"PAST, PRESENT AND FUTURE OF CORONARY SURGERY"

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President, International Scientific Board

MC Medicor | Izola, Slovenia

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Disclosure

Prof. Roberto R. Favaloro, MD

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President, International Scientific Board
MC Medicor | Izola, Slovenia

I have no conflicts of interest and nothing to disclose.

International Journal of Cardiology, 4 (1983) 331–344
Elsevier

Special Article

The present era of myocardial revascularization — some historical landmarks

René G. Favaloro *

Guemes Hospital and the El Salvador University School of Medicine, Buenos Aires, Argentina

TABLE 2

History of coronary bypass surgery.

A. EXPERIMENTAL

1910 Alexis Carrel. Homologous carotid artery between the descending thoracic aorta and left coronary artery [41,42]

1954 Murray and associates. Axillary or free carotid artery between the ascending aorta and coronary arteries with the use of heparin [43–45]

1961 Mamiya and associates. Left subclavian artery and left coronary artery [46]

1963 Sauvage and associates. External jugular vein between the descending aorta and left coronary artery [47]

1966 Wakabayashi and associates. Saphenous vein graft, as we know it today [48–50] (reported in 1968)

B. CLINICAL APPLICATION OF SAPHENOUS VEIN GRAFT

1962 Sabiston (reported in 1974) [51]. Saphenous vein graft to the right coronary artery (the patient died)

1964 Garrett and associates (reported in 1973). First clinical success: saphenous vein graft to the anterior descending coronary artery [52]

1966 Kahn (reported in 1971). Saphenous vein graft to the right coronary artery [53]

1967 Cleveland Clinic team [15,25]

1968 Johnson and associates from Milwaukee [21,22]

C. EXPERIMENTAL MAMMARY-CORONARY BYPASS

1956 Thal and associates. To the circumflex coronary artery [54]

1960 Goetz and associates. Nonsuture technique with tantalum rings to the anterior descending or circumflex coronary artery [55]

1961 Mamiya and associates. To the right coronary artery [46]

1964 Spencer and associates. To the circumflex coronary artery [56]

D. CLINICAL APPLICATION

1960 Goetz and associates. To the right coronary artery [55]

1966 Kolessov. To the anterior descending coronary artery [57]

1968 Bailey and Hirose. To the right coronary artery [58]

1968 Green and associates. To the anterior descending coronary artery with a microscope [29]

1970 Cleveland Clinic team

Mammary artery-coronary artery anastomosis as method of treatment for angina pectoris

V. I. Kolessov, M.D., Leningrad, U.S.S.R.*

FOREWORD

The opinions concerning the management and surgical treatment of angina pectoris as expressed in this paper by Professor V. I. Kolessov are at variance with the concepts of many surgeons in the United States. Consequently, with the approval of Professor Kolessov, we asked Dr. Donald B. Effler to prepare a comment on this paper. Also included at the end of this paper, is Professor Kolessov's response to Dr. Effler's comment.

—Brian Blades, Editor

Kolessov VI. *J Thorac Cardiovasc Surg.* 1967 Oct; 54(4):535-44

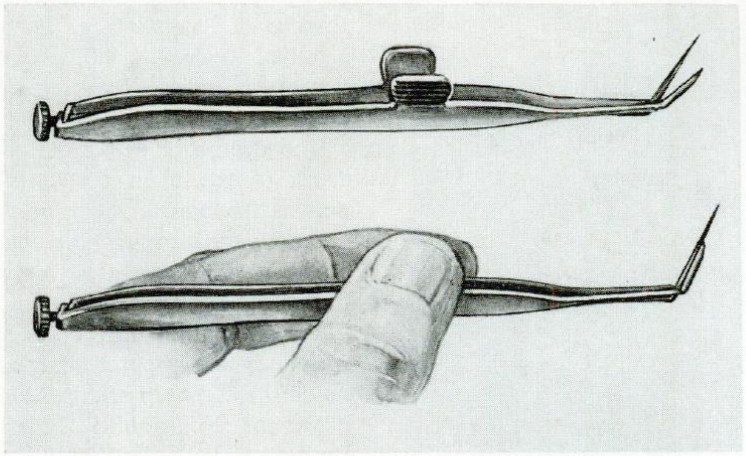

Fig. 3. The special scissors for incising the smaller vessels.

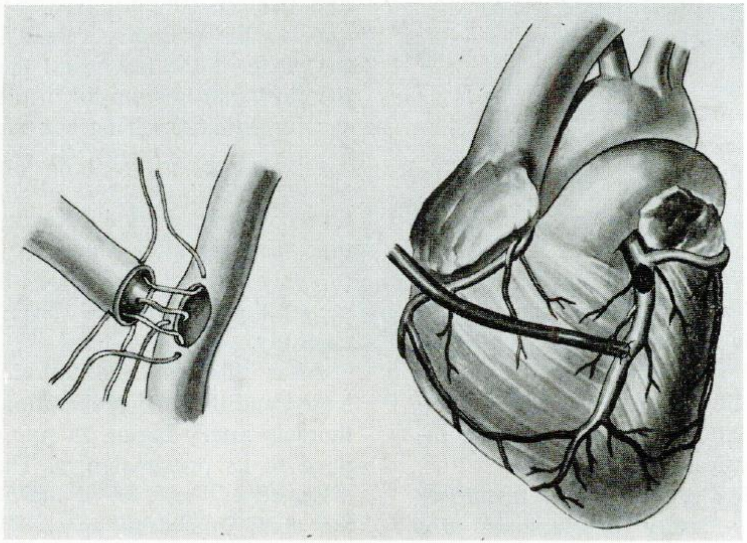

Fig. 4. An end-to-side anastomosis (schema). The arrangement of the sutures.

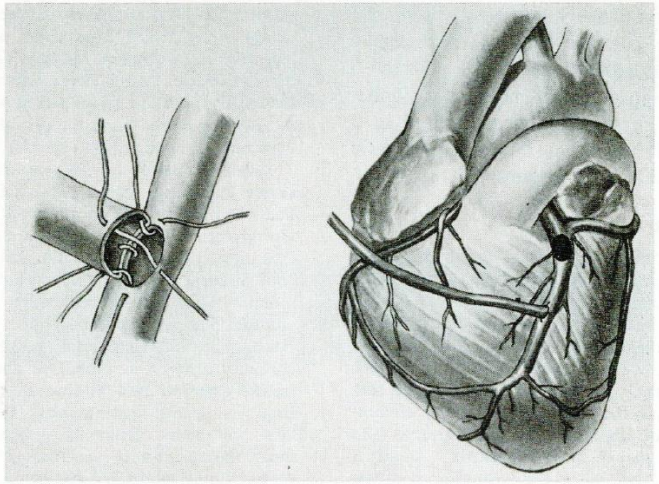

Fig. 5. An end-to-side anastomosis (schema). The arrangement of the sutures.

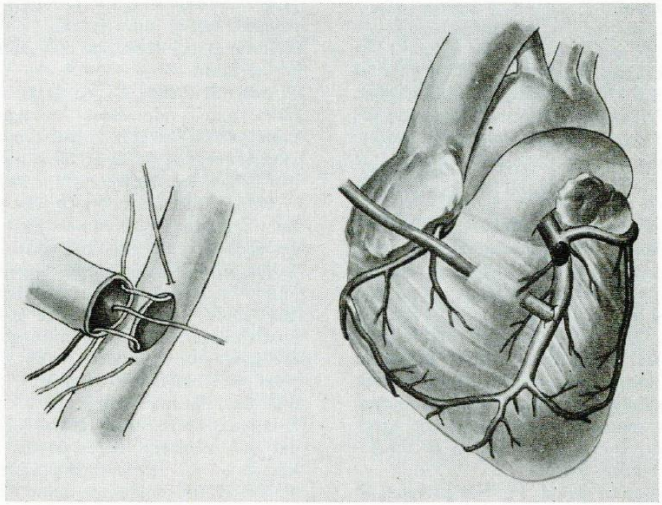

Fig. 6. Drawing of an implantation of the inner mammary artery into the myocardium and mammary artery–coronary artery anastomosis.

Kolessov VI. *J Thorac Cardiovasc Surg.* 1967 Oct; 54(4):535-44

Development of Surgical Treatments for Coronary Artery Disease

Robert H. Jones, MD

Alexis Carrel described the first experimental coronary artery bypass surgery in an article presented to the American Surgical Association on May 5, 1910, titled "On the Experimental Surgery of the Thoracic Aorta and Heart."[1] Dr. W. W. Keen of Philadelphia discussed the paper and recalled observing Dr. Carrel perform a bilateral thoracotomy with transection and resuturing of the thoracic aorta of a dog in his laboratory at the Rockefeller Institute for Medical Research. Dr. Keen closed the discussion with these words: "The promise of human surgery that lies in these early experiments to determine the technique is something that is marvelous, and the next 10 or 15 years are going to see us operating successfully on the esophagus and the thoracic and abdominal aorta and possibly on the human heart itself." Dr. Keen's words were appropriate both in his enthusiastic recognition of the promise of Carrel's work and in his qualification on the timing of the extension of these surgical techniques to the human heart. It was 42 years before Carrel's experiments were repeated in animals and 52 years before similar operations were performed on humans. The events of those intervening years followed a circuitous route typical of medical progress (Tables 1 and 2). This story of the evolution of coronary artery bypass surgery is important general knowledge for surgeons because of the common use of this procedure today. This history also reminds us how obvious solutions to common clinical problems are easily overlooked. We must be careful to avoid this trap in our work.

This article was originally published as Surgical Residents' Newsletter Vol 3, No. 9, September 1992 in *Annals of Surgery*, Vol. 216, No. 3, 1992.
From the Mary and Deryl Hart Professor of Surgery, Duke University Medical Center, Durham, NC.
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0003-4932/03/23800-0121
DOI: 10.1097/01.sla.0000097779.45670.36

THE ROAD TO CORONARY BYPASS GRAFTING

Indirect Operations on the Coronary Vasculature

Alexis Carrel received the Nobel Prize in medicine in 1912 for his work on vascular suture and the transplantation of blood vessels and organs (Fig. 1). His 1910 presentation to the American Surgical Association detailed much of the work for which the Nobel Prize was awarded, and included experiments performed to improve the general technique of intrathoracic operations.[1] Carrel emphasized the need for physiologic conditions, rigid asepsis, and precise tissue handling techniques while performing vascular surgery in the chest. He described the first experimental coronary bypass operation on the following words:

■ *In certain cases of angina pectoris, when the mouth of the coronary arteries is calcified, it would be useful to establish a complementary circulation for the lower part of the arteries. I attempted to perform an indirect anastomosis between the descending aorta and the left coronary artery. It was, for many reasons, a difficult operation. On account of the continuous motion of the heart, it was not easy to dissect and to suture the artery. In one case I implanted one end of a long carotid artery, preserved in cold storage, on the descending aorta. The other end was passed through the pericardium and anastomosed to the peripheral end of the coronary, near the pulmonary artery. Unfortunately, the operation was too slow. Three minutes after the interruption of the circulation, fibrillary contractions appeared, but the anastomosis took 5 minutes. By massage of the heart, the dog was kept alive. But he died less than 2 hours afterward. It shows that the anastomosis must be done in less than 3 minutes.*

He speculated that coronary artery bypass might be successfully performed by using a Payr's cannula or by placing the heart in a condition of anemia. He assigned operations on the coronary arteries to the most complex category of experimental cardiac operations because of heart motion. These important observations of Carrel were destined to lie dormant for more than 4 decades. The first operation performed for the relief of angina in humans was proposed by

TABLE 2. *Important First Operations for Coronary Artery Disease in Man*

Date Performed	Date Reported	Surgeon	Operation
April 2, 1916	1920	Jonnesco[3]	Left cervical sympathectomy
March 24, 1933	1933	Berlin[5]	Thyroidectomy
February 13, 1935	1935	Beck[7]	Cardiac abrasion and muscle flap
April 19, 1939	1941	Fauteux[18]	Coronary vein ligation
1952	1952	Murray[12]	Internal mammary artery implant
1950	1955	Vineberg[13]	Internal mammary artery implant
1939	1955	Zoja and Cesa-Bianchi[8]	Internal mammary artery ligation
October 29, 1956	1957	Bailey[24]	Coronary endarterectomy
February 12, 1959	1960	Dobost[26]	Excision of syphilitic overgrowth of coronary ostia
1958	1961	Senning[27]	Vein patch enlargement of coronary arteries
1964	1967	Kolessov[28]	Internal mammary artery to coronary artery bypass
May 9, 1967	1969	Favaloro[29]	Saphenous vein aorta to coronary bypass
November 16, 1964	1973	Garrett[31]	Saphenous vein aorta to coronary bypass
April 4, 1962	1974	Sabiston[32]	Saphenous vein aorta to coronary bypass

Robert H. Jones; Annals of Surgery, Vol. 238, N° 6S, Dicember 2003

Keynote Lecture Series

The history of arterial revascularization: from Kolesov to Tector and beyond

Brian F. Buxton[1,2,3], **Sean D. Galvin**[1]

[1]Department of Cardiac Surgery, The Austin Hospital, Heidelberg, Victoria, Australia; [2]Epworth Research Institute, Epworth Hospital, Melbourne, Victoria, Australia; [3]University of Melbourne, Melbourne, Victoria, Australia

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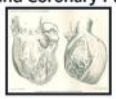
Coronary artery bypass grafting (CABG) is the one of the most effective revascularization strategies for patients with obstructive coronary artery disease. Total arterial revascularization using one or both internal thoracic and radial arteries has been shown to improve early outcomes and reduce long-term cardiovascular morbidity. Although CABG has evolved from an experimental procedure in the early 1900's to become one of the most commonly performed surgical procedures, there is still significant variation in grafting strategies amongst surgeons. We review the history and development of CABG with a particular emphasis on the early pioneers and the evolution of arterial grafting.

Buxton and Galvin *Ann Cardiothorac Surg* 2013;2(4):419-426

CENTRAL ILLUSTRATION Landmark Developments in the History of Coronary Artery Bypass Grafting

Key Pre-CABG Developments

1880 Langer
Collateral Circulation Around Coronary Plaque



1910 Carrell
Vascular Anatomosis

1916 Jonnesco
Surgical Sympathectomy

1939 Fieschi
IMA Ligation

1946 Vineberg
Direct Implantation of LIMA into LV

1953 Gibbon & Gibbon
First In-Human Application of Heart-Lung Machine

The Birth of CABG

1960 Goetz
RIMA to RICA
Tantalum Ring Anastomosis

1962 Sabiston
SVG to RCA
Hand-Sewn

1964 Garrett/DeBakey
SVG to LAD
Hand-Sewn

1964 Kolesov
RIMA to RICA
Hand-Sewn

1968 Green
LIMA to LAD
Hand-Sewn

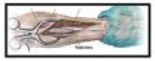
The Growth of CABG

1970s CABG vs. Medical Therapy Trials
1972-1974 VA Coop Trial
1973-1976 European Coronary Surgery Study
1975-1979 CASS Trial

1970s Buckberg
Myocardial Protection

1972 Favaloro
~1700 CABGs

1973 Carpentier
Radial Artery Conduit



1985 Buffolo/Benetti
First Large Series of Off-Pump CABG

1986 Loop
Superiority of LIMA-to-LAD

Continued Evolution of CABG

1997 Subramanian
MIDCAB

1999 Lytle
BIMA Utilization

2009 Serruys & Mohr
SYNTAX Trial

2010 Taggart
ART Trial

2011 Jones
STICH Trial

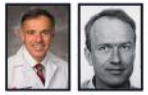
2012 Fuster
FREEDOM Trial

Continued Evolution of CABG

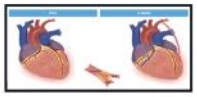
2013 Diegeler/Lamy
GOPCABE/CORONARY Trials

2015 Park
BEST Trial

2016 Sabik & Kappetein
EXCEL Trial



2016 Holm
NOBLE Trial



2019 Zenati
REGROUP Trial

20 Million CABG Operations Have Been Performed Worldwide

Mack, M.J. et al. J Am Coll Cardiol. 2021;78(4):365-83.


René G. Favaloro MD.

'I have always believed in team work. 'We' is more important than 'I'. In medicine the advances are always the result of many efforts accumulated over the years'

René G. Favaloro

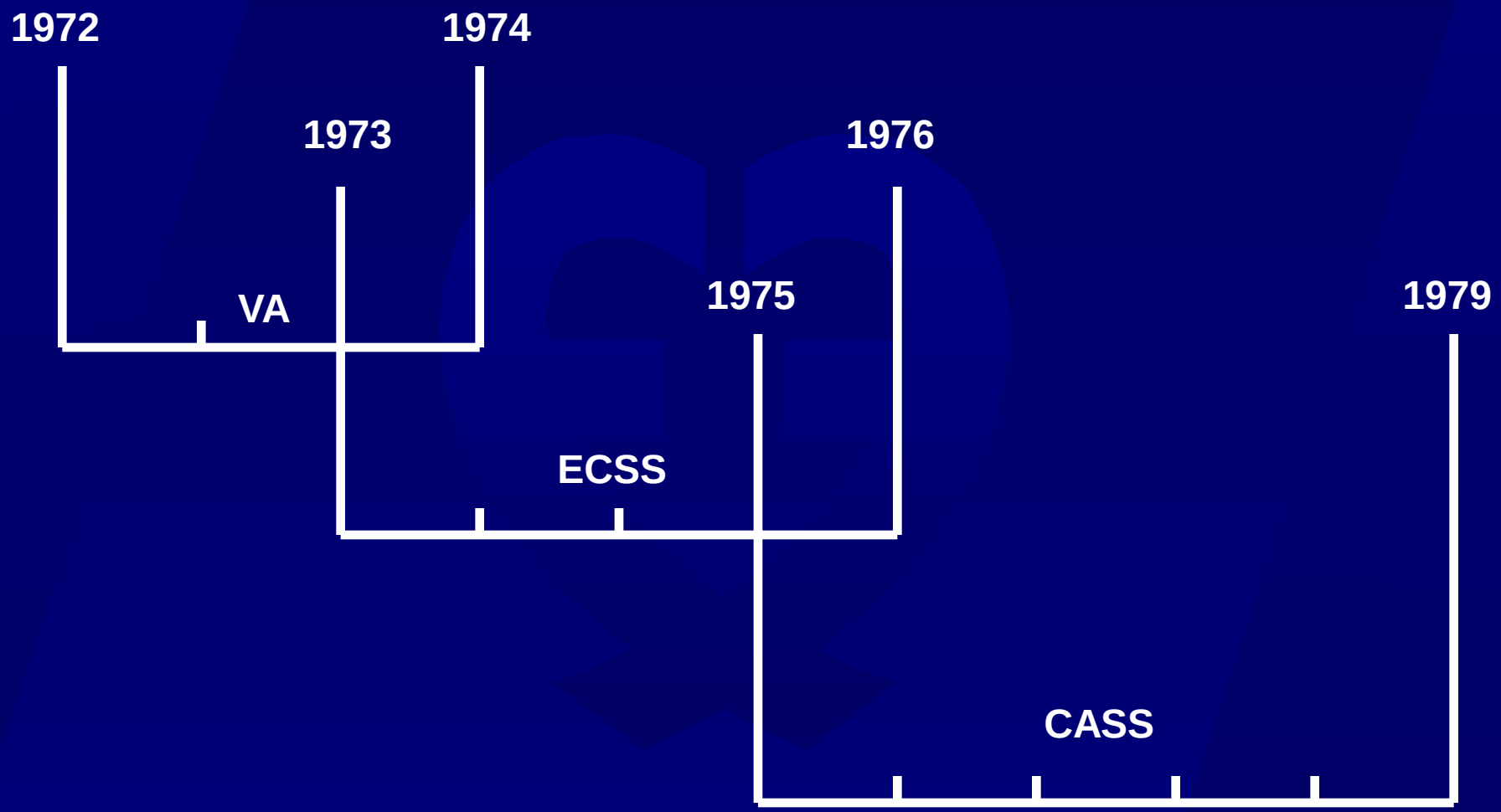
Circulation, 1998:98:466-478

1962 – 1971 Cleveland Clinic

William L. Proudfit, MD

F. Mason Sones Jr, MD

Donald B. Effler, MD


1972
1974
1973
1976
VA
1975
1979
ECSS
CASS

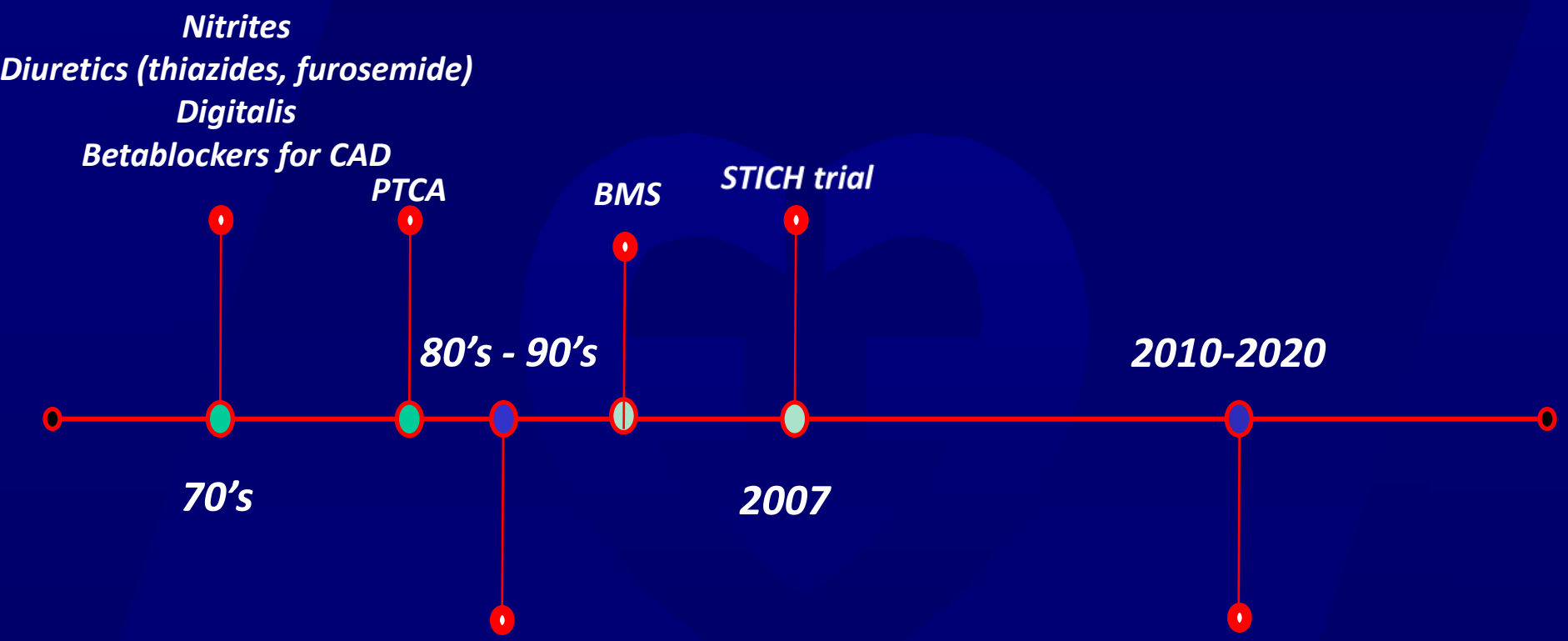
Effect of Coronary Artery Bypass Graft Surgery on Survival

Overview of 10-year Results from Randomised Trials

"This overview has shown that a policy of routine early CABG surgery improves survival over a policy of initial medical therapy (with delayed surgery for advanced symptoms). The benefits are especially pronounced in patients with more extensive coronary disease or ischaemia and in those who have clinical or angiographic features indicating high or moderate risk".

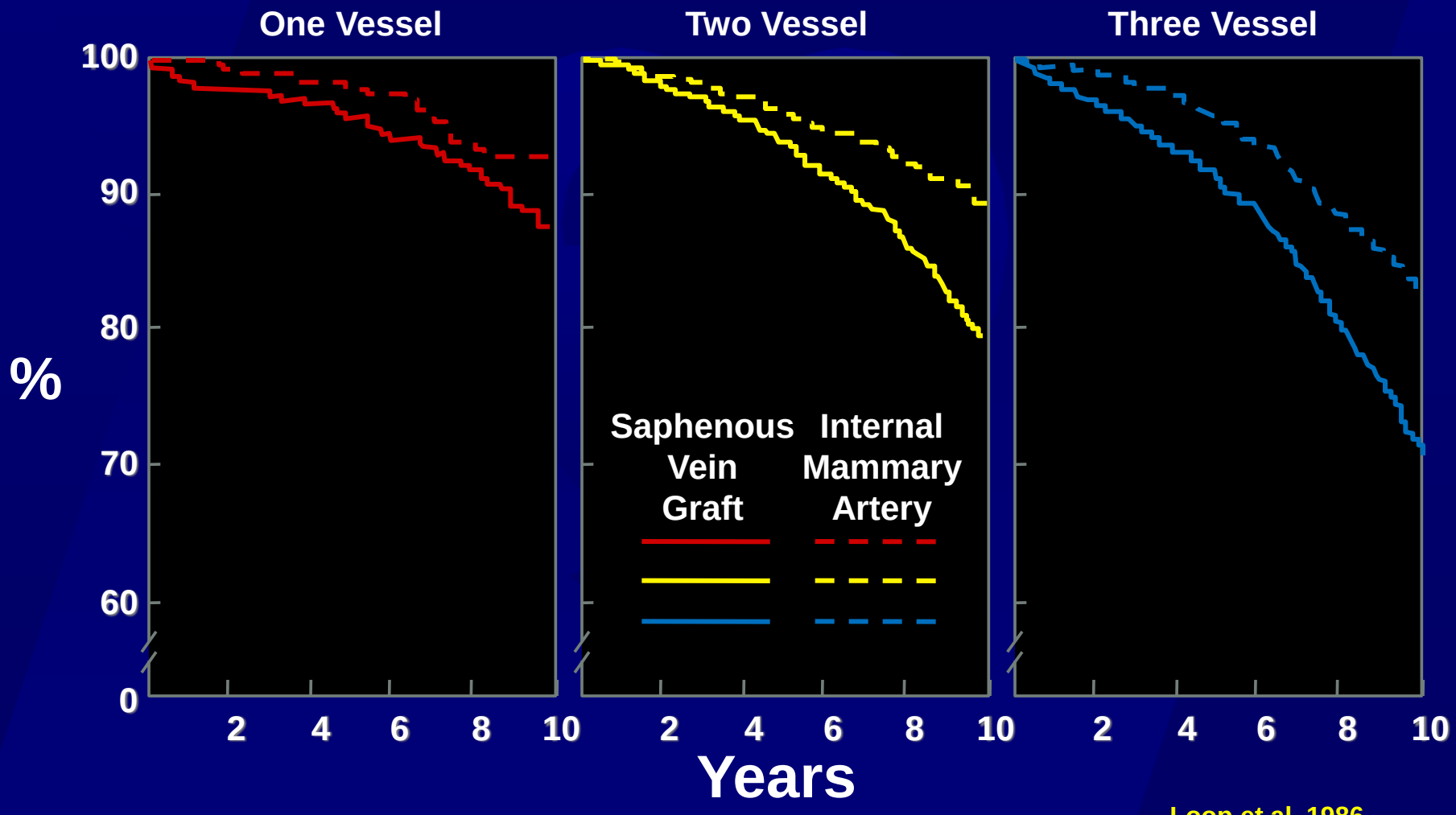
Salim Yusuf, MD., David Zucker, MD., Peter Peduzzi, MD., et al: The Lancet, 1994; 344: 563-570.

Medical treatment evolution



ACEIs: Angiotensin-converting enzyme inhibitors; ASA: acetylsalicylic acid ; ARNi: Angiotensin Receptor-Neprilysin Inhibitor
CAD: coronary artery disease

LIMA-LAD vs All SVG SURVIVAL

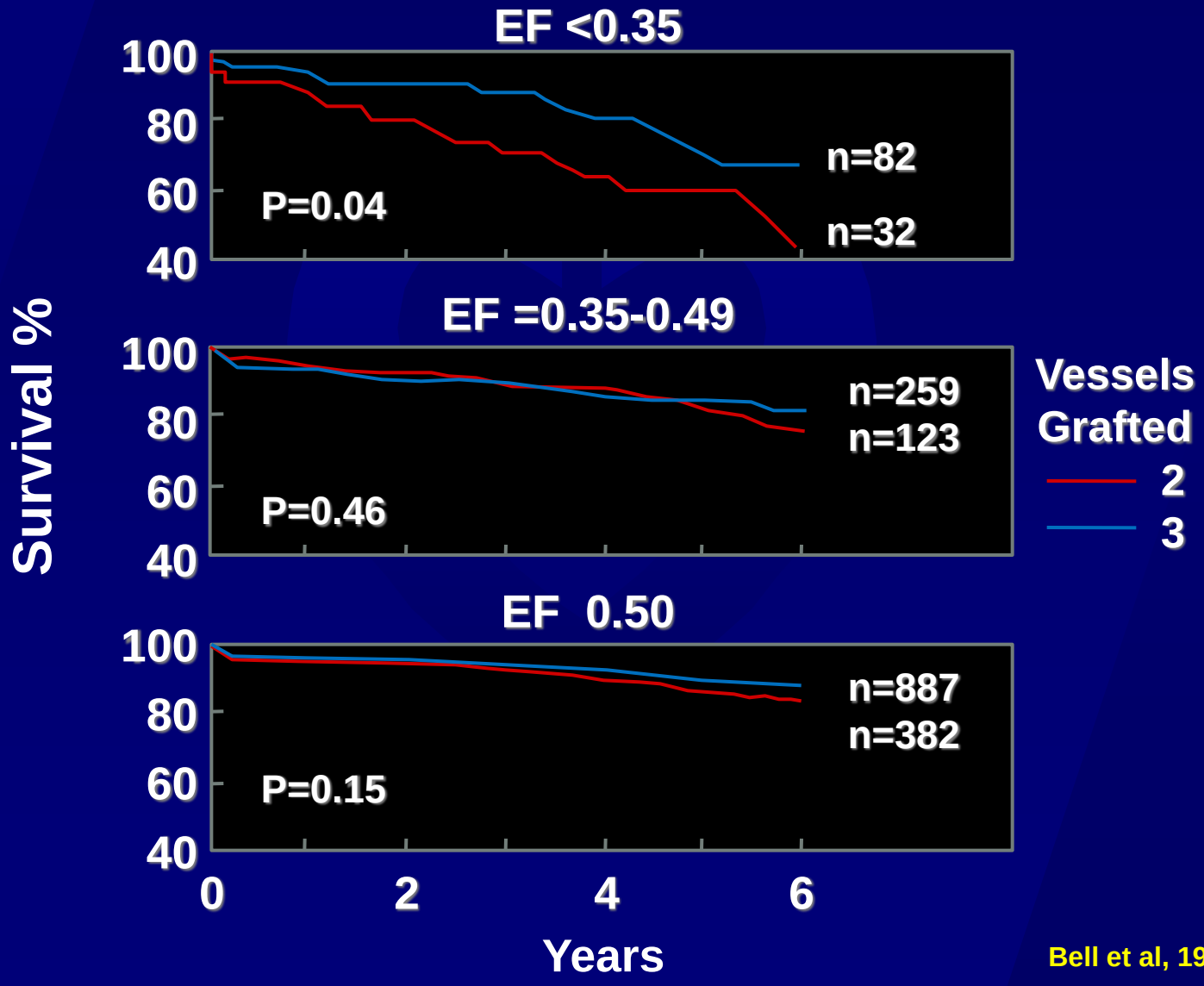


Loop et al, 1986

SVG PATENCY

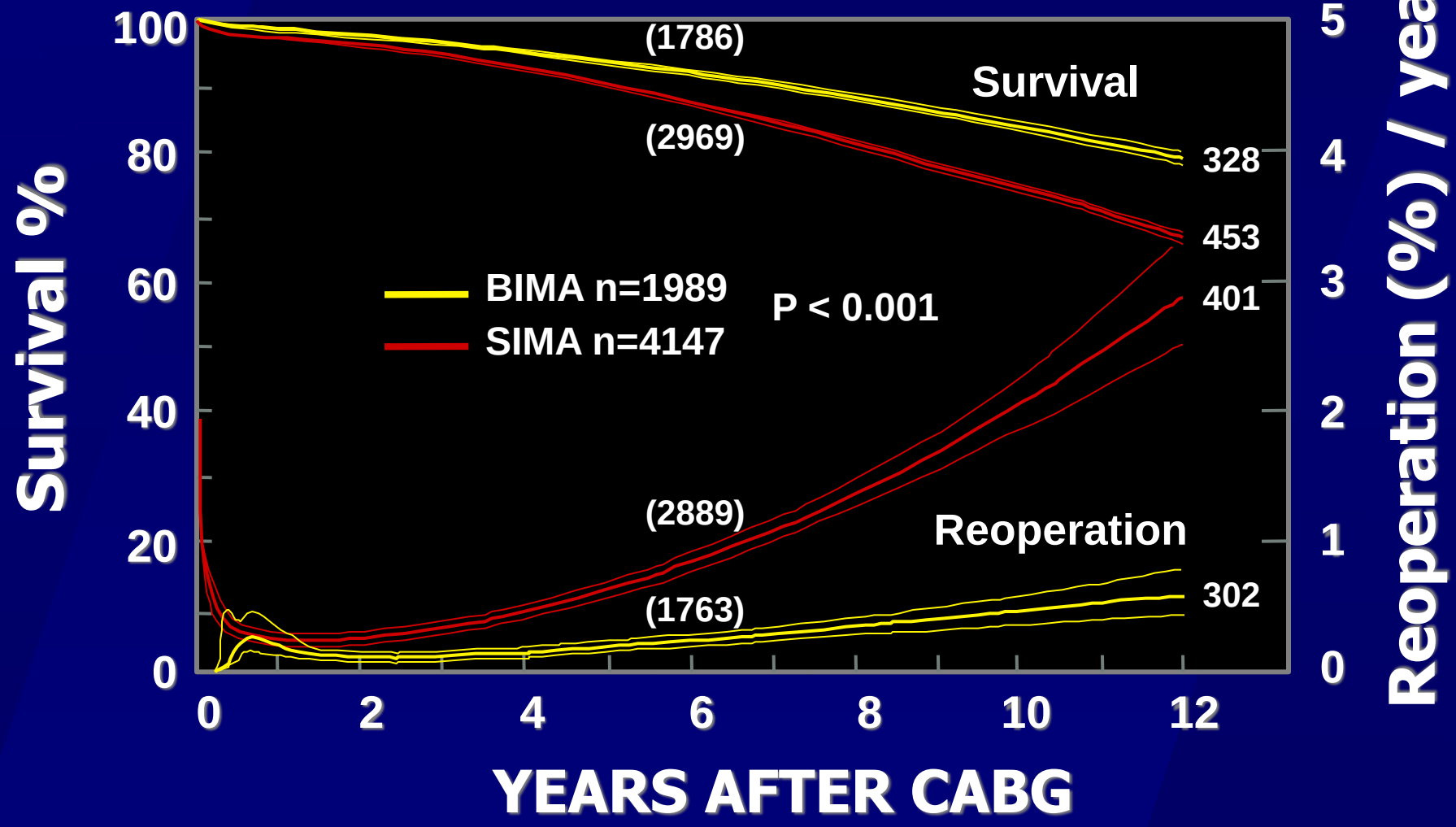
TRIAL	1 yr.	5 yr.	10 yr.
RAPS Trail (ACC 2011)	86%	82%	-
VA (JAMA 2011)	89%	-	-
RSVP (Circ 2008)	-	86%	-
RAPCO (JTCVS 2003)	-	84%	-
CASCADE (Circ 2010	94%	-	-
CCF (Loop et al, 1986)	80%	76%	67%

INCOMPLETE REVASCULARIZATION AND SURVIVAL
THREE VESSEL DISEASE - CASS REGISTRY



Bell et al, 1992

SURVIVAL AND REOPERATION
1 vs 2 IMA GRAFTS



Lytle *et al.* *J Thorac Cardiovasc Surg* 1999;117:855-872

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Six-year Survival Percentages ±1.96 by Number of Diseased Vessels, Number of Proximal Diseased Arterial Segments, and Left Ventricular Score

TABLE VI

6-yr Survival Percents±1.96 SE by Number of Vessels Diseased, Number of Proximal Arterial Segments Diseased, and Left Ventricular Wall Motion Score (Number of Patients in Cell at Enrollment)

No. diseased vessels	No. proximal segments diseased	Left ventricular score			
		5–11	12–16	17–30	Total
0	0	93±2 (1,836)	76±13 (45)	78±27 (9)	(1,890)
1	0	92±2 (1,430)	81±8 (219)	65±20 (36)	(1,685)
1	1	90±3 (796)	76±9 (204)	55±19 (65)	(1,065)
2	0	81±6 (652)	49±22 (128)	52±18 (37)	(817)
2	1	86±4 (617)	67±10 (188)	54±14 (71)	(876)
2	2	72±9 (234)	51±14 (102)	43±20 (39)	(375)
3	0	76±10 (238)	53±12 (96)	25±36 (29)	(363)
3	1	74±7 (371)	43±12 (191)	47±13 (71)	(633)
3	2	66±8 (297)	47±9 (165)	24±13 (74)	(536)
3	3	57±13 (156)	29±14 (93)	16±14 (46)	(295)
					(8,535)

Ringqvist et al; J Clin Invest; 71: 1854; 1983

Six-year Survival Percentages ±1.96 by Number of Diseased Vessels, Number of Proximal Diseased Arterial Segments, and Left Ventricular Score

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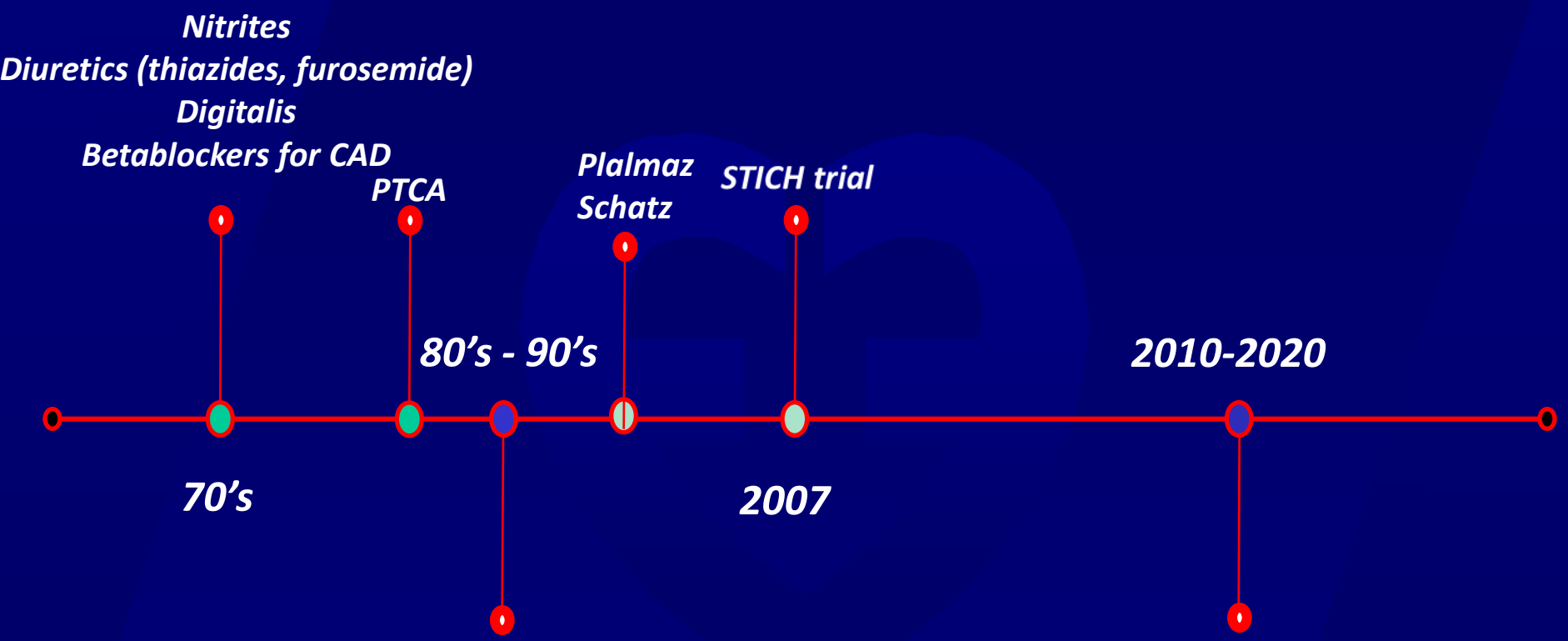
3	2	66±8	47±9	24±13	
		(297)	(165)	(74)	(536)
3	3	57±13	29±14	16±14	
		(156)	(93)	(46)	(295)
					(8,535)

Ringqvist et al; J Clin Invest; 71: 1854; 1983

Medical treatment evolution



ACEIs: Angiotensin-converting enzyme inhibitors; ASA: acetylsalicylic acid ; ARNi: Angiotensin Receptor-Neprilysin Inhibitor
CAD: coronary artery disease

All-cause Mortality

STICH

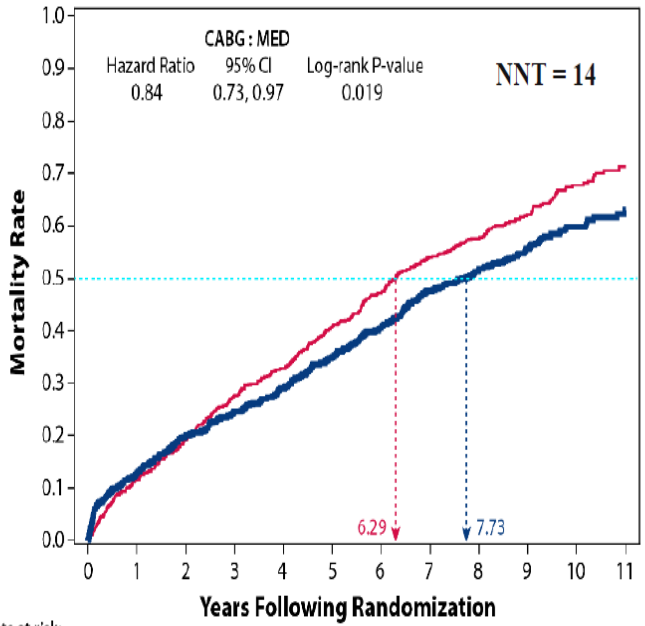
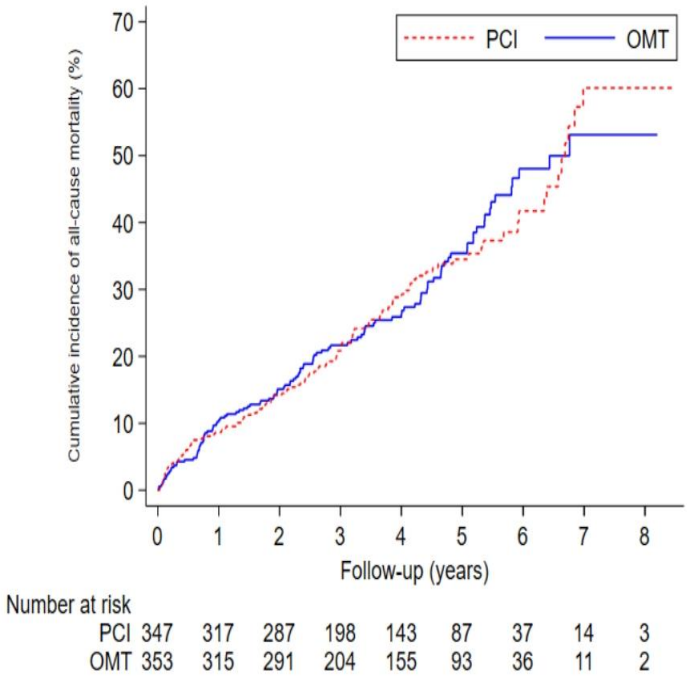


Figure S2: Kaplan-Meier Plot for All-Cause Mortality



OMT – optimal medical therapy, PCI – percutaneous coronary intervention

OPCAB

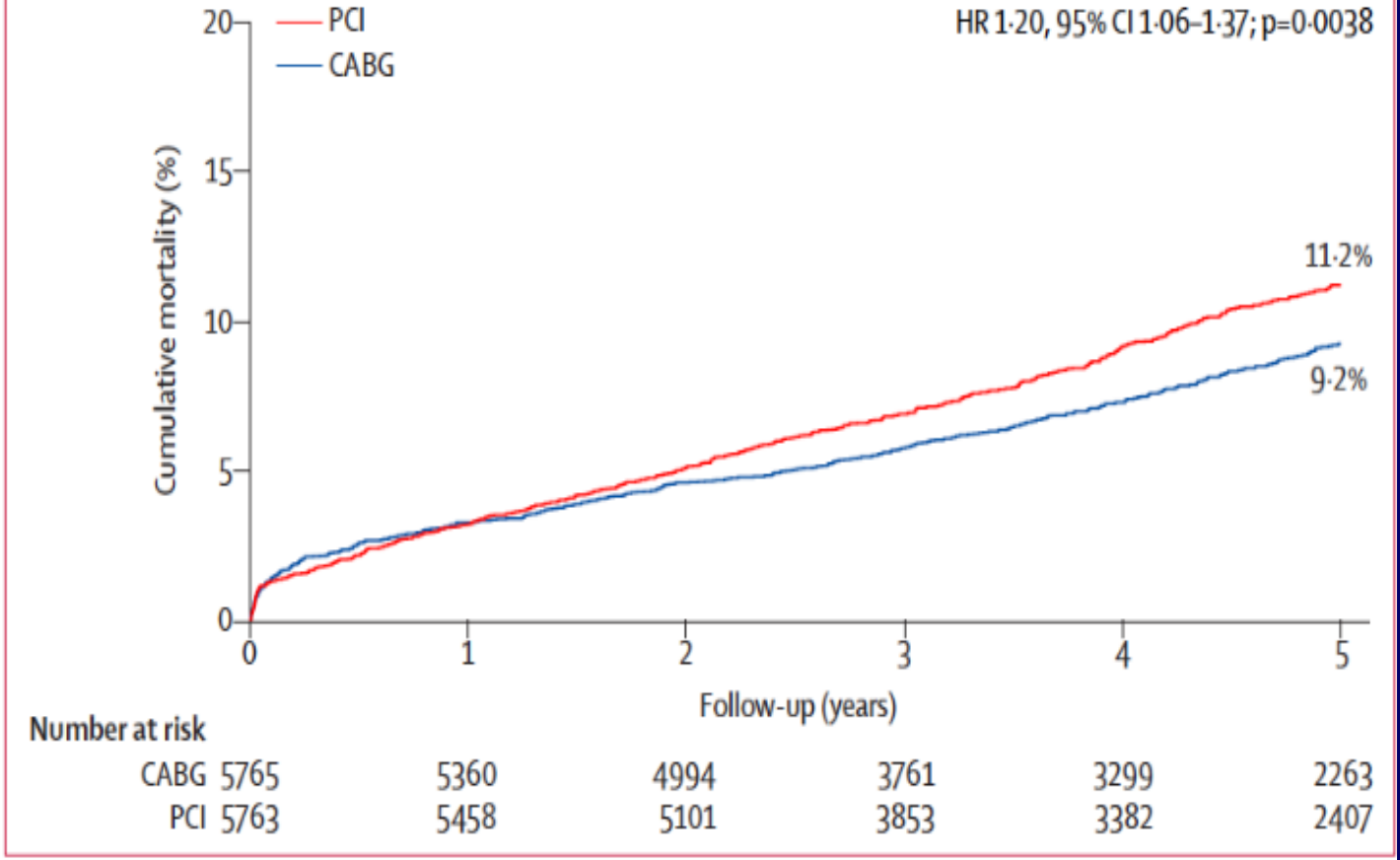
TAR

MIDCAB

TECAB Da Vinci Surgical System
IMA Harvesting
LIMA – LAD

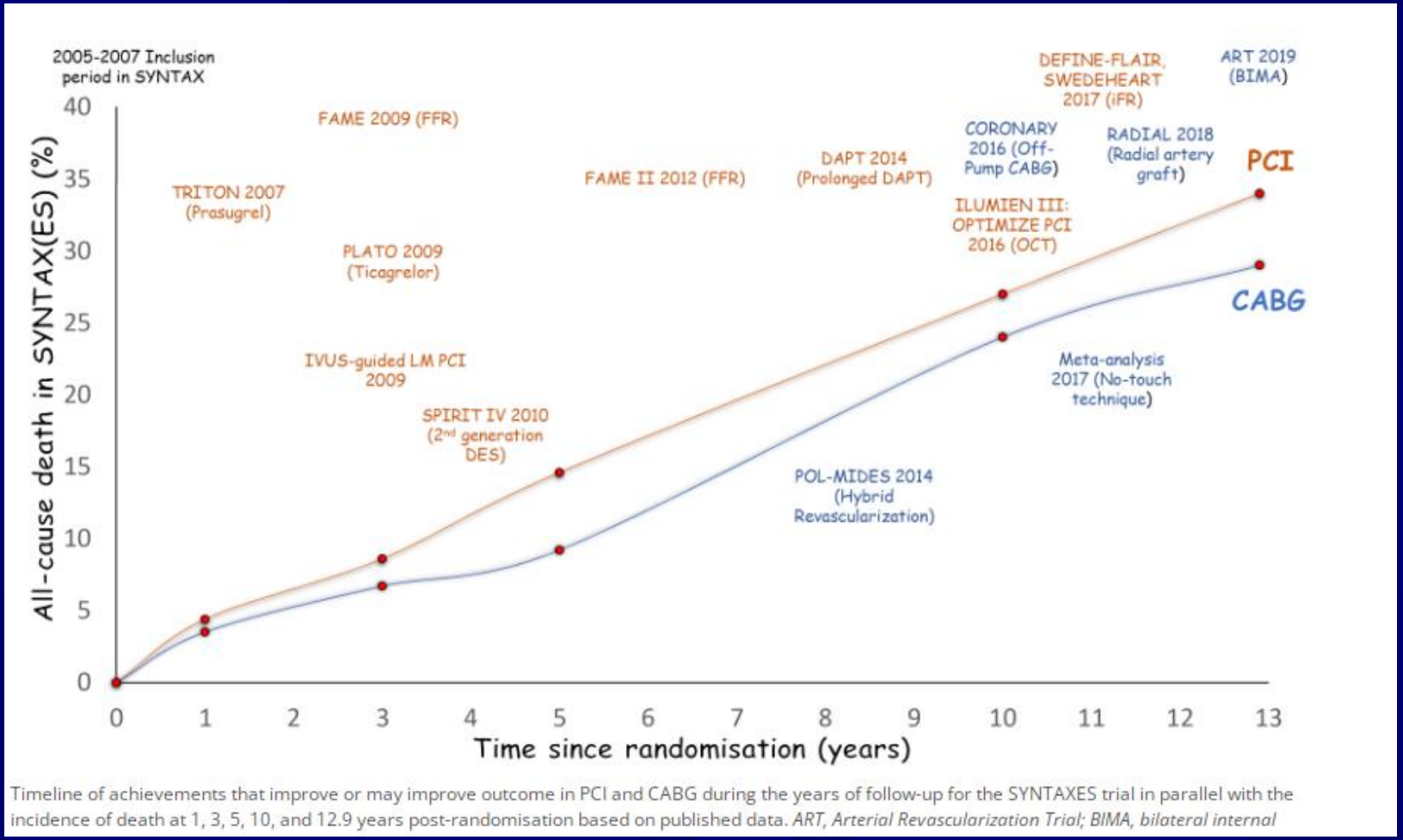
Hybrid Revascularization: LIMA – LAD
stent RCA Cx

CABG vs PTCA in 11.518 patients from 11 RCT



Head SJ et al., Lancet 2018; 391: 939-48

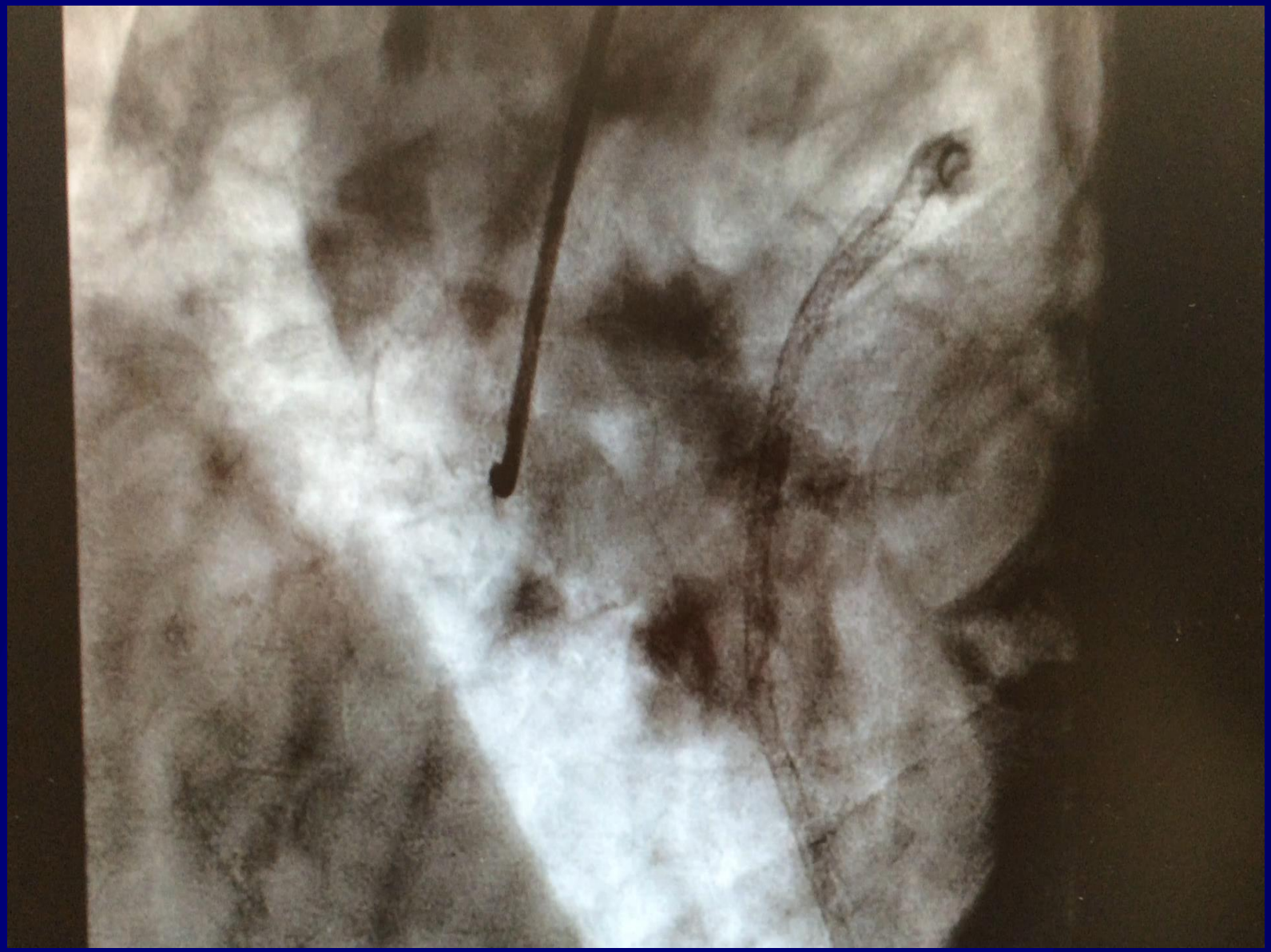
PCI vs. CABG in Patients With Three-Vessel or LM CAD

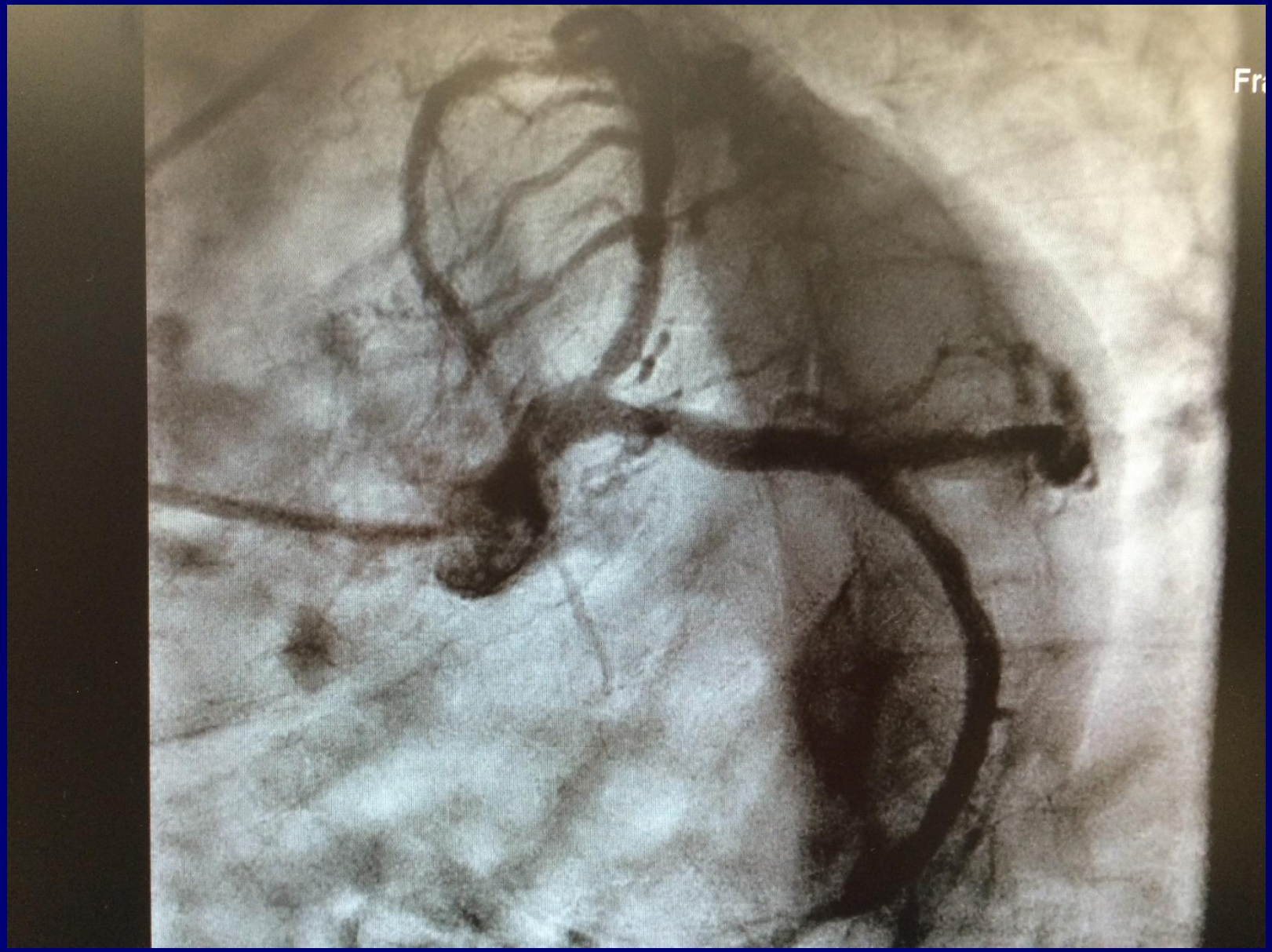


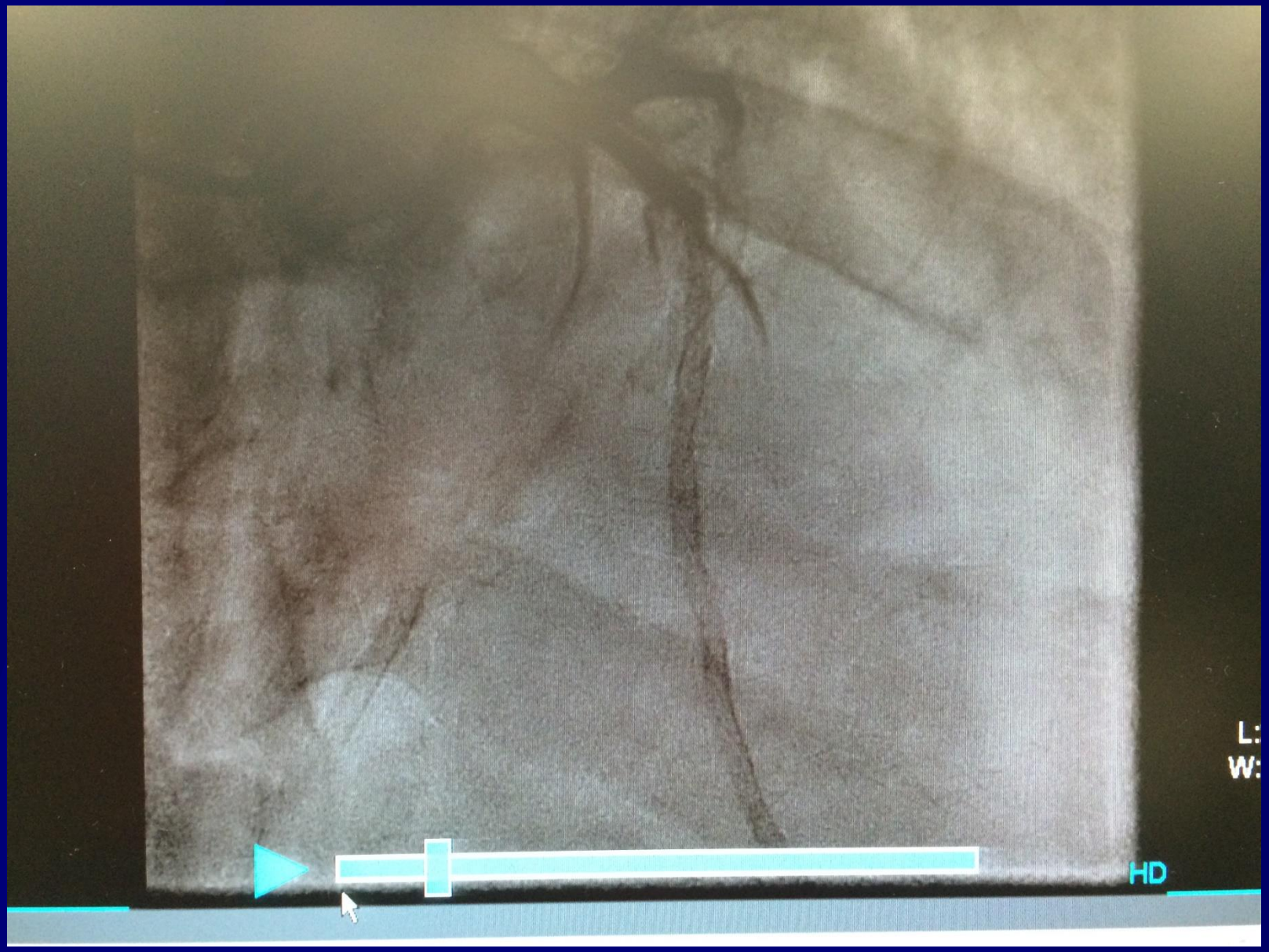
Timeline of achievements that improve or may improve outcome in PCI and CABG during the years of follow-up for the SYNTAXES trial in parallel with the incidence of death at 1, 3, 5, 10, and 12.9 years post-randomisation based on published data. *ART, Arterial Revascularization Trial; BIMA, bilateral internal*

CABG provided better (more complete) revascularization and better long-term survival compared with PCI.

https://www.acc.org/latest-in-cardiology/articles/2019/12/17/08/40/pci-vs-cabg-in-patients-with-three-vessel-or-lm-cad



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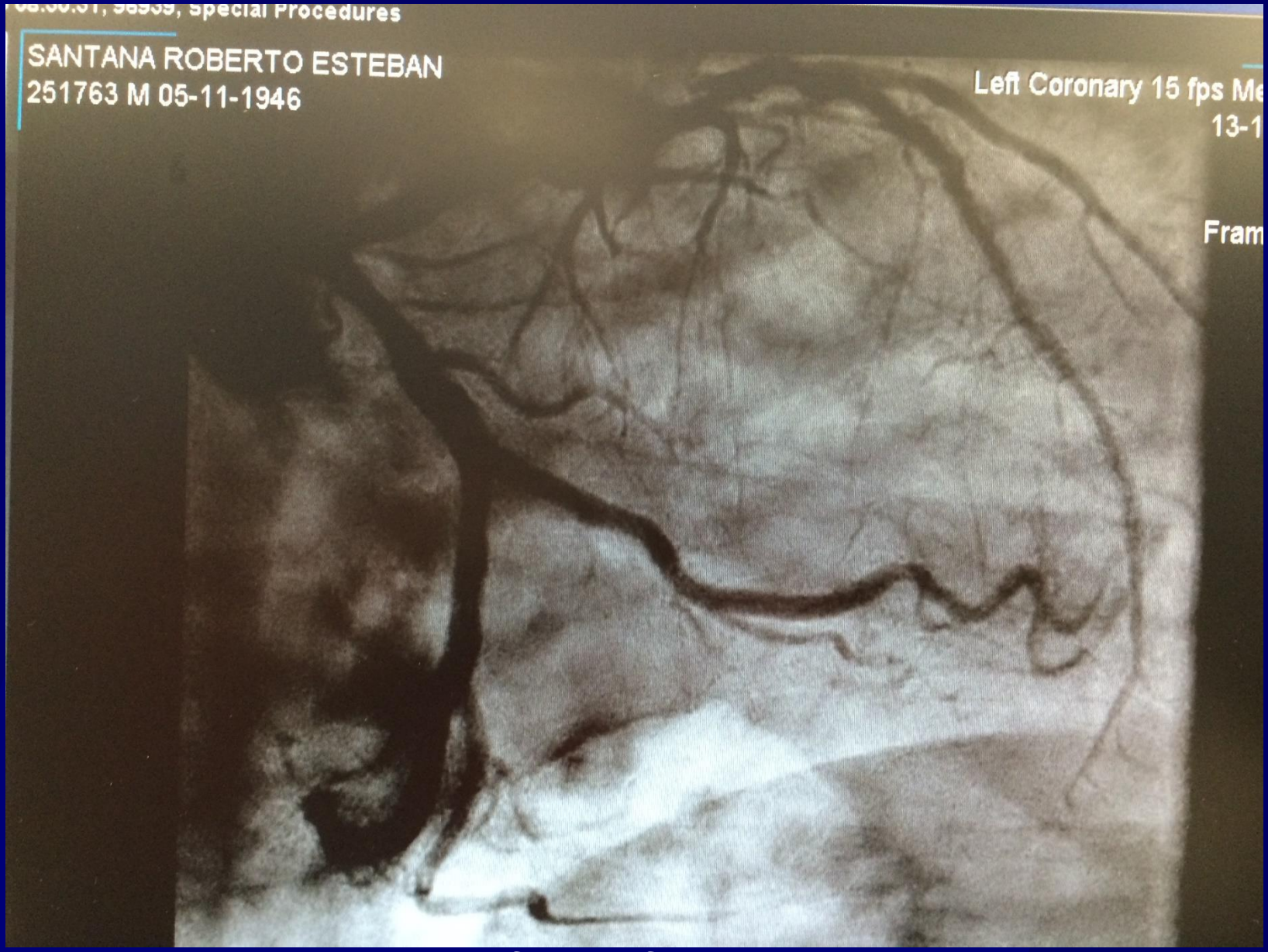
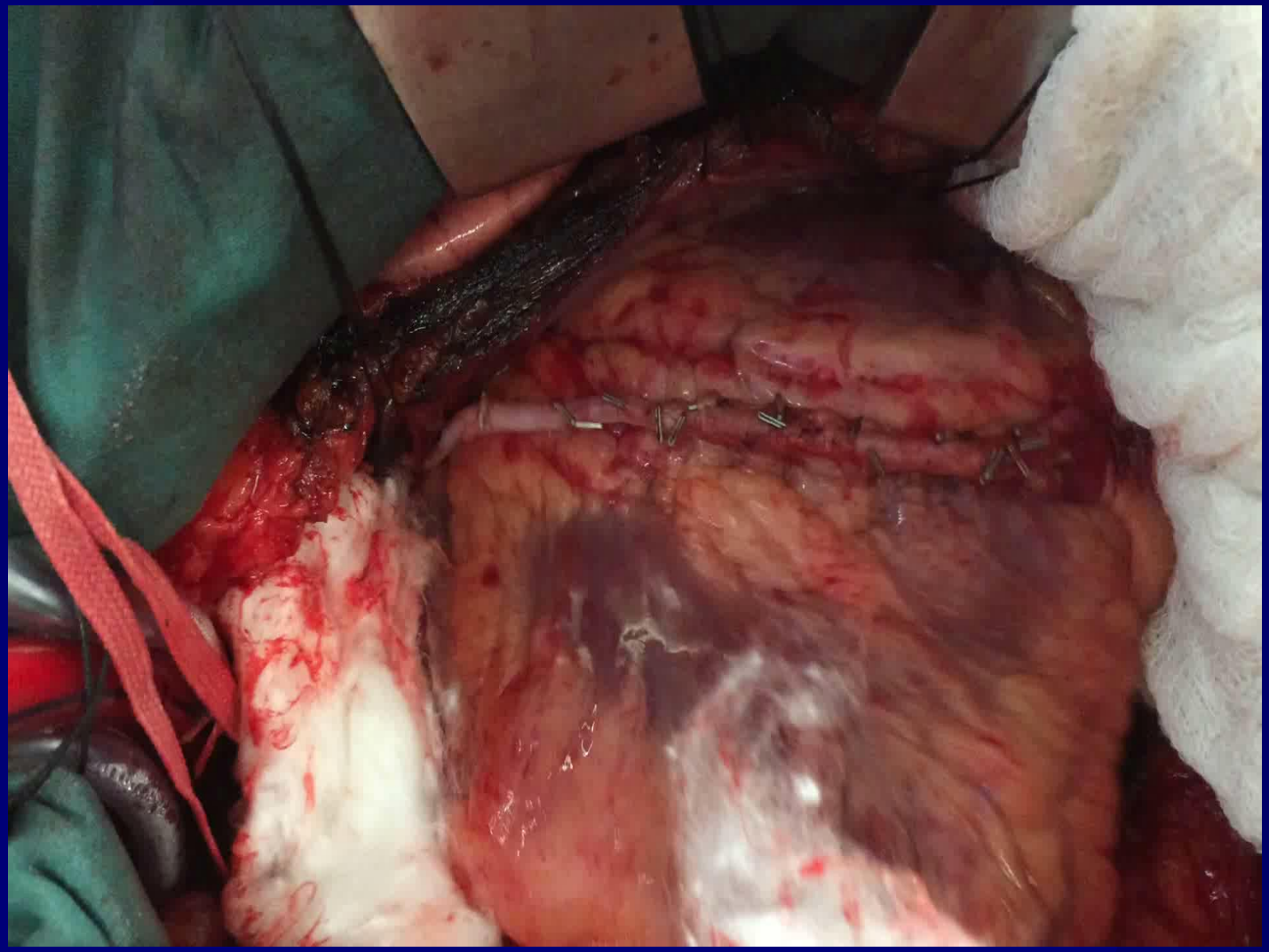
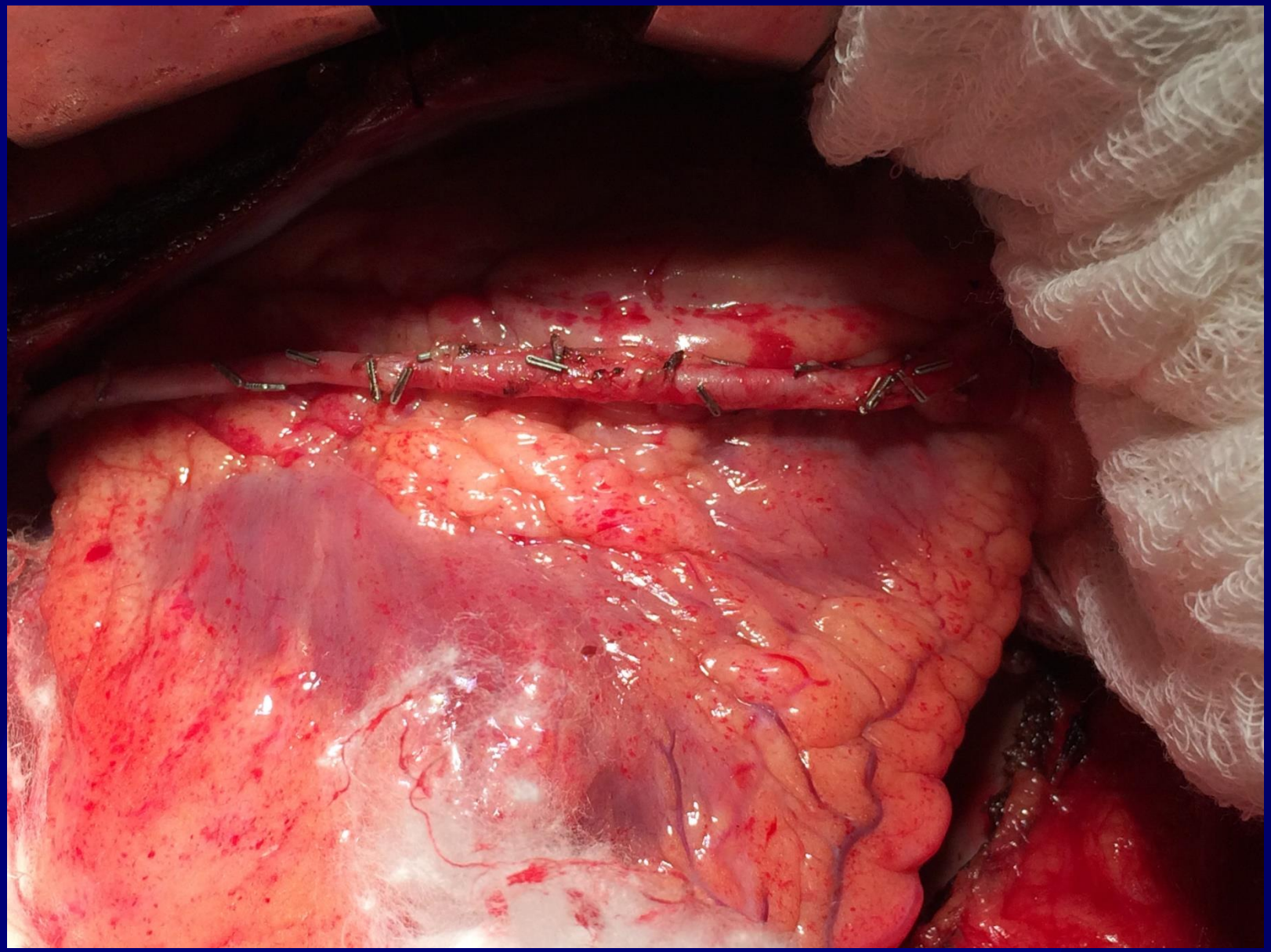

Special Procedures
SANTANA ROBERTO ESTEBAN
251763 M 05-11-1946
Left Coronary 15 fps Me
13-1
Fram





Current Status of CABG

Heart Team: cardiac surgeon &
clinical & invasive cardiologist

CABG remains the standard of care
for selected patients with complex CAD

LIMA-LAD standard practice

BIMA incremental

RA is better than SVG

ASA & Statins Improve SVG Patency

Complete revascularization important

Atherosclerosis is a progressive disease

PREVENTION

PREVENTION

PREVENTION

PREVENTION

PREVENTION

PREVENTION

PREVENTION

PREVENTION

PREVENTION

PREVENTION

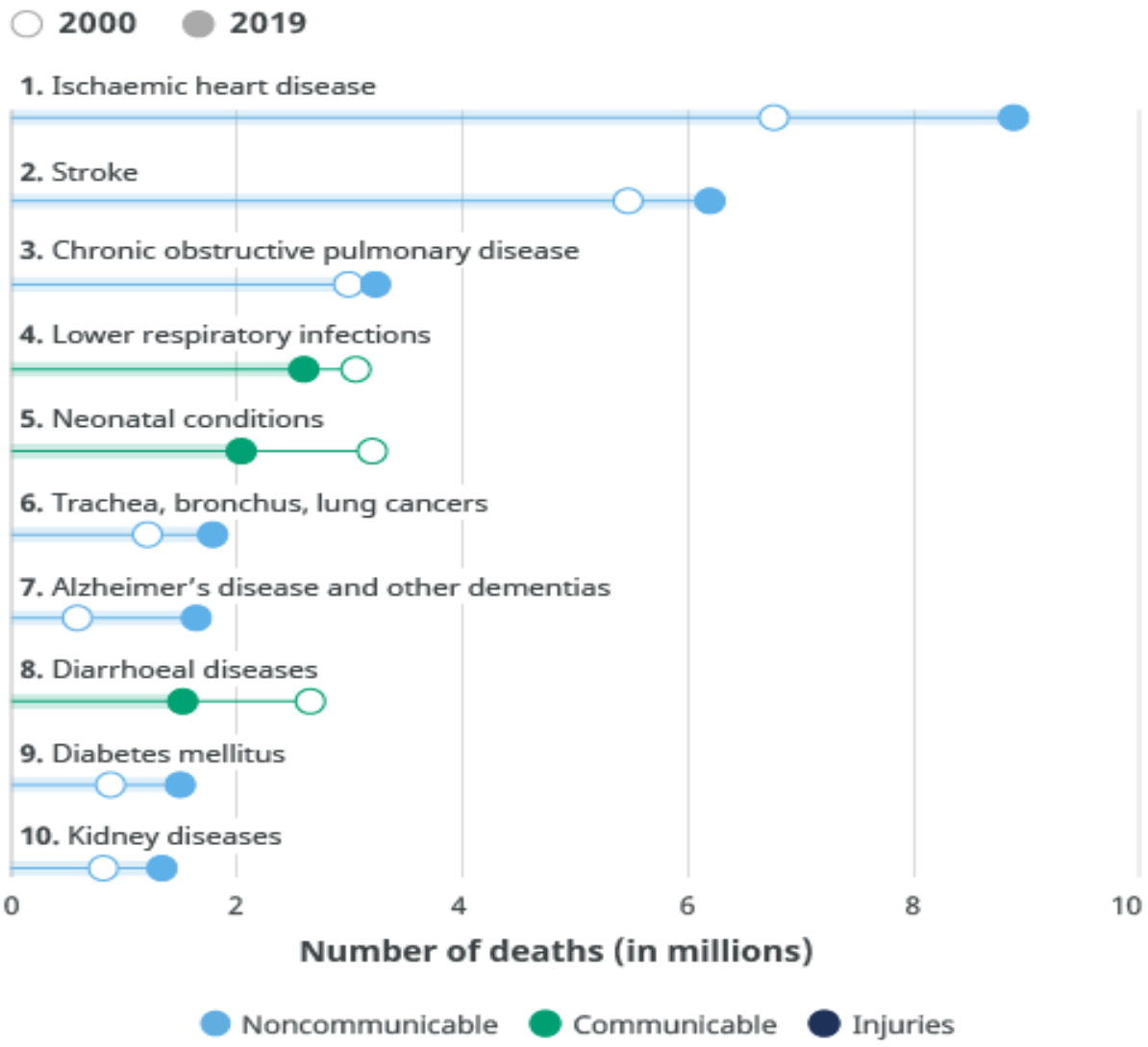
20,679* Physicians say "LUCKIES are less irritating"

"It's toasted"

Your Throat Protection · against irritation · against cough

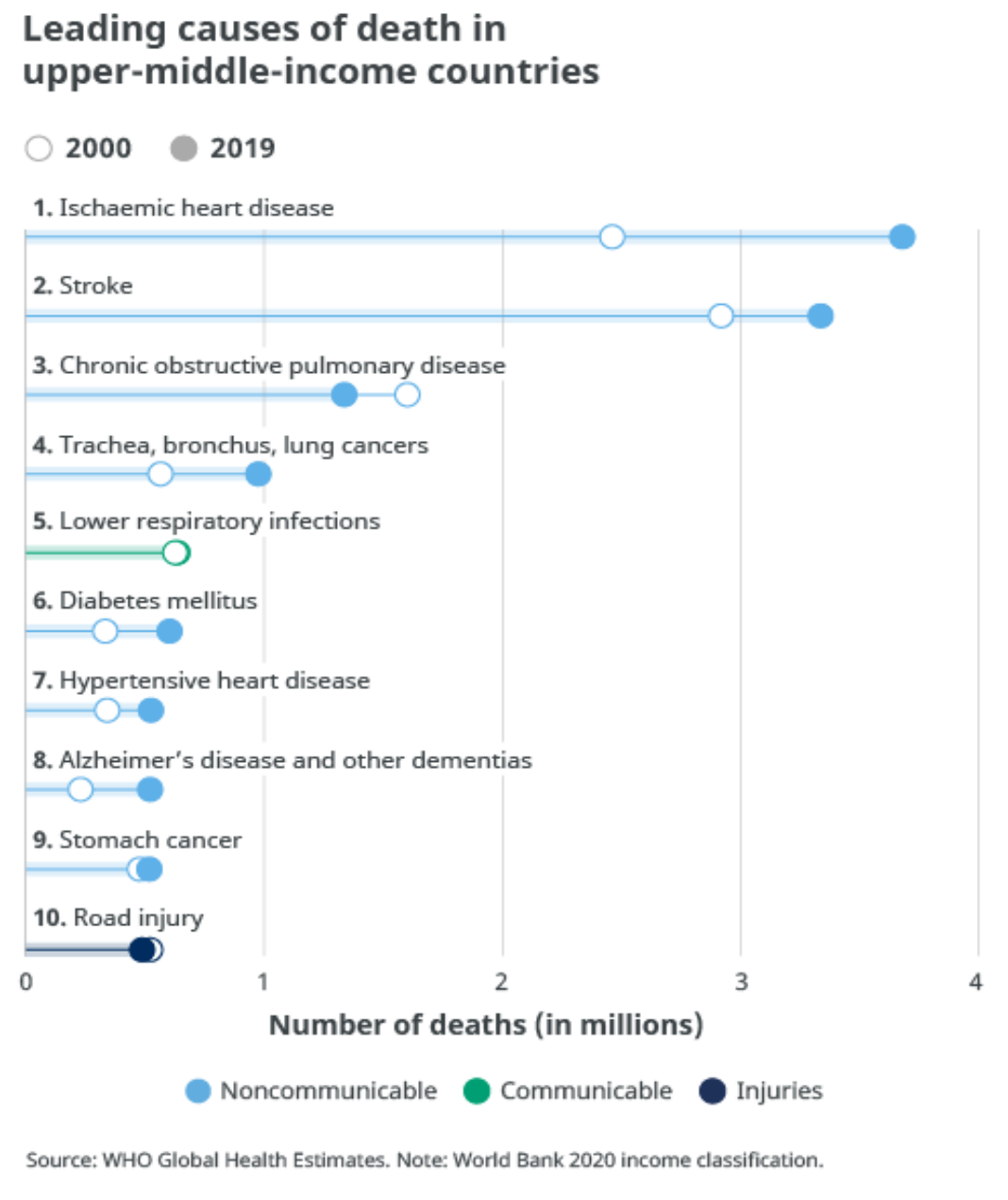
World Health Organization

Leading causes of death globally



Source: WHO Global Health Estimates.

https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death



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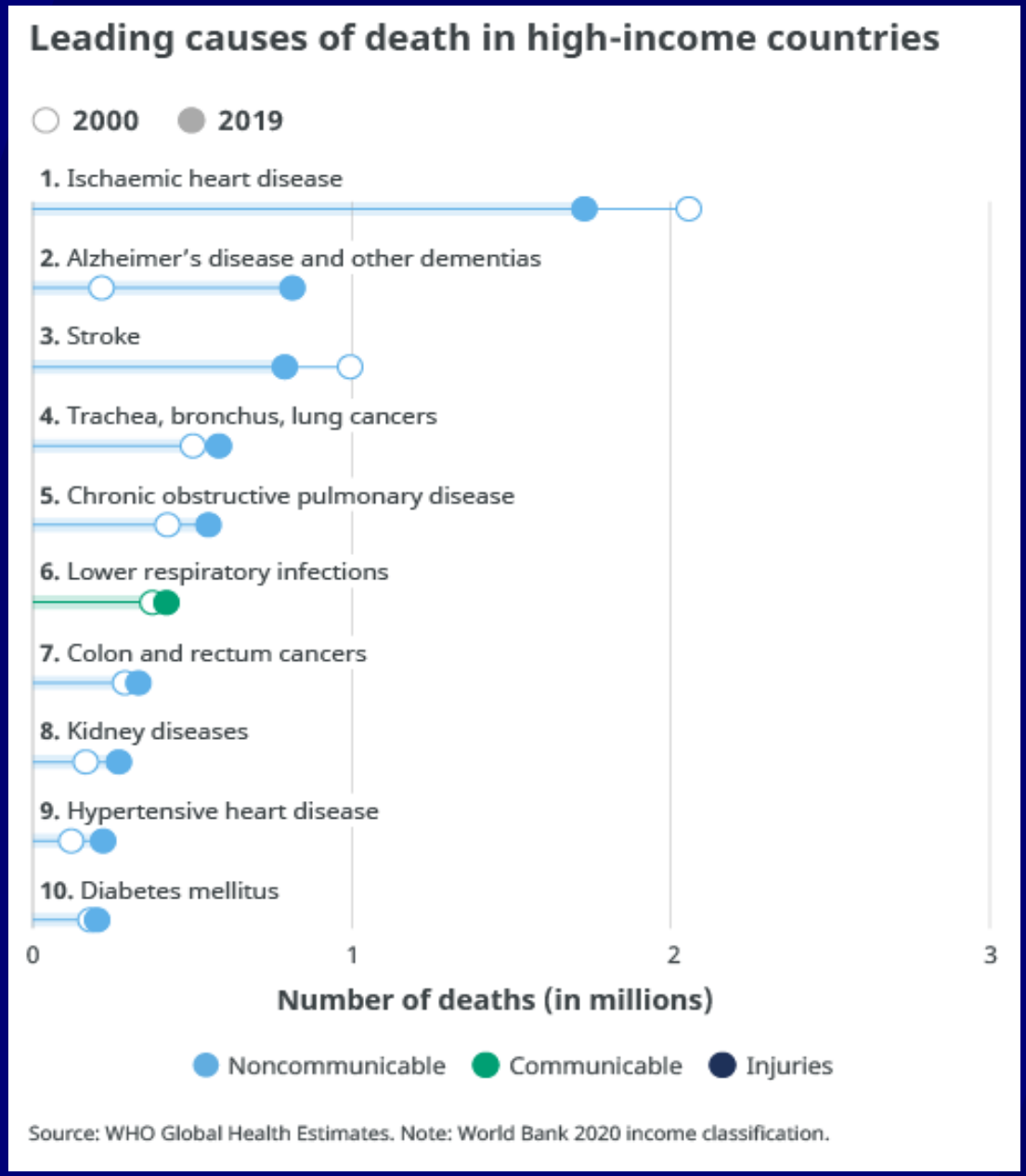
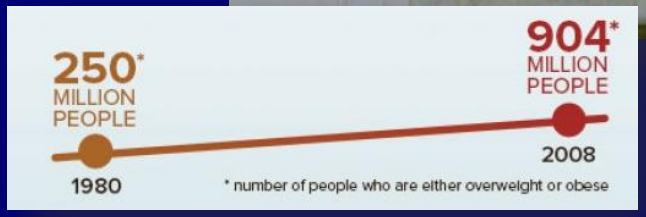


https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death

The World is Getting Fatter



OBESITY KILLS!

7 common diseases due to obesity:

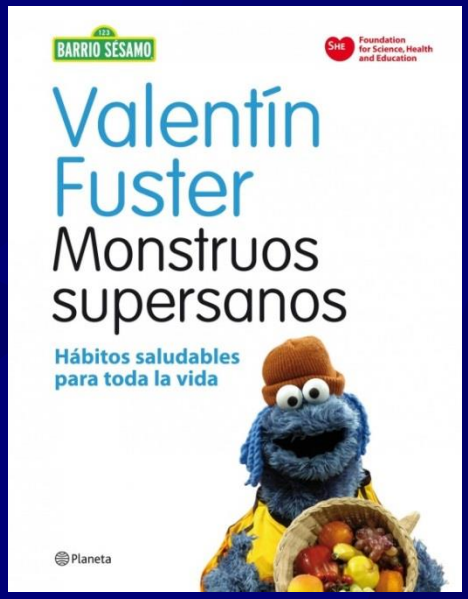
- Arthritis
- Back Pain
- Cancer
- Diabetes
- Infertility
- Stroke
- Heart Diseases

http://www.who.int/mediacentre/factsheets/fs311/en/

Junk Food

“What we created, I believe, is a culture of “healthy eating ” to fight a “toxic environment” of junk food and too little exercise”

Dr. Valentín Fuster



Evaluation of the Program SI! for Preschool Education: A School-Based Randomized Controlled Trial (Preschool_PSI!)

The SI Program for Preschool Education was an intervention that was both school and home based designed to improve the habits, knowledge and attitudes in four key areas: Food (diet), Physical Activity, Knowledge of the Body and Managing Emotions.

The intervention was implemented in children from three 3-5 years of age, with their parents and teachers.

To evaluate the efficacy of this intervention, the principal aim of the phase of evaluations was to quantify the behavior changes in the three groups/populations mentioned.

The evaluation had been designed according to the controlled intervention model, in which twenty-four schools from the Community of Madrid were randomized to implement the Program si! for Preschool Education or to function as control schools.

Peñalvo et al. BMC Public Health 2013, 13:656
http://www.biomedcentral.com/1471-2458/13/656

BMC Public Health

STUDY PROTOCOL Open Access

A cluster randomized trial to evaluate the efficacy of a school-based behavioral intervention for health promotion among children aged 3 to 5

José L Peñalvo[1*], Gloria Santos-Beneit[1,2], Mercedes Sotos-Prieto[1,2], Ramona Martínez[2], Carla Rodríguez[2], Manuel Franco[1,3,4], Pedro López-Romero[1], Stuart Pocock[1,5], Juliana Redondo[1] and Valentín Fuster[1,6]

Table 1 Summary of the Program SI! Intervention components

Strata	Objectives	Intervention activities	Intervention materials	Minimum hours
Children	Acquiring KAH regarding the 4 components of Program SI!	- Classroom instruction	- Didactic units. Including 7 key activities per unit, and associated resources: Sesame Street audiovisuals, books and games, and cooking workshops, and tales on healthy living	70
		- Health Fair	- Sesame Street Emotion cards	
Parents	Improving KAH regarding the 4 components of Program SI!	- Program SI! by Dr. Fuster (video)	- Informative letters and leaflets	12
		- Health Fair	- Program SI! website	
			- Healthy tips	
Teachers	Improving KAH regarding to the 4 components of the PSI!	- Program SI! by Dr. Fuster (video)	- Training booklet, and associated audiovisual material	30
		- Program SI! capacity building:	- Intranet continuing education tools	
		intensive training for teachers, and SHE Foundation's liaisons	- Program SI! website	
		- Continuing counseling from SHE Foundation's staff to the liaisons		
		- Health Fair		
School	Improving the school environment in regards of healthy environment	- Program SI! by Dr. Fuster (video)	- Document of healthy recommendations in schools	20
		- Periodical meetings between principals and SHE Foundation's liaison	- Program SI! website	
		- Health Fair		

KAH, Knowledge, attitudes and habits.

Peñalvo et al. BMC Public Health 2013, 13:1208
http://www.biomedcentral.com/1471-2458/13/1208

BMC Public Health

RESEARCH ARTICLE Open Access

The Program SI! intervention for enhancing a healthy lifestyle in preschoolers: first results from a cluster randomized trial

José L Peñalvo[1*], Mercedes Sotos-Prieto[1,2], Gloria Santos-Beneit[1,2], Stuart Pocock[3], Juliana Redondo[1] and Valentín Fuster[1,4]

Abstract

Background: Unhealthy lifestyles contribute to the development of cardiovascular risk factors, whose incidence is increasing among children and adolescents. The Program SI! is a long-term, multi-target behavioral intervention to promote healthy lifestyle habits in children through the school environment. The objective of the study is to evaluate the efficacy of this intervention in its first phase, preschoolers.

Methods: Cluster-randomized controlled trial in public schools in the city of Madrid, Spain. A total 24 schools, including 2062 children (3–5 years), 1949 families, and 125 teachers participated in the study. Schools were assigned to their usual school curriculum or to engage in an additional multi-component intervention (Program SI!). The primary outcome of this trial is 1-school year changes from baseline in scores for children's knowledge, attitudes and habits (KAH). Secondary outcomes are 1-school year changes from baseline in scores for knowledge, attitudes, and habits among parents, teachers, and the school environment.

Results: After 1-school year, our results indicate that the Program SI! intervention increases children's KAH scores, both overall (3.45, 95% CI, 1.84-5.05) and component-specific (Diet: 0.93, 95% CI, 0.12-1.75; Physical activity: 1.93, 95% CI, 1.17-2.69; Human body: 0.65, 95% CI, 0.07-1.24) score.

Conclusions: The Program SI! is demonstrated as an effective and feasible strategy for increasing knowledge and improving lifestyle attitudes and habits among very young children.

Trial registration: NCT01579708, Evaluation of the Program SI! for Preschool Education: A School-Based Randomized Controlled Trial (Preschool-SI!).

Keywords: Health education, Health promotion, Children's health

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THE PRESENT AND FUTURE

JACC STATE-OF-THE-ART REVIEW

Lessons Learned From 10 Years of Preschool Intervention for Health Promotion

JACC State-of-the-Art Review

Gloria Santos-Beneit, PhD,[a,b,c] Rodrigo Fernández-Jiménez, MD, PhD,[c,d,e] Amaya de Cos-Gandoy, MSc,[a,c] Carla Rodríguez, MSc,[a] Vanesa Carral, PhD,[a] Patricia Bodega, MSc,[a,c] Mercedes de Miguel, MSc,[a,c] Xavier Orrit, PhD,[a] Domenec Haro, BA,[a] José L. Peñalvo, PhD,[f] Juan Miguel Fernández-Alvira, PhD,[c] Carles Peyra, BA, MBA,[a,b] Jaime A. Céspedes, MD,[g,h] Alexandra Turco, BS,[b] Marilyn Hunn, BS,[b] Risa Jaslow, MS, RDN,[b] Jorge Baxter, PhD,[i] Isabel Carvajal, MSc,[a] Valentin Fuster, MD, PhD[a,b,c]

ABSTRACT

Implementing a health promotion program for children is a complex endeavor. In this review, we outline the key lessons learned over 10 years of experience in implementing the SI! Program (Salud Integral–Comprehensive Health) for cardiovascular health promotion in preschool settings in 3 countries: Colombia (Bogotá), Spain (Madrid), and the United States (Harlem, New York). By matching rigorous efficacy studies with implementation science, we can help bridge the divide between science and educational practice. Achieving sustained lifestyle changes in preschool children through health promotion programs is likely to require the integration of several factors: 1) multidisciplinary teams; 2) multidimensional educational programs; 3) multilevel interventions; 4) local program coordination and community engagement; and 5) scientific evaluation through randomized controlled trials. Implementation of effective health promotion interventions early in life may induce long-lasting healthy behaviors that could help to curb the cardiovascular disease epidemic. (J Am Coll Cardiol 2022;79:283–298) © 2022 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

And what for the future?

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Thank you for your attention.