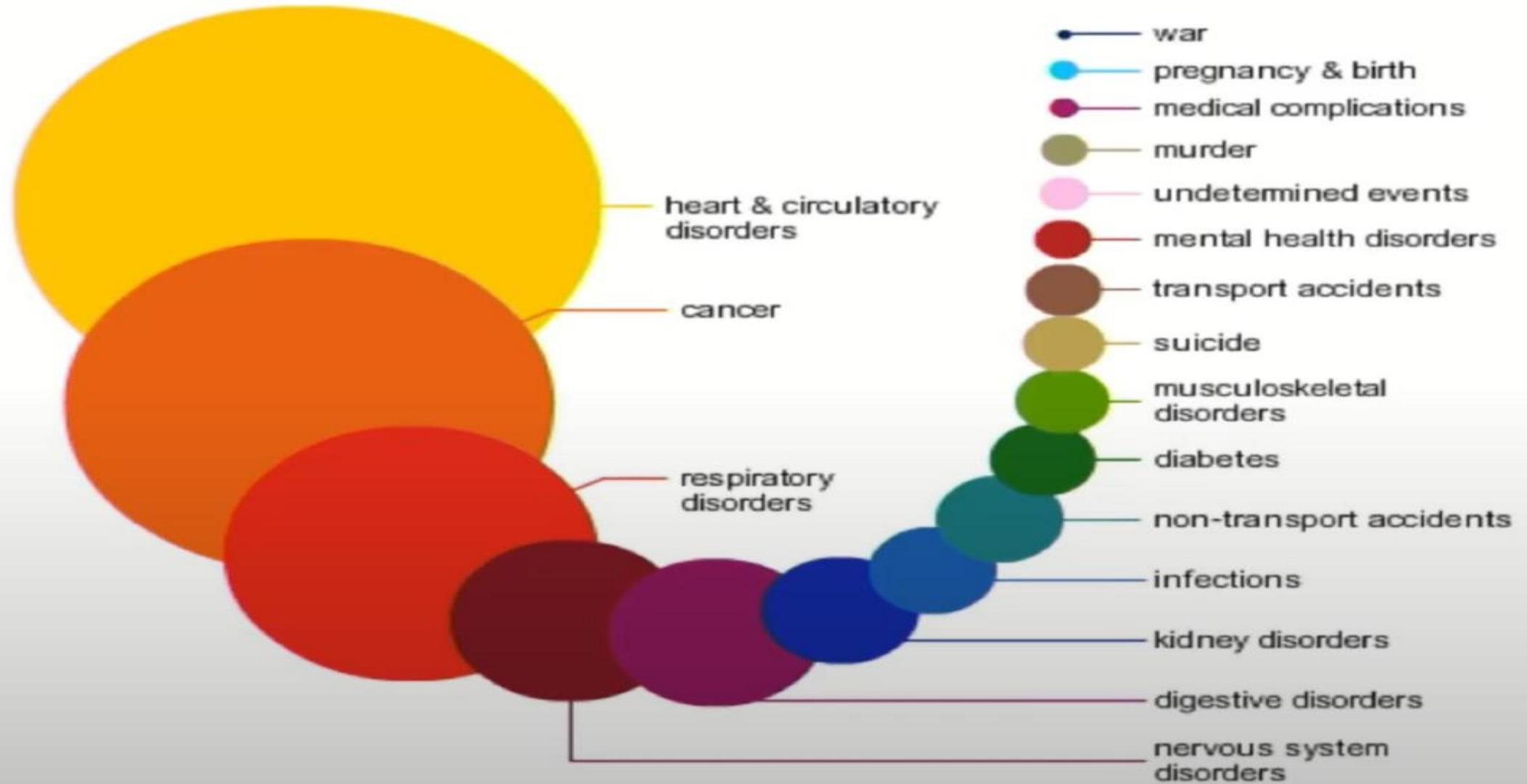
Vascular



Thoracic



Leading causes of death in perspective





The
heart valve
s o c i e t y

HVS ANNUAL MEETING 2019, 11-13 APRIL

MELIA HOTEL, SITGES (BARCELONA), SPAIN

WWW.HEARTVALVESOCIETY.ORG

I am a poor debater ! ...he is a great scientist

- In this house a patient with MI will be treated with morphine, oxygen, and gentle care of a nurse (1982, London) – **CON** (*Celia Oakley*) **lost**
- Balloon angioplasty is doomed to disappear (1982, London) – **CON** (*Raphael Balcon*) **lost**
- PCI will never be applicable to patients with multivessel disease (1987, ACC Miami) – **CON** (*Bruce Lytle*) **lost**
- The only use of stent is as bailout (1990, TCT) – **CON** (*David Holmes*) **lost**
- Provisional stenting is the way to go (1995, TCT) – **CON** (*David Holmes*) **lost**
- The aortic valve will be replaced by catheter even for the standard patient with aortic valve disease in the near future? –(2007,london) **PRO** (*Sir Magdi*) **CON**
- **Tissue engineered valves will dominate in 2031 – CON** (*Sir Magdi*)

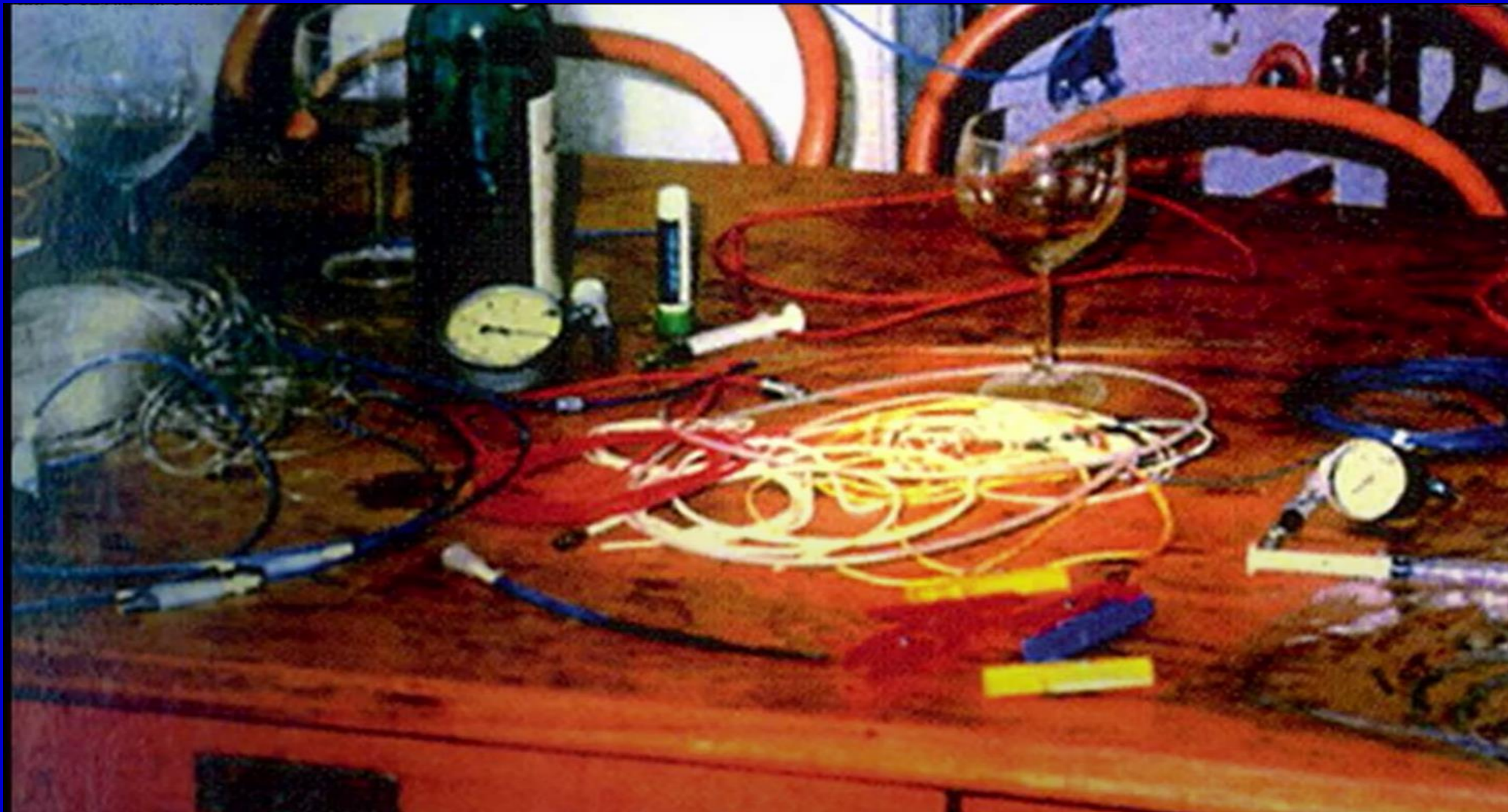




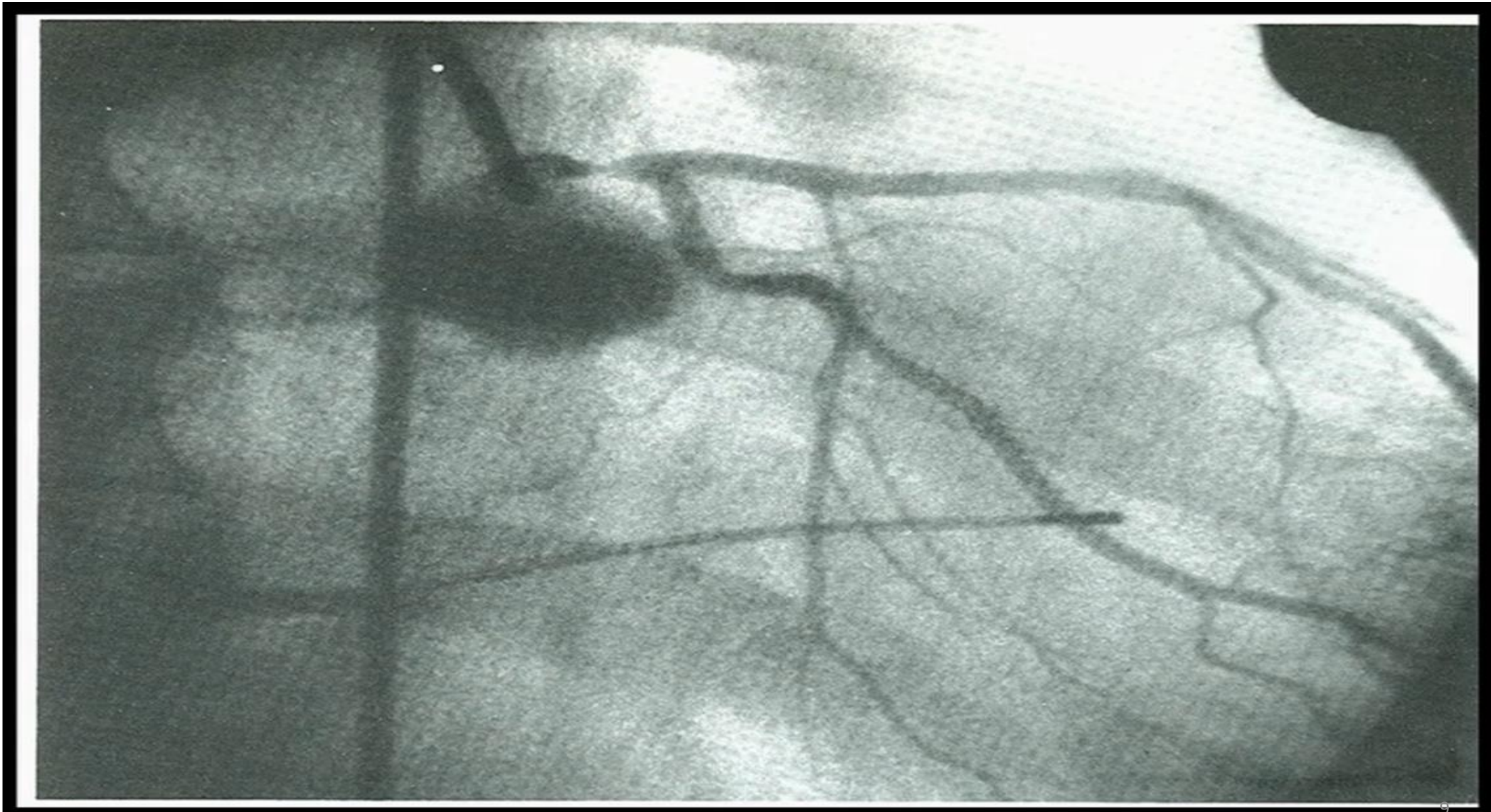
[Open in a separate window](#)

Figure 1

Portrait of Charlotte Grüntzig with Andreas (sitting) and Johannes Grüntzig (right). The photograph is embossed by a mark of Photostudio Th. Alfred Hahn in Chemnitz, Germany, where the photograph was taken in 1942. Photograph reproduced with permission of Johannes Grüntzig, M.D., Düsseldorf.







EXCEL

LMCA Revascularization



Stone GW et al. N Engl J Med 2016;375:2223-2235

EXPERIENCES WITH ASPIRIN (ACETYLSALICYLIC ACID)
IN THE NONSPECIFIC PROPHYLAXIS OF
CORONARY THROMBOSIS*

Lawrence L. Craven, M.D.
Glendale, California

CORONARY thrombosis is one of the principal causes of sudden death, prolonged morbidity, or permanent disability, and strikes especially often males in their late middle age, who to all appearances enjoyed the best of health. Ordinarily premonitory signs are absent, and it is therefore impossible to institute some form of specific preventive therapy. The possibility of general, nonspecific prophylaxis is hardly taken into consideration, and the medical profession tends to maintain a similarly fatalistic attitude toward episodes of coronary thrombosis as does the laity.

There can be no argument that any definitive plan of prophylaxis—specific or nonspecific—depends on continued research and a more complete understanding of the etiologic and pathologic aspects of coronary thrombosis. But in the meantime experiences which might have a bearing on the general prophylaxis of the disease may not be entirely without practical interest.

It should be pointed out that only ten years ago the prophylactic use of anticoagulants in the presence of impending venous thrombosis or following coronary occlusion was still considered to be hypothetical or controversial.³⁵ Nowadays sufficient experience has been accumulated to establish precise indications and dosages for this type of medication, which is well on its way to becoming a standardized procedure.

The value of anticoagulant therapy using heparin and dicumarol in the prevention of embolism and repeated coronary occlusion has been demonstrated beyond any reasonable doubt. Thus the question arises whether the salicylates, which have essentially the same effect as dicumarol, but are less powerful,³⁶ do not deserve a place in the general nonspecific prophylaxis of coronary occlusion. Because of their lesser potency these drugs can be more freely prescribed, and may prove useful if administered to subjects most likely to experience coronary thrombosis, before the first episode has taken place.

More particularly, the value of aspirin (acetylsalicylic acid) in the general prophylaxis of coronary occlusion is suggested by observations accumulated during the past seven years. Concededly, the effectiveness of any type of prophylactic treatment is difficult to prove, and this applies especially to a procedure

aiming merely at nonspecific prevention. Observations on healthy subjects can never be made under strictly scientific conditions, and resulting figures are only within limits suitable for statistical evaluation. Such findings may therefore merely have the value of preliminary impressions, and will be substantiated or refuted by subsequent clinical research. But as long as the field of general prophylaxis of coronary thrombosis is still outside the limits of present-day research procedures, preliminary observations may still be of practical importance provided:

1. the measure is safe in all subjects and throughout the entire extended period of medication;
2. the observations are not in opposition to trend and results of clinical and experimental research; and
3. it is well understood that the findings were not arrived at under strictly scientific conditions.

Aspirin (acetylsalicylic acid) was suggested as a general prophylactic of coronary thrombosis to 1465 healthy male subjects, mainly between the ages of 45 and 65 years, who were overweight and known to lead a sedentary life. It is common knowledge that individuals of this type are more frequently and earlier in their lives exposed to the dangers of sudden episodes of coronary thrombosis. But the precise cause of such attacks cannot be ascertained with any degree of certainty, and it must be assumed that a multitude of factors contribute to the development of coronary thrombosis. Undeniably, atherosclerosis plays a considerable part, but even most recent authors on the subject³⁷ are unable to account for the occurrence of specific episodes which are described as spontaneous events. Despite all electrocardiographic observations, and findings at autopsy, the matter is far from being resolved. How could it otherwise be explained that many persons with advanced atherosclerosis of the entire arterial tree live to a ripe old age, and then die of something else than 'heart disease'. There must be other factors which enter into the picture and are responsible for 'heart attacks'.

It is in this respect of interest to note that the incidence of postoperative

* Third Prize, 1952 Mississippi Valley Medical Society Essay Contest.

"One aspirin a day."

"A regular aspirin is advised to all male patients in the age bracket between 45 and 65 years, and especially to those who are overweight, apparently have a tendency to overeat, and to lead a sedentary life with little or no physical activity."

Mississippi Valley Medical Journal
1953;75:38-44

Aspirin, Heparin, Both, or Neither

Acute Unstable Angina
N = 479

Aspirin
325 mg BID

UFH
1,000U/hr

ASA
+ UFH

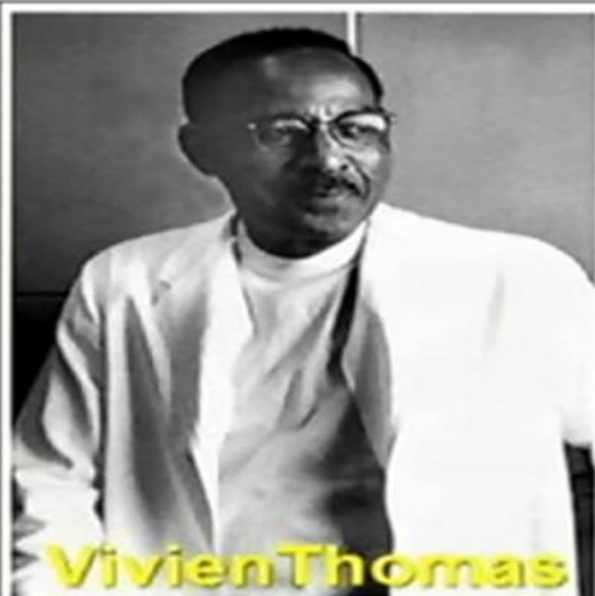
Aspirin placebo
+ UFH placebo

• In-patient Clinical Events •

Thérroux P et al. N Engl J Med 1988;319:129-1105-1111

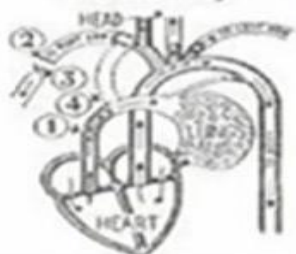
"A Thrill of Extreme Magnety": Robert E. Gross and the Beginnings of Cardiac Surgery





Vivien Thomas

**Switching Arteries
Sidetracks Blood and
Oxygen to Otherwise
Starved Lungs**



The "Blue" babies' blood leaks what oxygen remains the artery 111 from the heart to the lungs is conducted by turning an artery of the arm 121, 131, 141 and 151 and attaching it to the lung artery 161 the connection is by-passed.

By Robert D. Potter

AWESLEYAN physician's acute good character and imagination, and the skill of one of the world's great surgeons have combined to bring hope to many "blue" babies. Dr. Alfred Blalock, "father" of the blue baby operation, has shown that these babies are not doomed. They are suffering from a lack of oxygen in their blood because of a defective heart. The blood that should go to their lungs is instead being sent to their

**Saving
our Doomed
'Blue' Babies**

the blood would pick up the oxygening oxygen. Then it would go back to the heart again to be sent forward through the body.

But could it be done? It is surprising to have a physician undertake a job of this nature and undertake such a difficult to say the least, the heart, every one of its main arteries, which is to connect these primary and secondary in the patient in the operation. Dr. Blalock's skill is needed for.

Since the general thought the operation has been largely successful, although in its early stages. Among the first 50 patients, 18 died. The rate is 5 to 1 for success.

How does the case of Dr. Blalock's operation is known through the country the list of patients grows daily. Blue babies become citizens of Florida, Michigan, Virginia, North Carolina, and other states. Many are playing like other children.

The name of the procedure, "Blalock" in the long with the "blue" babies, shows what can be done.



Vivien Thomas (top left) stands behind Dr. Alfred Blalock during an early operation at Johns Hopkins Hospital. Courtesy Alan Mason Chesney Medical Archives, Johns Hopkins University



Alfred Blalock



Helen Taussig

Adults with CHD



CENTRAL
INTELLIGENCE
AGENCY

0-14 years: 25.64% (male 962,504,434/female 897,959,144)

15-24 years: 16.34% (male 610,915,870/female 574,498,881)

25-54 years: 40.98% (male 1,502,925,383/female 1,470,748,023)

55-64 years: 8.56% (male 303,057,587/female 317,738,739)

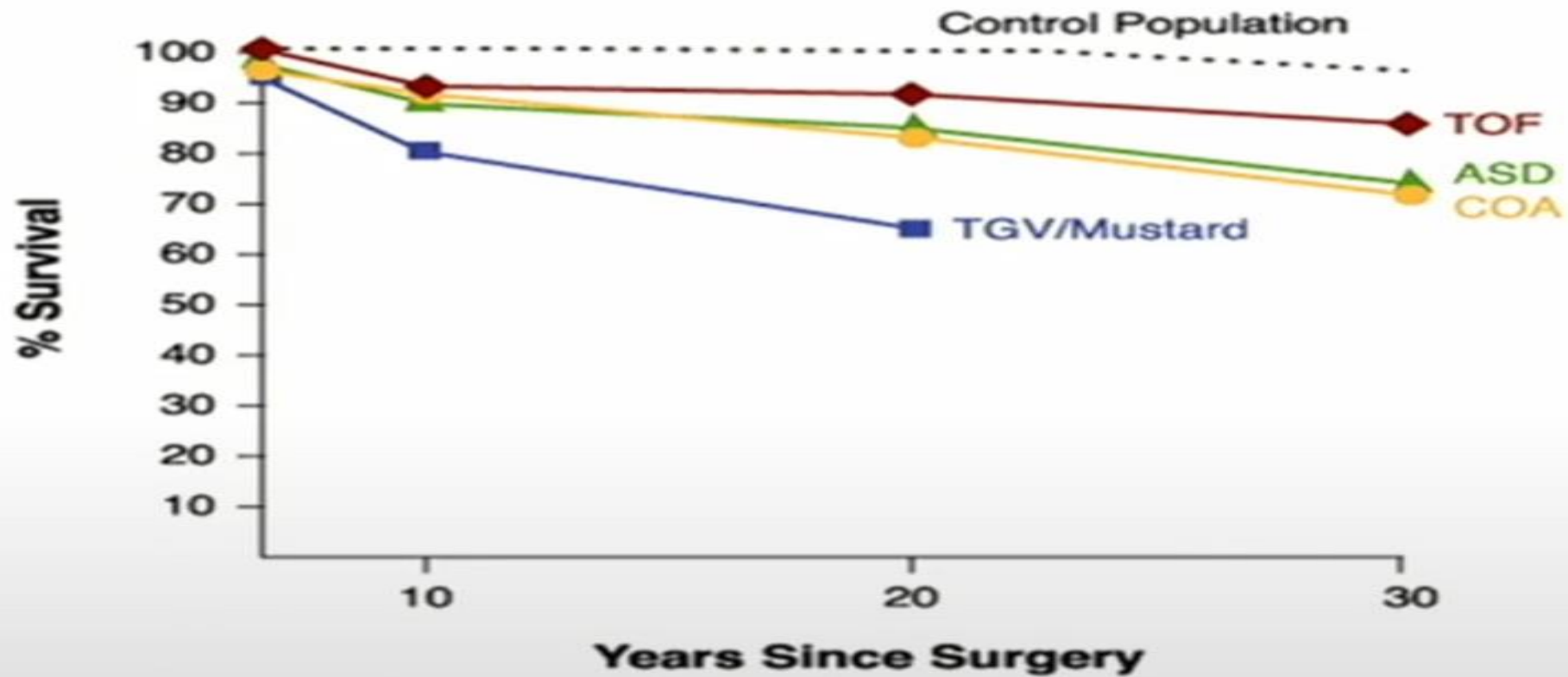
65 years and over: 8.49% (male 274,517,510/female 341,624,440) (2015 est.)

4.5 billion adults in world population



13.5 million adults with CHD

Survival Following CHD Surgery

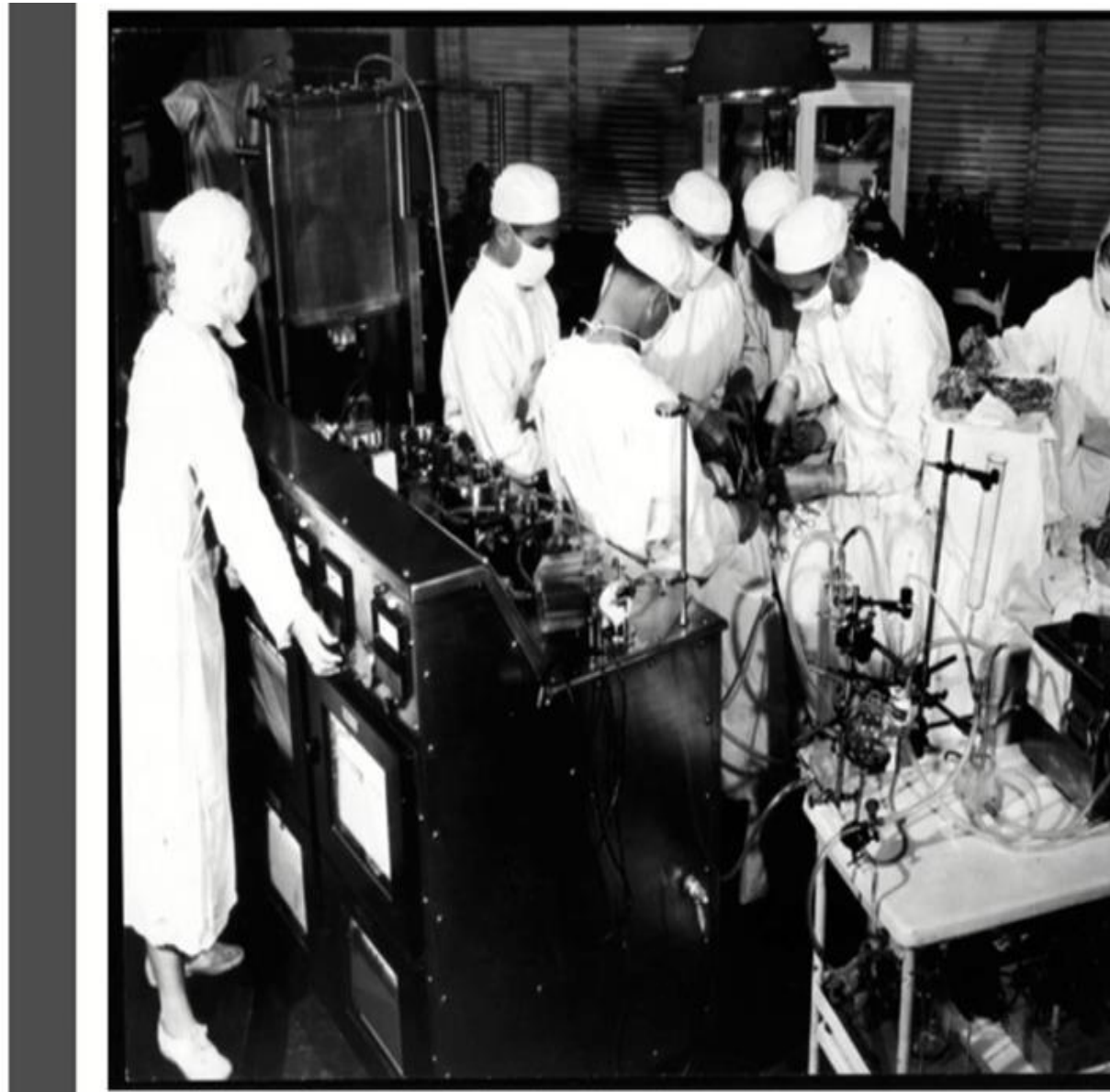
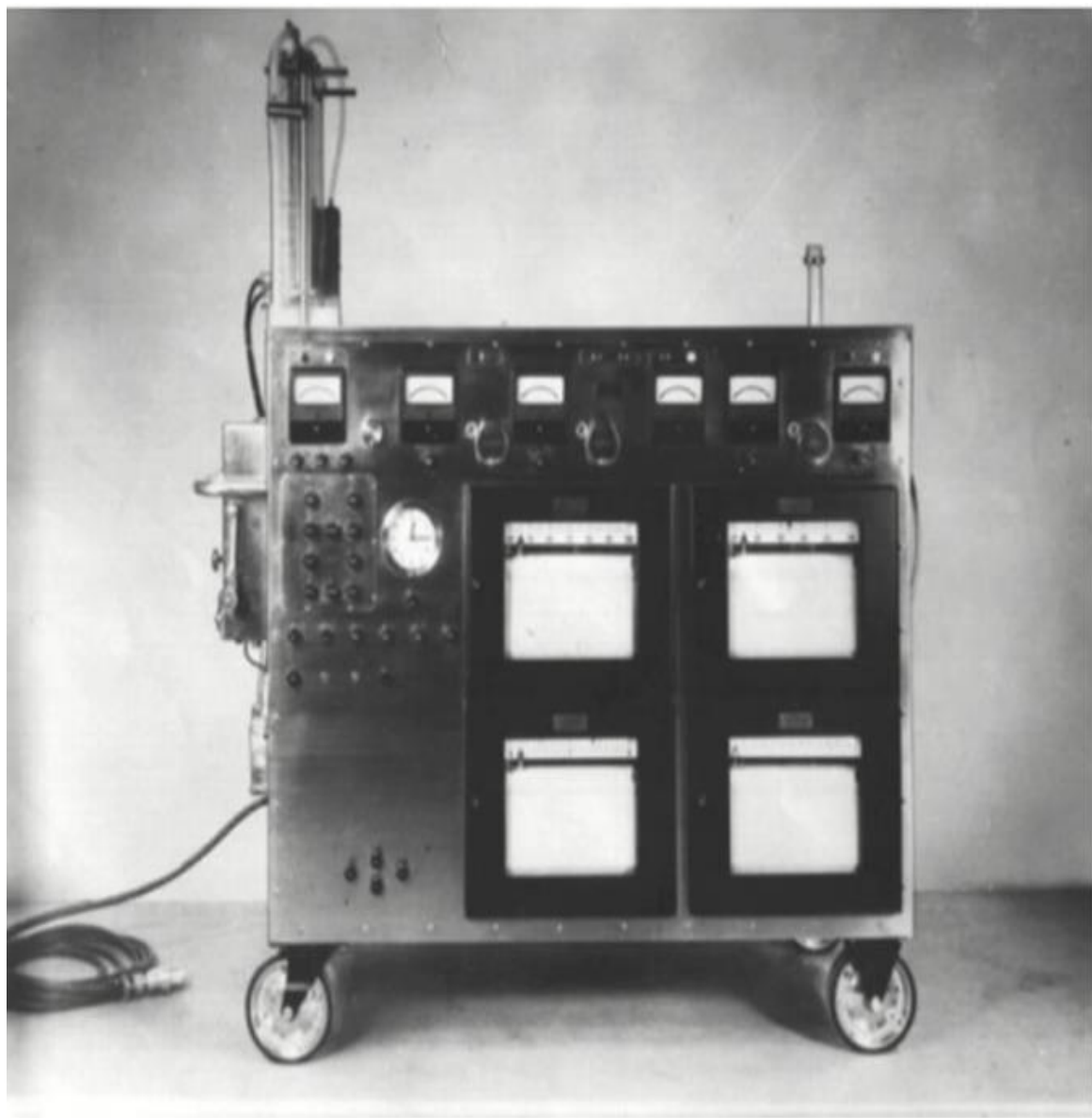


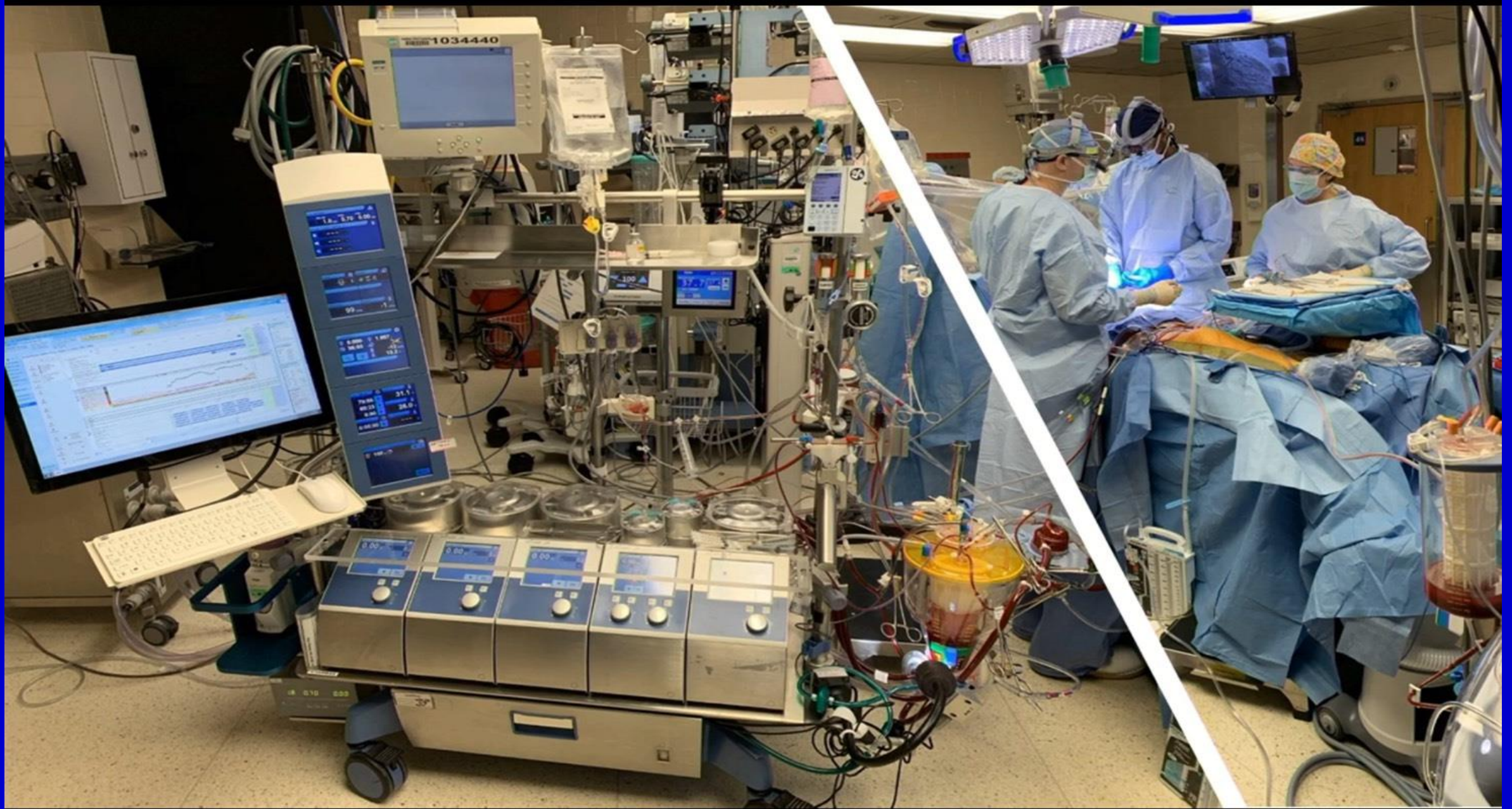
Daniels, CJ. Congenital Heart Disease. ACCSAP V

Surgical Issues

- Multiple reoperations
- Compromised ventricular function
- Pulmonary HTN
- Poor vascular access
- Co- morbidities



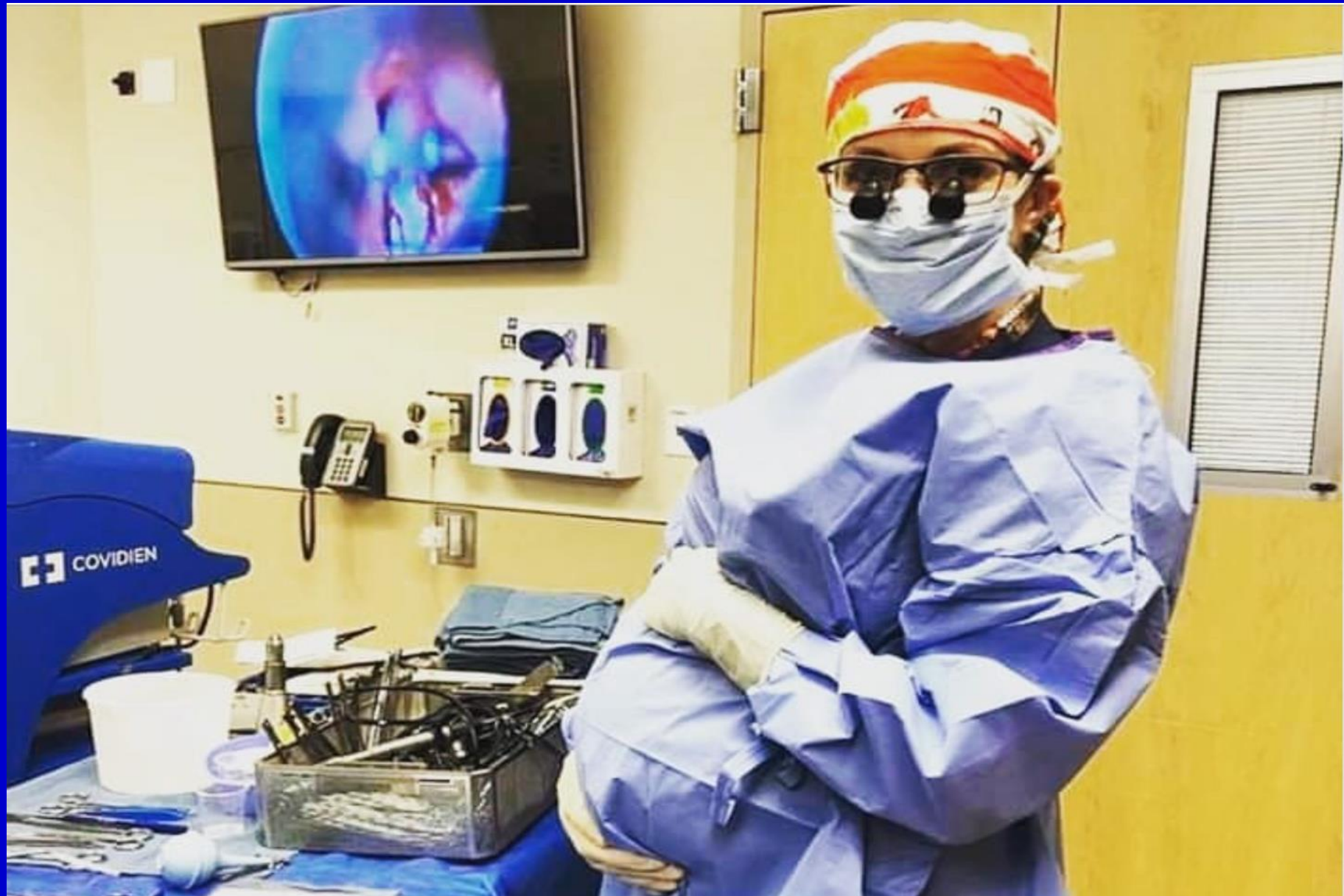




- **The electric light did not come from the continuous improvements of candles**

Oren Harari

- In the world of Technological change,
It has become
 - Better
 - Faster and Cheaper
- But in Medical Technological change,
It has become
 - Better
 - Faster but super-expensive





[SEND FEEDBACK](#)

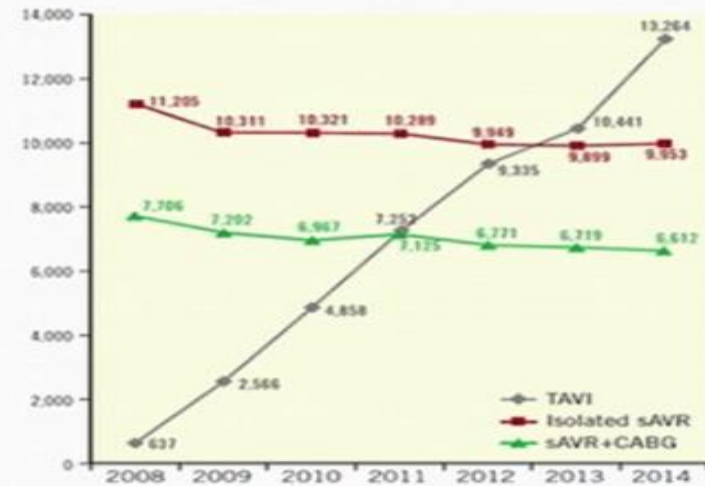
TAVR

United States



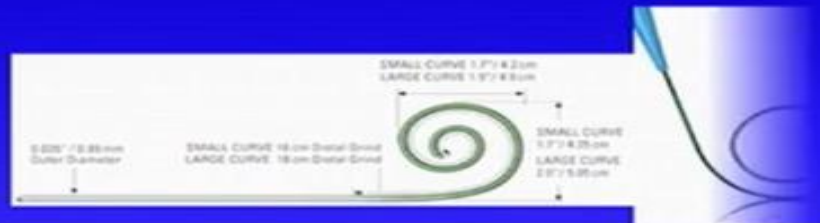
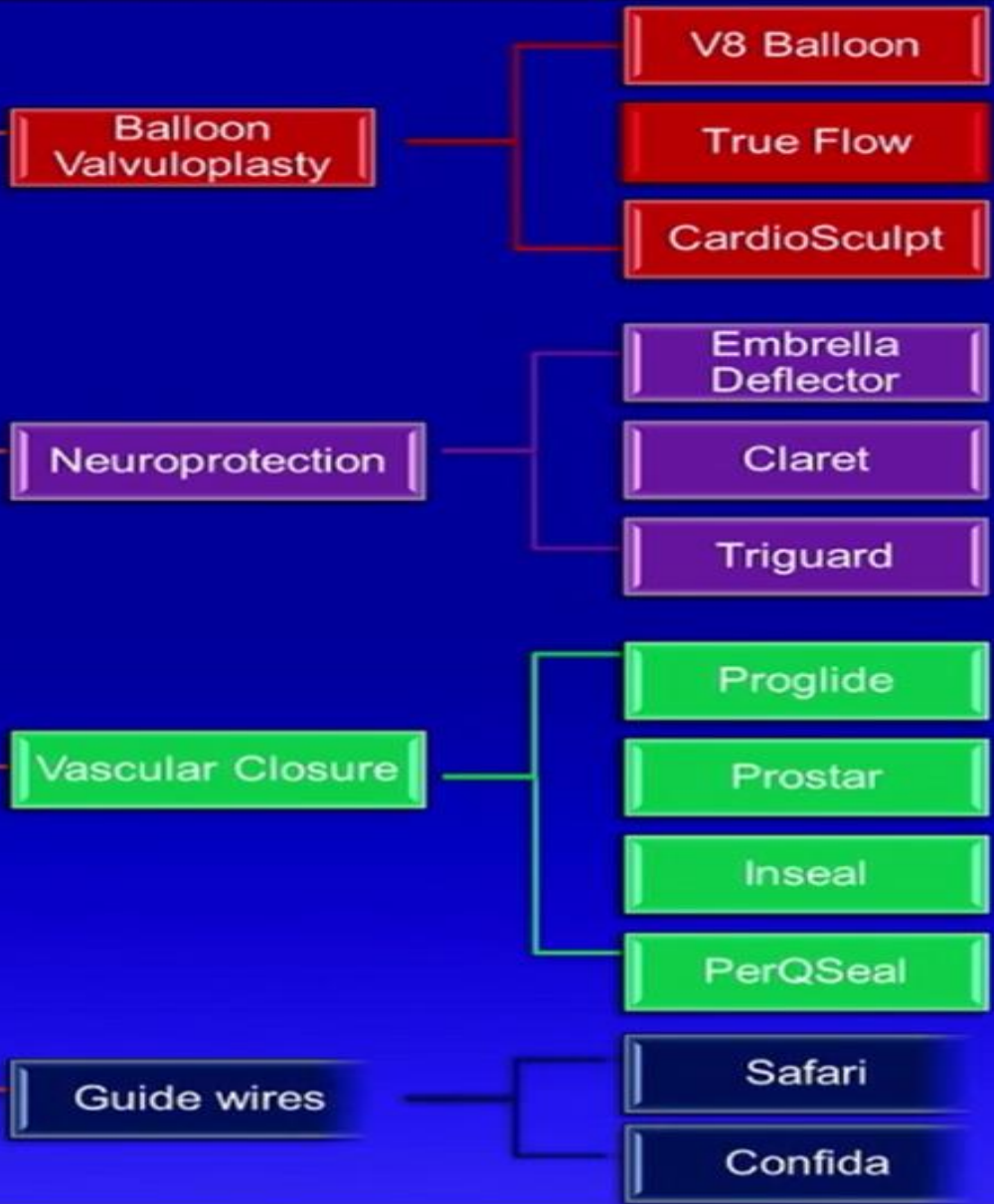
Grover F et al. J Am Coll Cardiol 2017

Germany



Eggebrecht H et al. EuroIntervention 2015

TAVI ACCESSORY DEVICES



TAVR

Step-wise Evolution

2007

2010

2011

2012

2013

2014

2015

2017

EDWARDS SAPIEN THV



TF, TA

EDWARDS SAPIEN XT



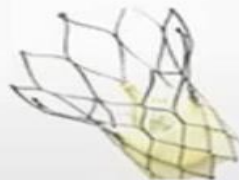
TF, TA

SYMETIS ACURATE
TA



TA

SJM PORTICO



TF

DIRECT FLOW
MEDICAL



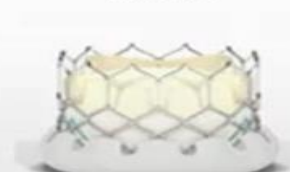
TF

BSC LOTUS



TF

EDWARDS
SAPIEN 3



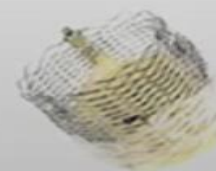
TF, TA

MEDTRONIC
EVOLUT R



TF

LOTUS EDGE



TF

MEDTRONIC COREVALVE



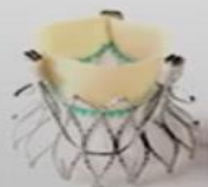
TF, TS, DA

JENAVALVE



TA

MEDTRONIC
ENGAGER



TA

SYMETIS ACURATE
NEO



TF

TAVR is now the **preferred** treatment even for low surgical risk patients



Martin Leon

"TAVR, through 1-year, should be considered the preferred therapy in low surgical risk aortic stenosis patients"

Interventional cardiologist

THE NEW ENGLAND JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Transcatheter Aortic-Valve Replacement with a Balloon-Expandable Valve in Low-Risk Patients

M.J. Mack, M.B. Leon, V.H. Thourani, R. Makkar, S.K. Kodali, M. Russo, S.R. Kapadia, S.C. Malaisrie, D.J. Cohen, P. Pibarot, J. Leipsic, R.T. Hahn, P. Blanke, M.R. Williams, J.M. McCabe, D.L. Brown, V. Babaliaros, S. Goldman, W.Y. Szeto, P. Genereux, A. Pershad, S.J. Pocock, M.C. Alu, J.G. Webb, and C.R. Smith, for the PARTNER 3 Investigators*

Michael Reardon

"TAVR may be a preferred strategy to surgery in patients with severe aortic stenosis at low risk of surgical mortality"

Surgeon



THE NEW ENGLAND JOURNAL OF MEDICINE

ORIGINAL ARTICLE

Transcatheter Aortic-Valve Replacement with a Self-Expanding Valve in Low-Risk Patients

Jeffrey J. Popma, M.D., G. Michael Deeb, M.D., Steven J. Yakubov, M.D., Mubashir Mumtaz, M.D., Hernal Gada, M.D., Daniel O'Hair, M.D., Tamir Bajwa, M.D., John C. Hesser, M.D., William Merhi, D.O., Neal S. Kleiman, M.D., Judah Askew, M.D., Paul Sorajja, M.D., Joshua Rovin, M.D., Stanley J. Chetcuti, M.D., David H. Adams, M.D., Paul S. Teirstein, M.D., George L. Zorn III, M.D., John K. Forrest, M.D., Didier Tchétché, M.D., Jon Resar, M.D., Antony Walton, M.D., Nicole Piazza, M.D., Ph.D., Basel Ramlawi, M.D., Newell Robinson, M.D., George Petrossian, M.D., Thomas G. Gleason, M.D., Jee K. Oh, M.D., Michael J. Boulware, Ph.D., Hongyan Qiao, Ph.D., Andrew S. Mugglin, Ph.D., and Michael J. Reardon, M.D., for the EvoLut Low Risk Trial Investigators*

Now, TAVR is for EVERYBODY!

Same-Day Discharge after TAVR

Featured Case Reports

Same Day Discharge after Transcatheter Aortic Valve Replacement: Are We There yet?

Philippe Généreux,^{1,2*} MD, Philippe Demers,¹ MD, and Frédéric Poulin,¹ MD

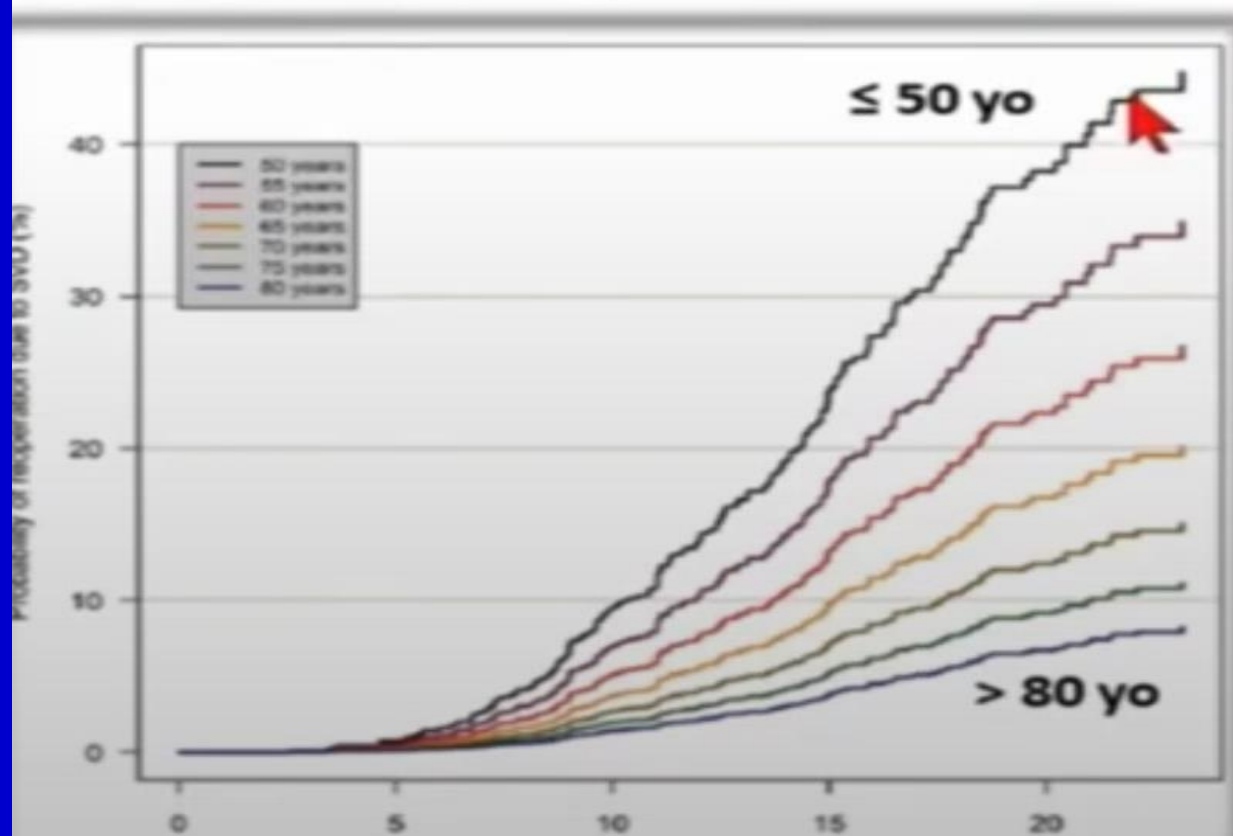
Early discharge after transcatheter aortic valve replacement (TAVR) has been increasingly reported, and is now becoming routinely performed in experienced TAVR centers. However, to the best of our knowledge, no case has been described where a patient was safely discharged on the same the day of the procedure. This report will present the case of a patient who underwent a successful transfemoral TAVR and was safely discharged home the same day. Specific requirements and criteria are proposed to ensure the safety of this approach. © 2015 Wiley Periodicals, Inc.

Key words: TAVR; TAVI; discharge

's be serious ,the Wolf is right....

Age-Dependent SVD in CE pericardial Perimount Bioprosthesis

flaps in pericardial, bovine, porcine (fixed in glutaraldehyde) are shown to generate and undergo structural valve deterioration ant thrombosis



- 2,659 patients with AVR using CE pericardial Perimount bioprosthesis followed for 20 years
- Competing risk regression evaluating the cumulative risk of reoperation due to SVD with age at surgery

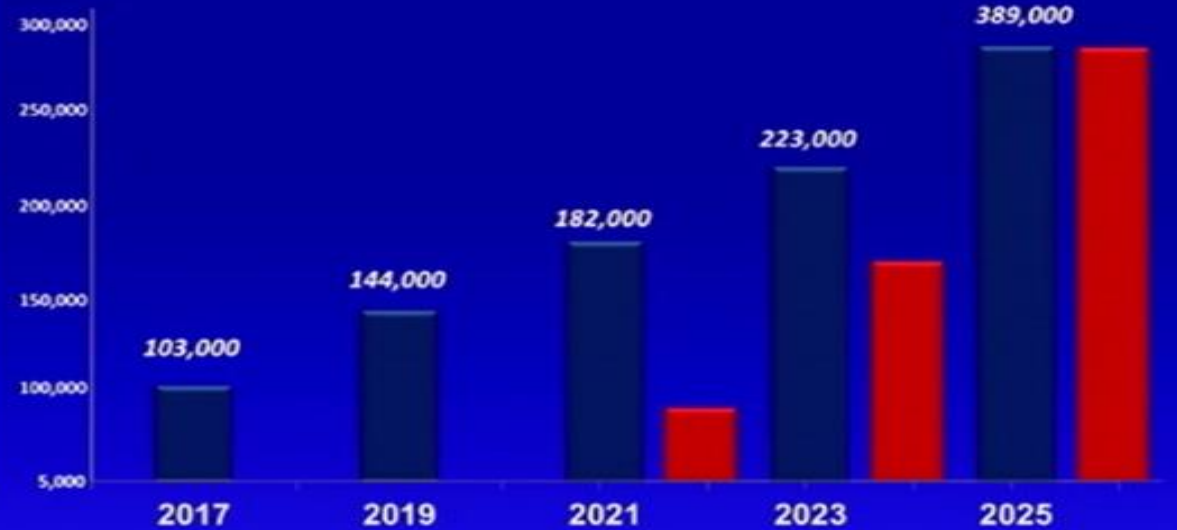
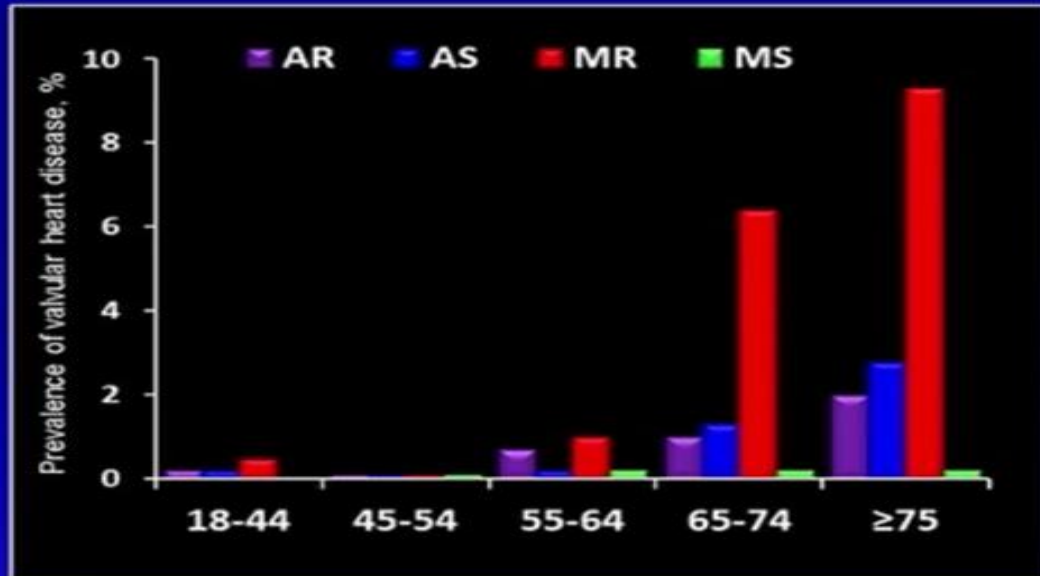
All TAVR systems will certainly demonstrate evidence of valve generation during long-term (> 10 years) assessments, especially if echo criteria are applied in the definitions of durability!



*Surgically explanted Sapien and
CorveValve THVs*

Mitral Valve Disease

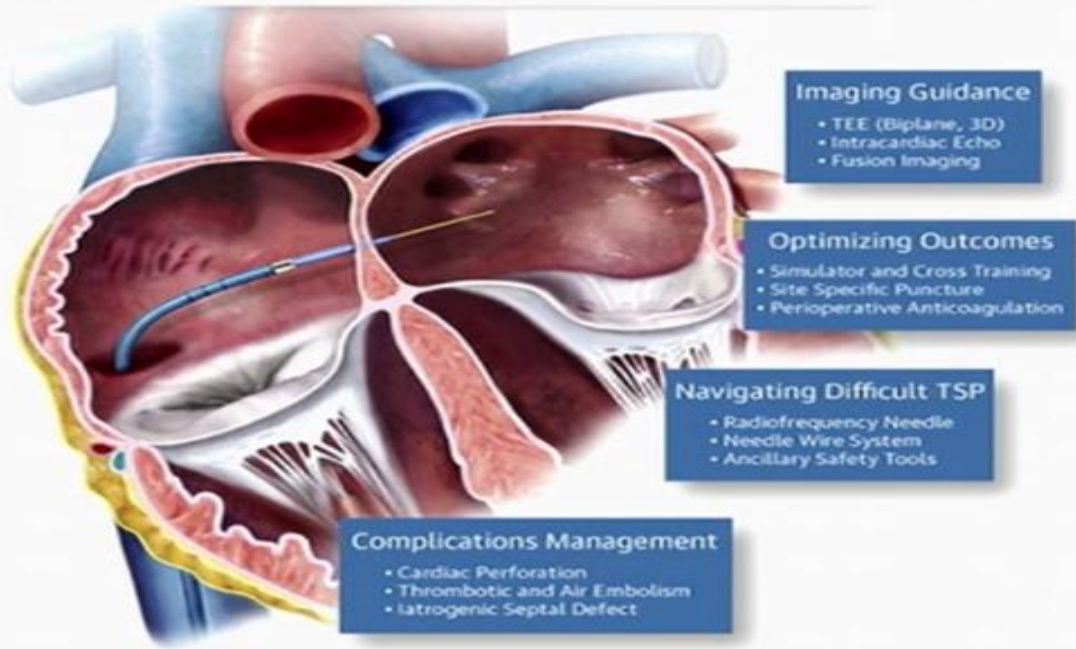
■ Global TAVI Units
■ Global TMVR Units



lung B et al. Canadian Journal of Cardiology 2014

Credit Suisse TAVI Comment – 8 January 2015

TMVR



Mitral valve repair



Mitral valve replacement

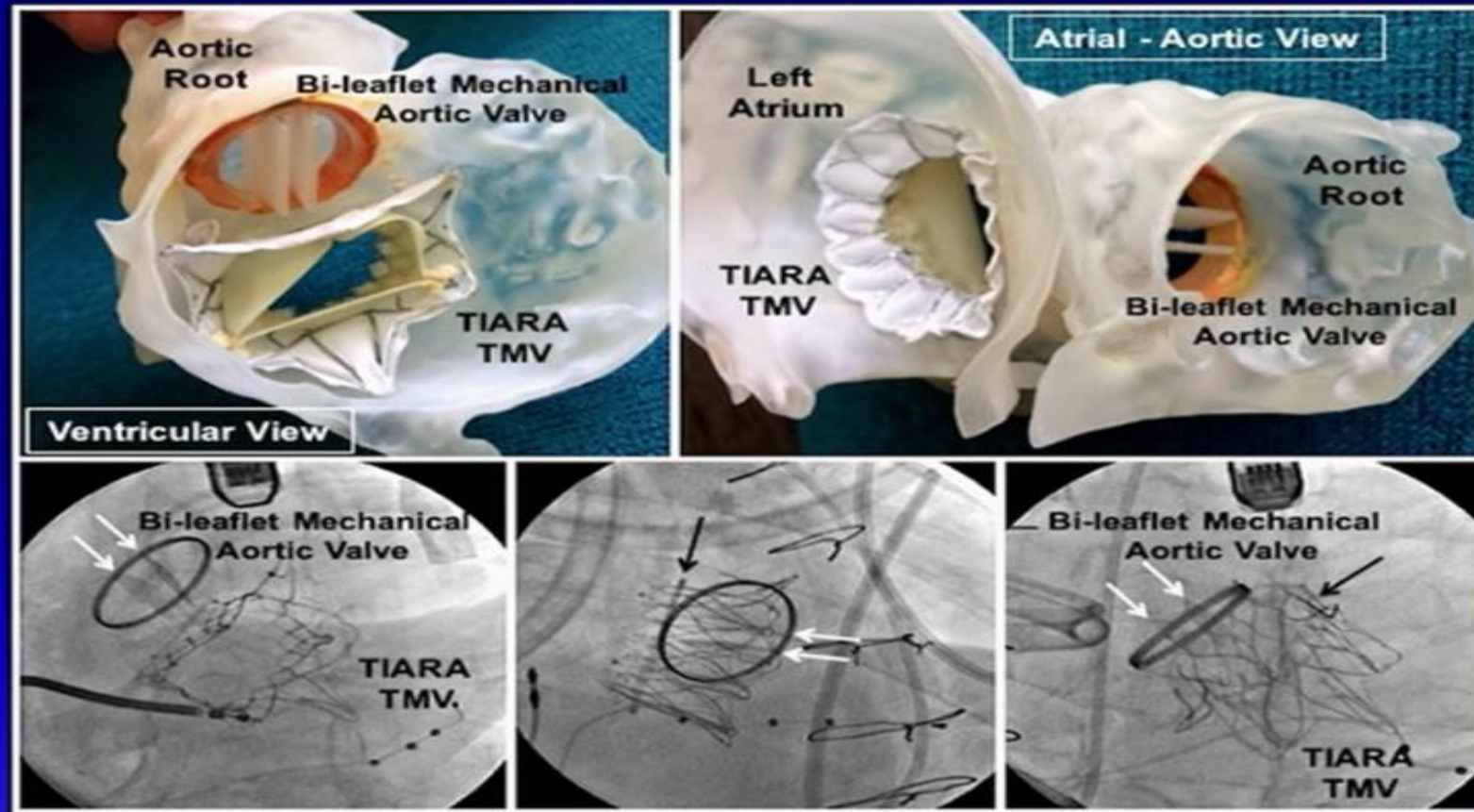


Mitral valve-in-valve implantation



Alkhouli M et al. J Am Coll Cardiol Intv 2016;9:2465-2480

TMVR



TTVR

An Unaddressed Problem

Patients with severe tricuspid regurgitation

N=1,600,000

0.5%



No surgery

Stuge O et al. J Thorac Cardio Surg 2006

Patients referred for heart valve surgery

N=4,741

1.3%



Other valve surgery

Scully et al. J Thorac Cardiovasc Surg 1995

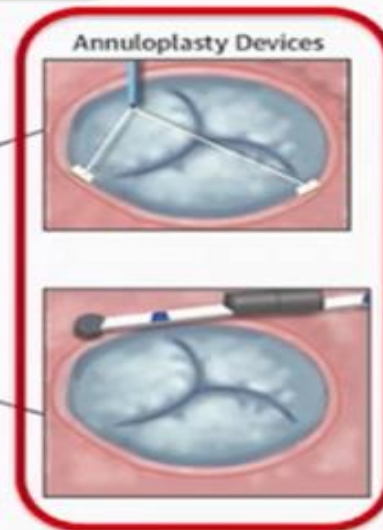
TTVR

Several Device Strategies

FORMA device



Caval valve implantation (CAVI)



**Mitralign
TriCinch**

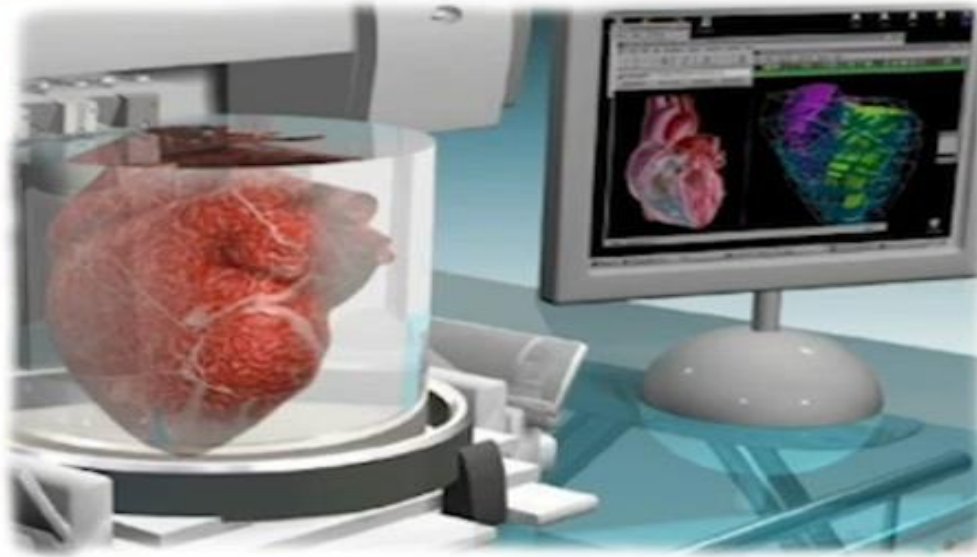
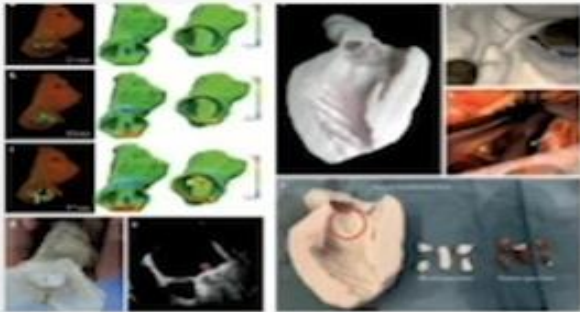
Caval valve implantation (CAVI)

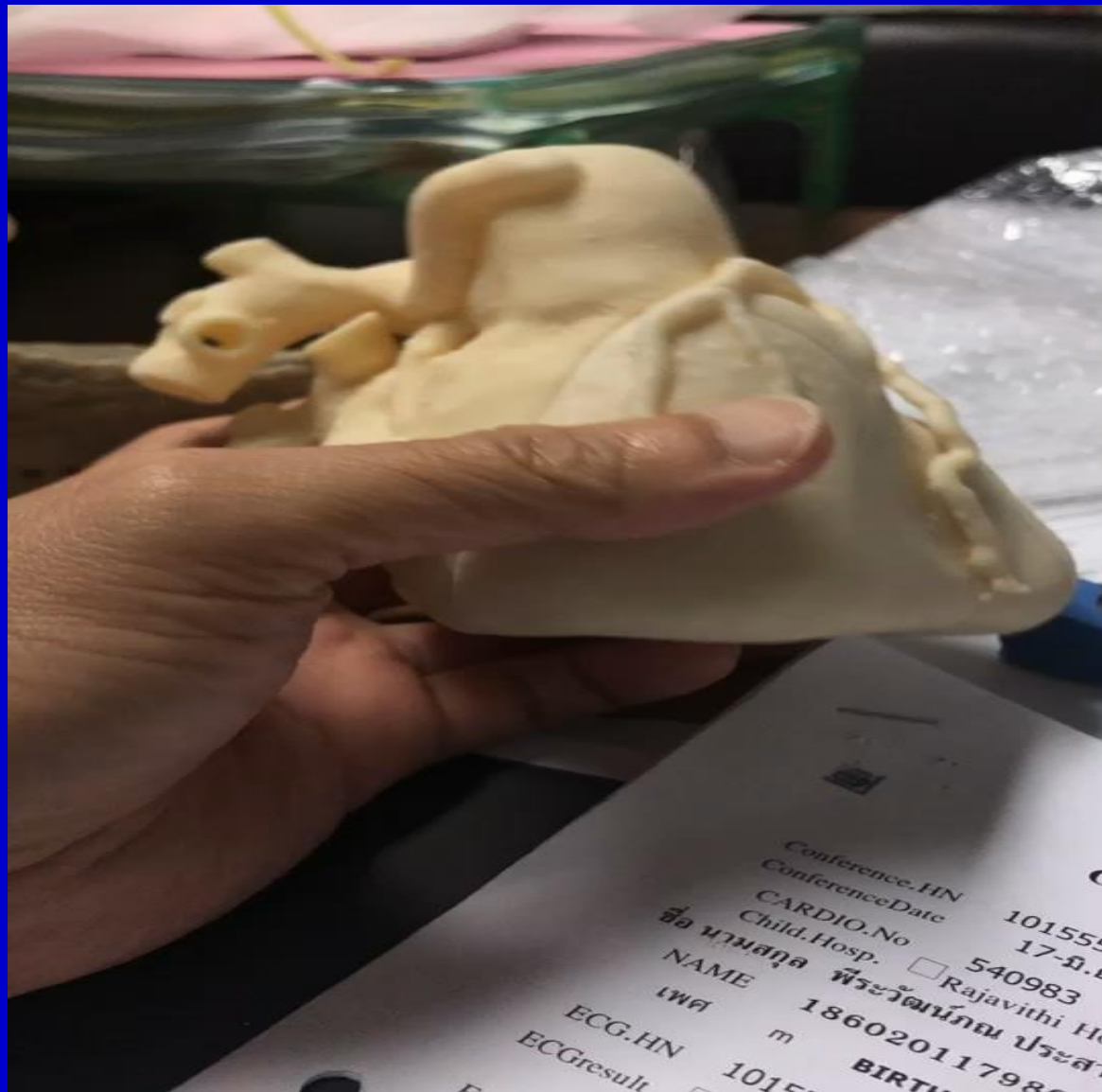
FUTURE OF SURGERY...

3D PRINTING

3D Printing And Planning Technologies Are Already Used In Surgery To Prepare For Interventions And Produce Personalised Implants And Surgical Instruments.

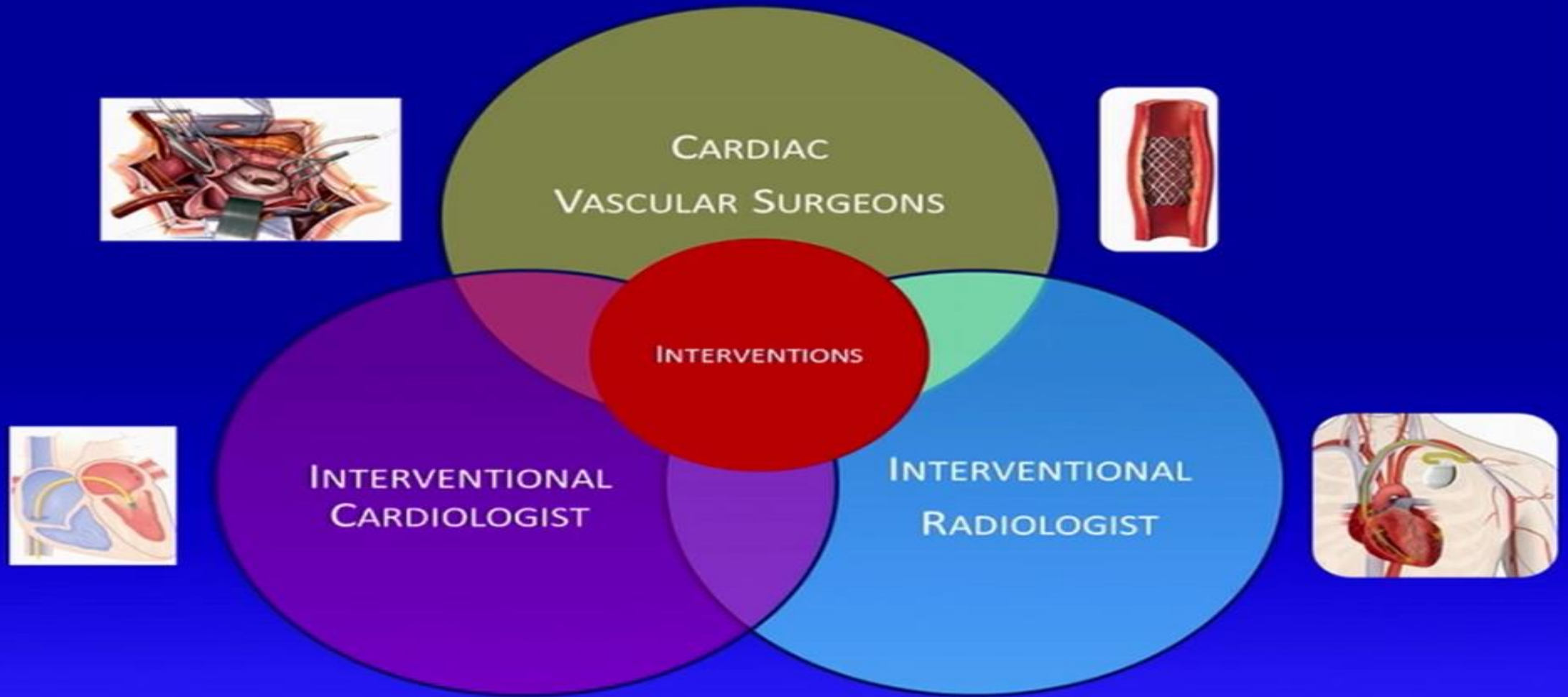
Scan – Plan – Print – Practice – Perform





Conference.HN 101555
ConferenceDate 17-11-2017
CARDIO.No 540983
Child.Hosp. Rajavithi Ho
ชื่อ นามสกุล พระวิวัฒน์คุณ ประสา
NAME 18602011798
เพศ m BIRTH
ECG.HN 101555
ECGresult

Convergence of Disciplines





STOP BUILDING WALLS!

**No need to keep fighting in defending borders
from the invasion of others!**



START BUILDING TRUST!

Trust is the most important component of Team Work!

WHERE ARE WE TODAY?

PATIENT OPTIMIZED SURGICAL CARE

(Heart) Team 2.0

Each member is equal

Build on diversity that enables cross-fertilisation

Evolves beyond "collaborative approach"
(...*being complementary is a temporary solution*)

Establish Partnerships

Focus on Similarities & Synergies

Emphasis on Competencies rather than skills

WHERE ARE WE TODAY?

PATIENT OPTIMIZED SURGICAL CARE

From Understanding
Surgical Techniques
to Understanding
Technology

Techniques are Static!

Technologies are Dynamic!

WHERE ARE WE TODAY?

PATIENT OPTIMIZED SURGICAL CARE

Maintaining
Durability
&
Able to deal with
complexity

Low risk patients are not necessarily low age groups!

If a surgeon (never) is not exposed to the low risk and complexity, how will be able to deal with high risk and complexity?

Multiple challenges in 2030

1. Increase in procedural complexity, not enough straight forward cases for residents.
2. A persistent low filling rate of residency program.

- 3. Severe therapeutic deviation towards percutaneous trans catheter intervention in CAD, valvular disease.**
- 4. Social reluctant to CVT surgery.**

hopes

1. Developing simulation curricula, annual boot camp.
2. Leaderships and the society has increased number of educational programs and seminars/webinars about catheter-based proceeding.
3. 3D Printing and simulator.

THANK YOU