

Surgery for Congenital Heart Defects; science or art?



M a r t i n E l l i o t t
37th Gresham Professor of Physic
Professor of Cardiothoracic Surgery at UCL
Consultant Paediatric Cardiothoracic Surgeon
&
co-Medical Director
The Great Ormond Street Hospital for Children

remember the last time?

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today, I am going to talk about innovators

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“There is nothing more difficult to take in hand, more perilous to conduct, nor uncertain in its success, than to take the lead in the introduction of a new order of things.

For the innovator has for enemies all of those who have done well under the old, and lukewarm defenders in all of those who may do well under the new.”

Niccoló Macchiavelli (1469-1527)

Theodor Billroth 1829-1894



<http://www.aerzteblatt.de/archiv/54013/Medizingeschichte-Herznaht-wider-ethische-Bedenken>

Theodor Billroth 1829-1894



‘Ein Chirurg, der versuchte, eine Wunde des Herzens zu nähen, verlöre die Achtung seiner Kollegen.’

‘Eine Operation, die nach meiner Auffassung erreicht, was einige Chirurgen Prostitution der chirurgischen Kunst, andere eine chirurgische Frivolität nennen’

<http://www.aerzteblatt.de/archiv/54013/Medizingeschichte-Herznaht-wider-ethische-Bedenken>

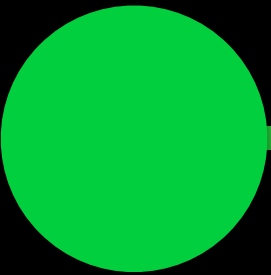
Theodor Billroth 1829-1894



A surgeon who tries to suture a heart wound deserves to lose the esteem of his colleagues

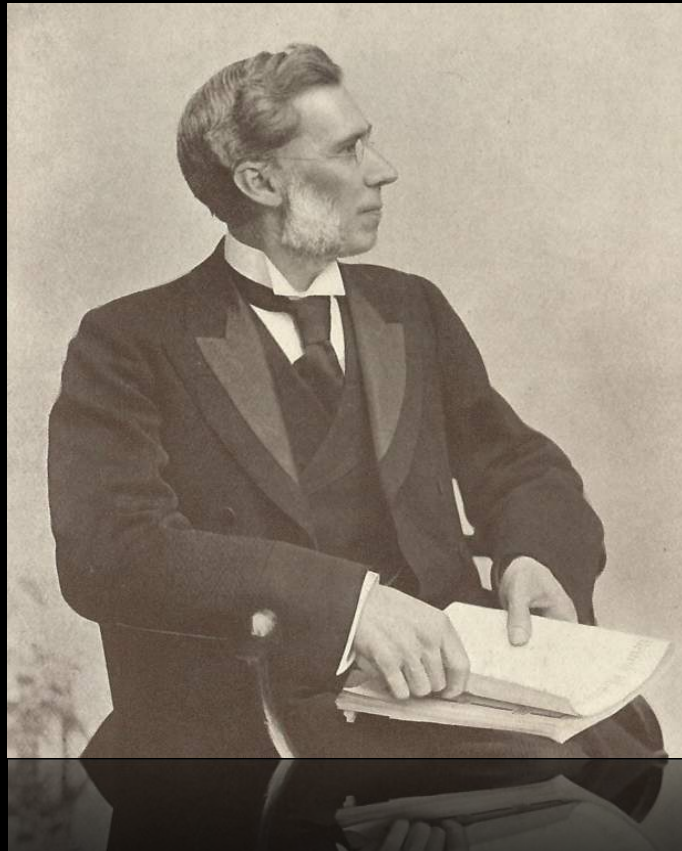
Performing an operation to the heart is tantamount to an act of prostitution in surgery or surgical frivolity.

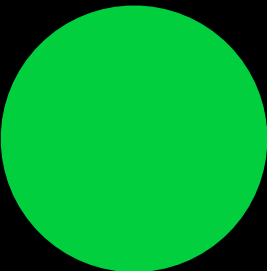
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1881

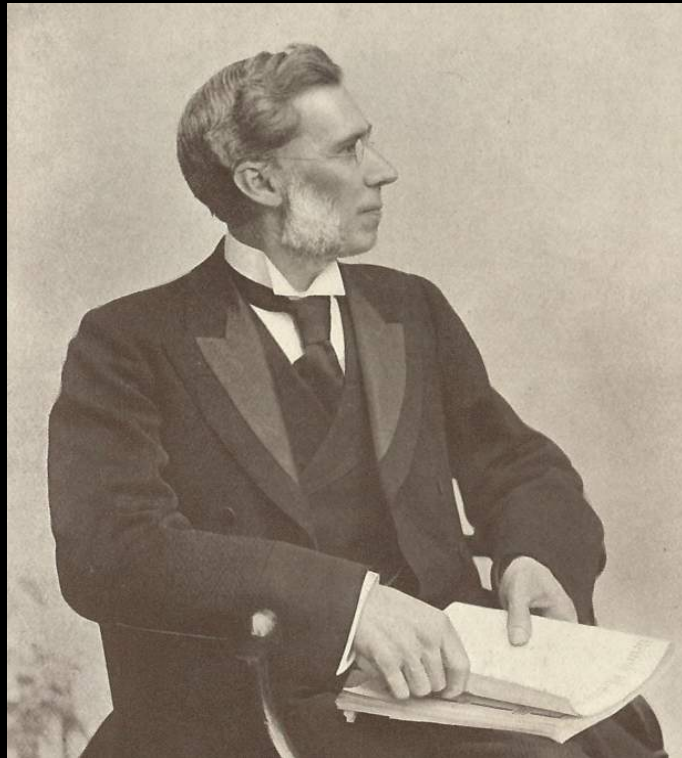
Edmund
Symes Thompson





1881

Edmund
Symes Thompson



CORRESPONDENCE.

DR. SYMES THOMPSON AND THE GREAT NORTHERN RAILWAY COMPANY.

SIR,—I feel that an explanation of the circumstances under which I appeared at the Clerkenwell Police Court last week is due to my professional brethren. I therefore forward a statement which I addressed to the President and Council of the Royal Medical and Chirurgical Society.

I have also the pleasure to enclose a resolution which the Council unanimously adopted; and I confidently trust that the profession in general will receive the explanation in the same generous spirit as was shown at the meeting of the Royal Medical and Chirurgical Society on Tuesday last.

I am, etc., E. SYMES THOMPSON.

3, Upper George St., W., Jan. 27, 1874.

To the President and Council of the Royal Medical and Chirurgical Society of London.

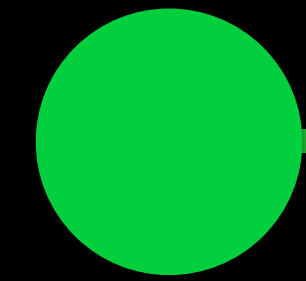
Mr. President and Gentlemen,—As Honorary Secretary of the Royal Medical and Chirurgical Society, I feel called upon to make a statement with reference to a charge made against me of travelling on the Great Northern Railway without having previously paid my fare, and with intent to defraud the Company, the result of which has been reported in the daily papers.

On the morning of December 25th, my wife being ill, and being very much hurried, I reached the Potter's Bar Station too late to take a ticket or speak to the guard. I at once determined, as I was coming back in the evening, to take my return ticket at King's Cross, having failed to do so at Potter's Bar.

When the train stopped at Holloway, I had to change carriages, and, passing a ticket-office, I took a ticket to King's Cross, solely with the purpose of avoiding delay and explanation, and believing that I was too well known on the line to be accused of wishing to avoid the payment of my full fare. The ticket-collector, before whose eyes I had deliberately left the train and taken the ticket, demanded my ticket for the journey to the Potter's Bar. I then, for the first time, realised that I

John Bingham Roberts
(Philadelphia)

*“The time may possibly come
when wounds of the heart
itself will be treated by
pericardial incision to allow
extraction of clots and perhaps
to suture the cardiac muscle.”*



1881

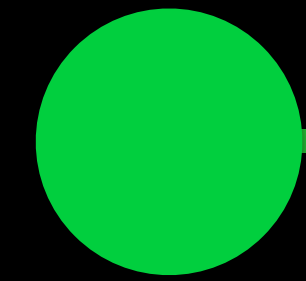
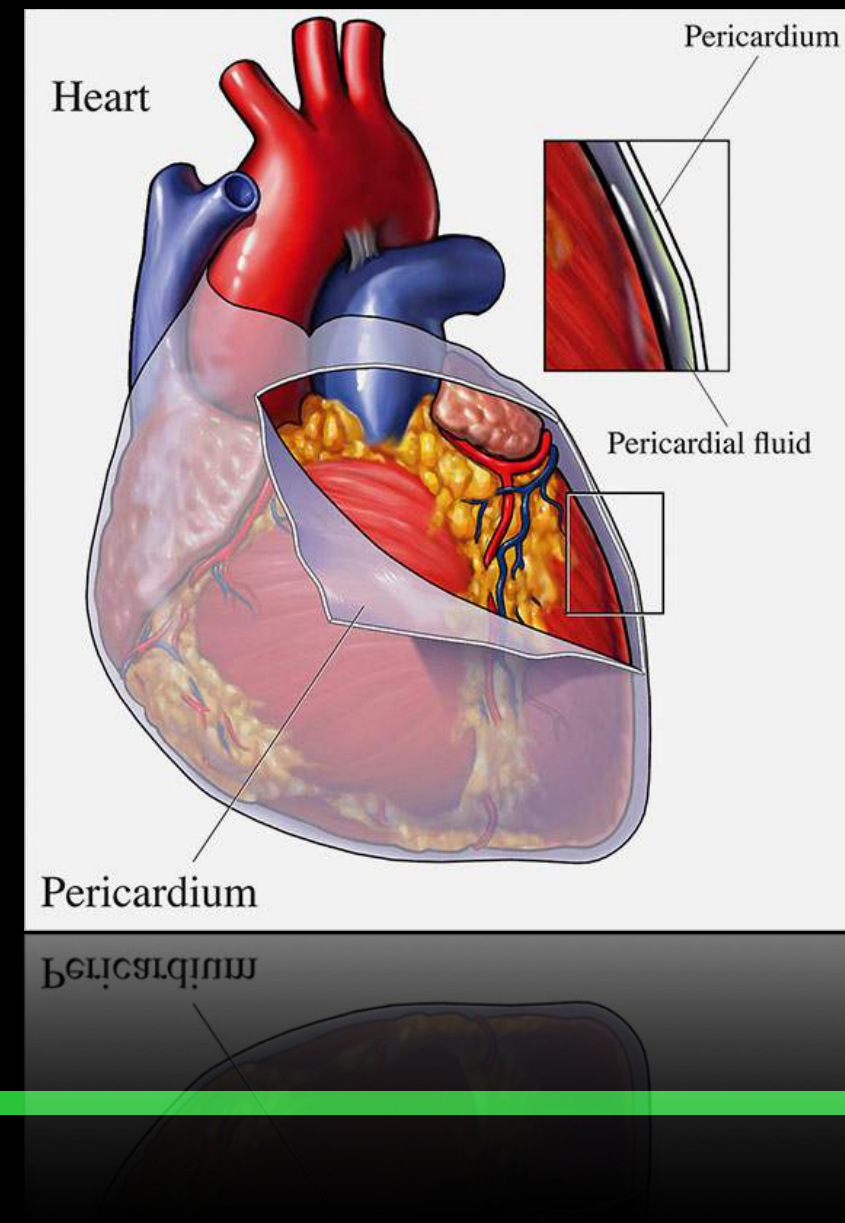
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Symes Thompson



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extraction of clots and perhaps
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Henry C Dalton
(St Louis)



1881

Edmund
Symes Thompson

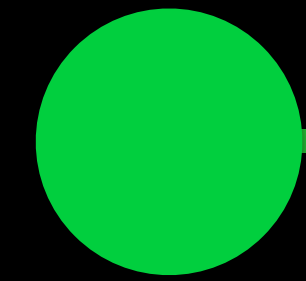
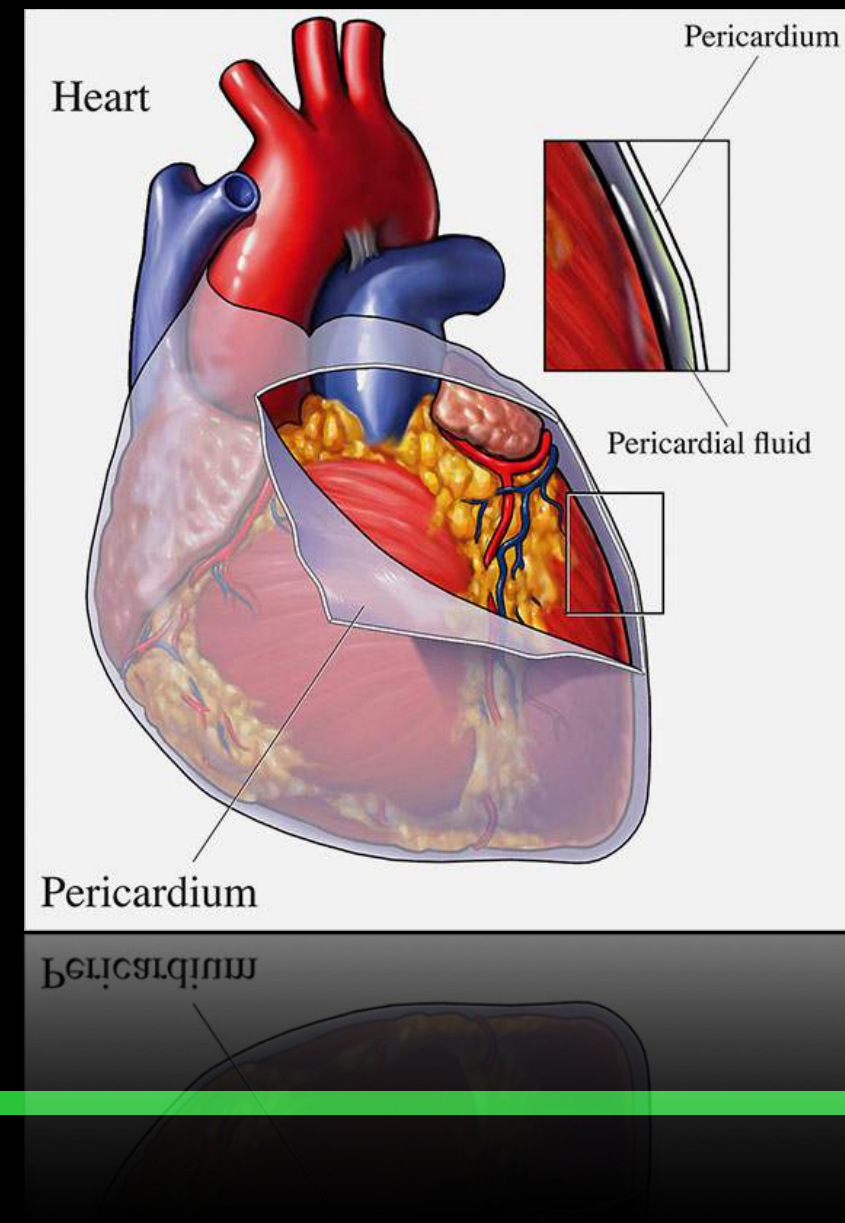


1891

John Bingham Roberts
(Philadelphia)

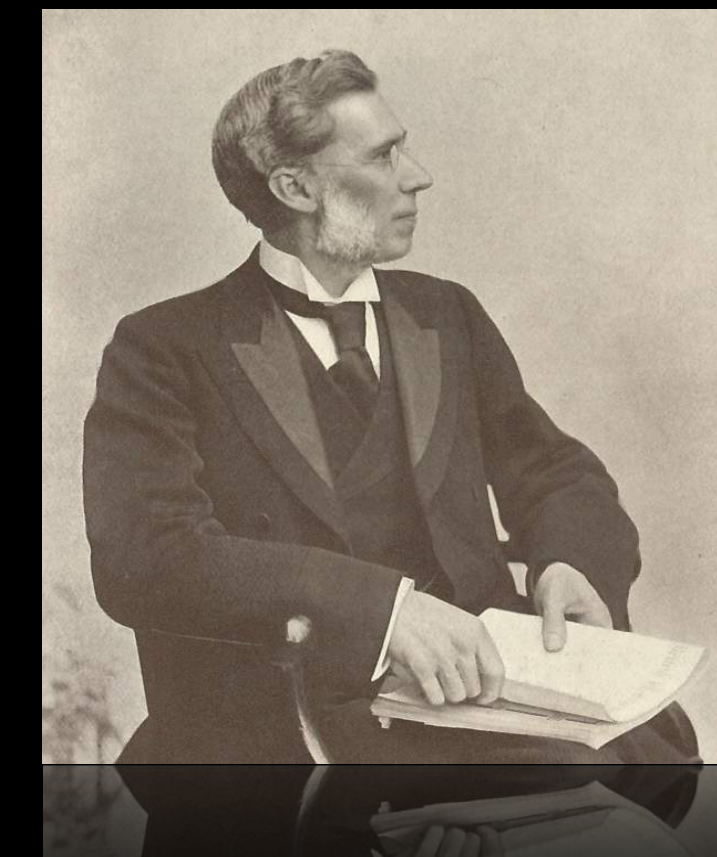
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Henry C Dalton Hale Williams
(St Louis) (Chicago)



1881

Edmund
Symes Thompson

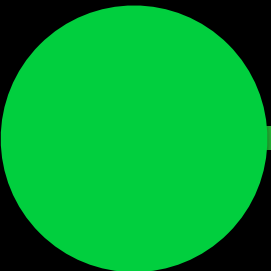


1891

1893

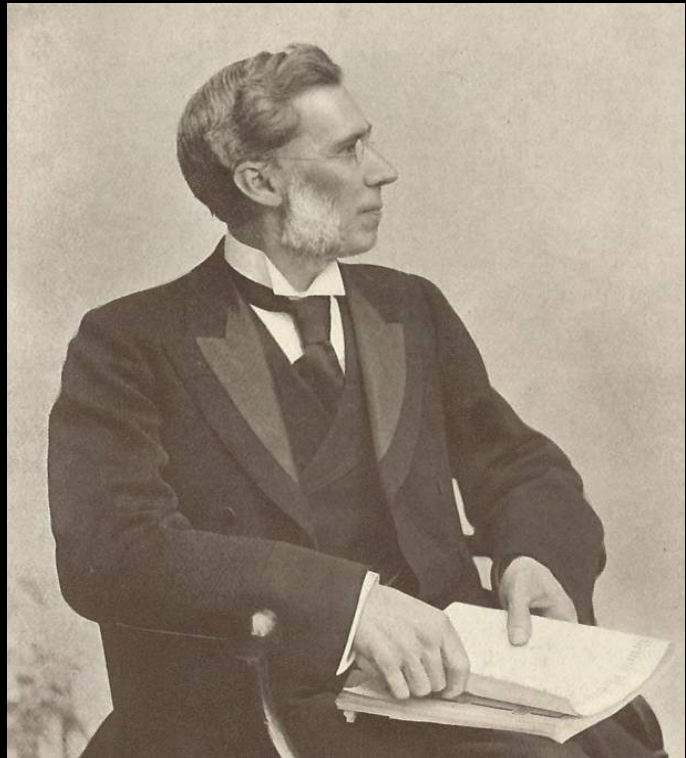
John Bingham Roberts
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“The time may possibly come when wounds of the heart itself will be treated by pericardial incision to allow extraction of clots and perhaps to suture the cardiac muscle.”

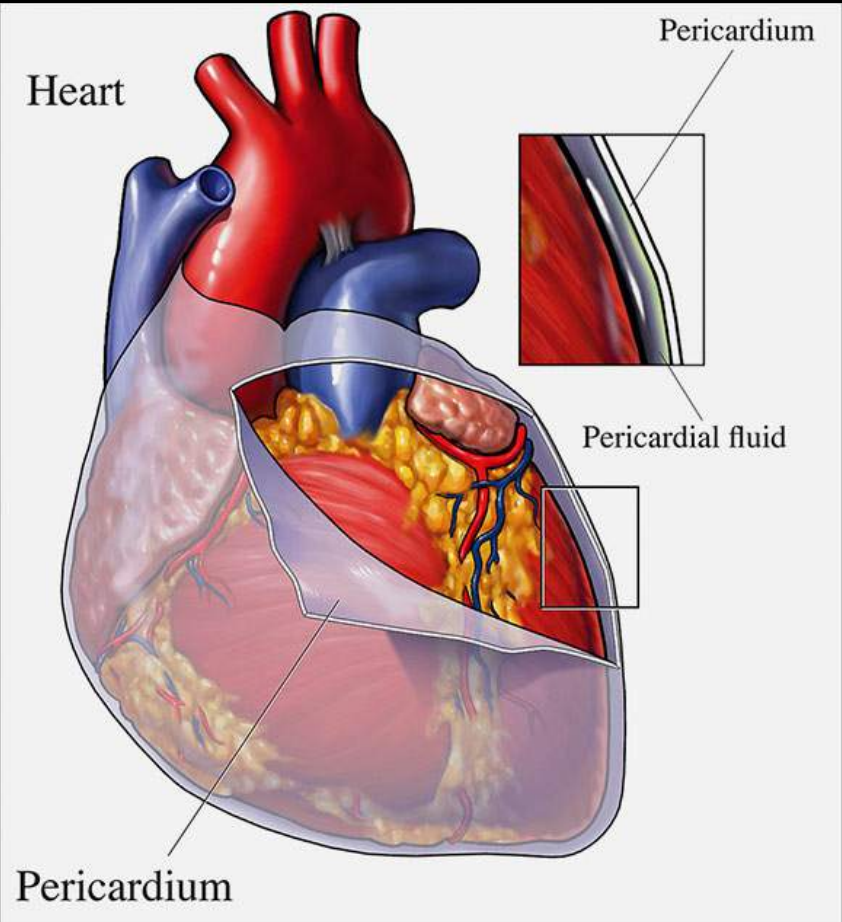


1881

Edmund
Symes Thompson



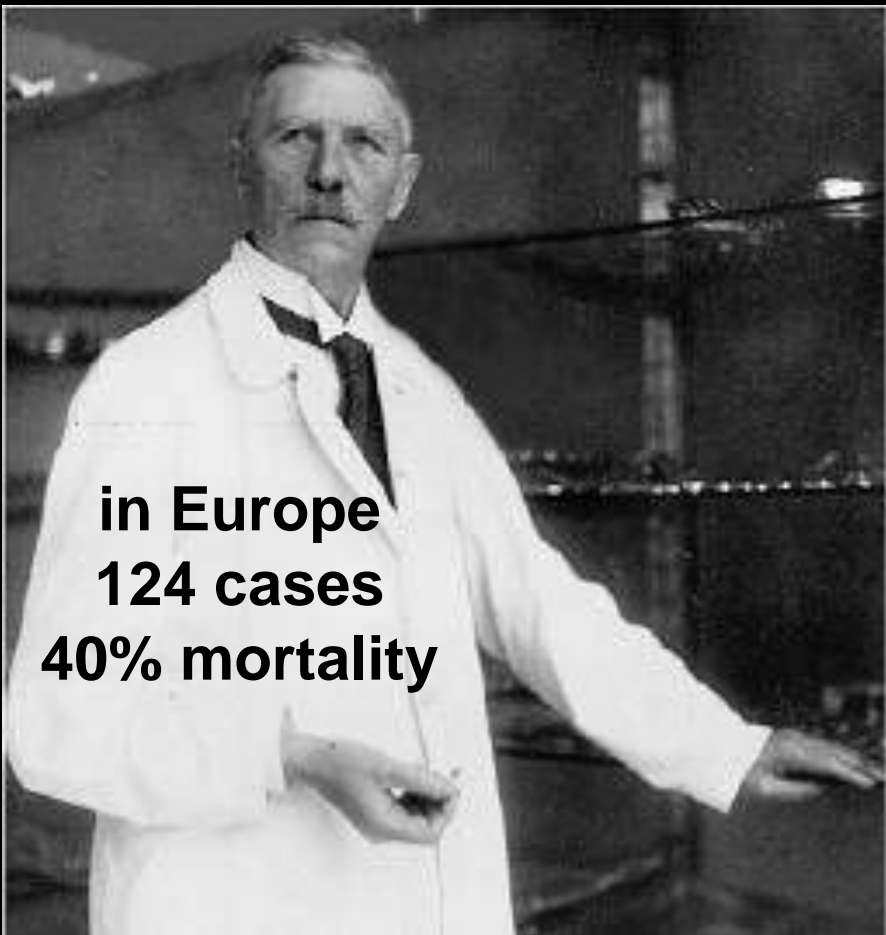
Henry C Dalton Hale Williams
(St Louis) (Chicago)



1891

1893

Ludwig Rehn
(Frankfurt)



in Europe
124 cases
40% mortality

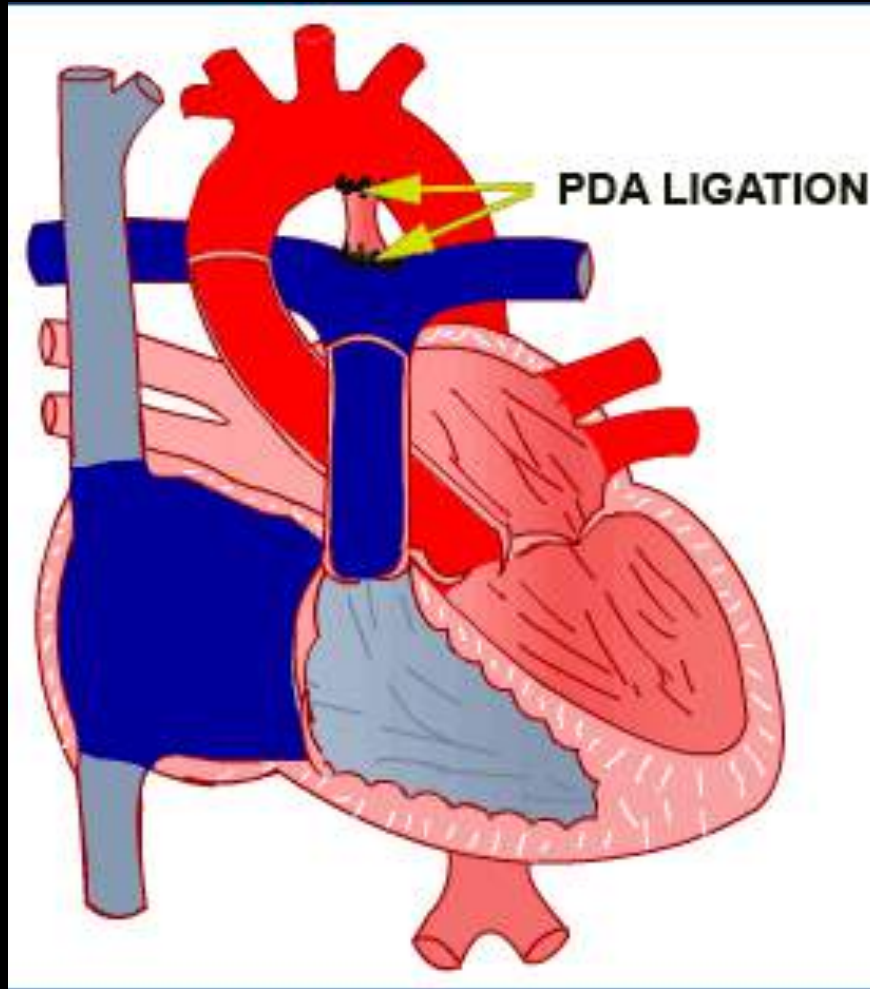
1906



1937

Vincent
Sutherland
Hodson

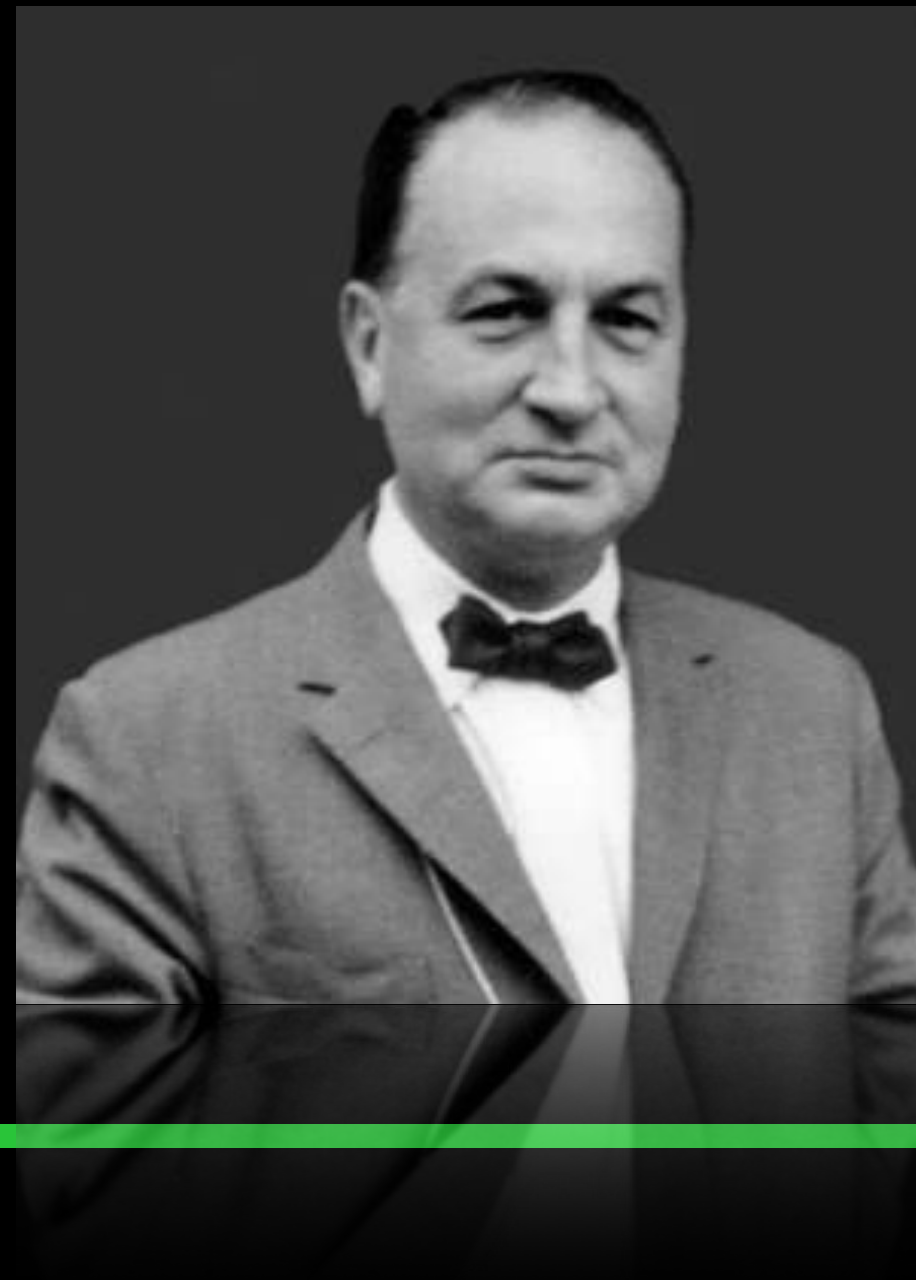
John Streider
(Boston)



1937

Vincent
Sutherland
Hodson

Robert Gross
(Boston)



1937 1938

Vincent
Sutherland
Hodson

Robert Gross
(Boston)



Lorraine Sweeney & Gross 1963

1937 1938

Vincent
Sutherland
Hodson

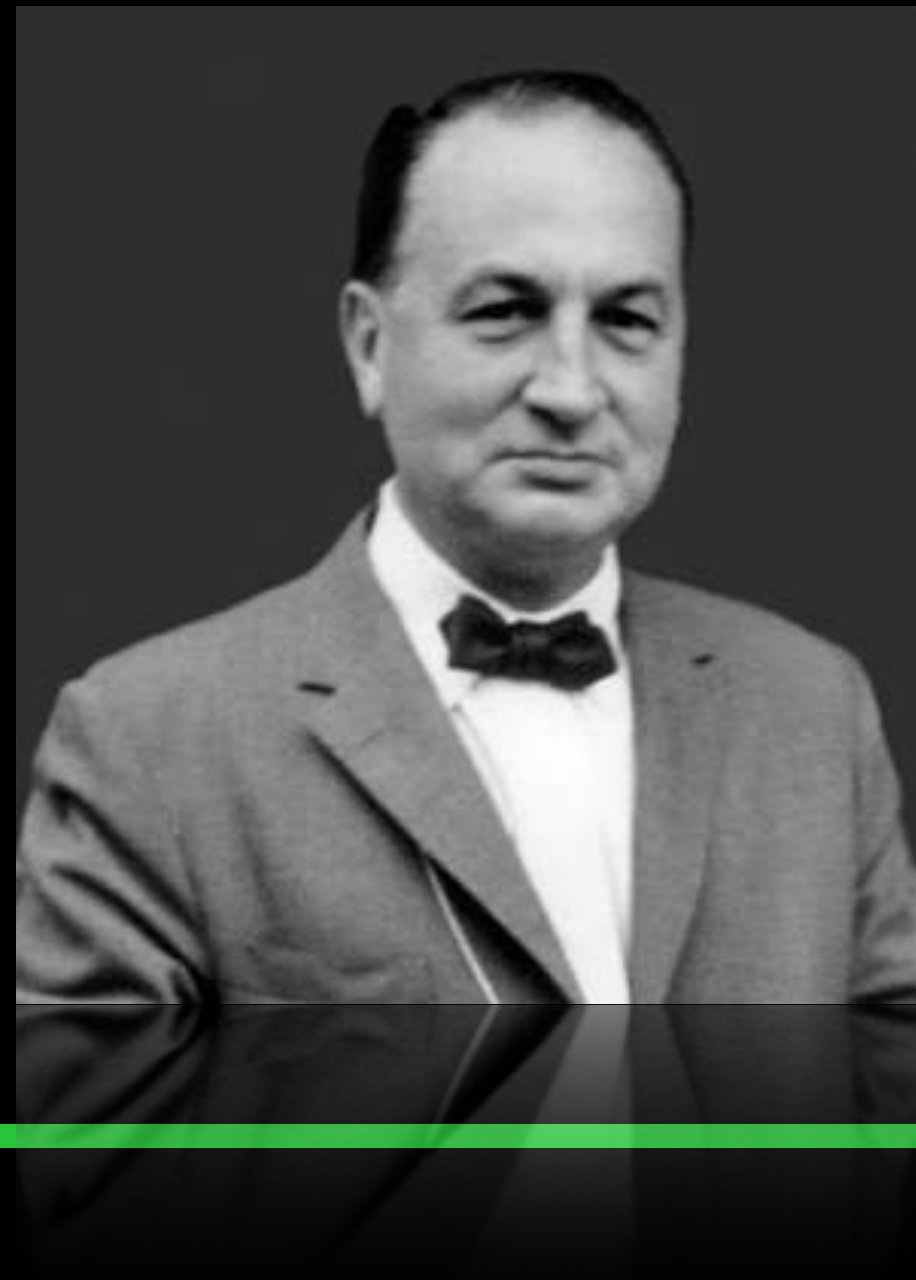
Robert Gross
(Boston)



1937 1938

Vincent
Sutherland
Hodson

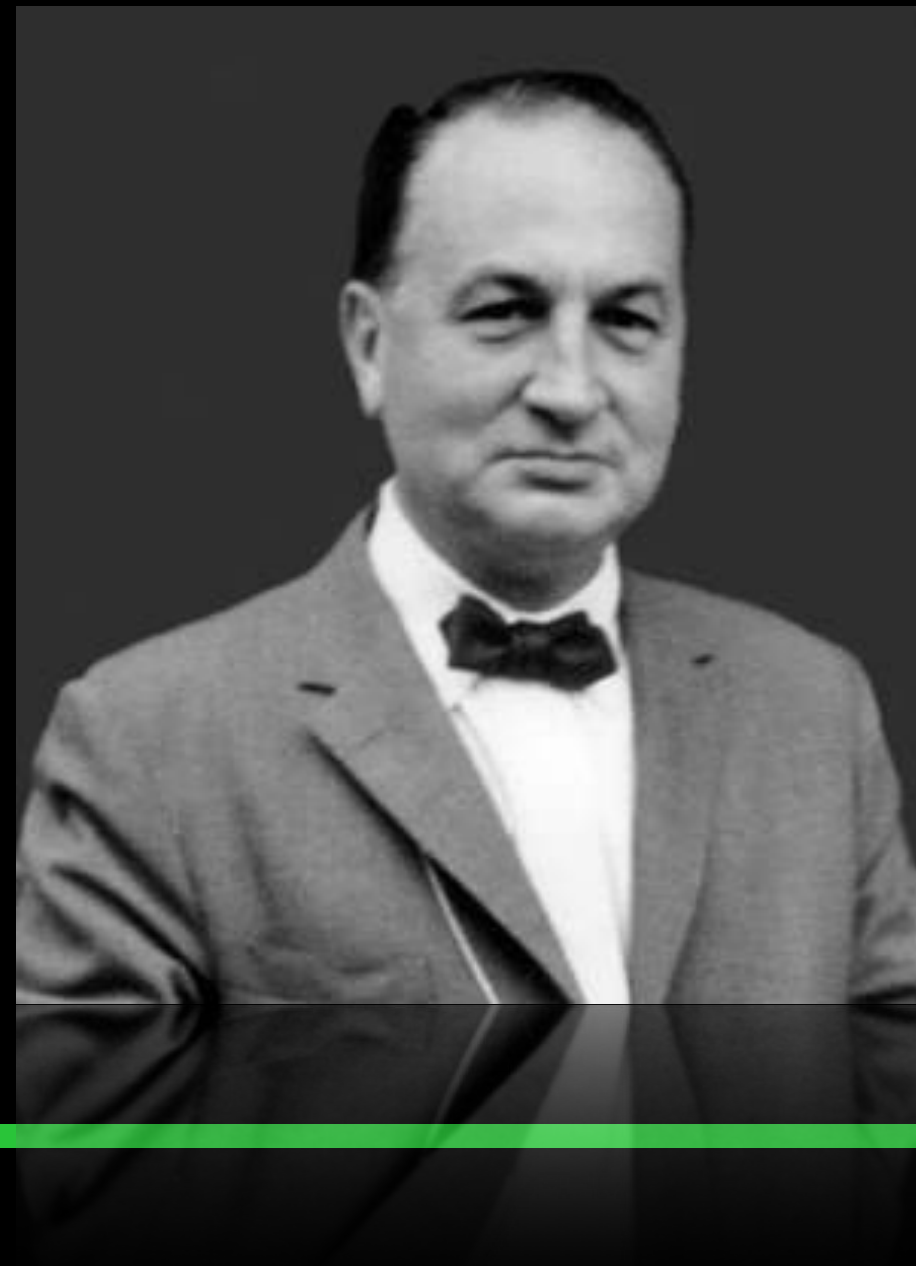
Robert Gross
(Boston)



1937 1938

Vincent
Sutherland
Hodson

Robert Gross
(Boston)



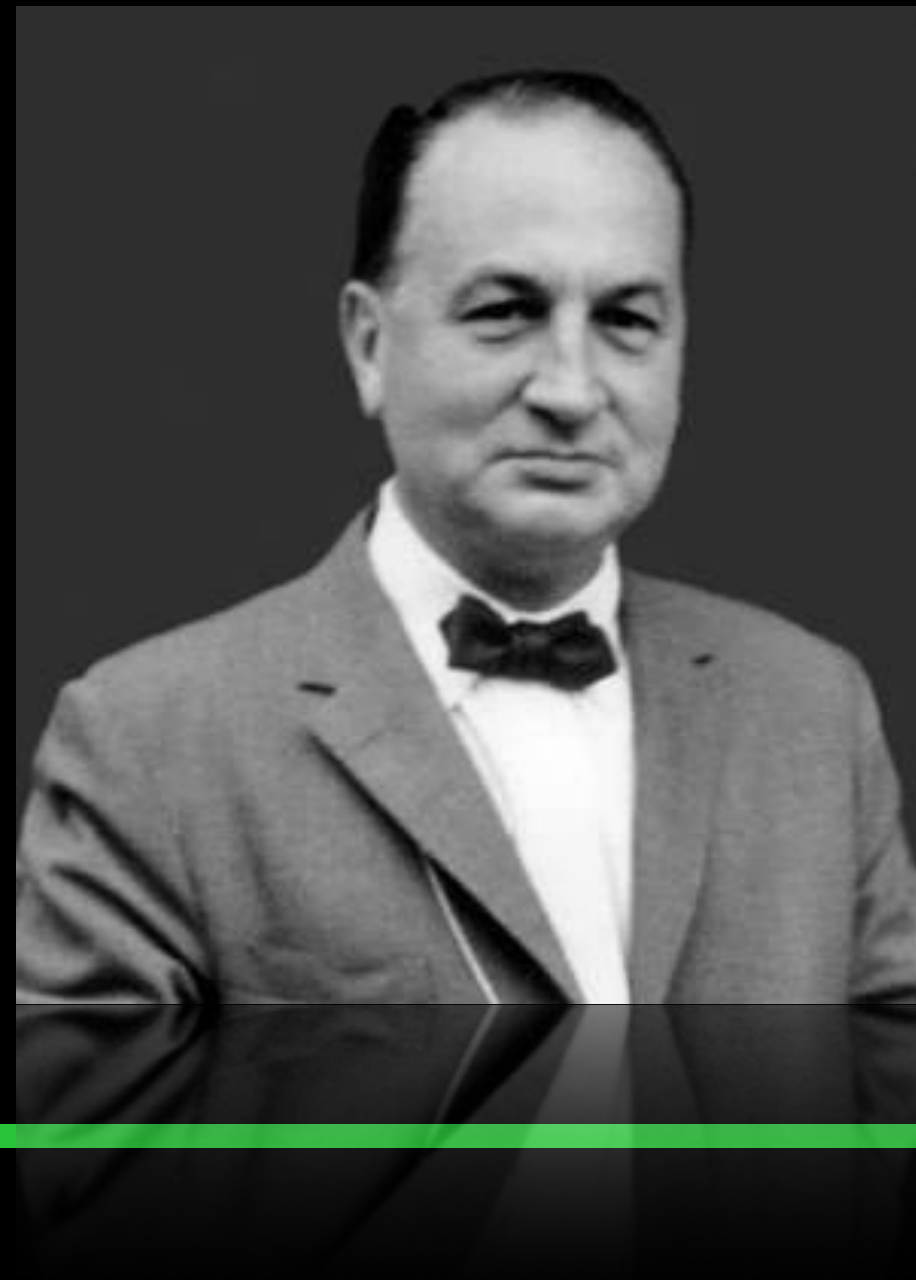
1937 1938

Vincent
Sutherland
Hodson



During World War II
military doctors, facing injury and suffering on a massive scale, pioneered advances in antibiotics, anesthesia, and blood transfusions—advances that would usher in the age of modern surgery.

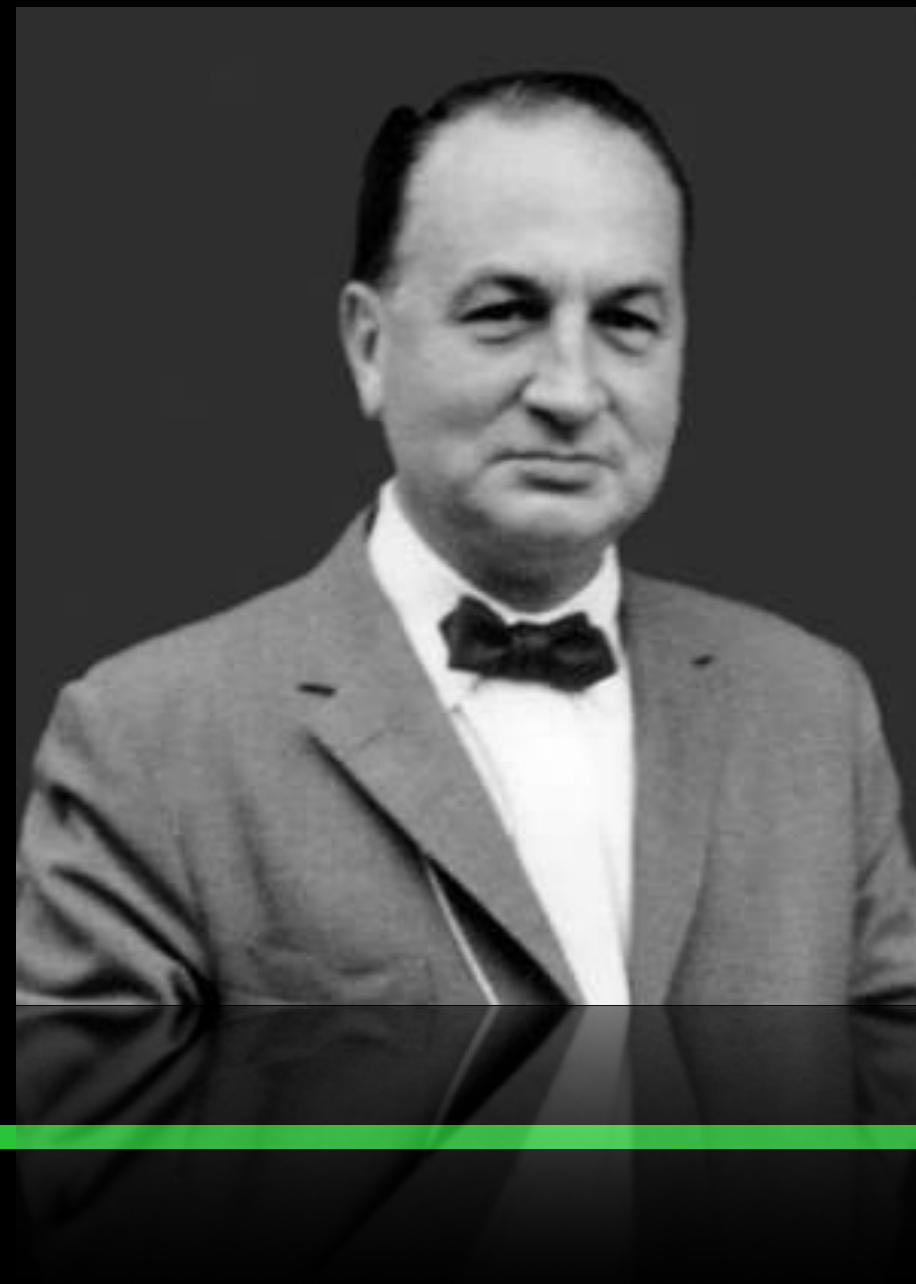
Robert Gross
(Boston)



1937 1938

Vincent
Sutherland
Hodson

Robert Gross
(Boston)



1937 1938

Vincent
Sutherland
Hodson

Clarence Craaford
(Stockholm)



1944

Robert Gross
(Boston)



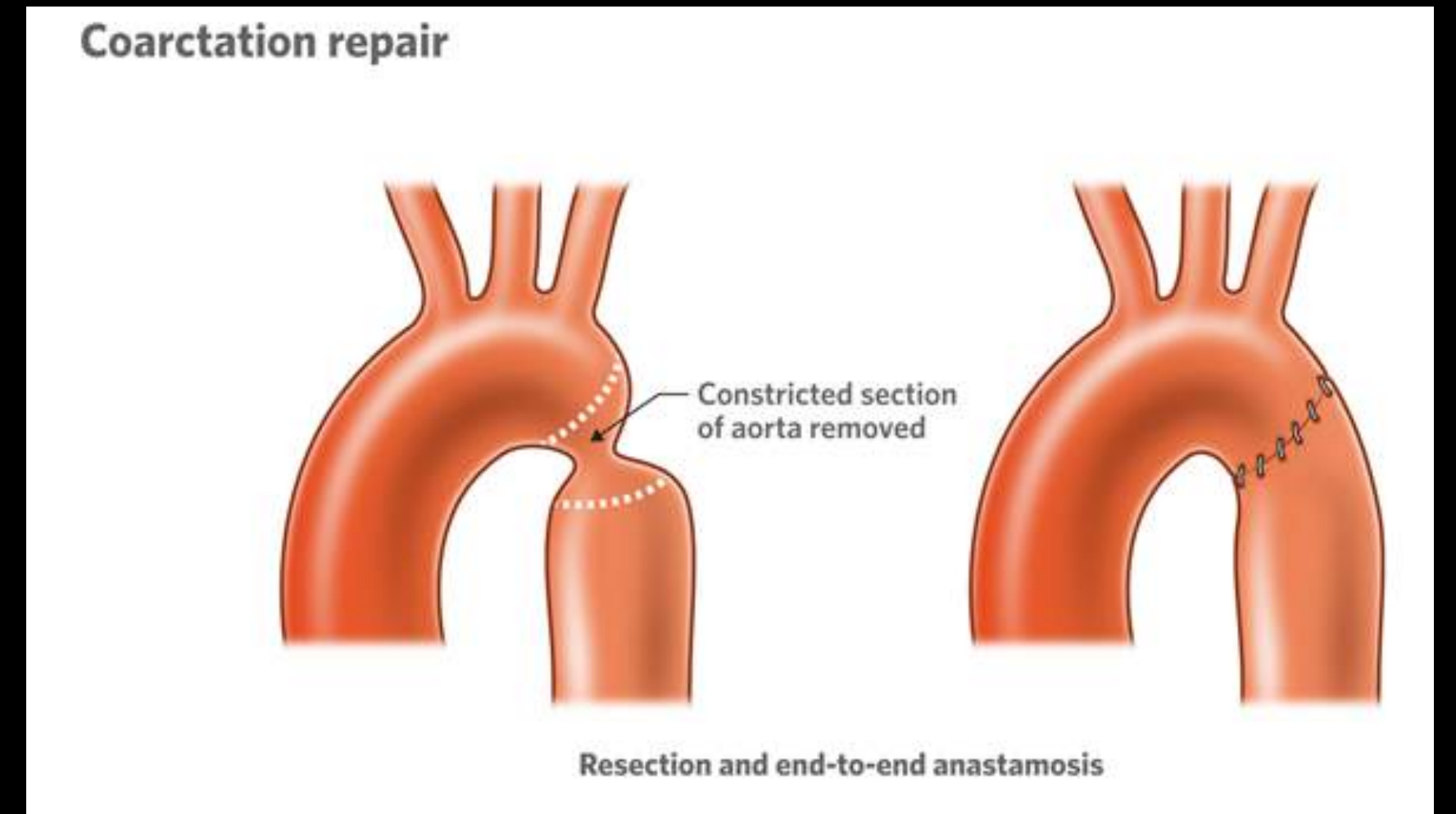
1937 1938

Vincent
Sutherland
Hodson

Clarence Craaford
(Stockholm)



1944



Resection and end-to-end anastomosis



1944



Dr. Alfred Blalock

Vivien Thomas

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ARCHIVES OF THE JOHNS HOPKINS
MEDICAL INSTITUTIONS*

*MEDICAL INSTITUTIONS
ARCHIVES OF THE JOHNS HOPKINS
PHOTOS BY BY THE ALAN MASON CHESNEY MEDICAL*

Dr. Alfred Blalock

Vivien Thomas

1944



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Vivien Thomas

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MEDICAL INSTITUTIONS
ARCHIVES OF THE JOHNS HOPKINS
PHOTOS BY BY THE ALAN MASON CHESNEY MEDICAL

Dr. Alfred Blalock

Vivien Thomas

1941

1944



Dr. Alfred Blalock

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MEDICAL INSTITUTIONS
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PHOTOS BY BY THE ALAN MASON CHESNEY MEDICAL

Dr. Alfred Blalock

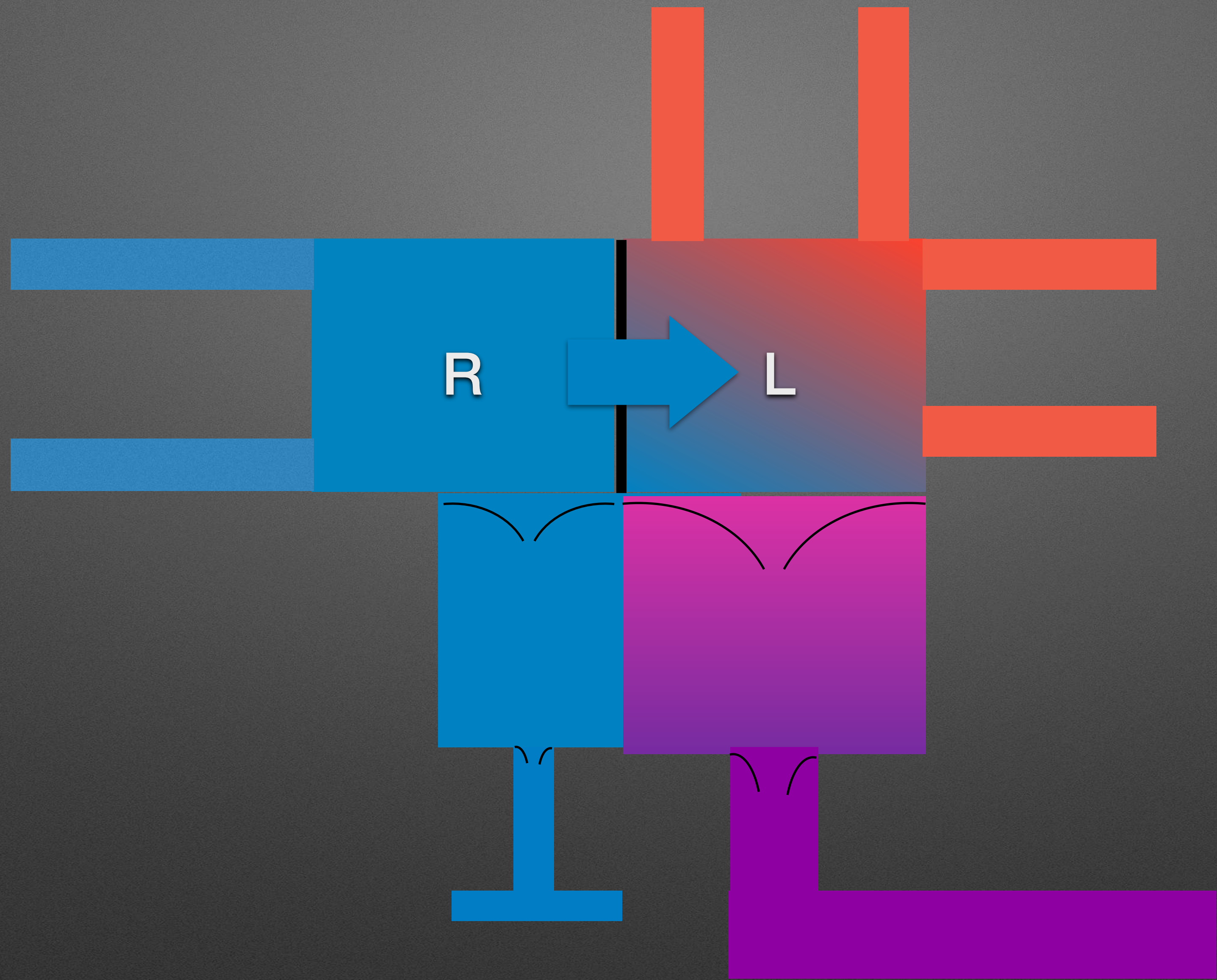
Vivien Thomas

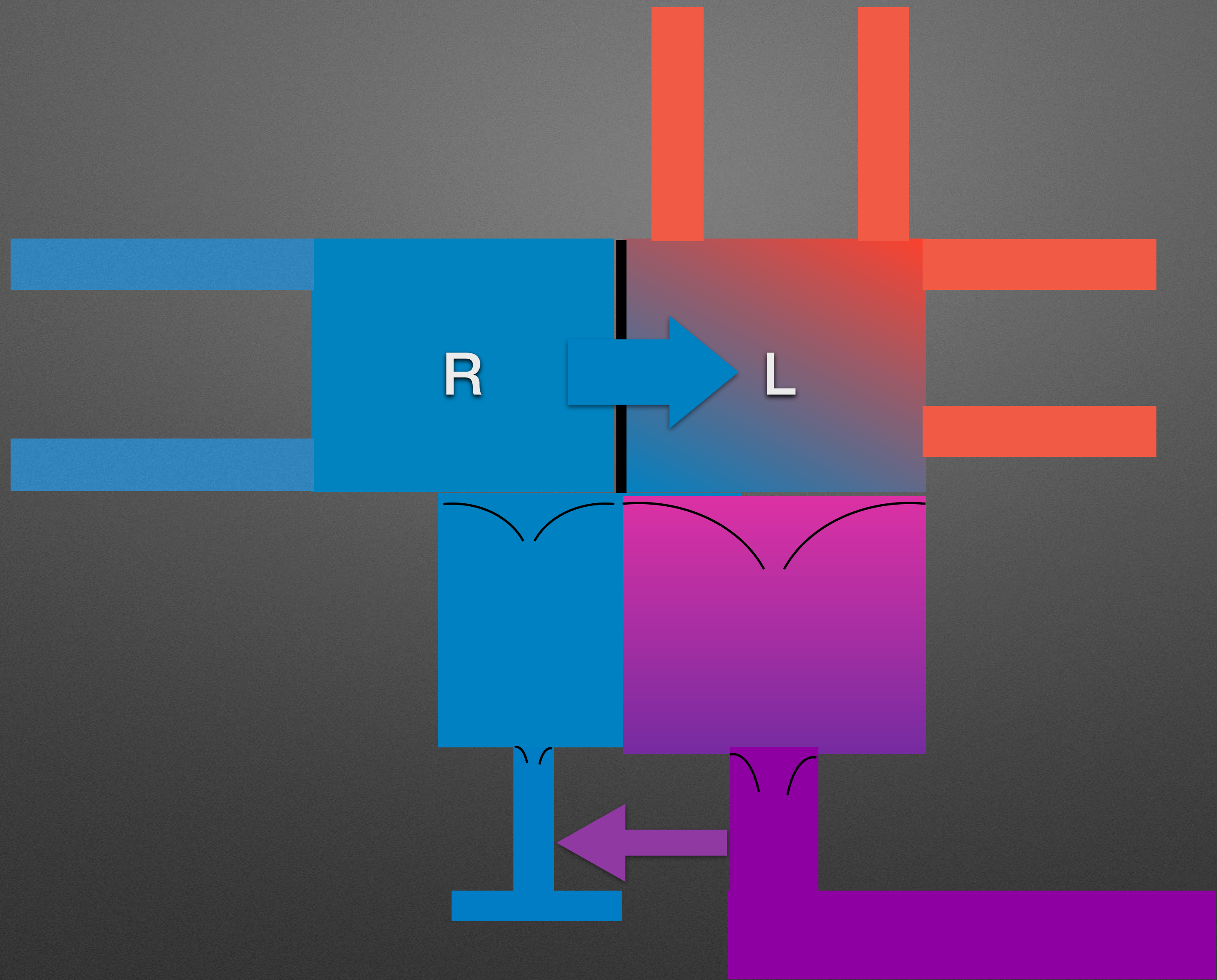


Helen Taussig

1941

1944







Dr. Alfred Blalock

Vivien Thomas

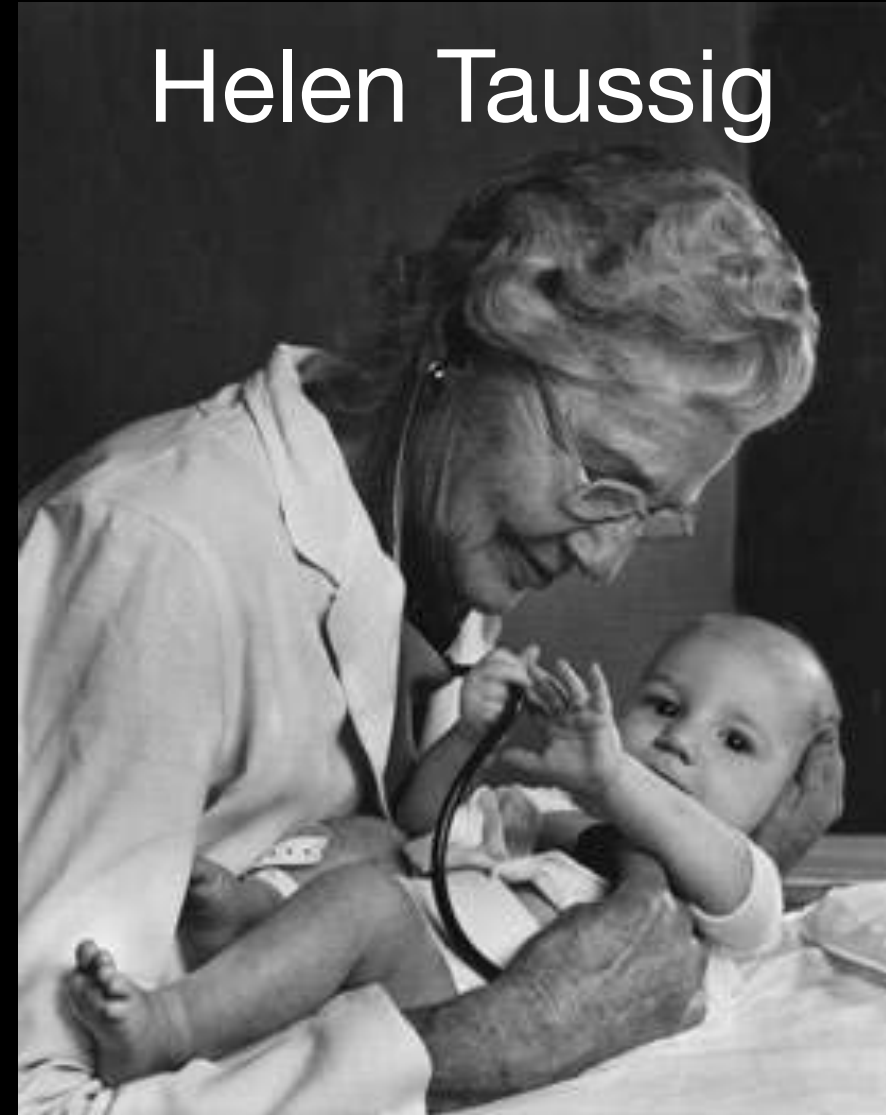
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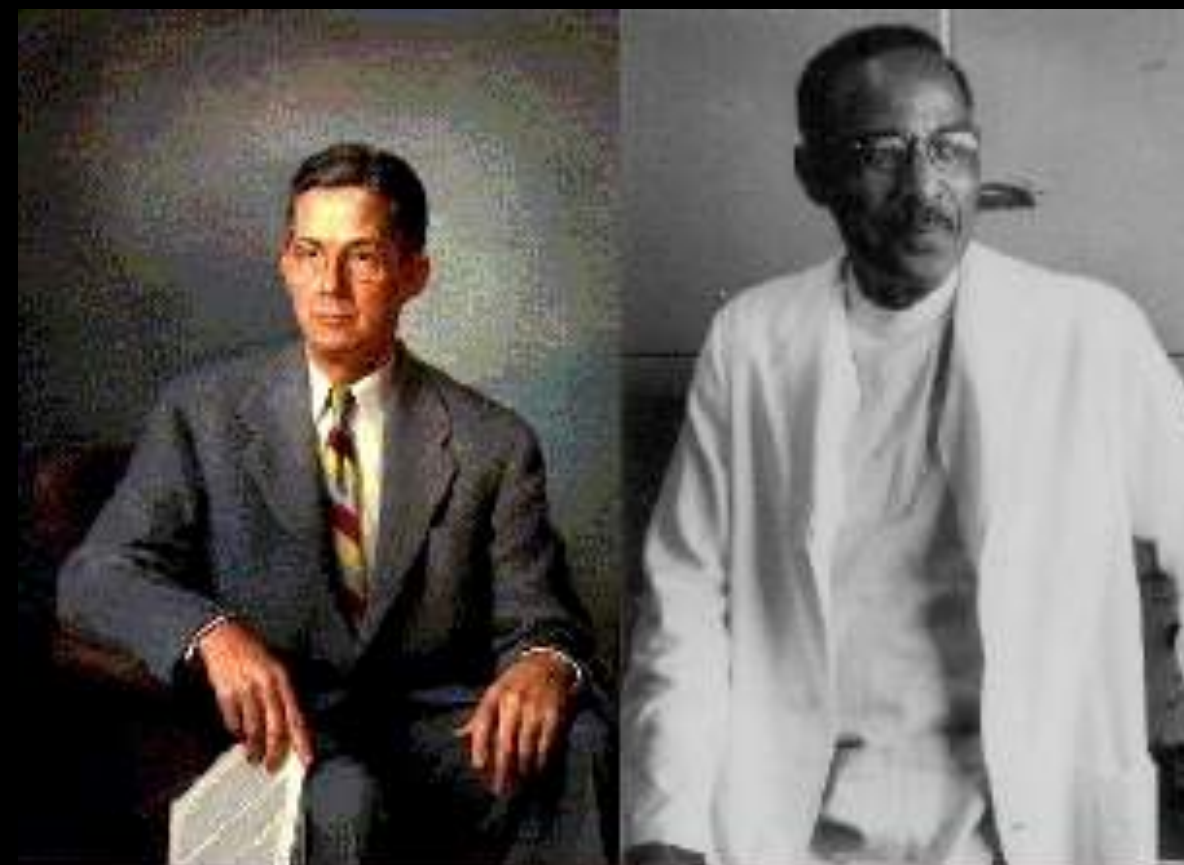
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Helen Taussig



1941

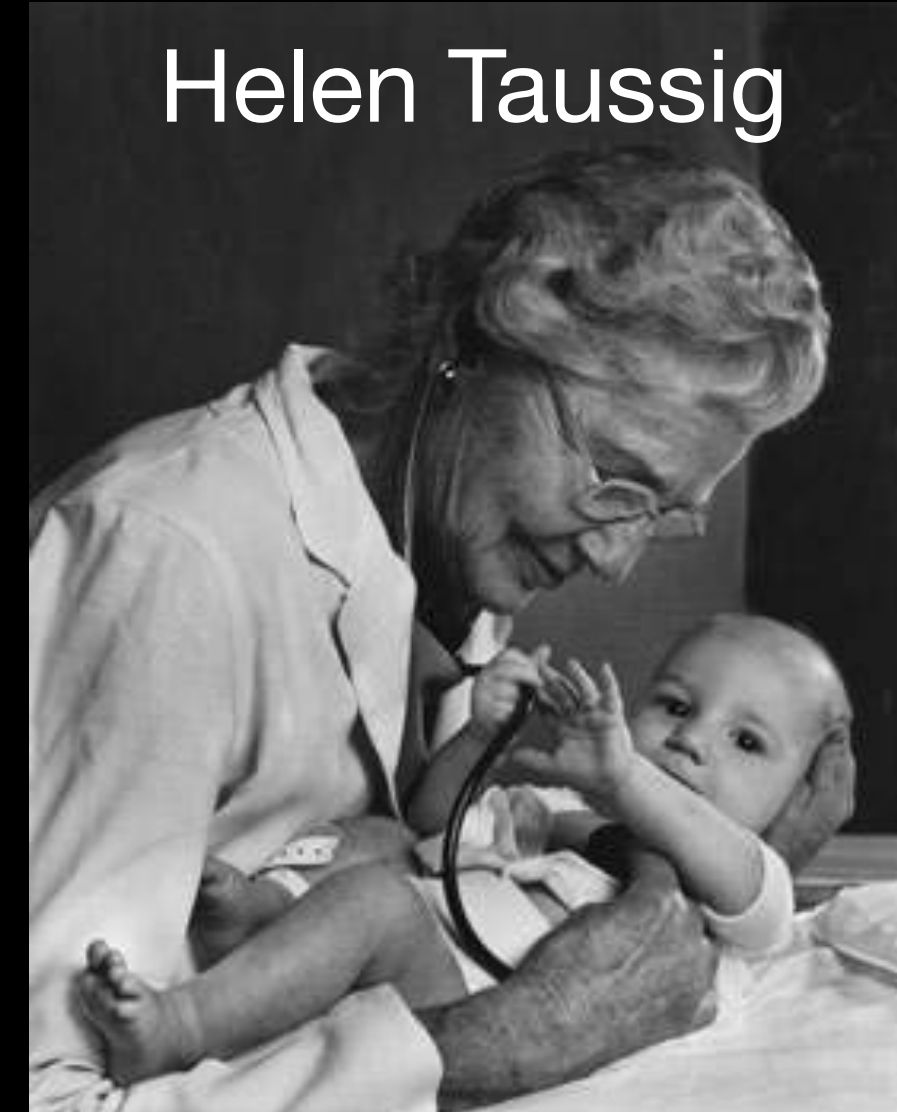
1944



Dr. Alfred Blalock

Vivien Thomas

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1944



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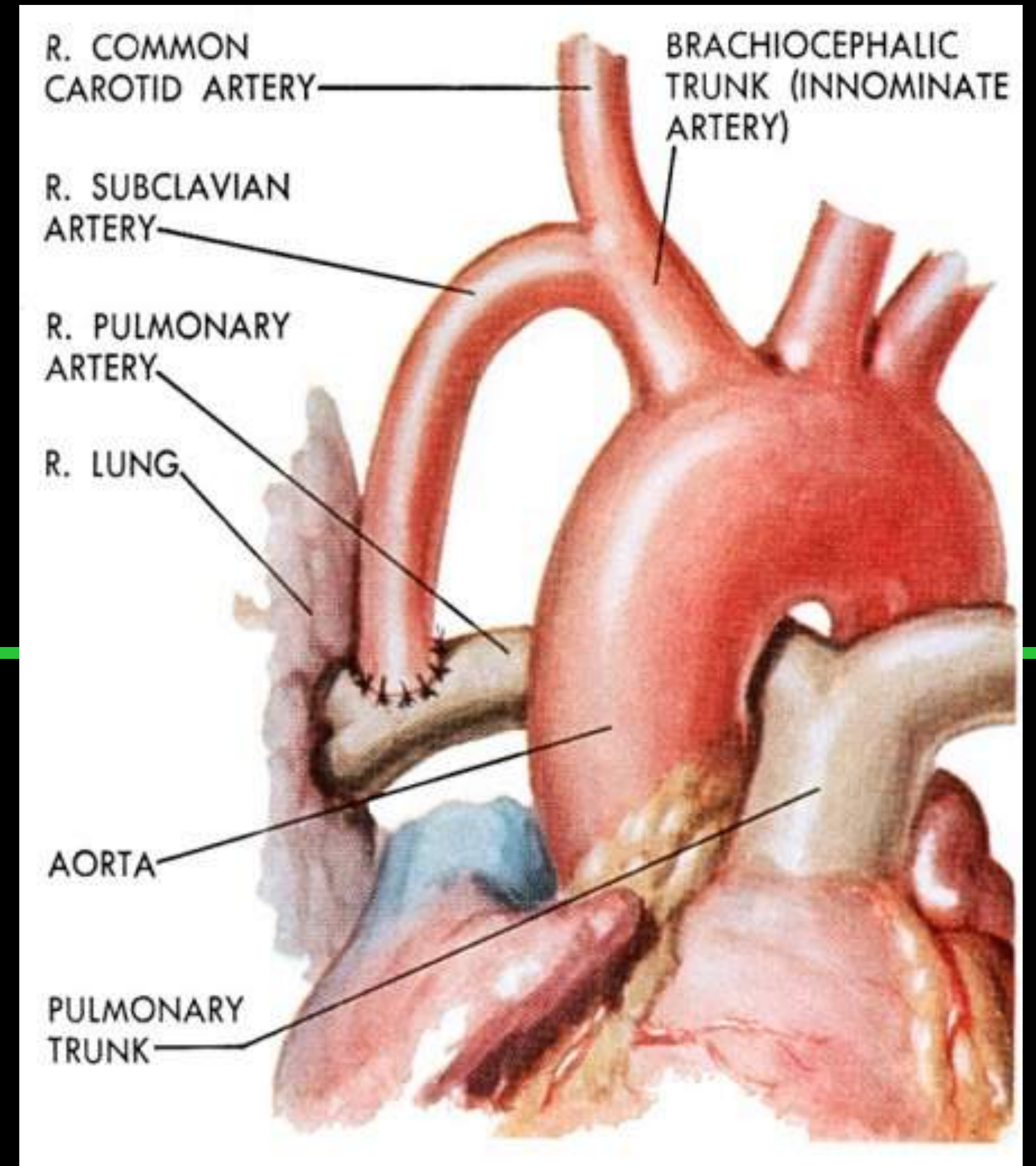
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PHOTOS BY THE ALAN MASON CHESNEY MEDICAL

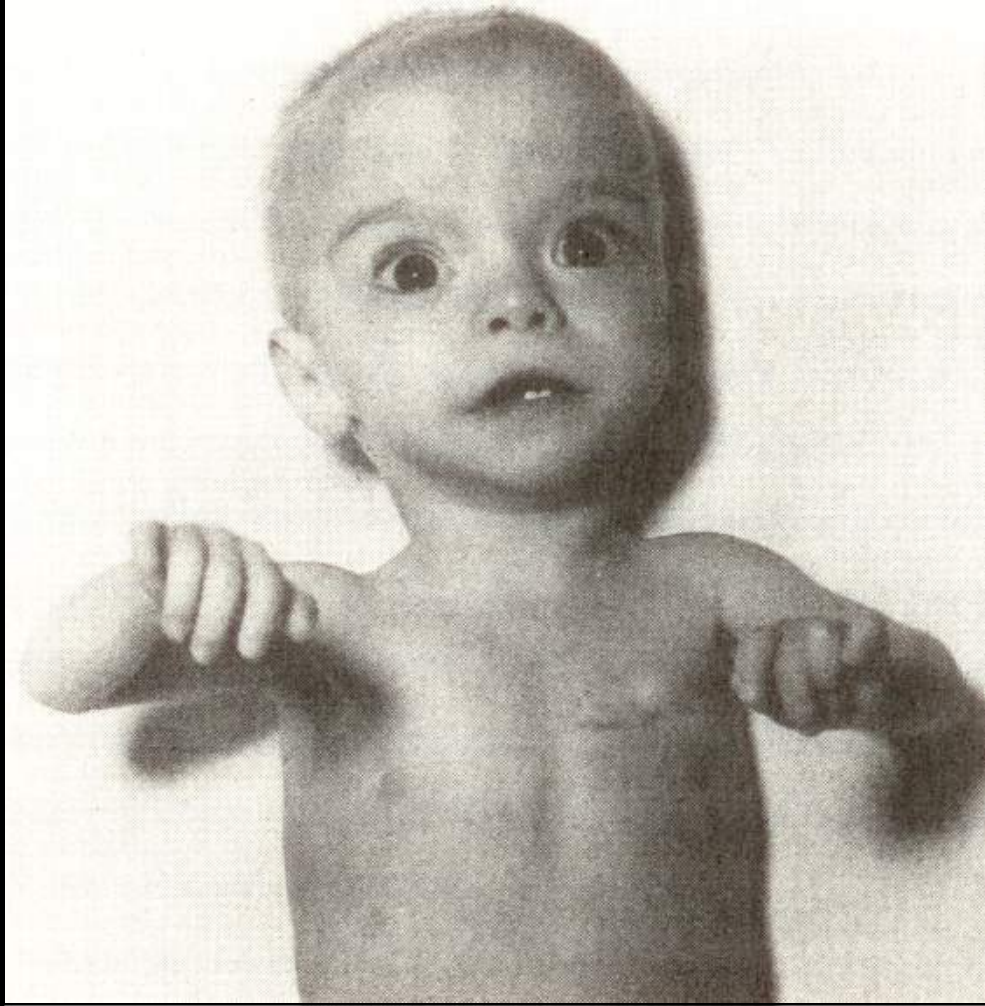
Helen Taussig



1941

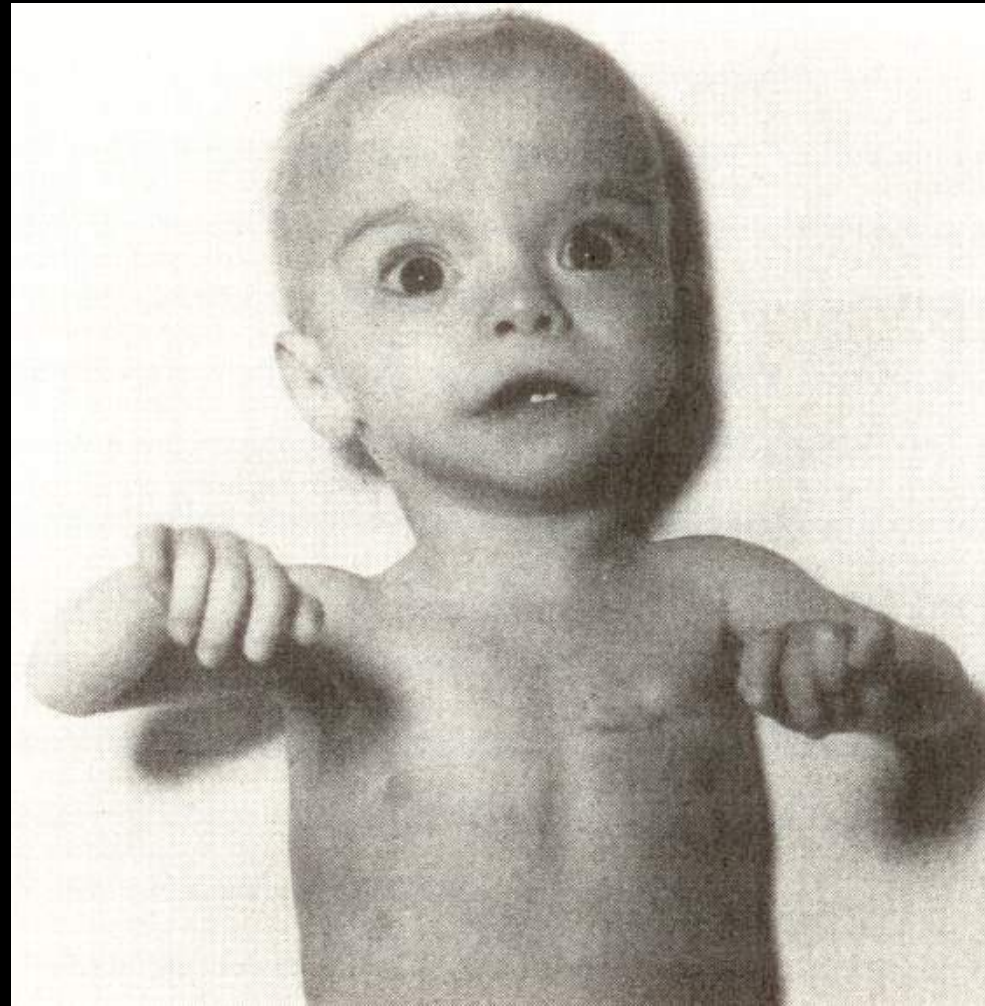
1944





Eileen Saxon,
age 15m





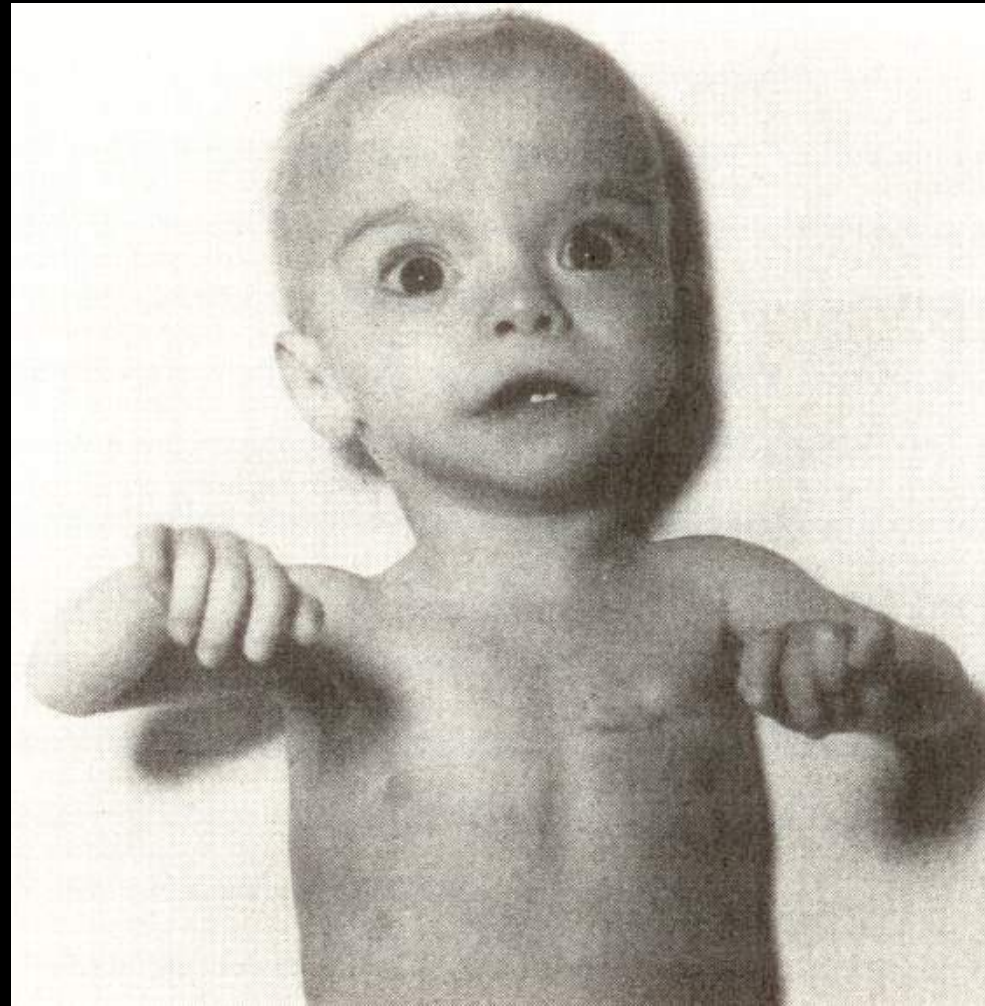
Eileen Saxon,
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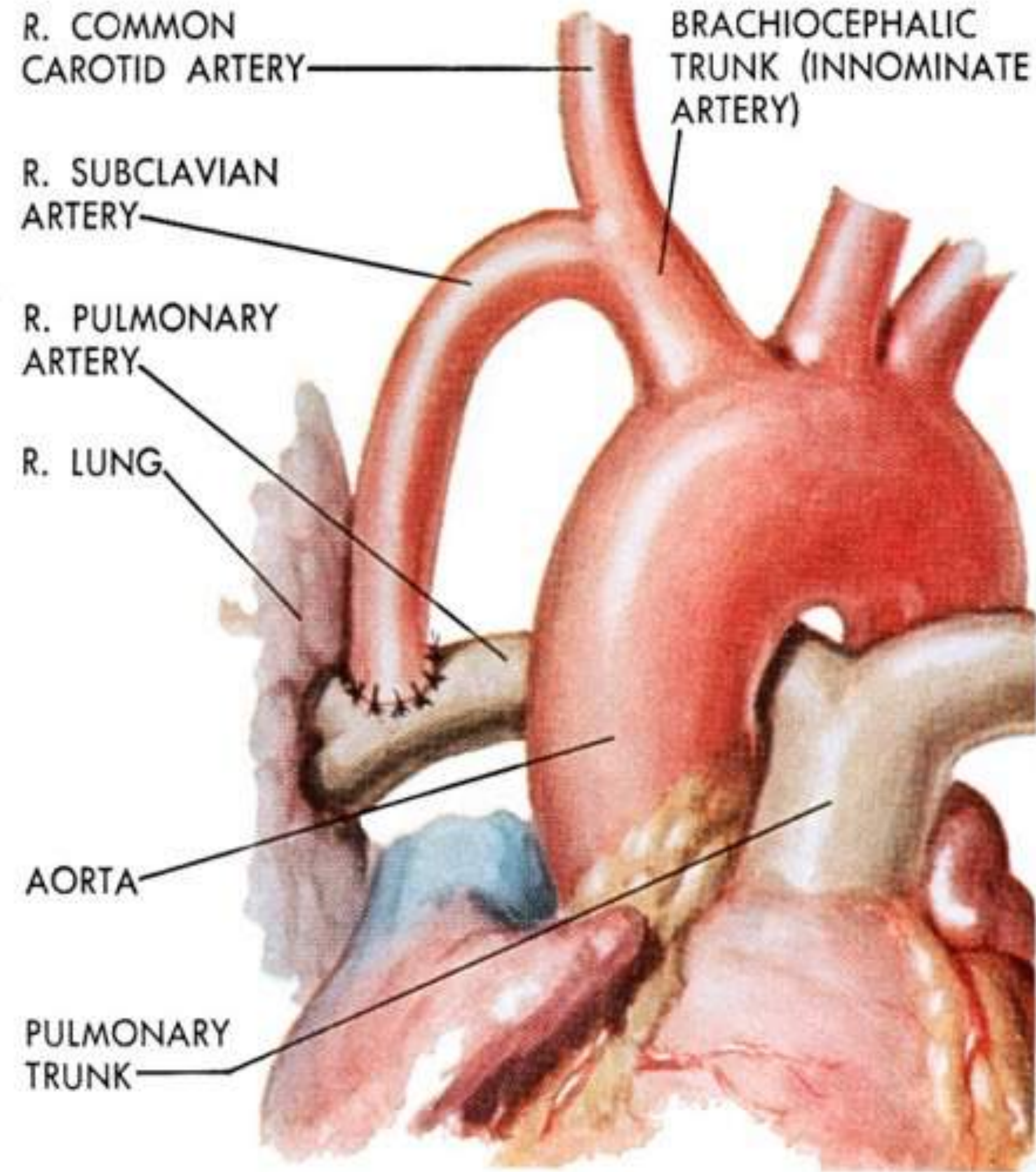
Bill Longmire

“.. On evening rounds, we arrived at the crib of this fifteen-month old baby...

I was immediately astounded by the deep cyanotic appearance of the child, much more cyanotic than any patient I had ever seen before: the lips were a deep, dark blue .. The face was suffused with dilated veins, the conjunctiva almost purple.”



Eileen Saxon,
age 15m



“At operation we lacked all the modern vascular instruments and really had very little but the professor’s determination to carry us through the procedure. With the extremely thin wall of an extremely small pulmonary artery I marveled at Dr Blalock’s determination in completing this first anastomosis, certainly **the most difficult I have ever seen**”.

Eileen Saxon became blue again
in a few months.

She died shortly after
having a Blalock-Taussig shunt
on the opposite side

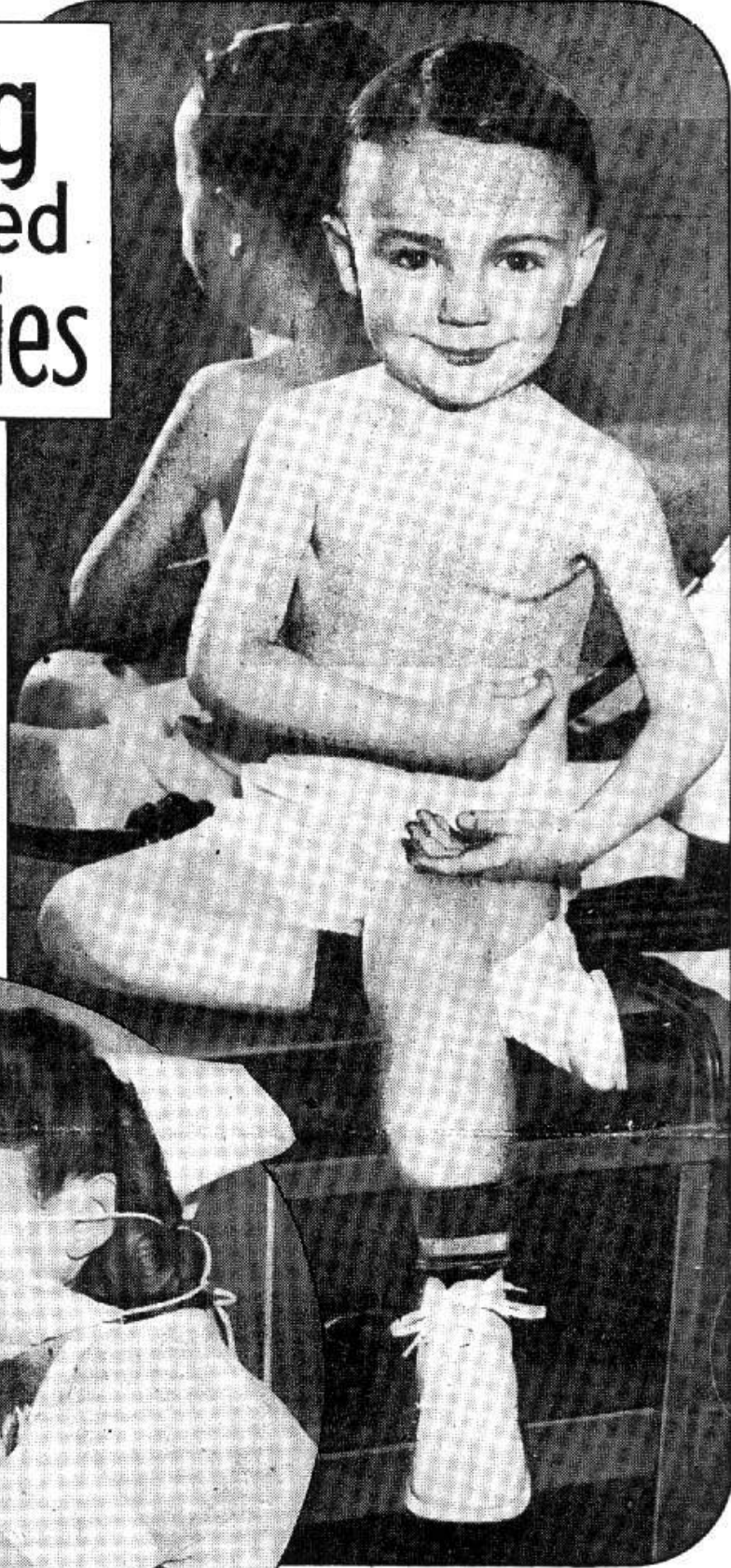
The diagram illustrates the human circulatory system. The heart is shown with four chambers. Arrows indicate the flow of blood. A dashed line separates the pulmonary circulation (heart to lungs and back) from the systemic circulation (heart to body and back). The steps are numbered as follows: 1. Blood enters the right atrium from the body. 2. Blood is pumped from the right ventricle to the lungs. 3. Blood enters the left atrium from the lungs. 4. Blood is pumped from the left ventricle to the body.

By Robert D. Potter

the blood would pick up its life-giving oxygen. Then it would go back to the heart again to move outward through the body.

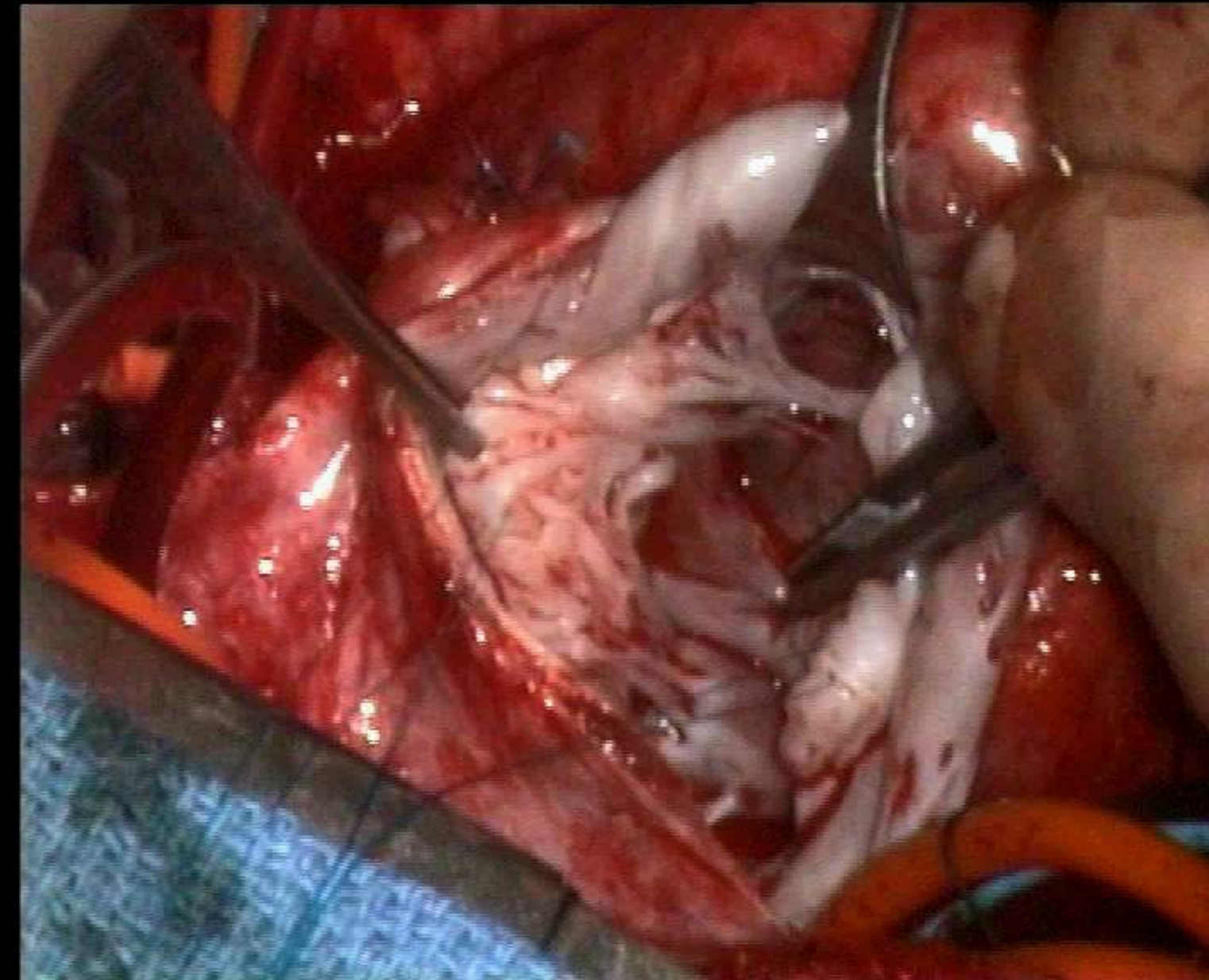
But could it be done? It is one thing to have a plumber re-arrange a piping system and something quite different to lay bare the human heart, sever one of its main arteries, splice it to another artery and sustain life in the patient in the process. Dr. Blalock said he would try.

Since the pioneer attempt the operation has been largely successful, although it is one filled with danger. Among the first 70 patients, 14 died. The odds are 5 to 1 for success.



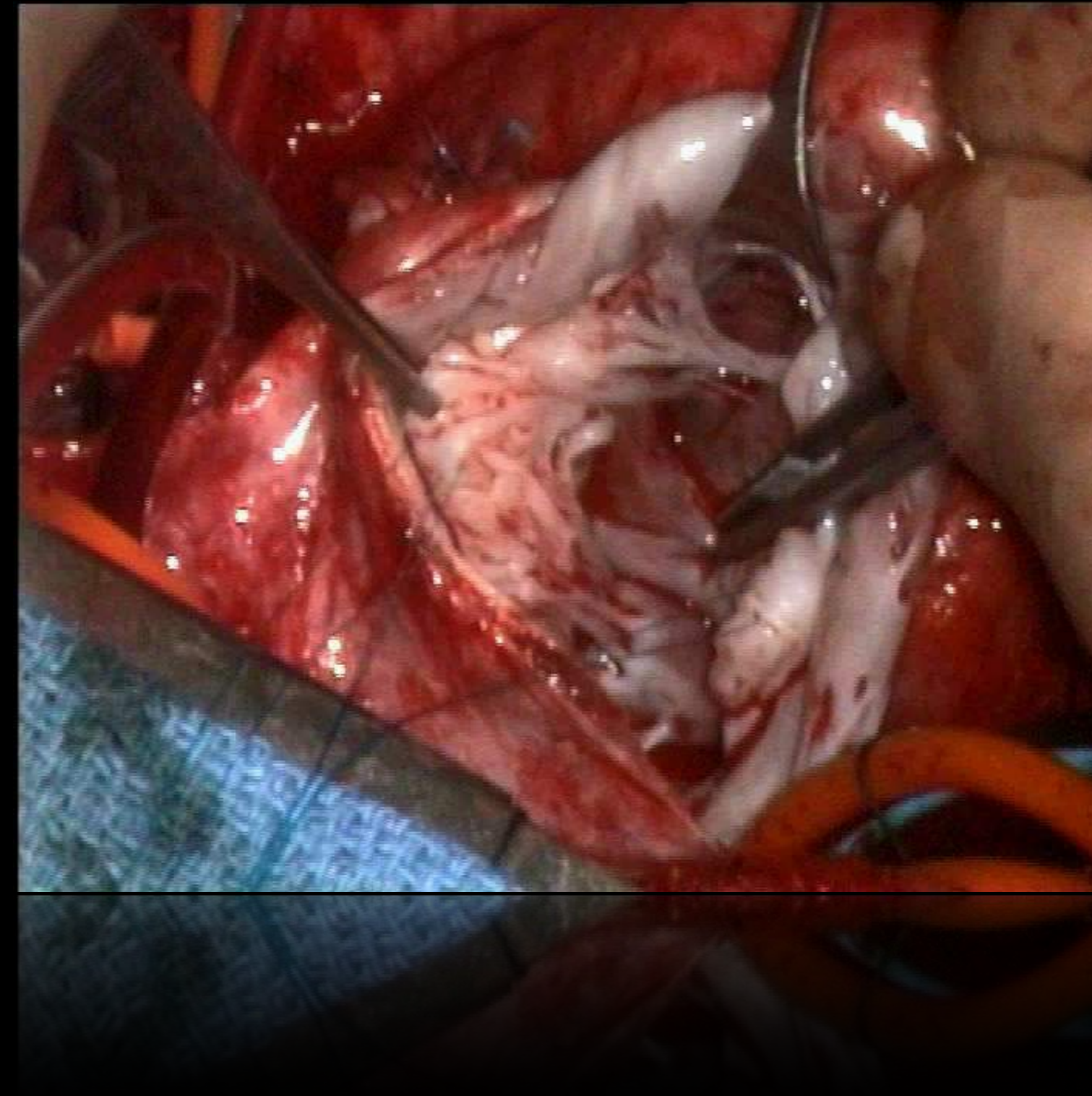
<http://www.medicalarchives.jhmi.edu/tausbio.htm>

getting into the heart safely



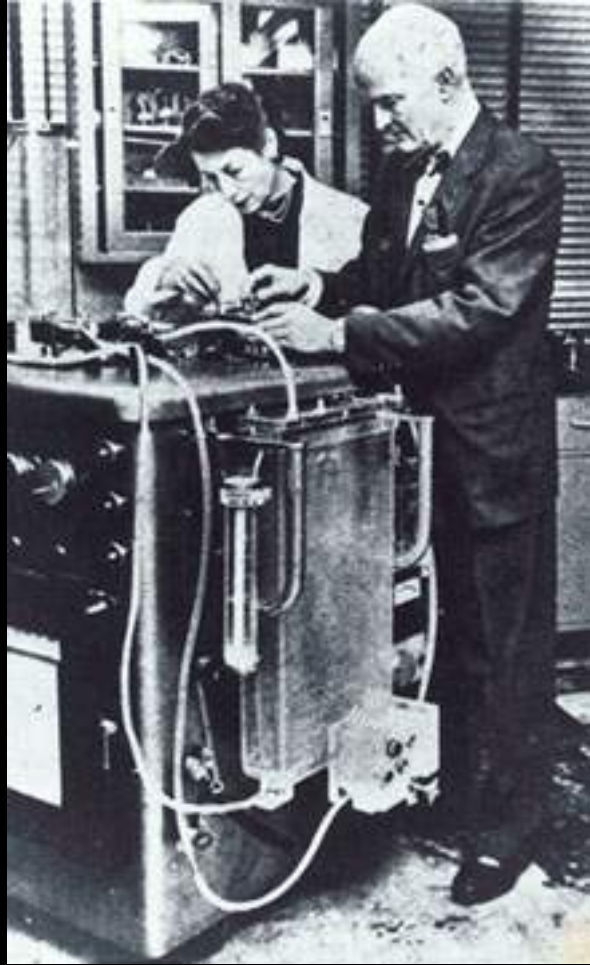
air, time, movement

getting into the heart safely



air, time, movement

John & Mary
Gibbon
(Boston)

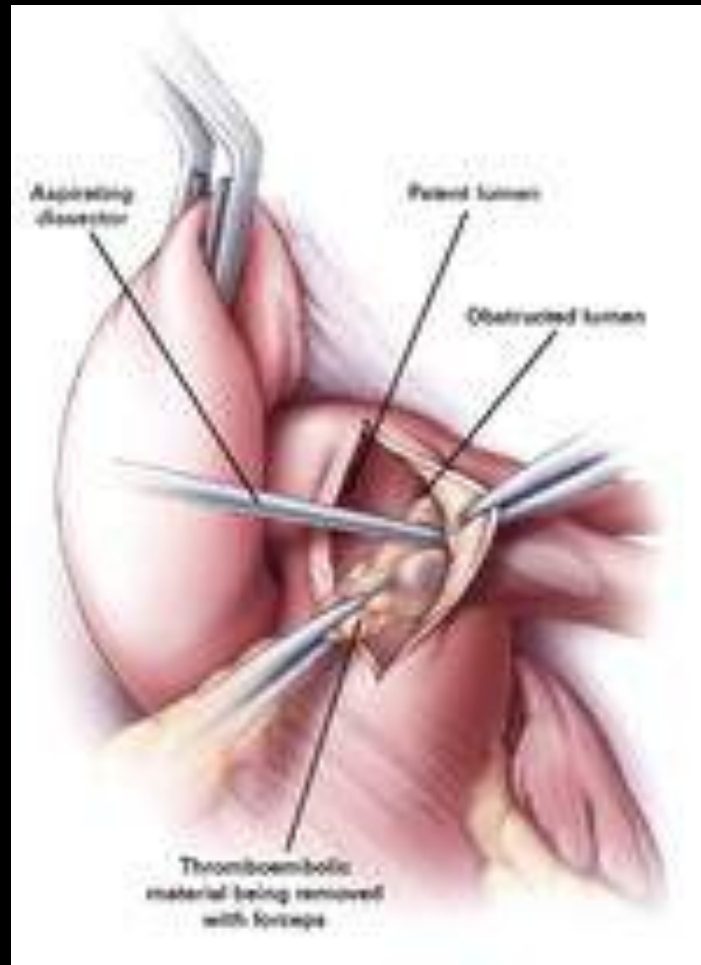
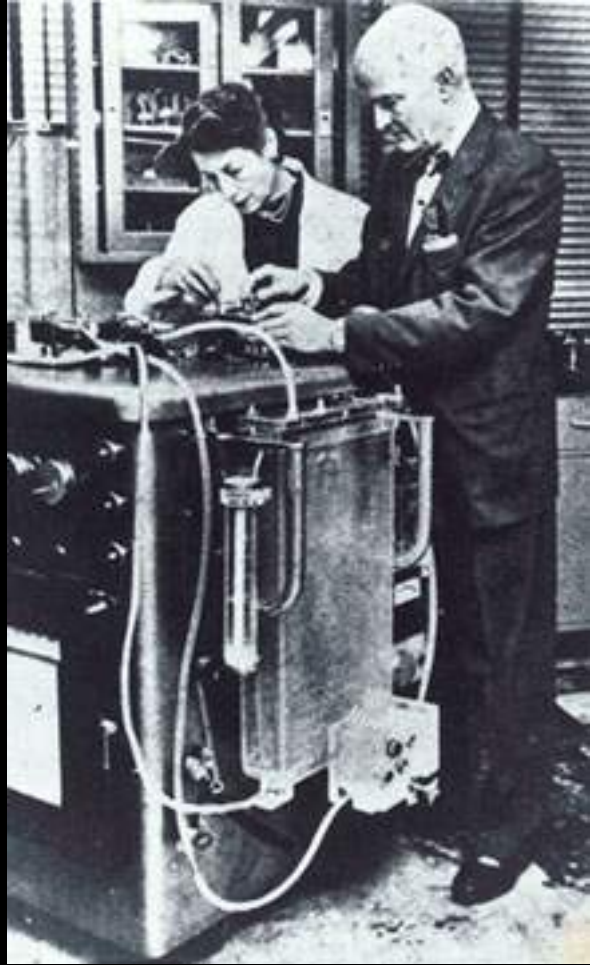


1931

Sir George
Newman



John & Mary
Gibbon
(Boston)

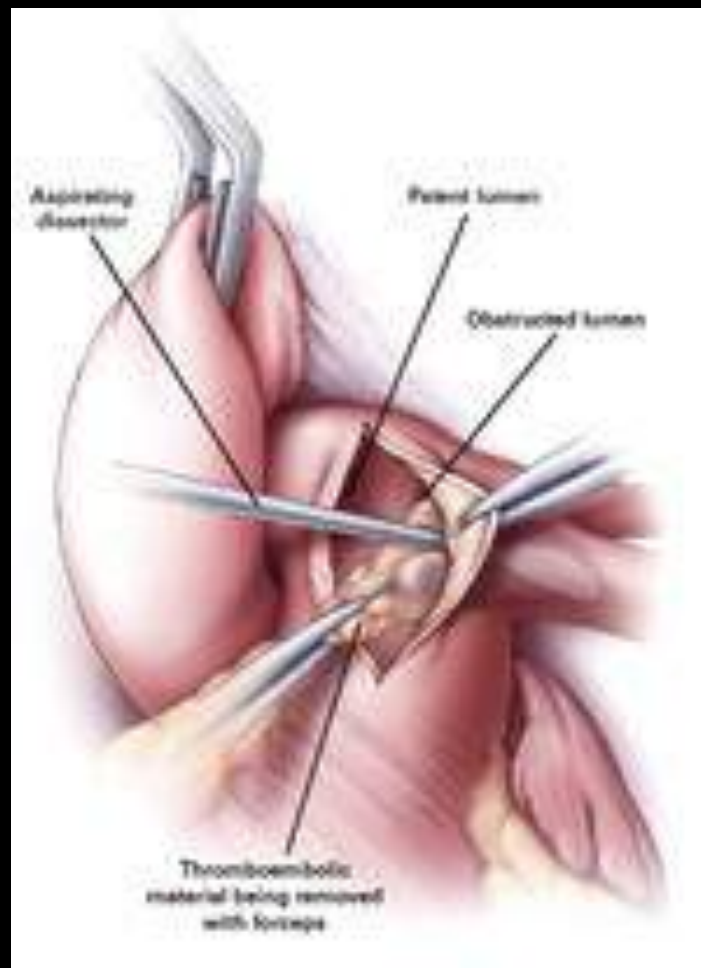
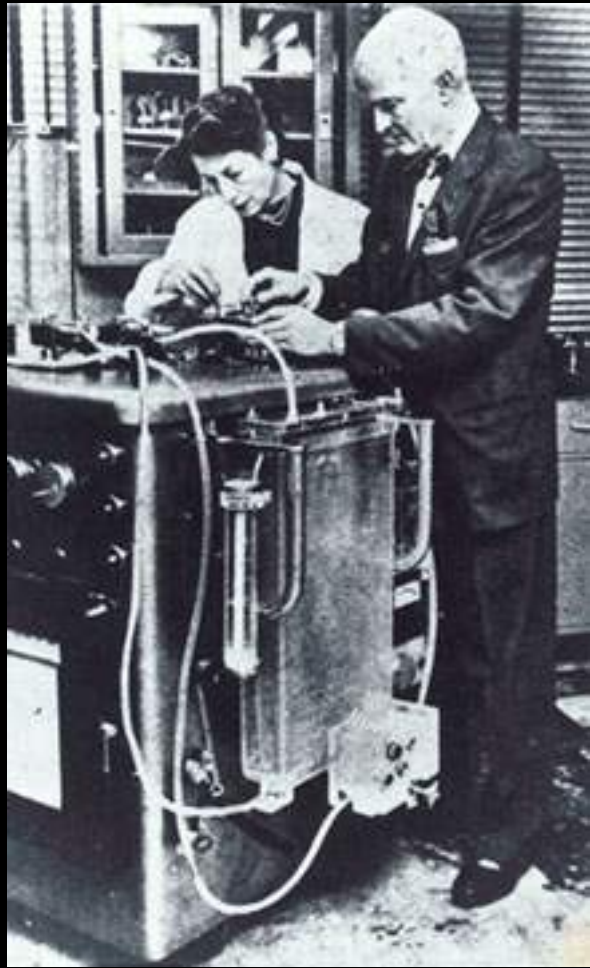


1931

Sir George
Newman

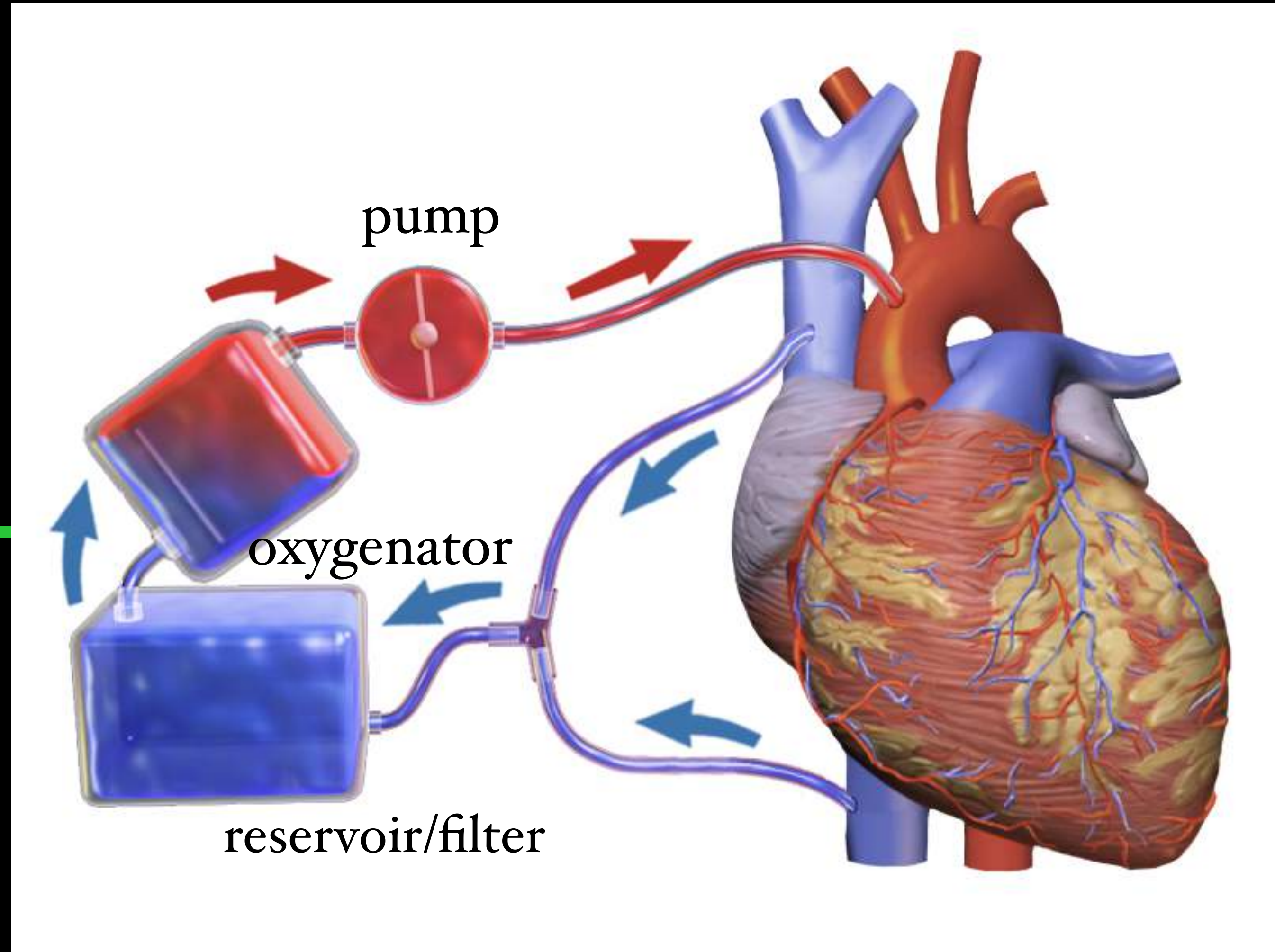


John & Mary
Gibbon
(Boston)

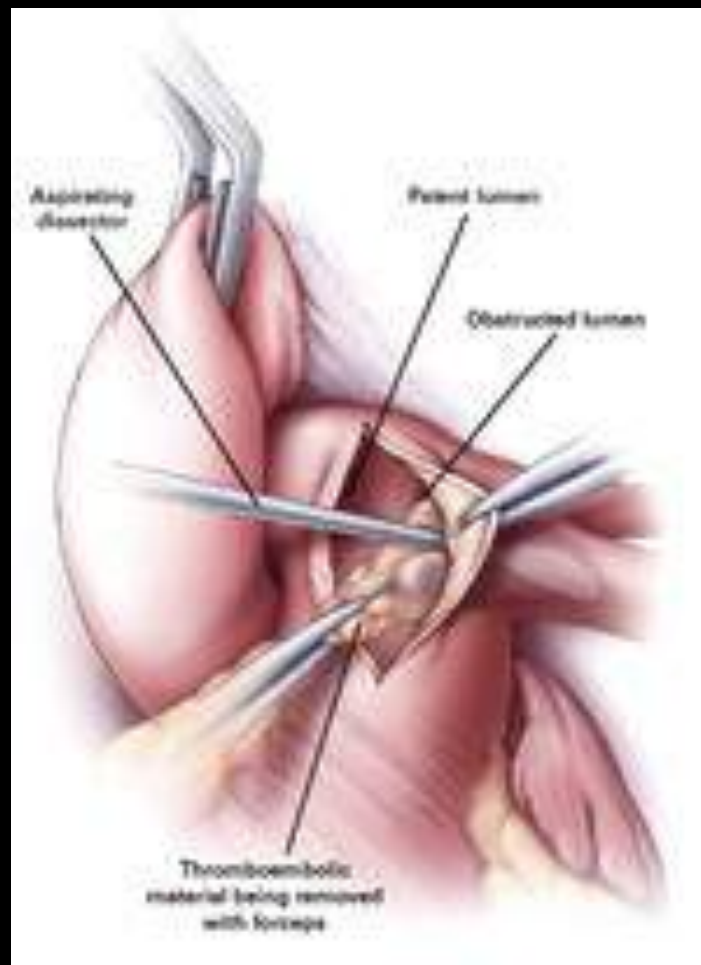
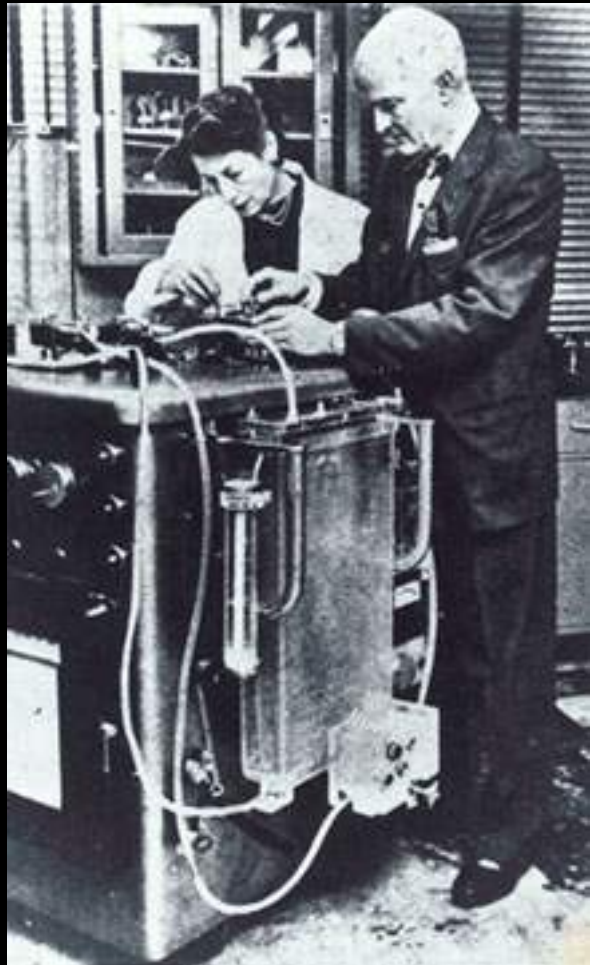


1931

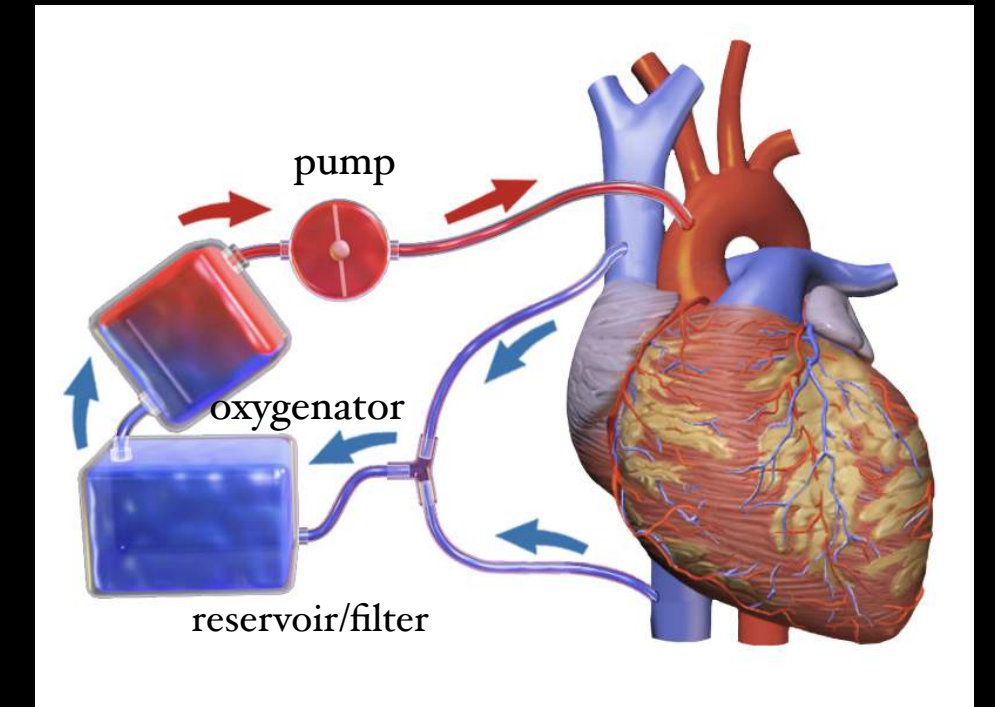
Sir George
Newman



John & Mary
Gibbon
(Boston)



20 years work

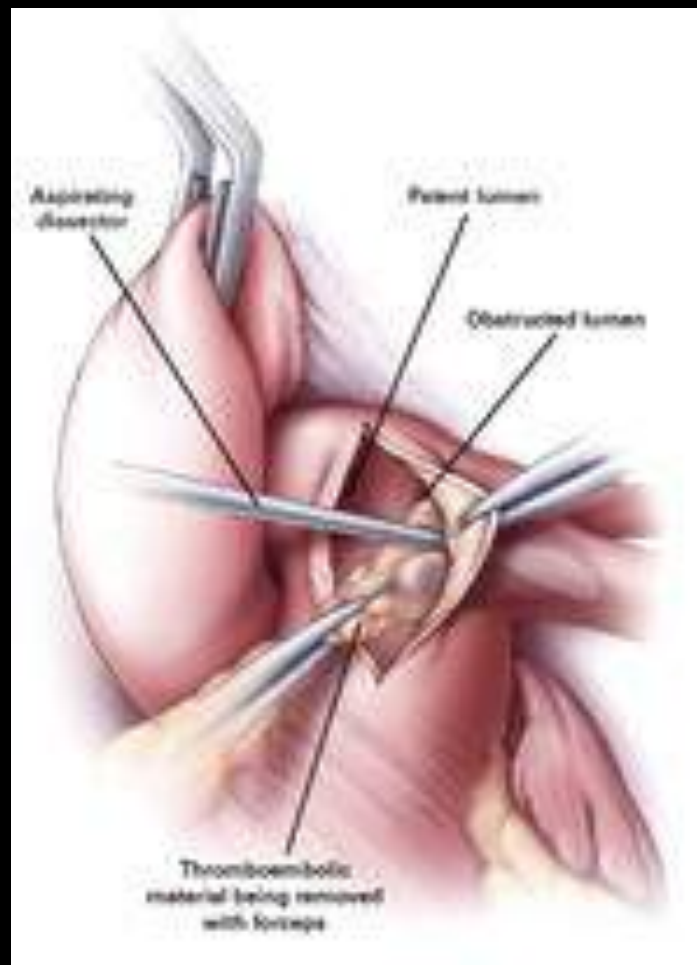
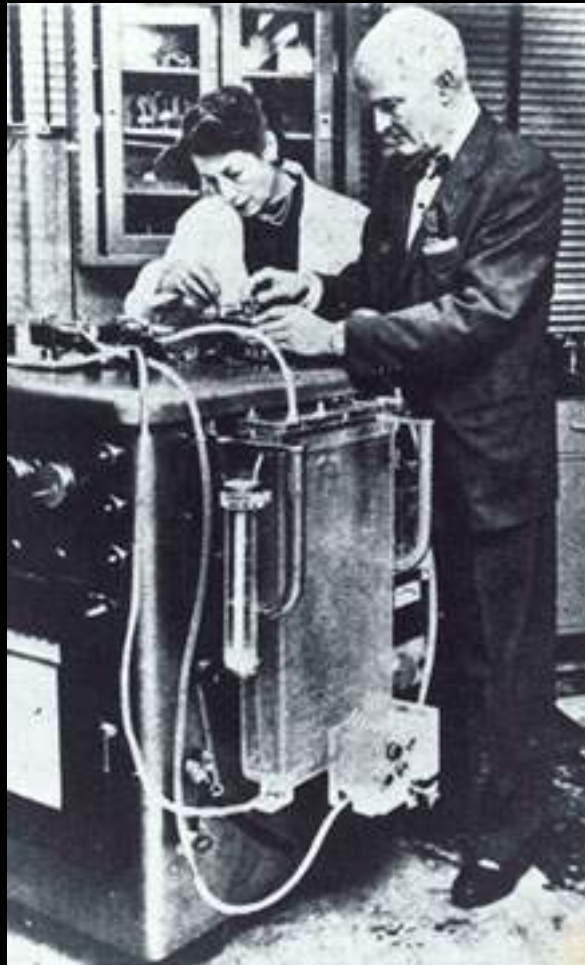


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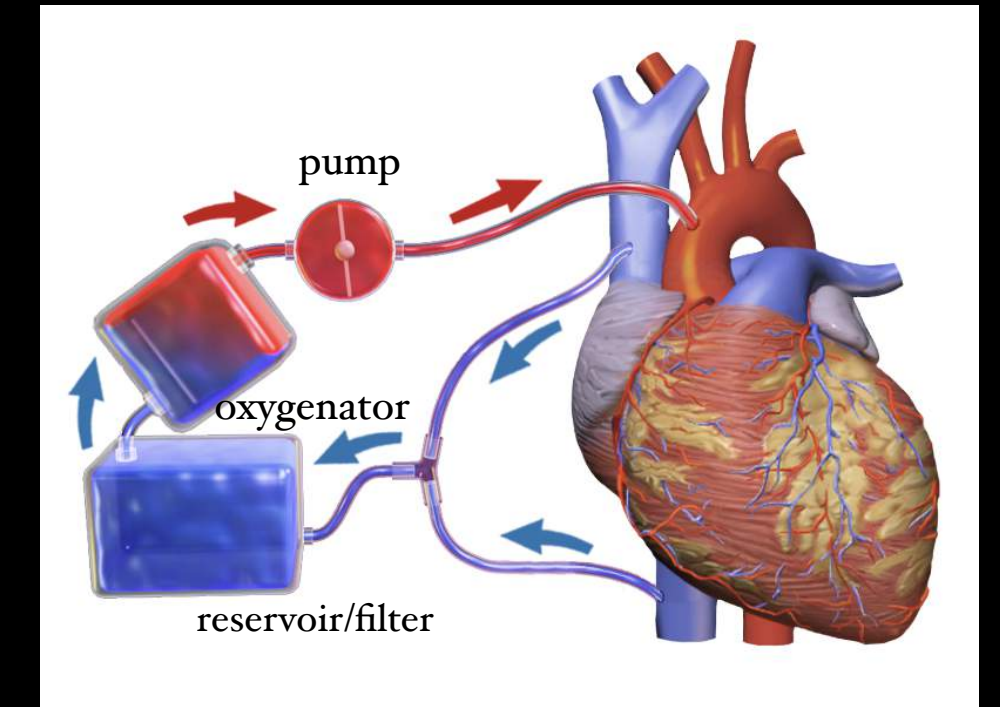
Sir George
Newman



John & Mary
Gibbon
(Boston)



20 years work



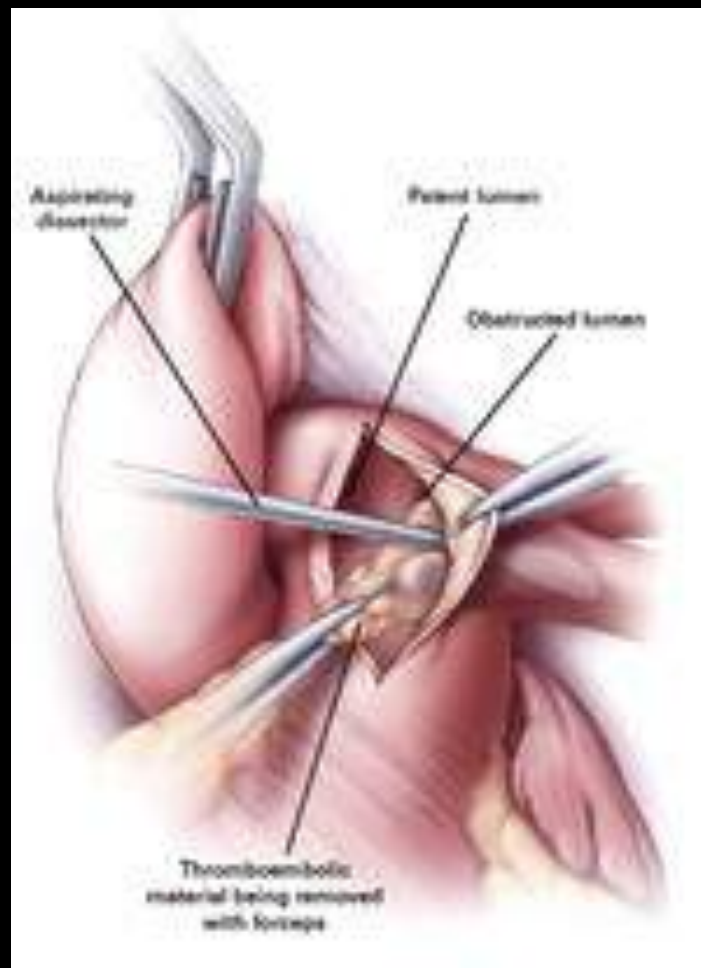
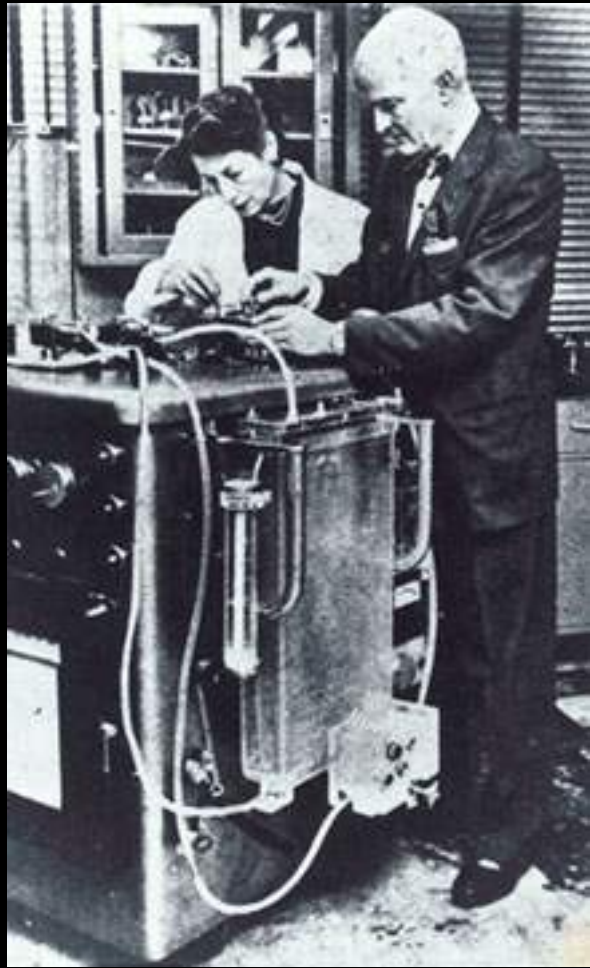
1931

Sir George
Newman

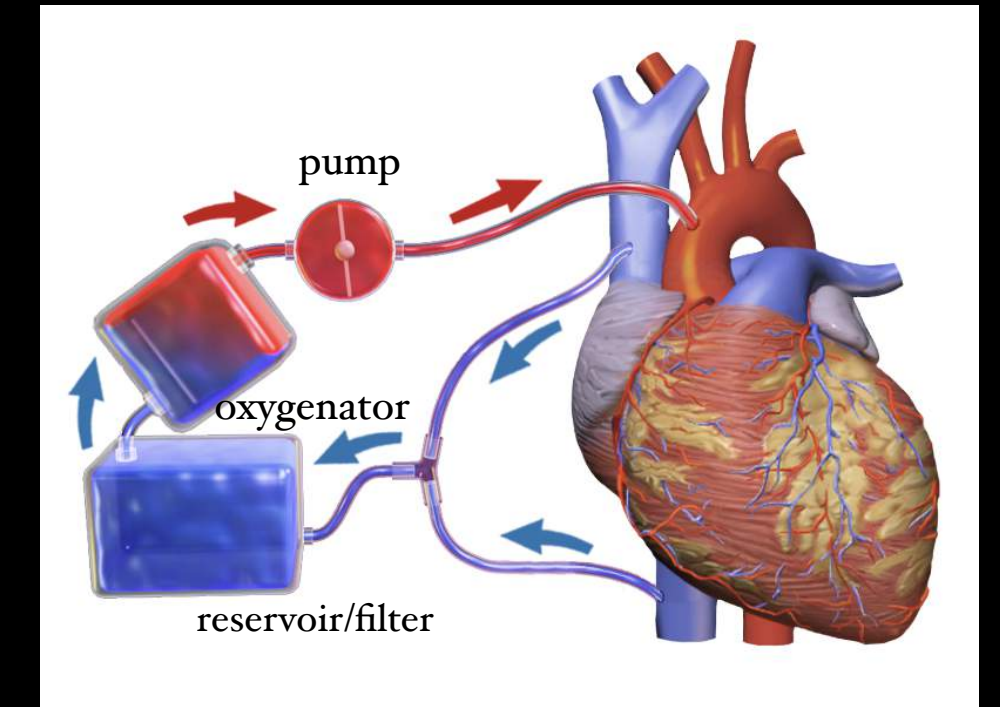


"I can recall prowling around Beacon Hill at night with some tuna fish as bait and a gunny sack to catch any of those stray cats which swarmed over Boston in those days. To indicate the number the S.P.C.A. was killing 30,000 a year."

John & Mary
Gibbon
(Boston)



20 years work



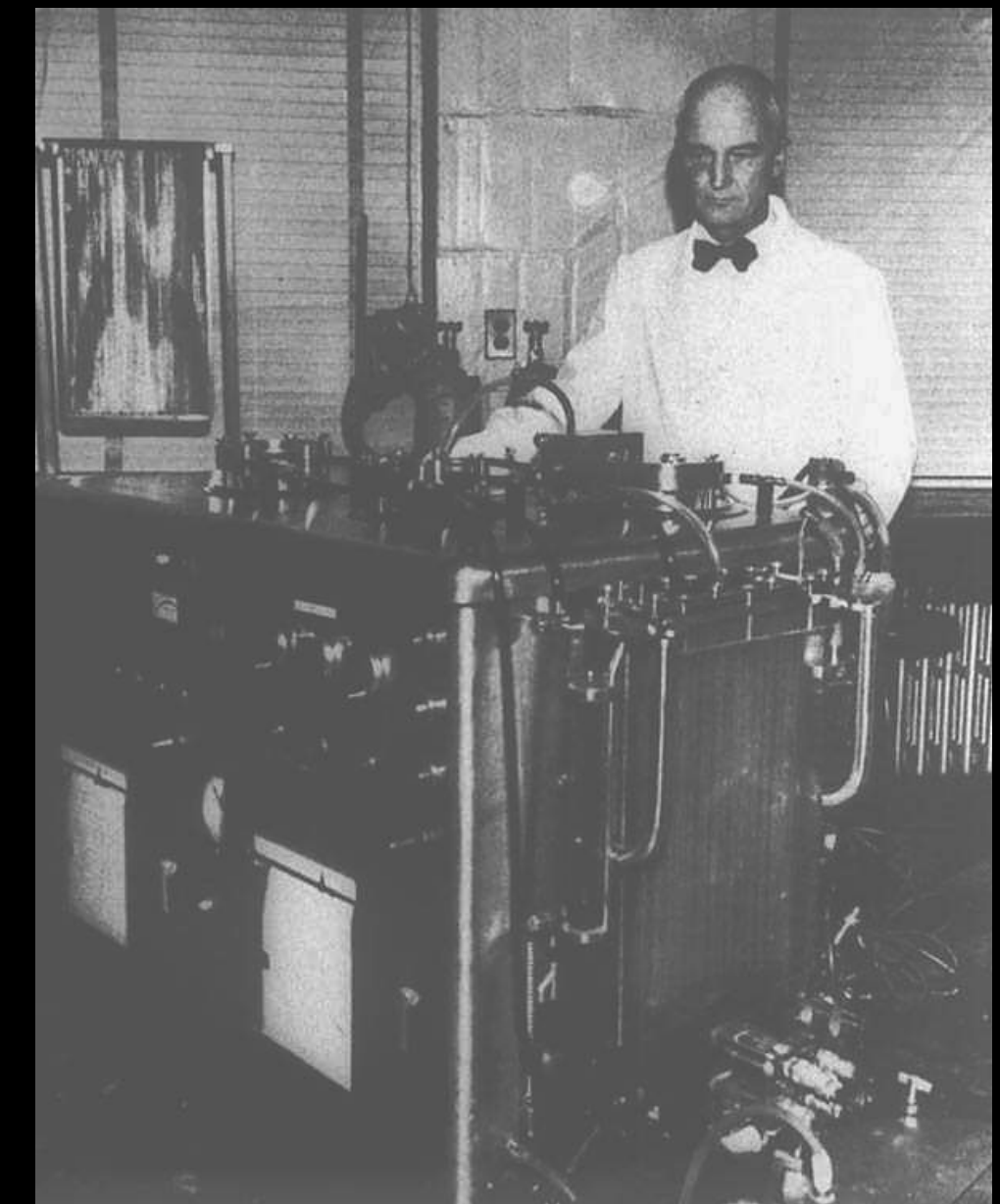
1931

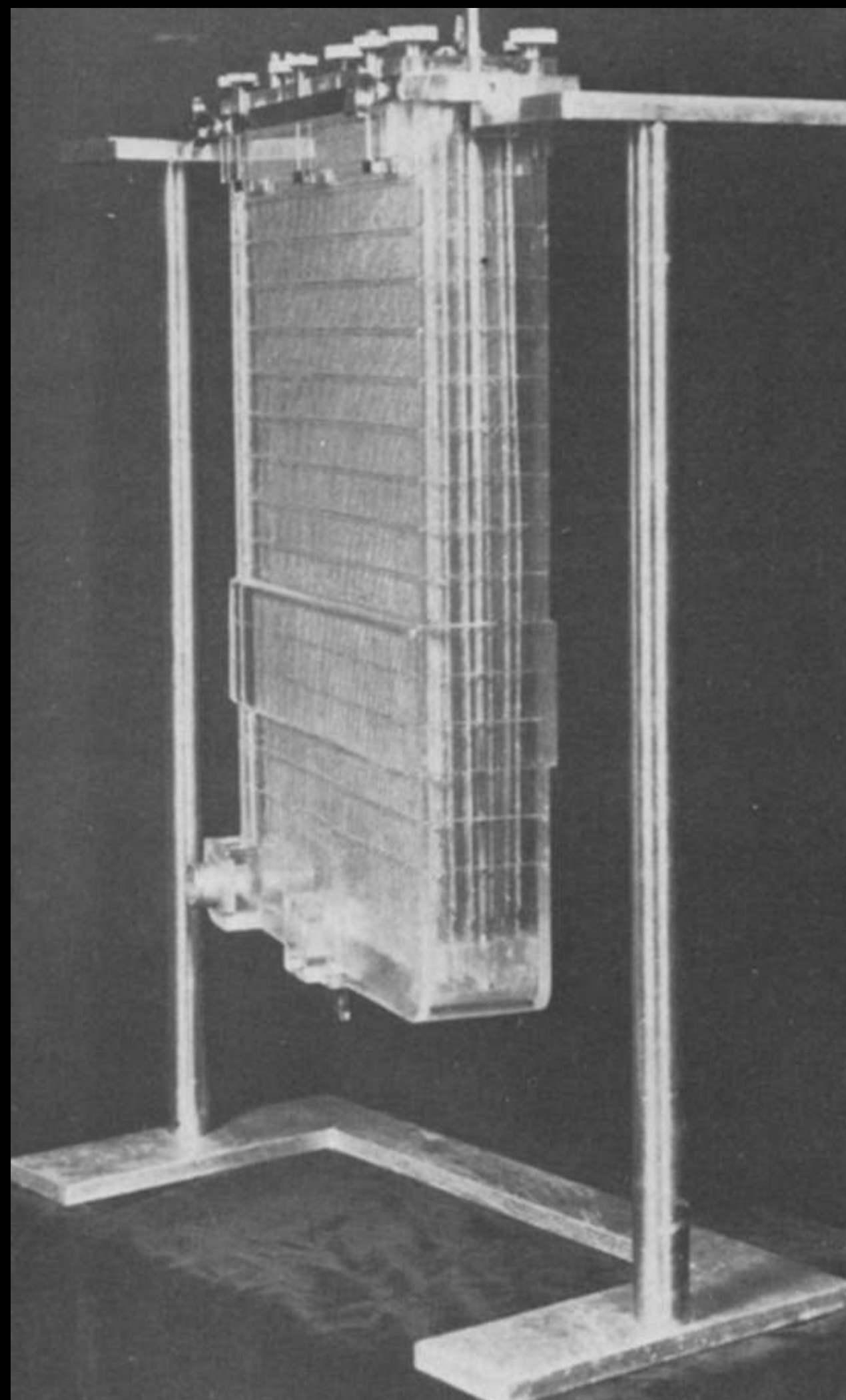
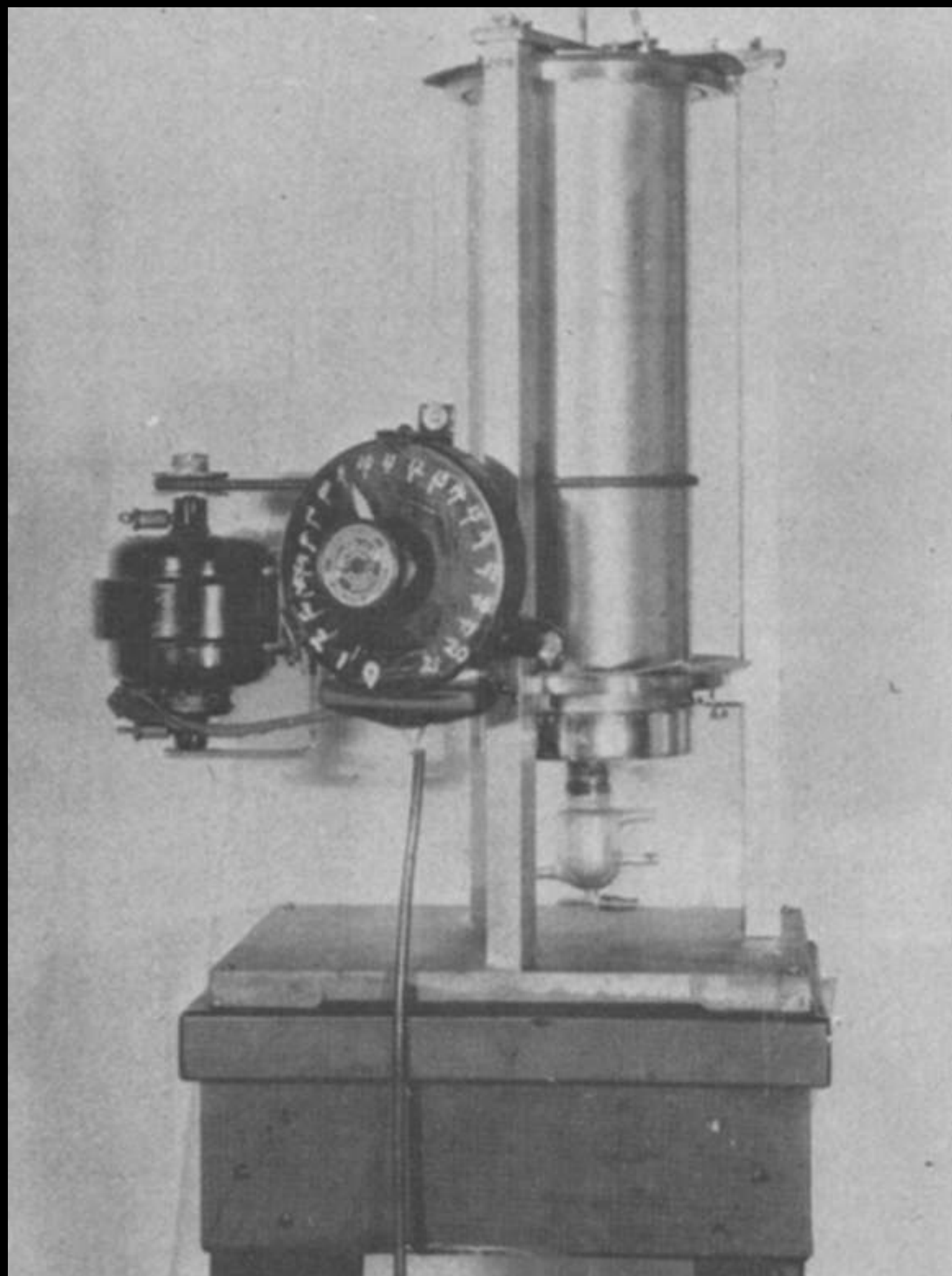
Sir George
Newman

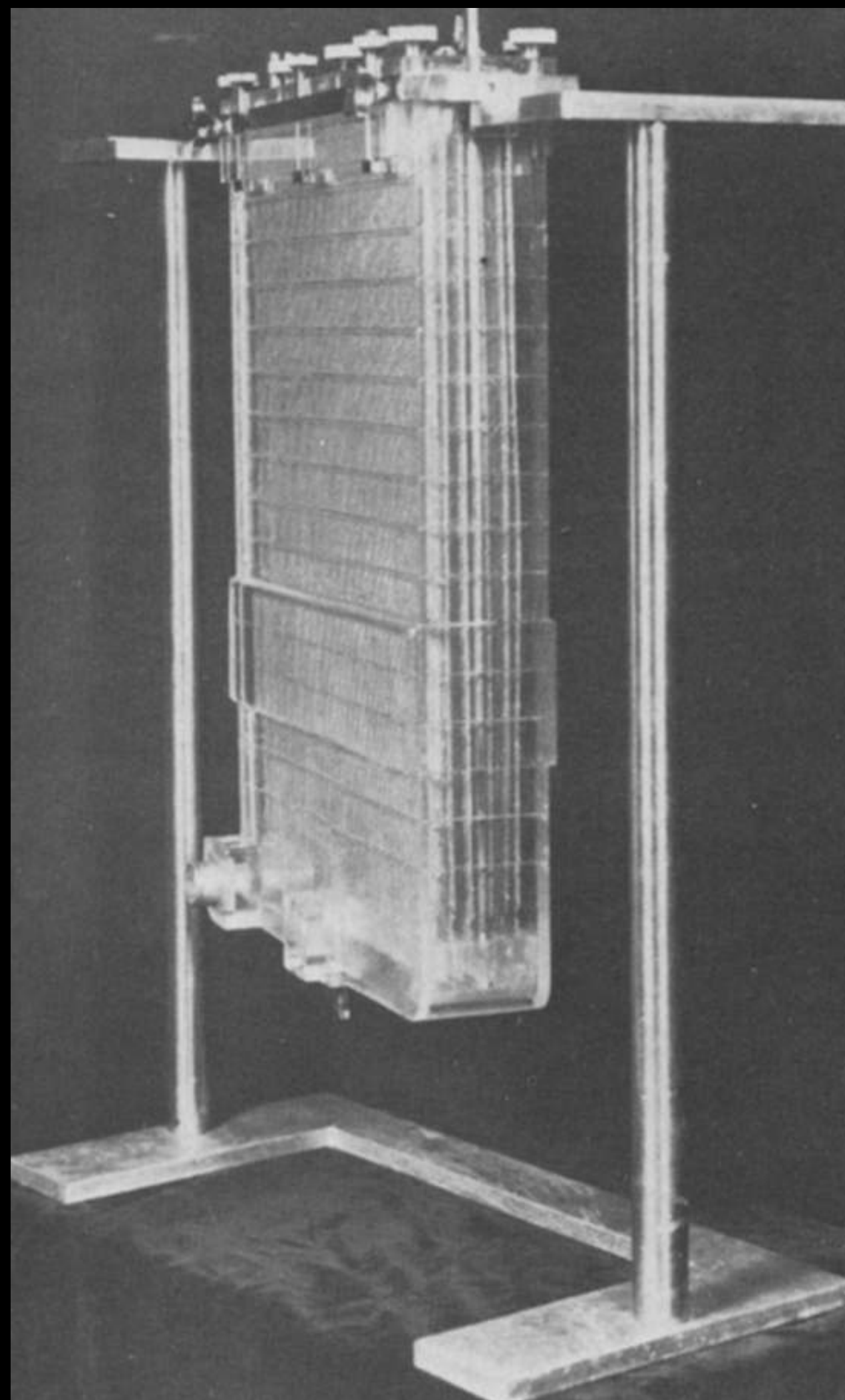
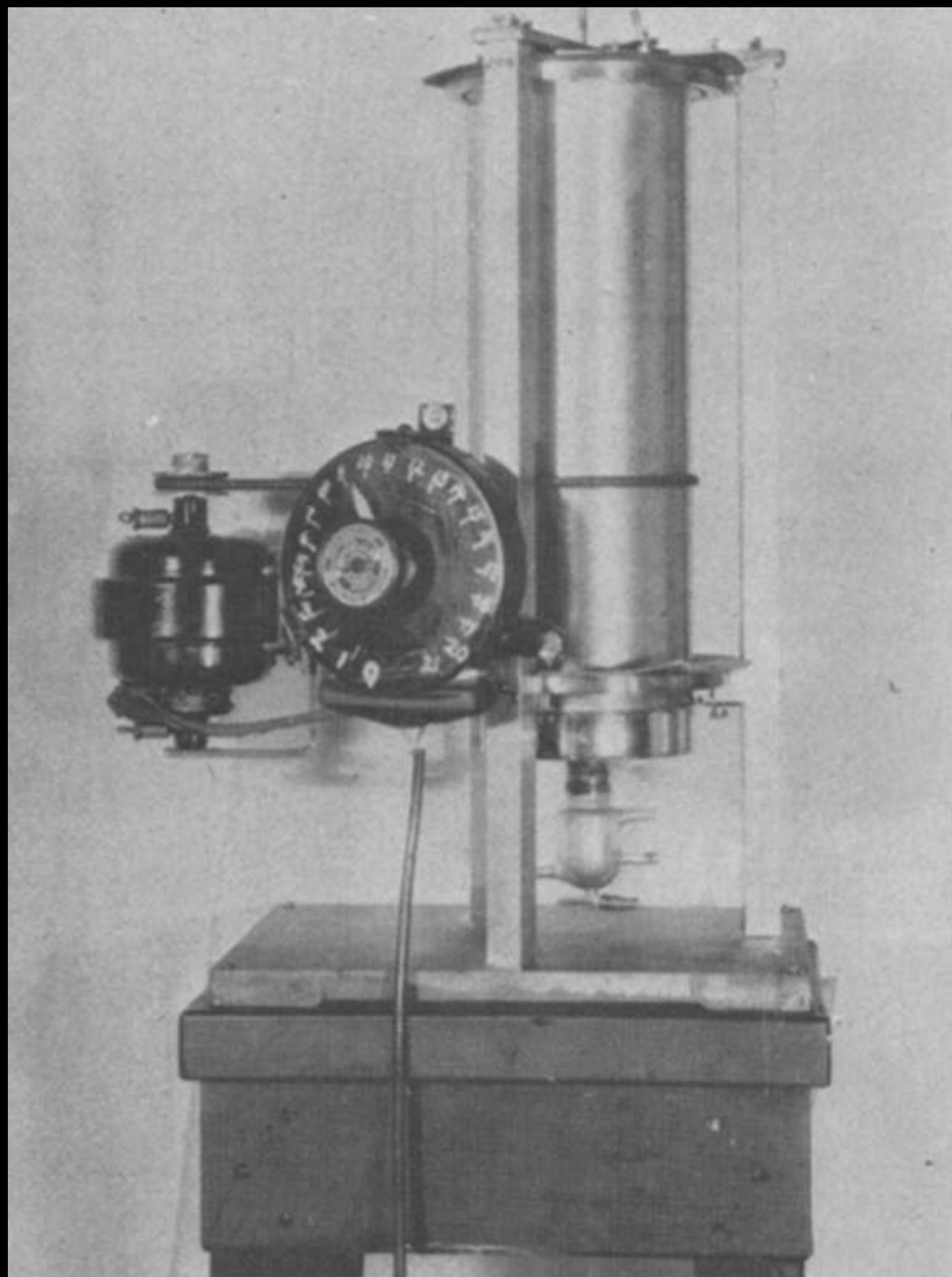


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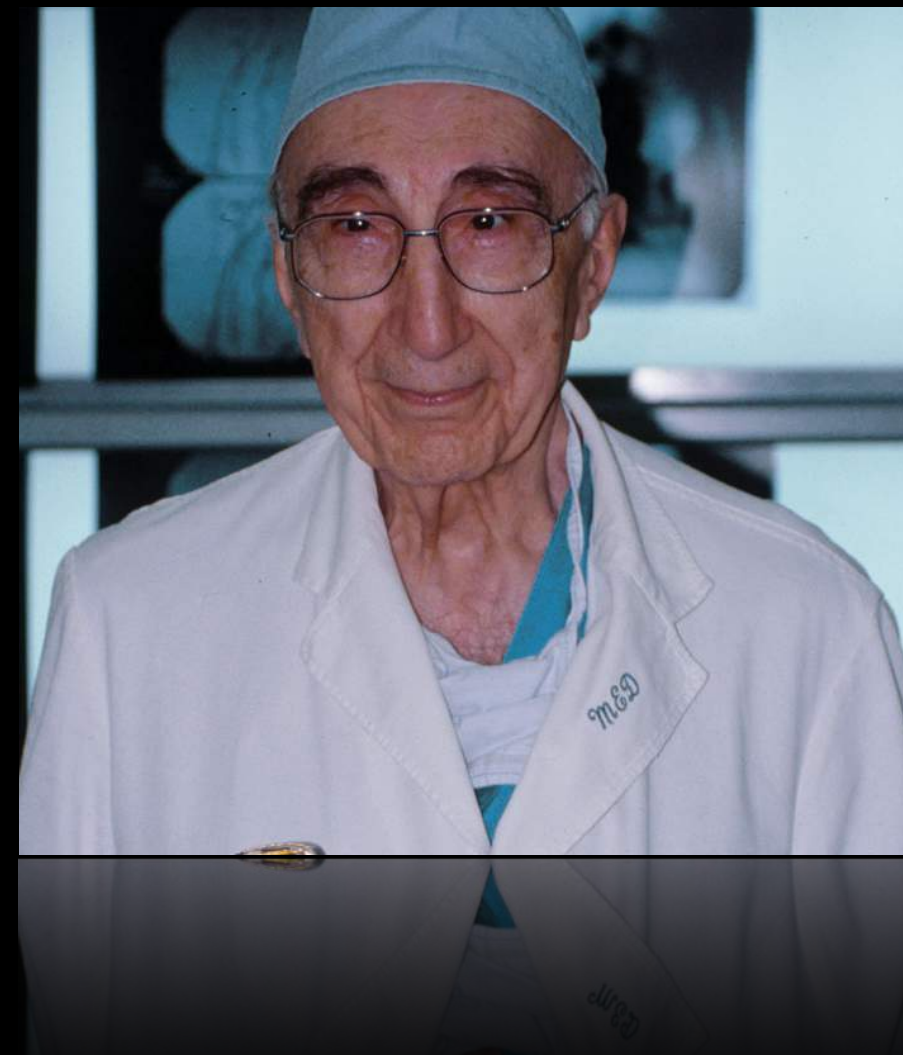
1952





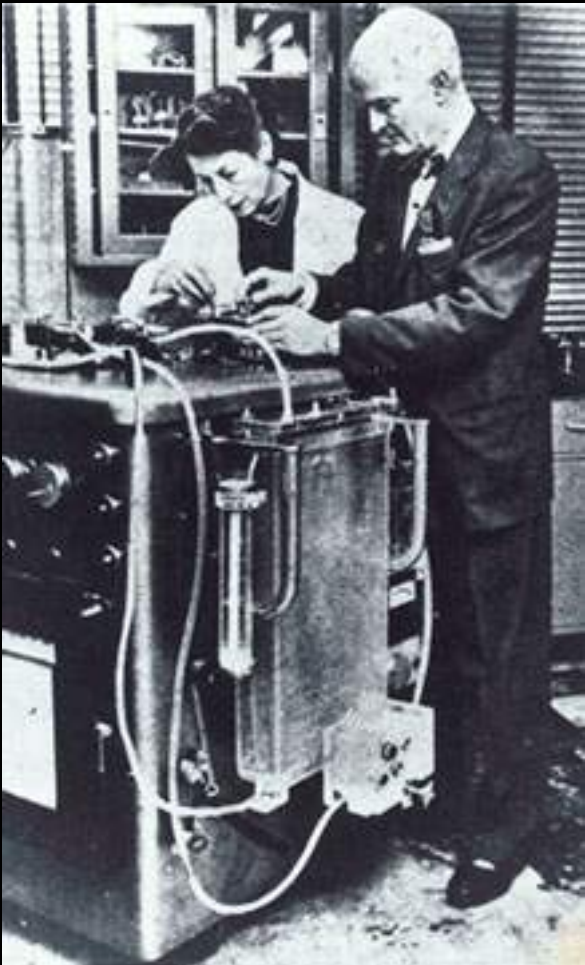


“He (Gibbon) blasted open the door that had been locked for centuries against any medical therapeutic intrusion in to the cardiovascular field”.



Michael DeBakey

John & Mary
Gibbon
(Boston)



1931

Sir George
Newman



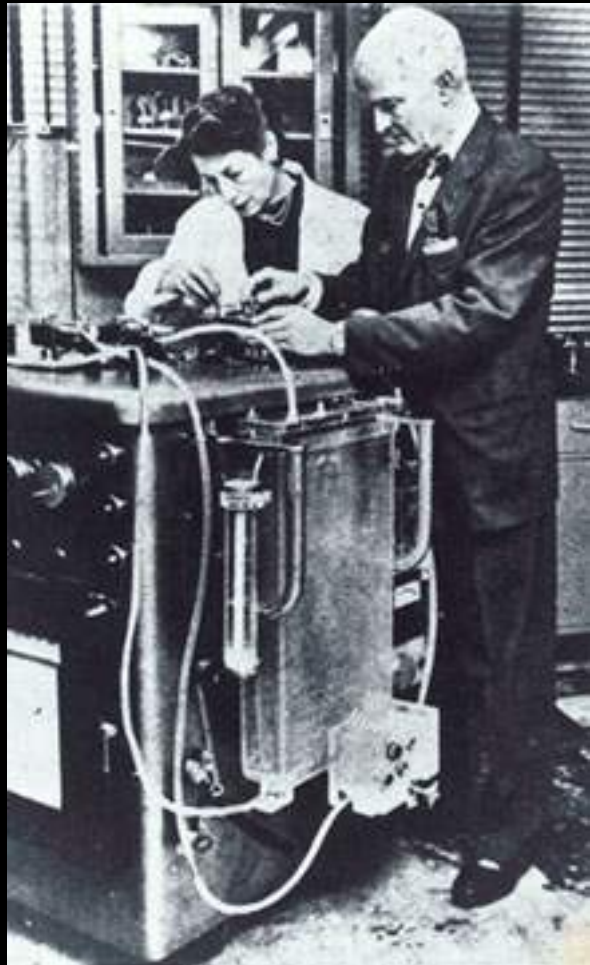
1947

Hamilton
Hartridge

1955

John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



Wilfred Bigelow
(Toronto)



1931

1945

1947

1955

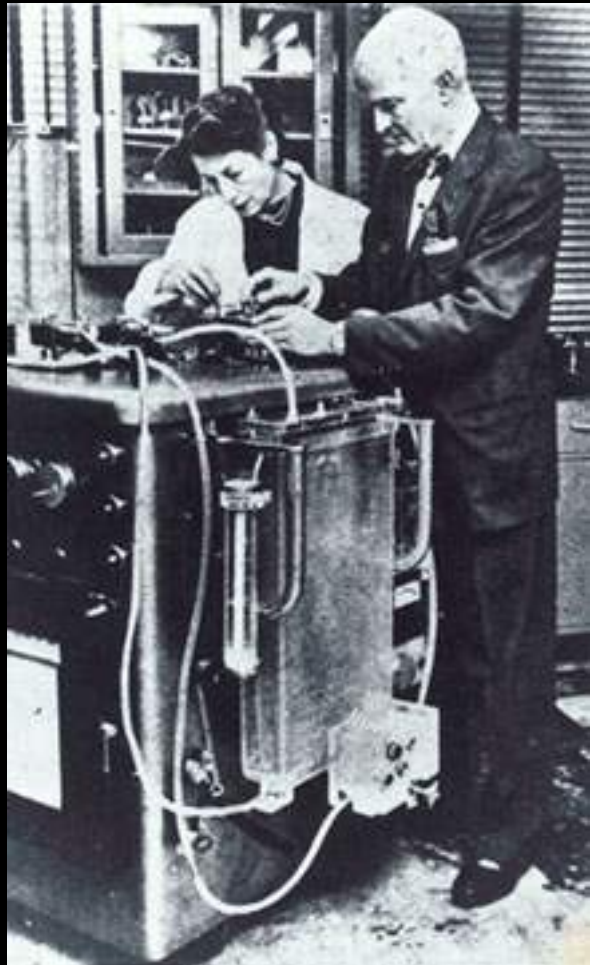
Sir George
Newman



Hamilton
Hartridge

John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



Wilfred Bigelow
(Toronto)



"One night I awoke with a simple solution to the problem, and one that did not require pumps and tubes -- cool the whole body, reduce the oxygen requirements, interrupt the circulation, and open the heart."

1931

Sir George
Newman



1945

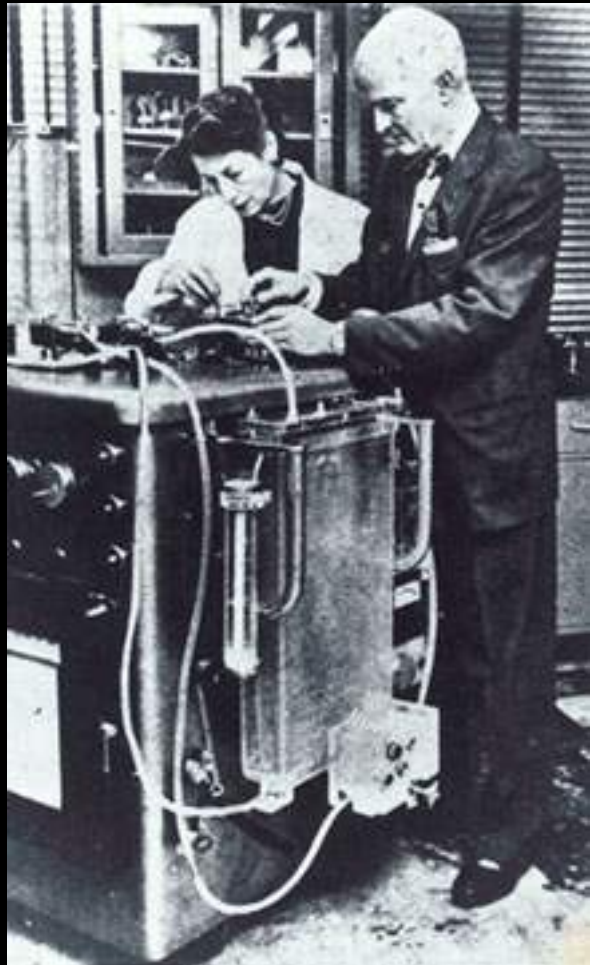
1947

Hamilton
Hartridge

1955

John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



Wilfred Bigelow
(Toronto)



1931

1945

1947

1950

1955

Sir George
Newman

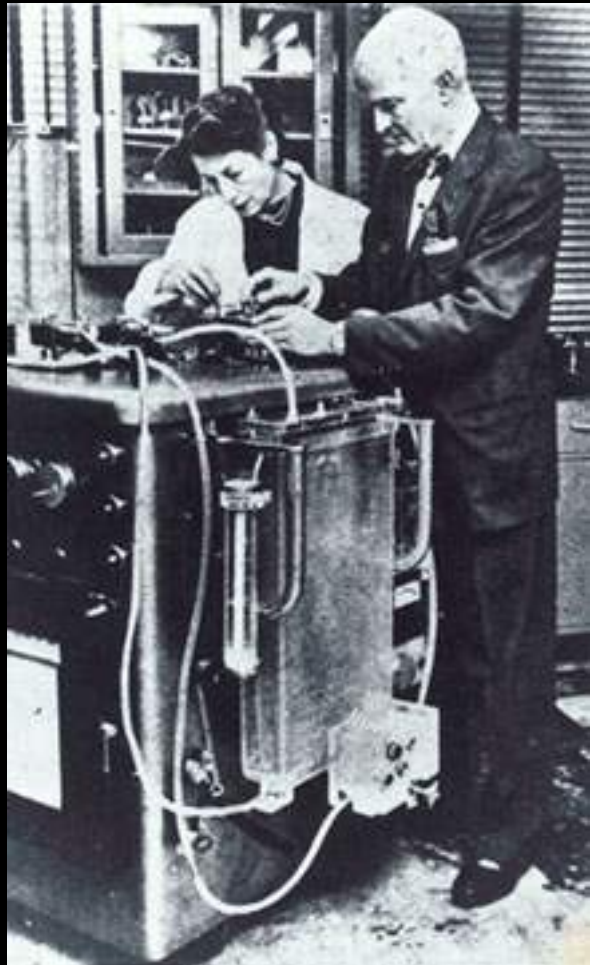


Groundhog Days



John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



Wilfred Bigelow
(Toronto)



John Lewis and Richard Varco
(Minnesota)



1931

1945

1947

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Sir George
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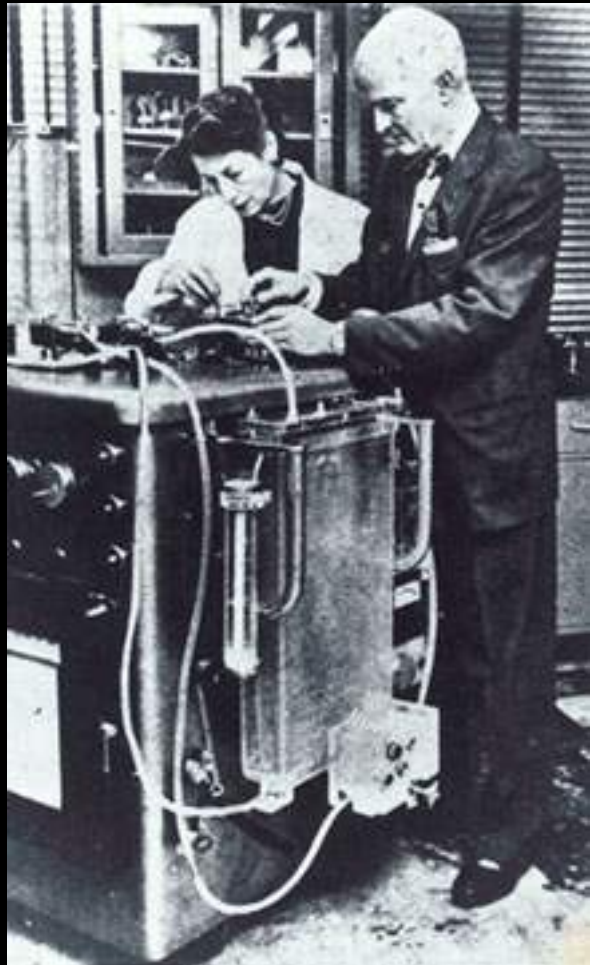


Groundhog Days



John Leonard
d'Silva

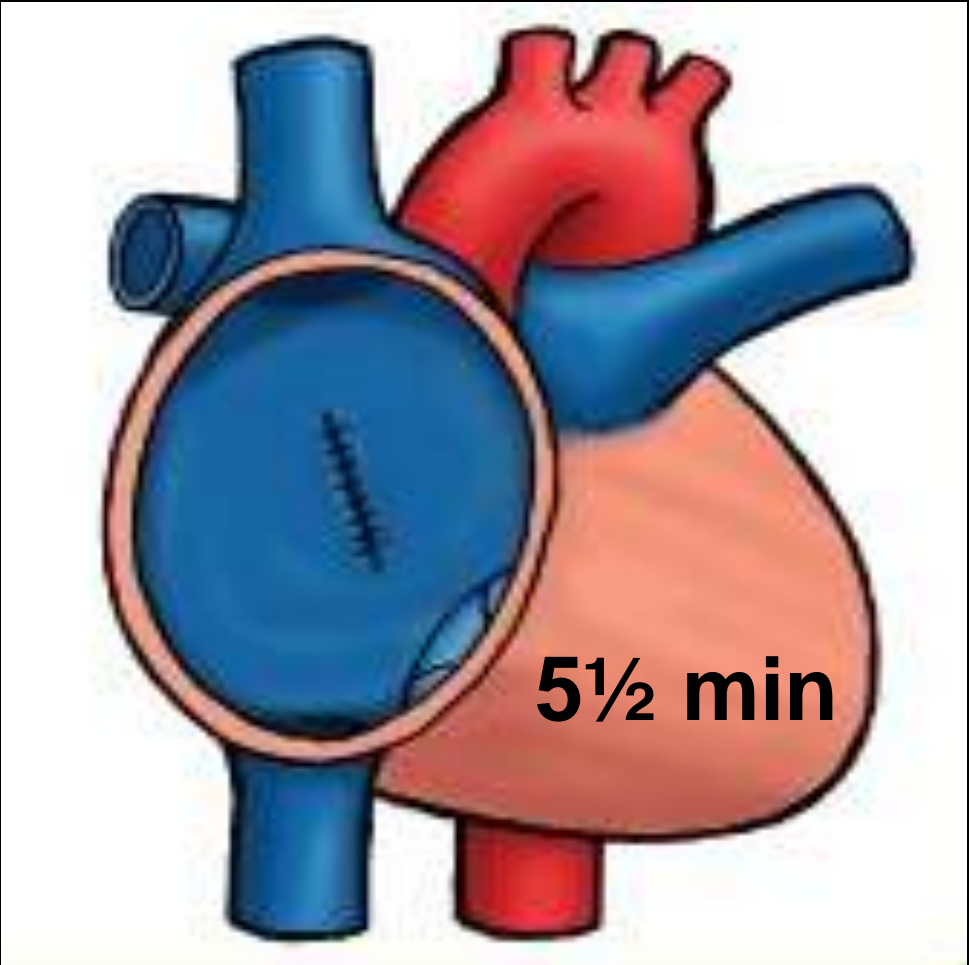
John & Mary
Gibbon
(Boston)



Wilfred Bigelow
(Toronto)



John Lewis and Richard Varco
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1931

1945

1947

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1955

Sir George
Newman

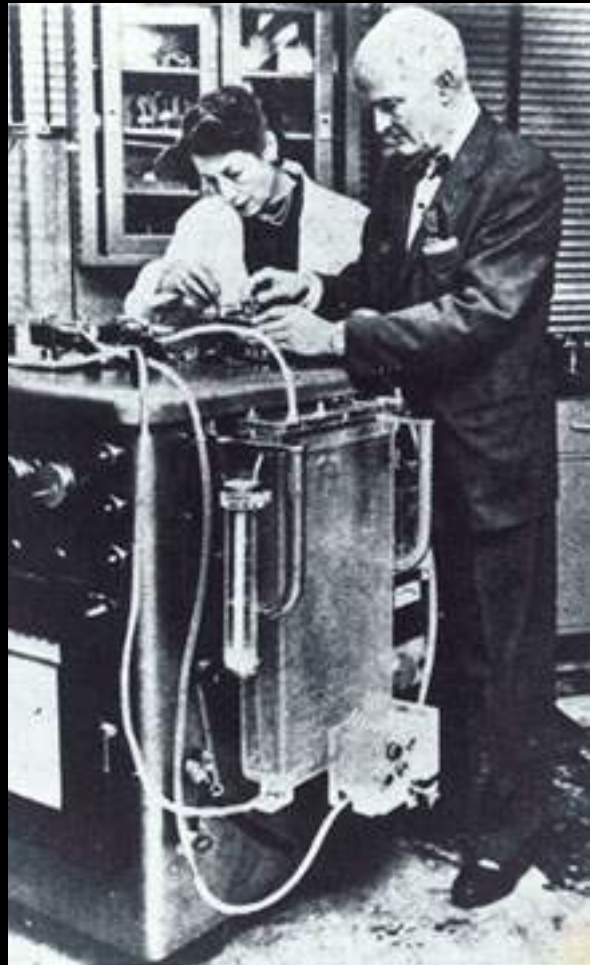


Groundhog Days



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John Lewis and Richard Varco
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1931

1945

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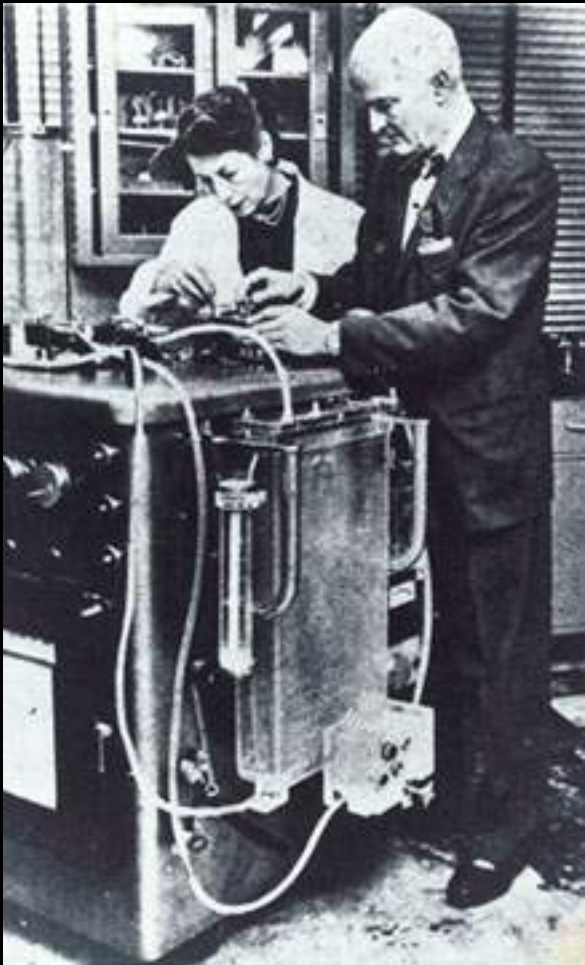
Sir George
Newman



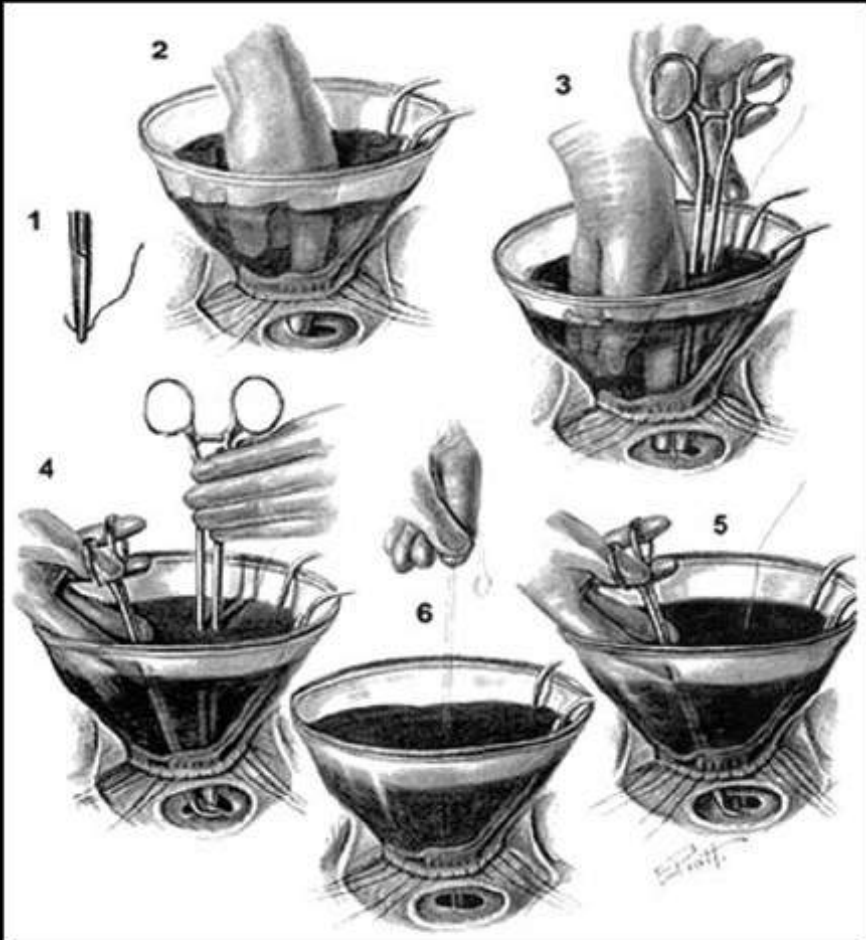
Hamilton
Hartridge

John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



Robert Gross
(Boston)



Illustratiuon of the atrial well methode to close ASD as
described by Robert Gross in 1952.

1931

Sir George
Newman



1947

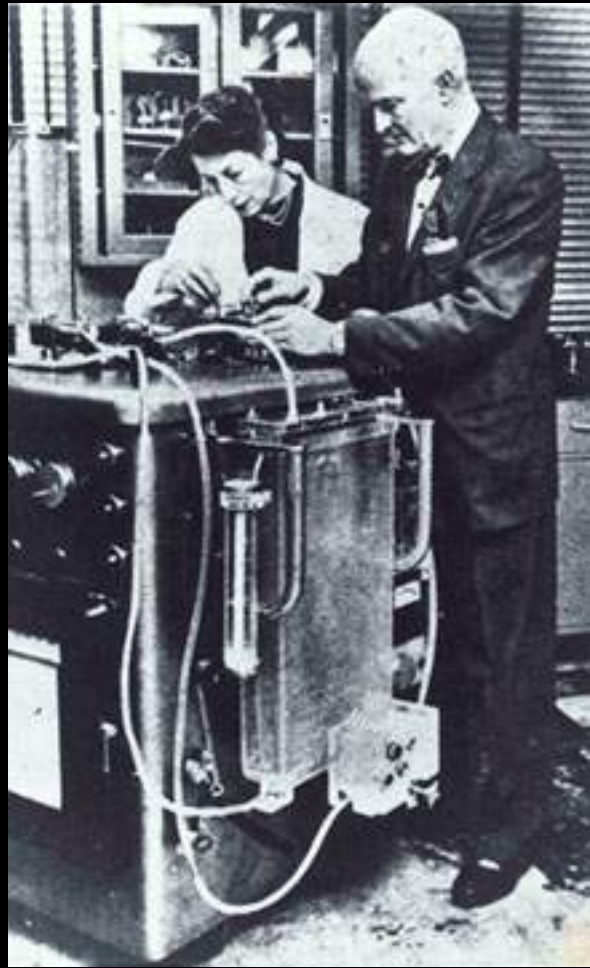
Hamilton
Hartridge

1952

1955

John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



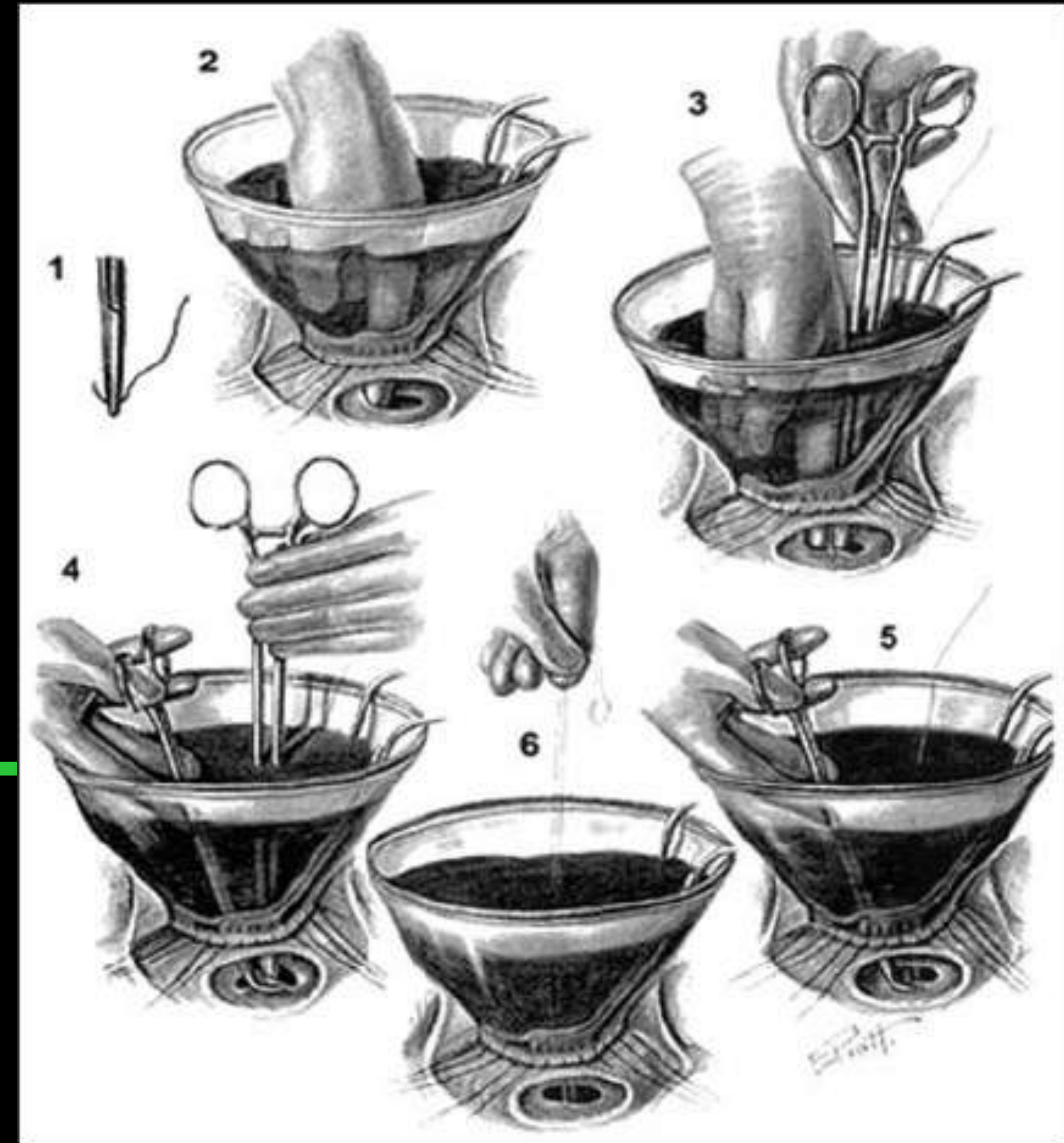
1931

Sir George
Newman



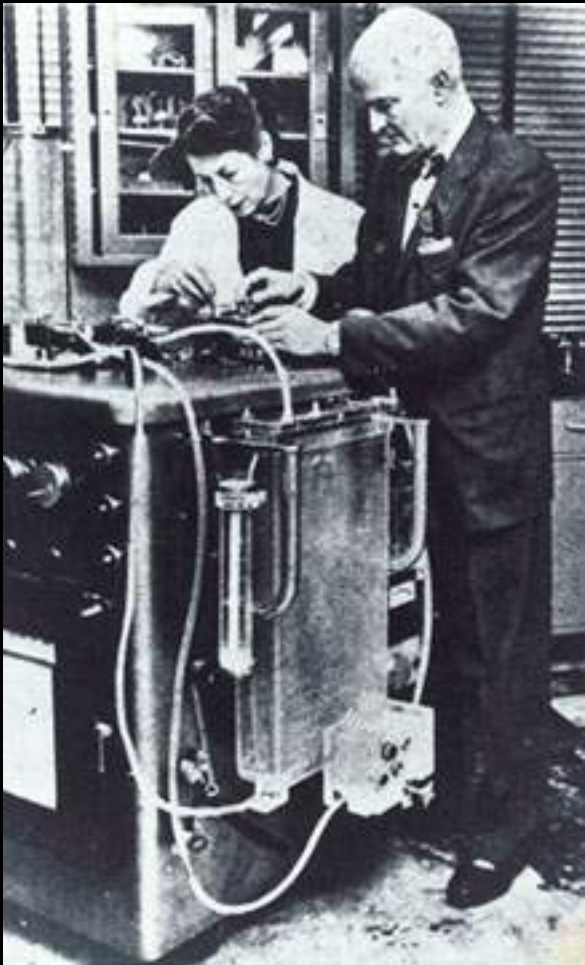
1947

Hamilton
Hartridge



*Illustratiuon of the atrial well methode to close ASD as
described by Robert Gross in 1952.*

John & Mary
Gibbon
(Boston)



1931

Sir George
Newman



1947

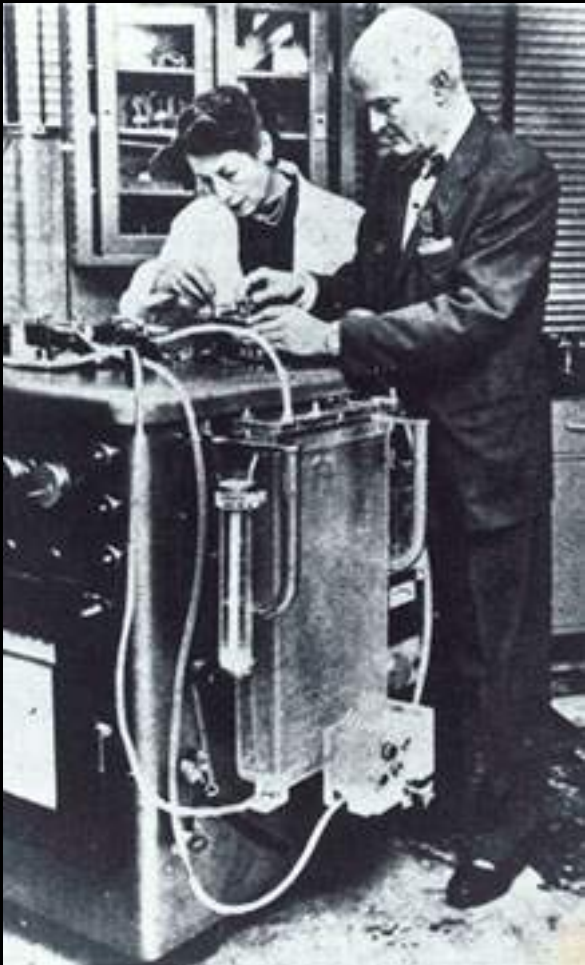
Hamilton
Hartridge

1952

1955

John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



Henry Swan
(Colorado)



1931

Sir George
Newman



1947

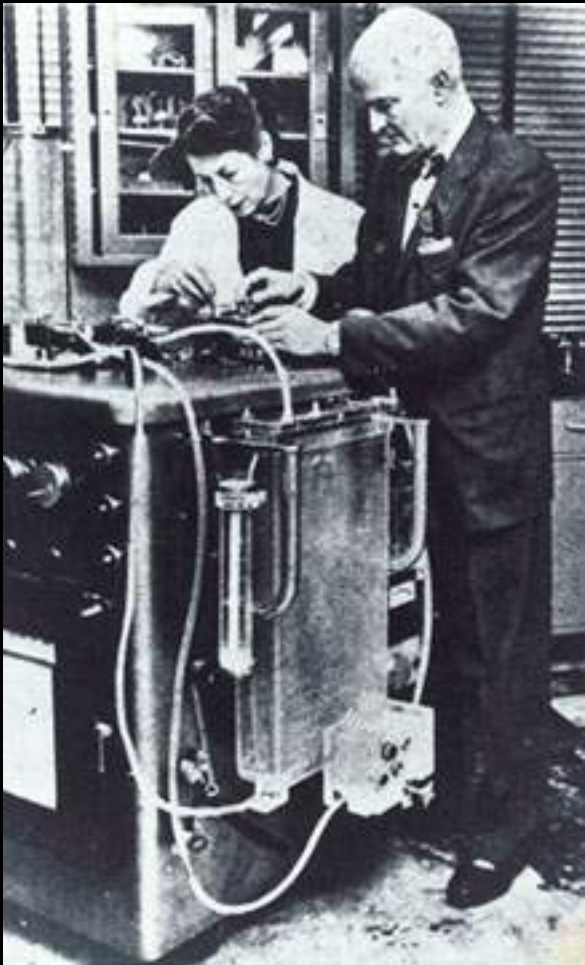
Hamilton
Hartridge

1952 1953

1955

John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



1931

Sir George
Newman



1947

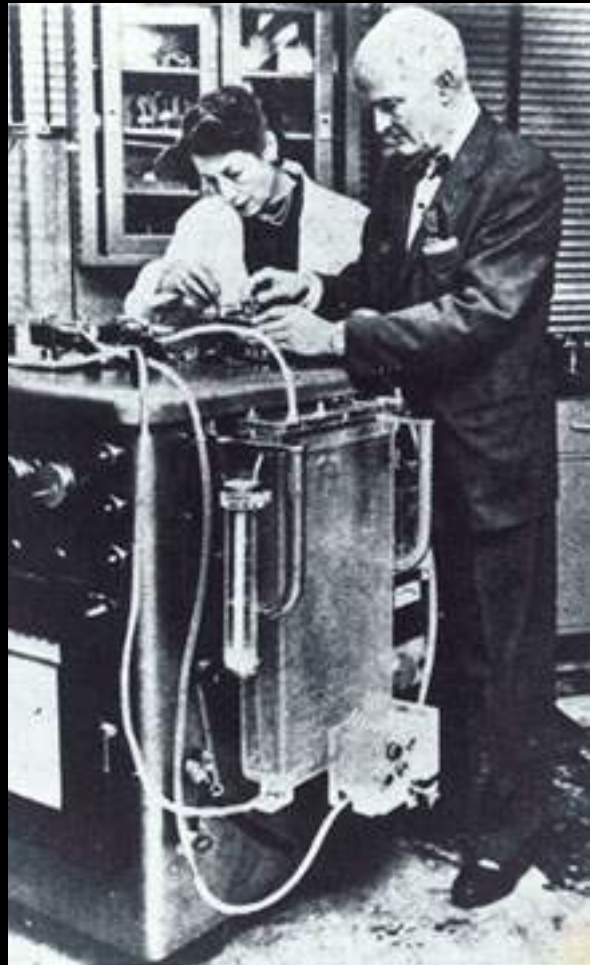
Hamilton
Hartridge

1952

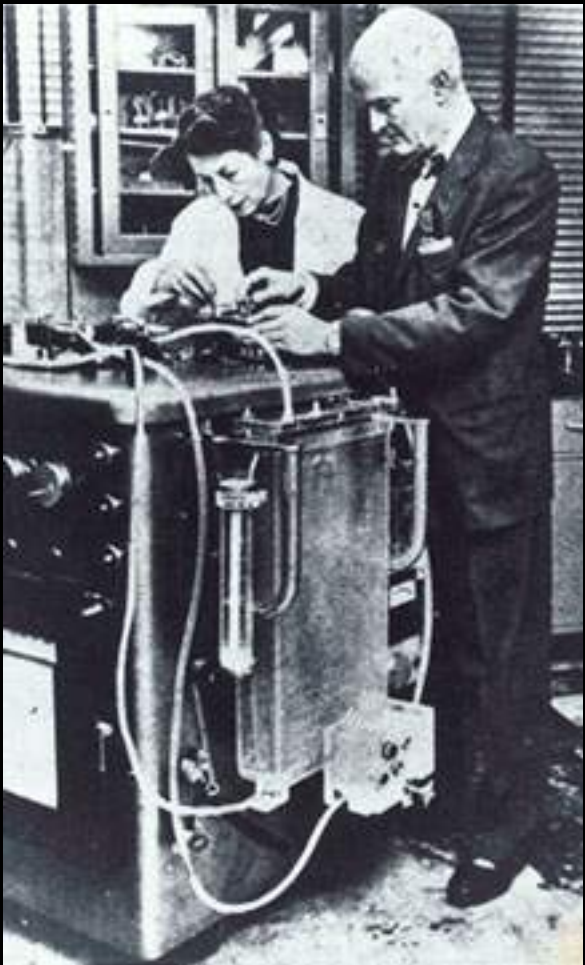
1955

John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



John & Mary
Gibbon
(Boston)



1931

Sir George
Newman



1947

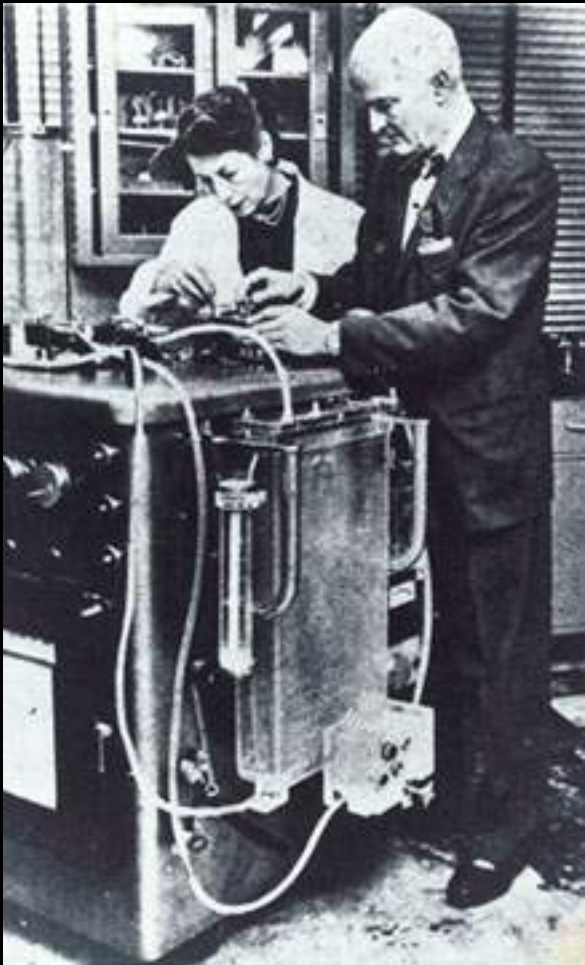
Hamilton
Hartridge

1952

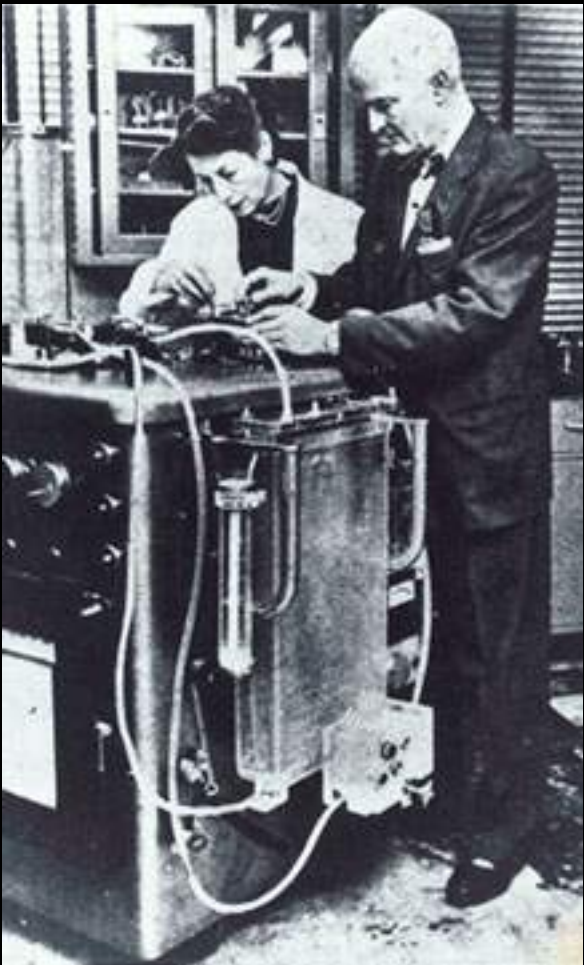
1955

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d'Silva

John & Mary
Gibbon
(Boston)



John & Mary
Gibbon
(Boston)



1931

Sir George
Newman



1947

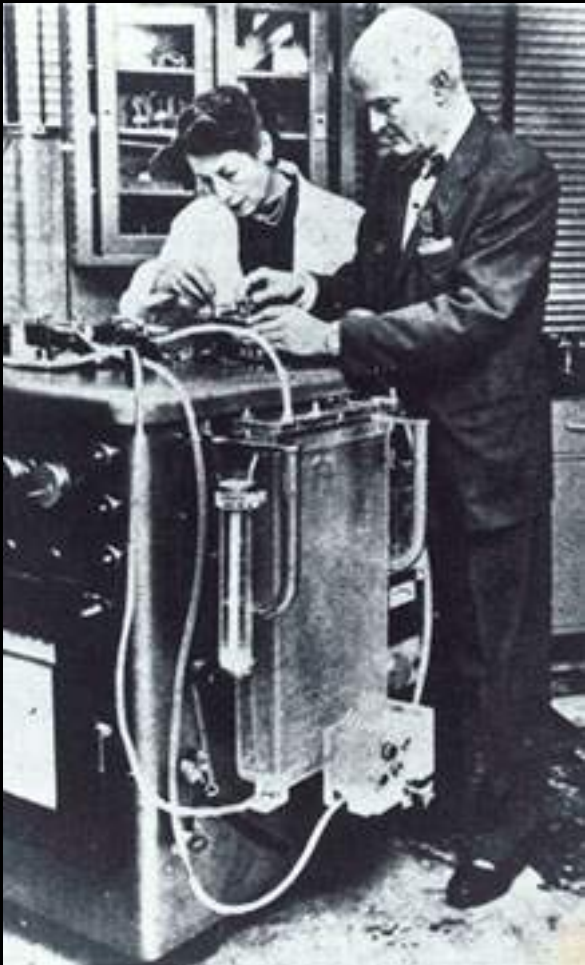
Hamilton
Hartridge

1952 1953

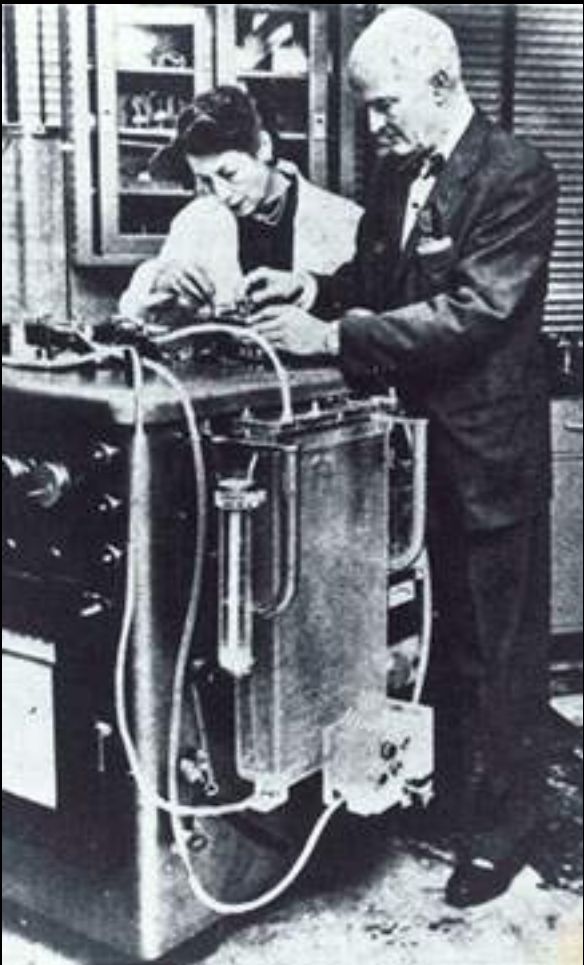
1955

John Leonard
d'Silva

John & Mary
Gibbon
(Boston)



John & Mary
Gibbon
(Boston)



The next
5 patients died

1931

Sir George
Newman



1947

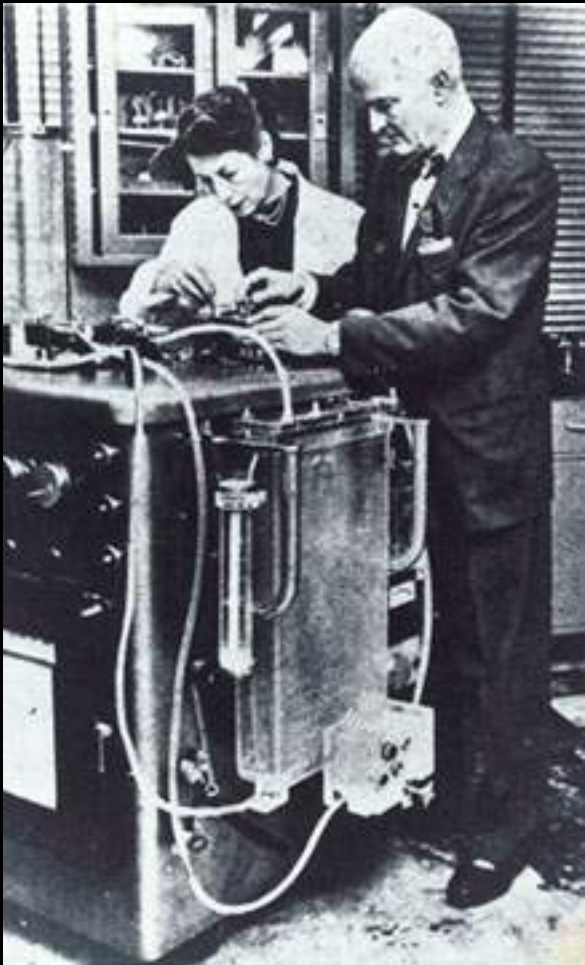
Hamilton
Hartridge

1952 1953

1955

John Leonard
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John & Mary
Gibbon
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1931

Sir George
Newman



1947

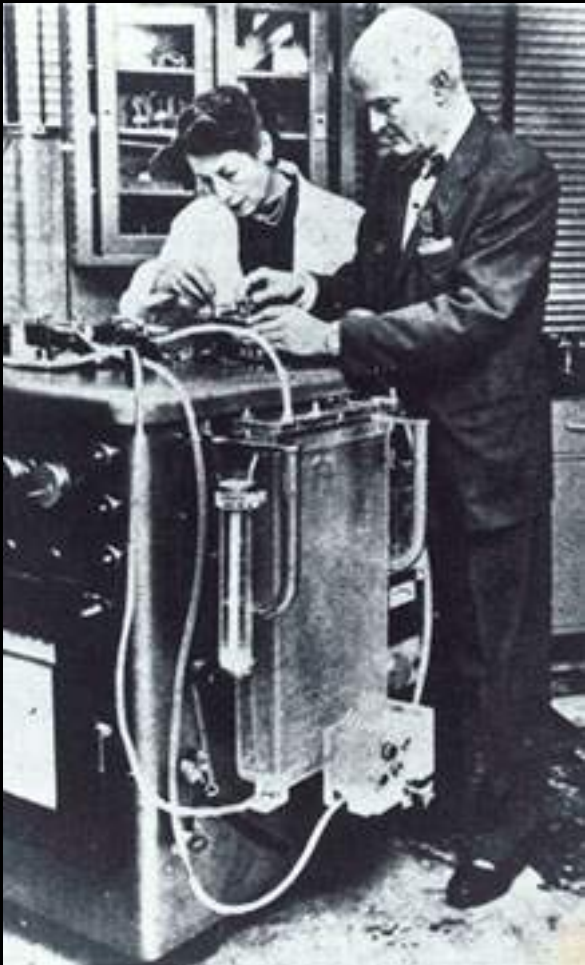
Hamilton
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1952 1953

1955

John Leonard
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C Walt Lillehei
(Minnesota)



1931

Sir George
Newman



1947

Hamilton
Hartridge

1952 1953 1954 1955

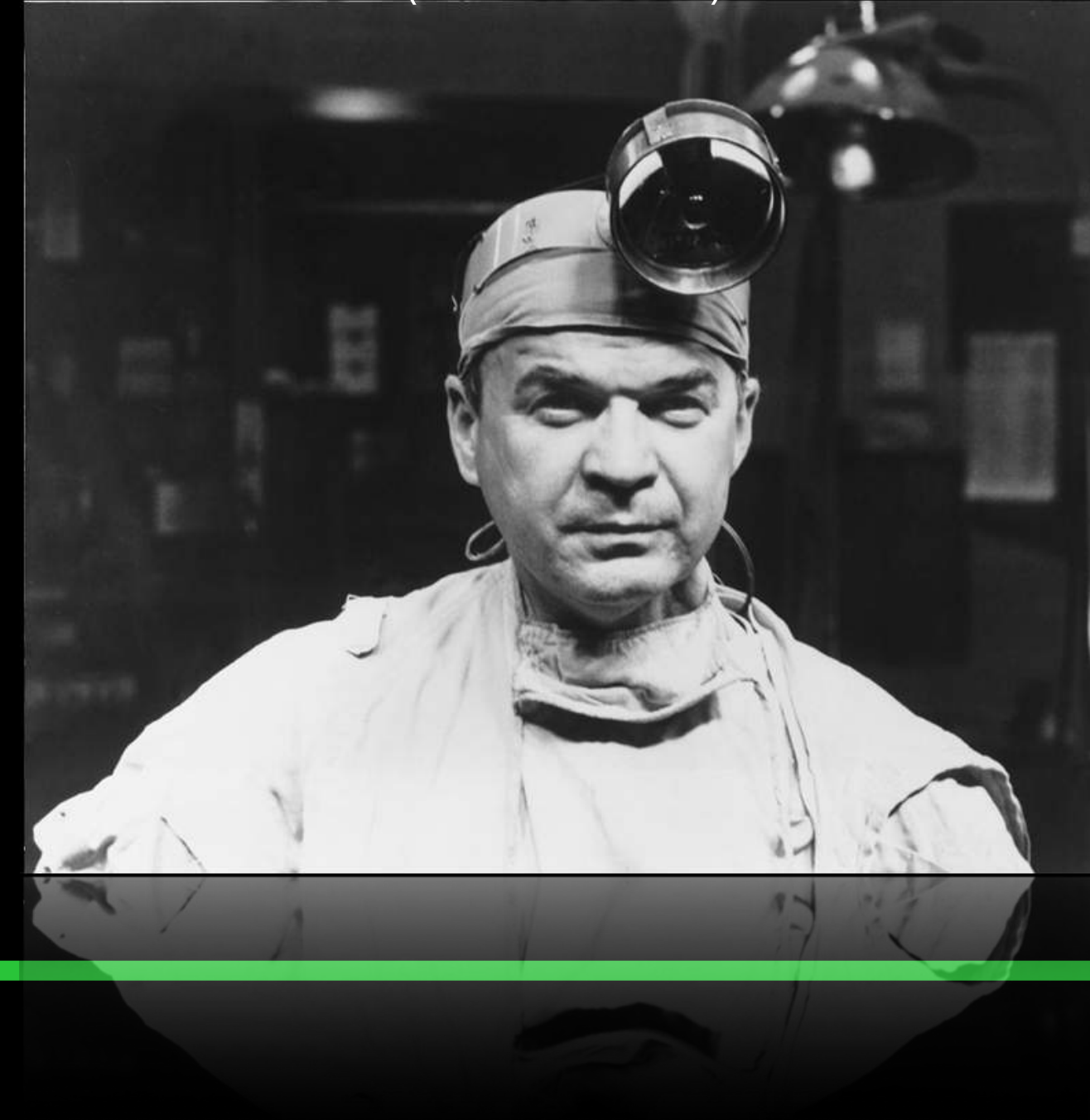
John Leonard
d'Silva

C Walt Lillehei
(Minnesota)

C Walt Lillehei

The Father of Open-Heart Surgery

“The King of Hearts”



1931

Sir George
Newman

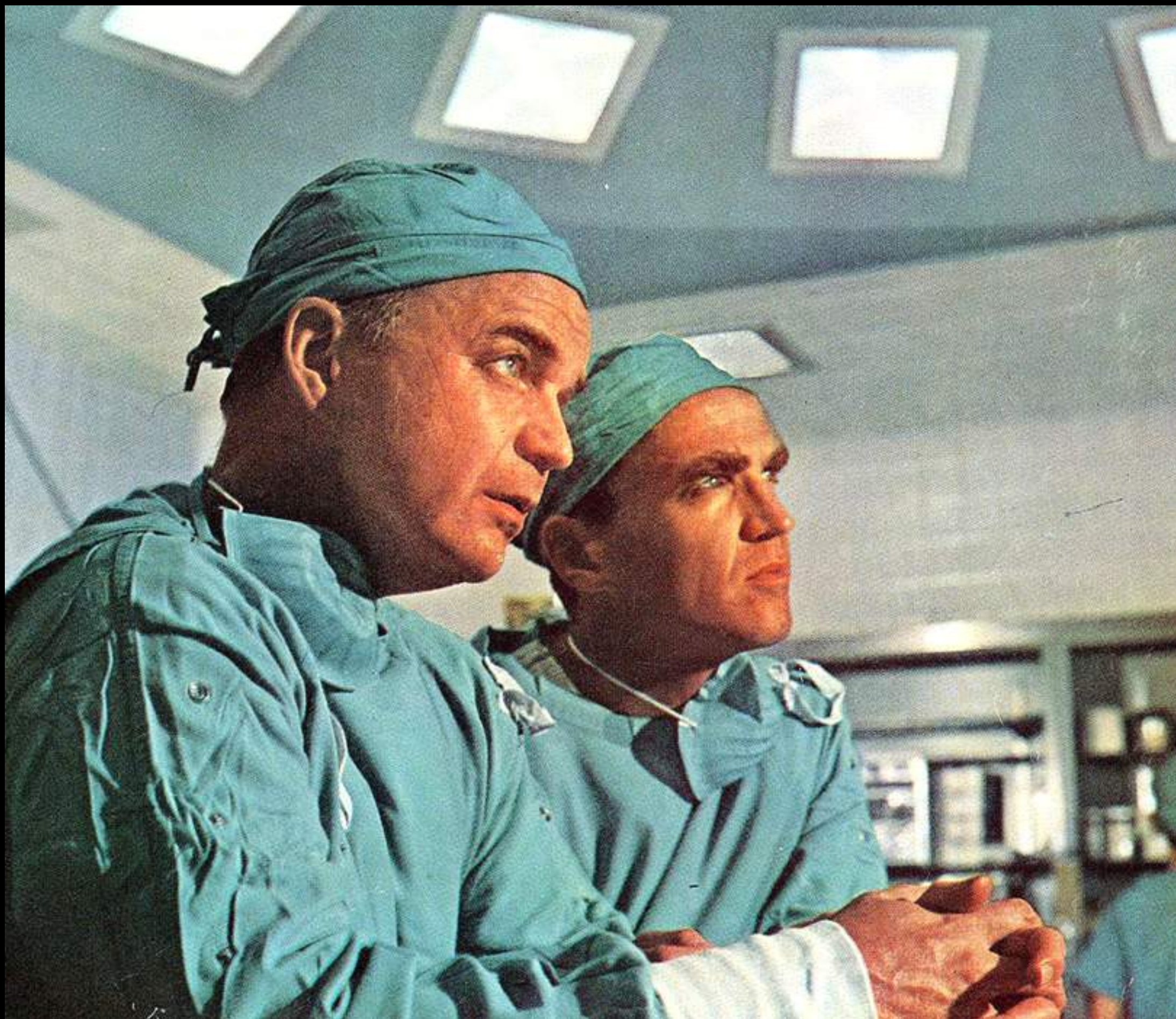
1947

Hamilton
Hartridge

1954

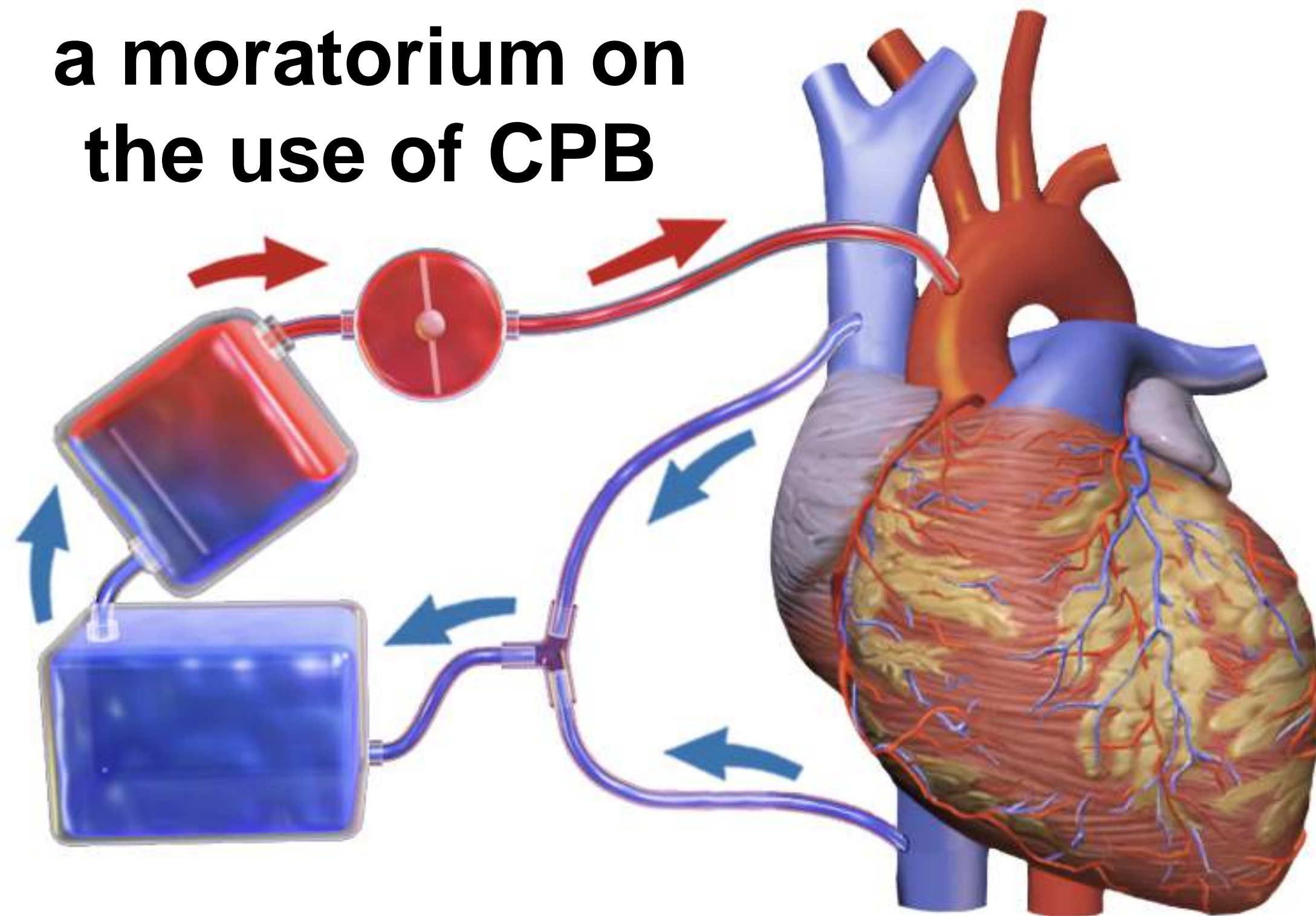
1955

John Leonard
d'Silva



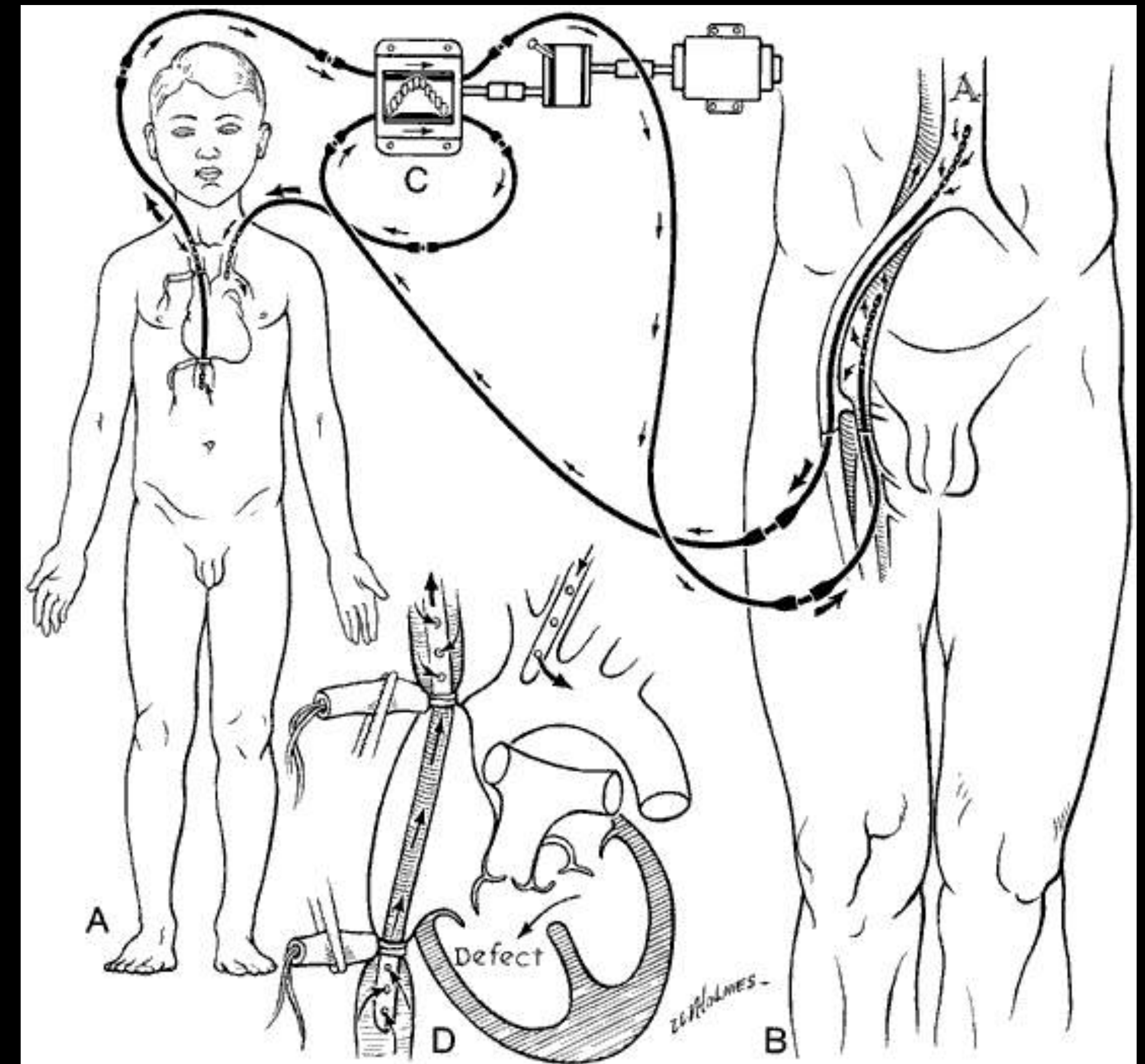
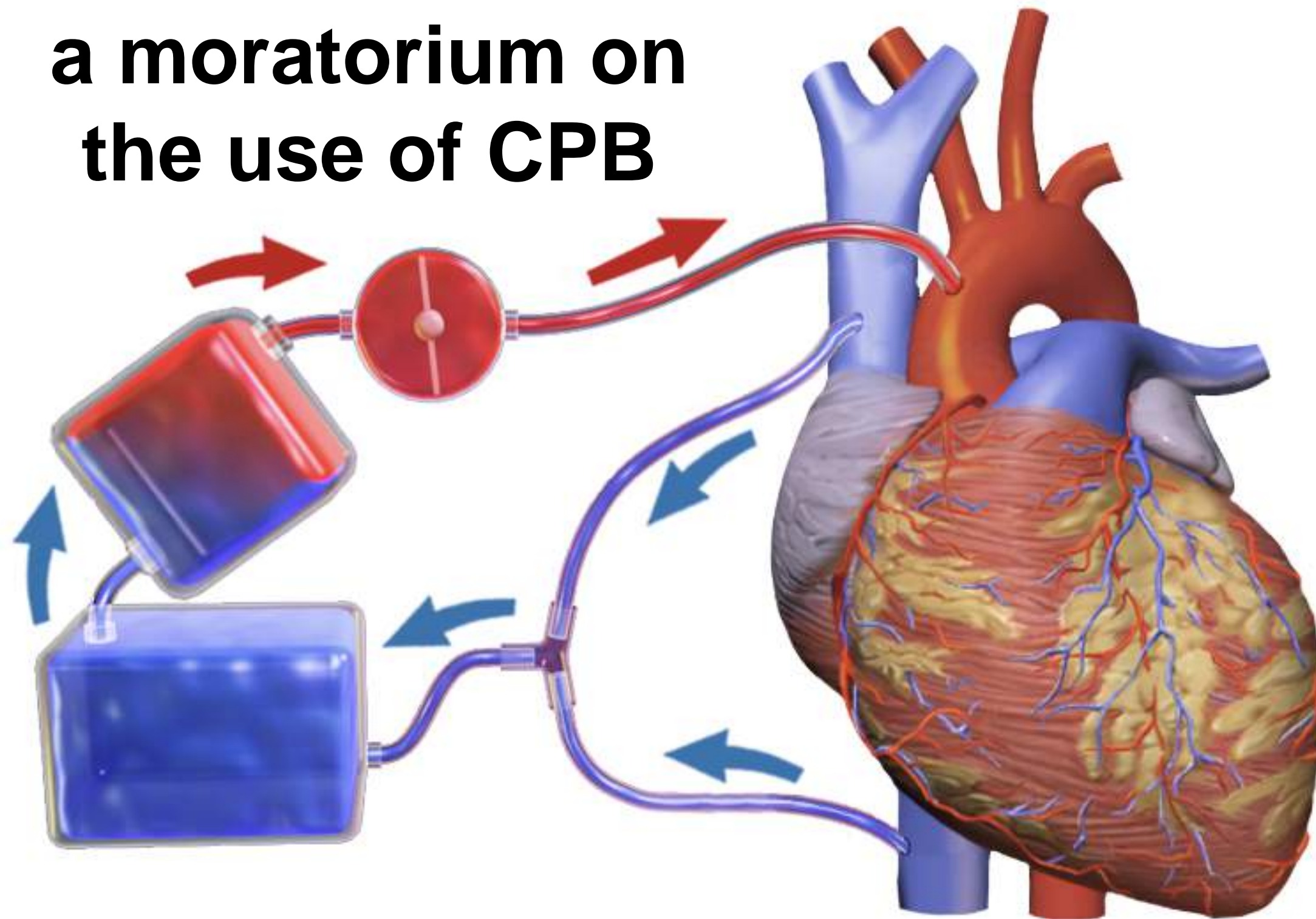
**"When going into the wilderness, do
not expect to find a paved road"
- C. Walt Lillehei**

**a moratorium on
the use of CPB**



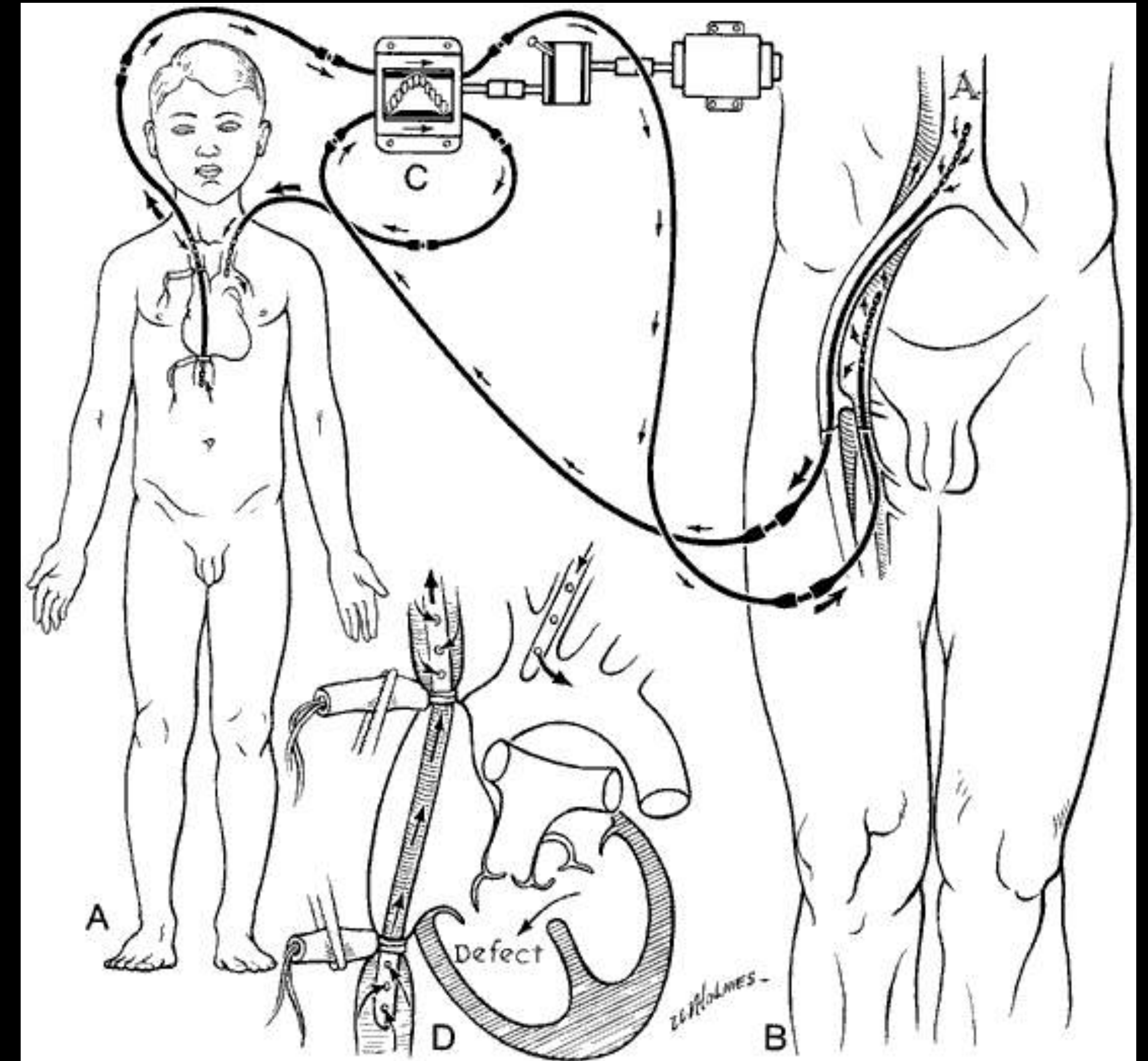
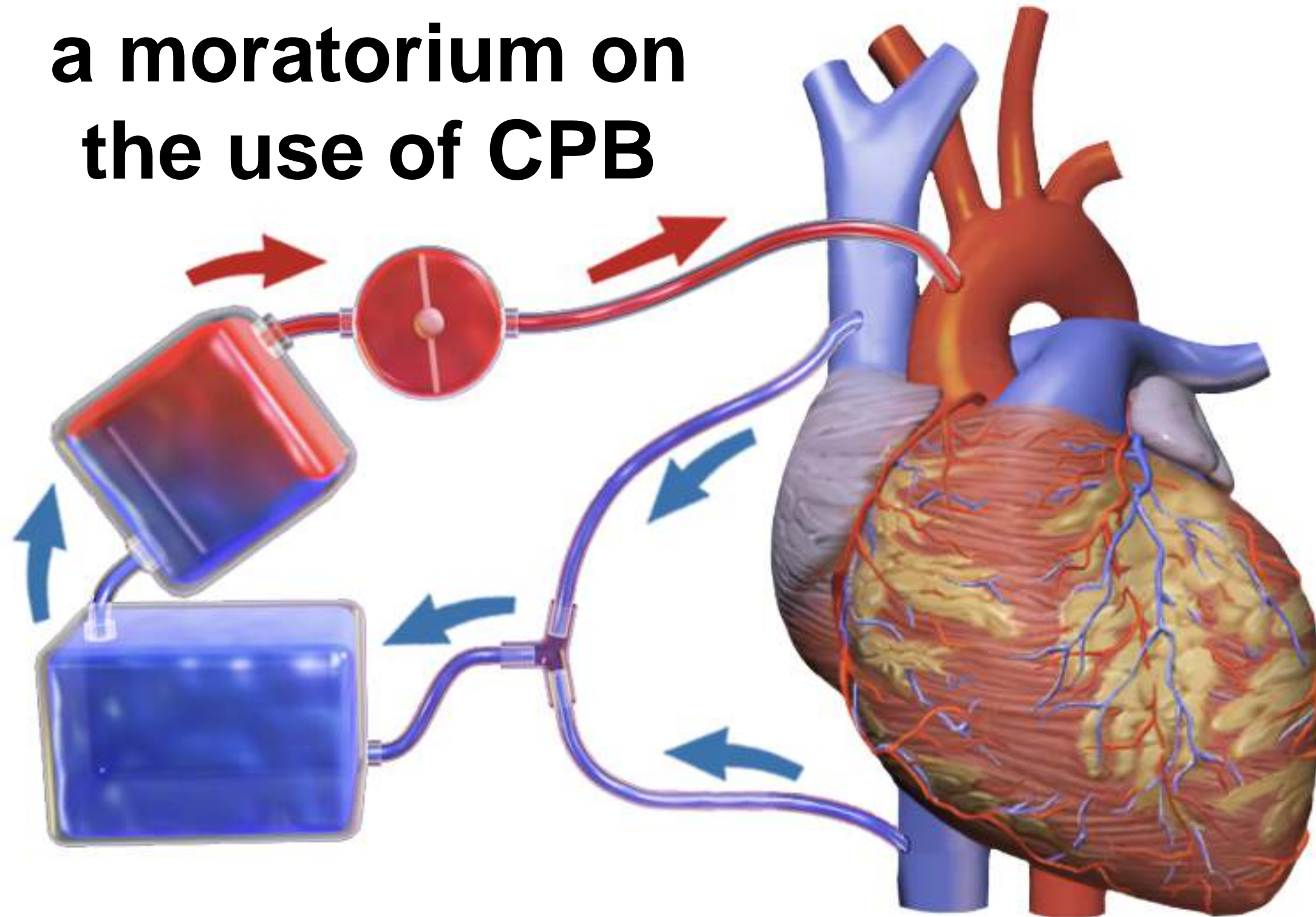
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**a moratorium on
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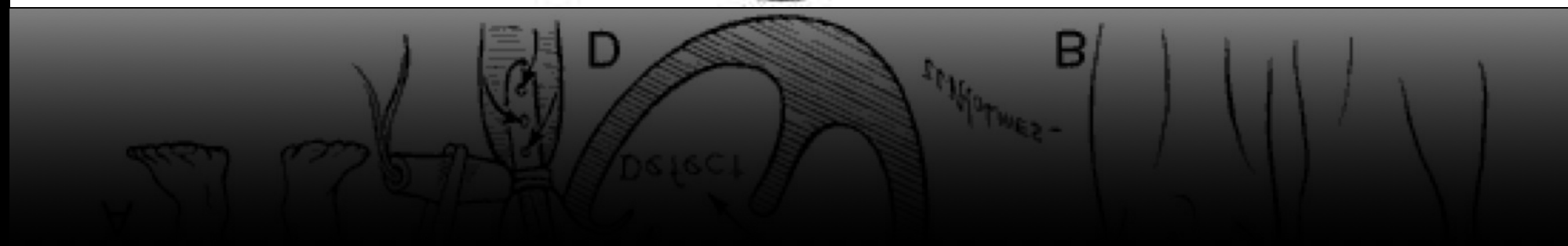
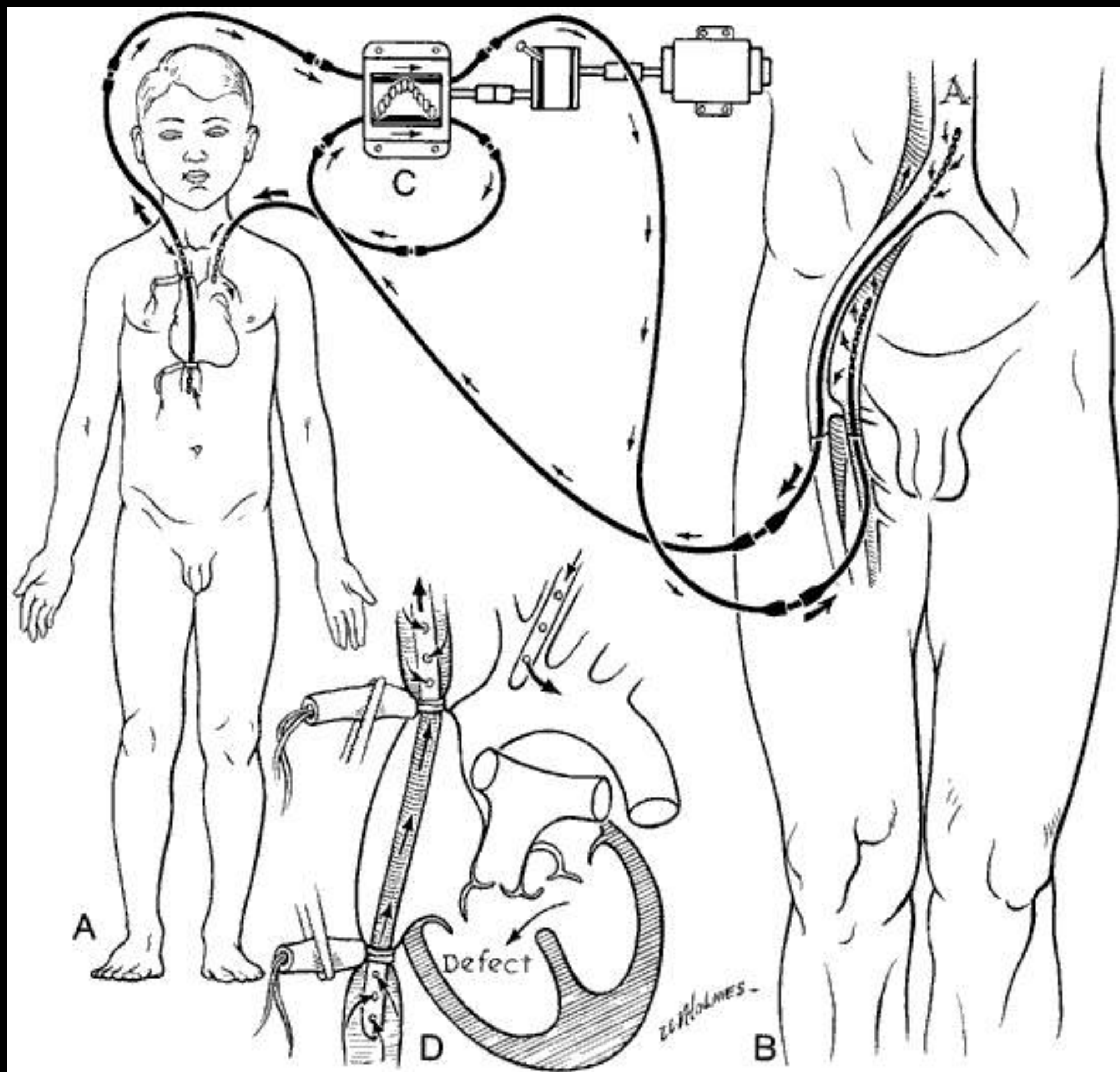
**"When going into the wilderness, do
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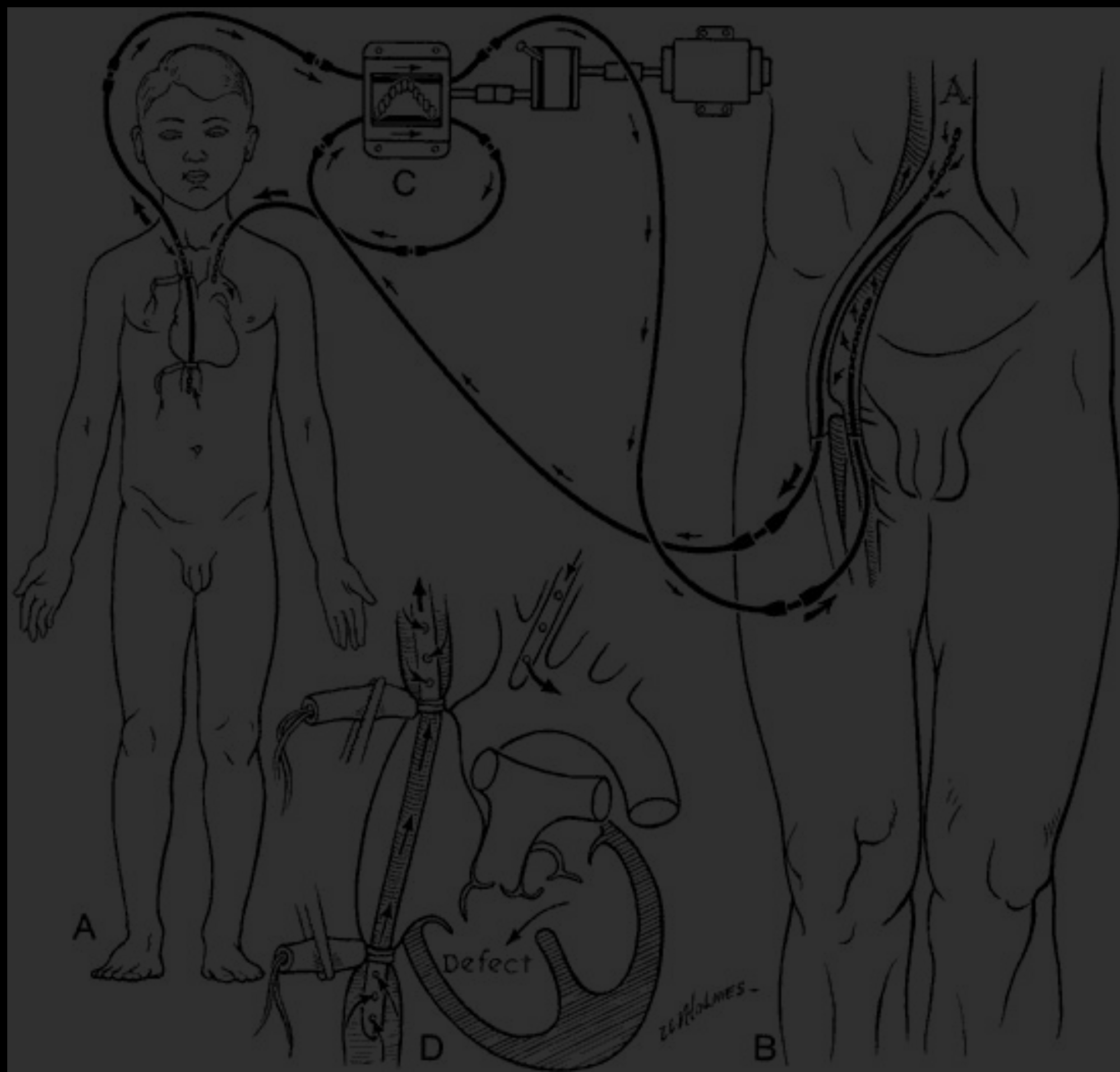
**a moratorium on
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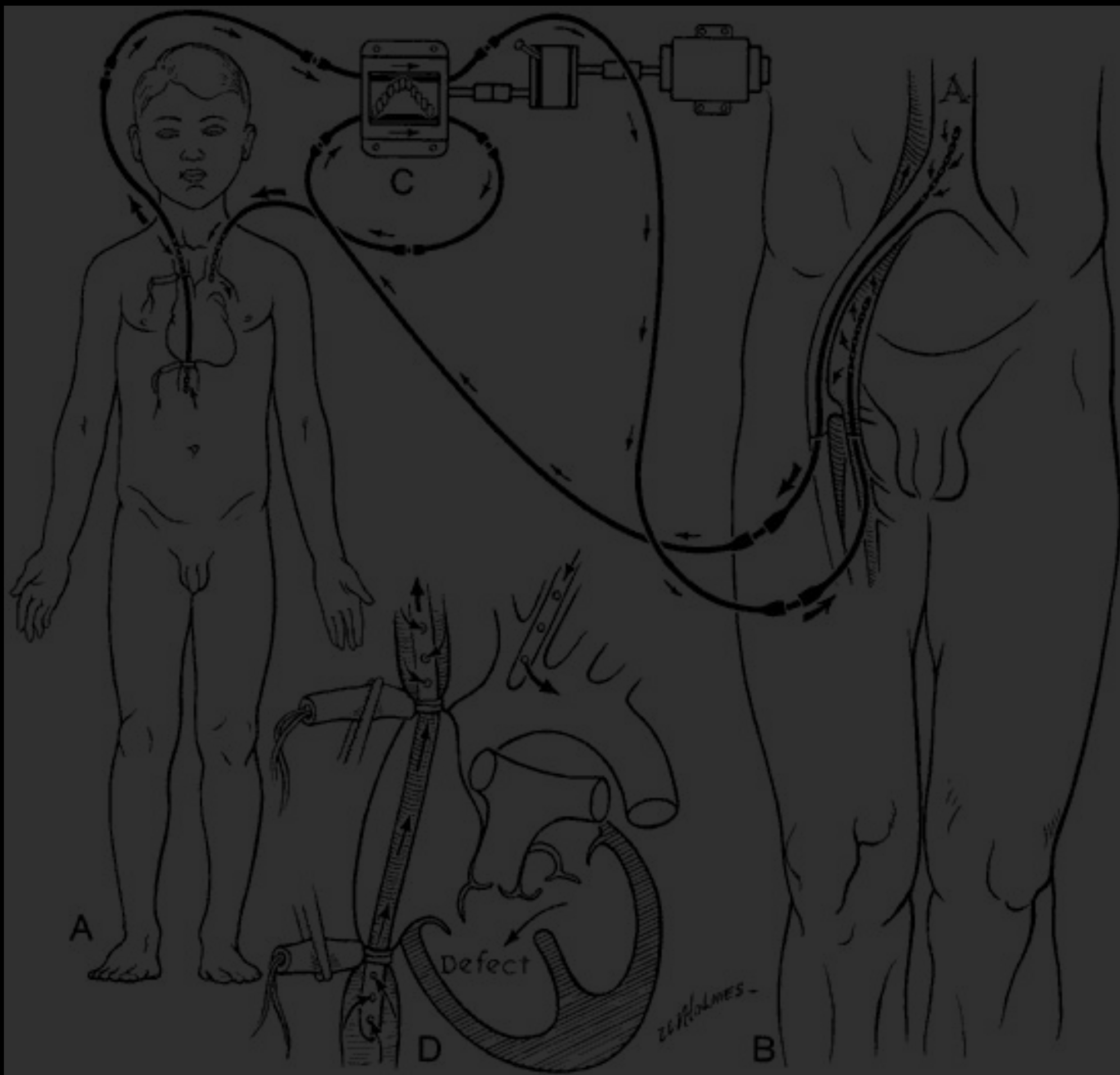


**"When going into the wilderness, do
not expect to find a paved road"**
- C. Walt Lillehei

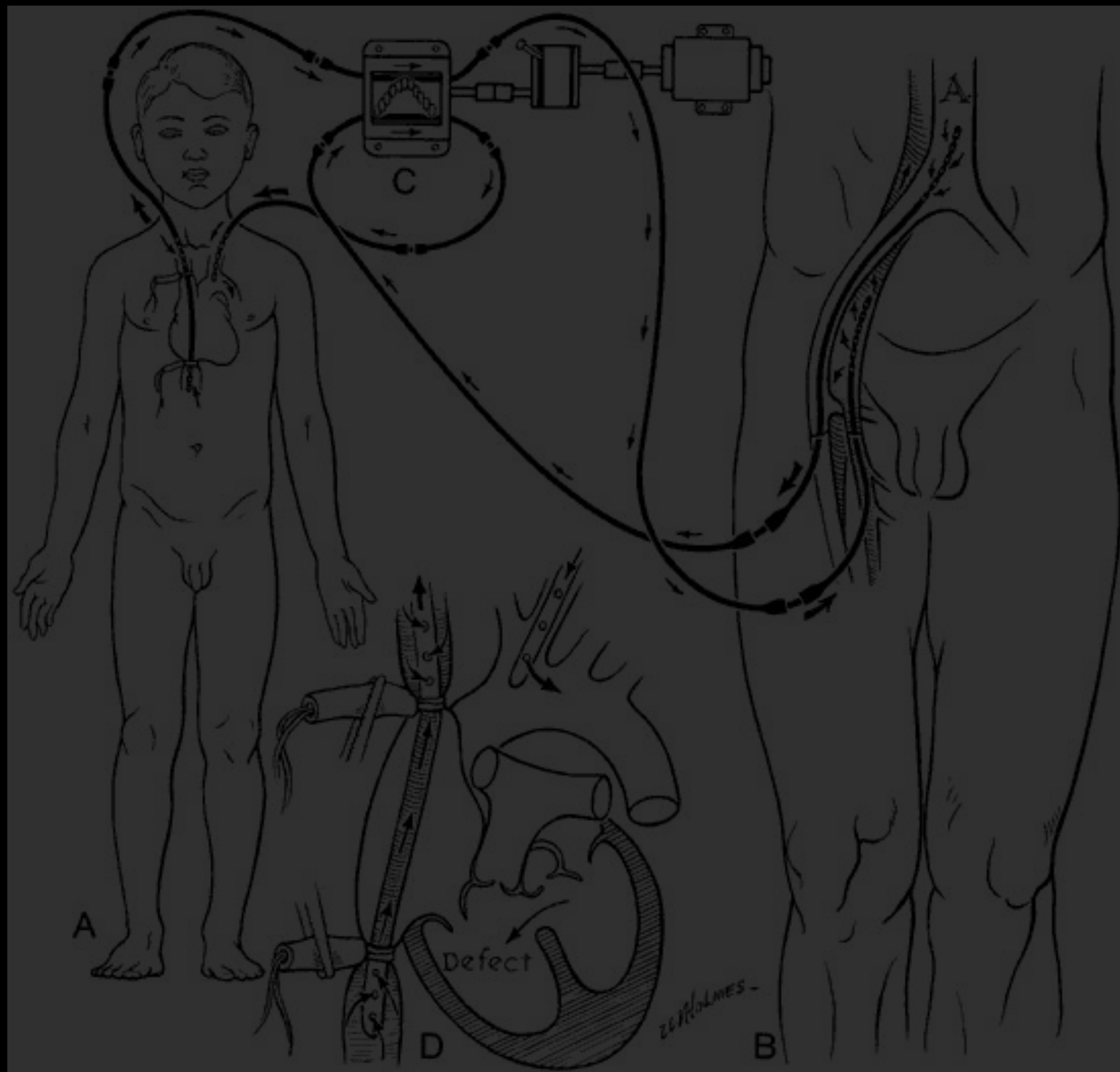
**"An operation that could
have a 200% mortality."**
- Unknown critic







cross circulation was LOUD



cross circulation was LOUD

Cross-Circulation



Cross-Circulation

First VSD closure
March 26, 1954

First AVSD closure
August 6, 1954

First Tetralogy of
Fallot repair
August 31, 1954

45
operations

28
survivors



Cross-Circulation

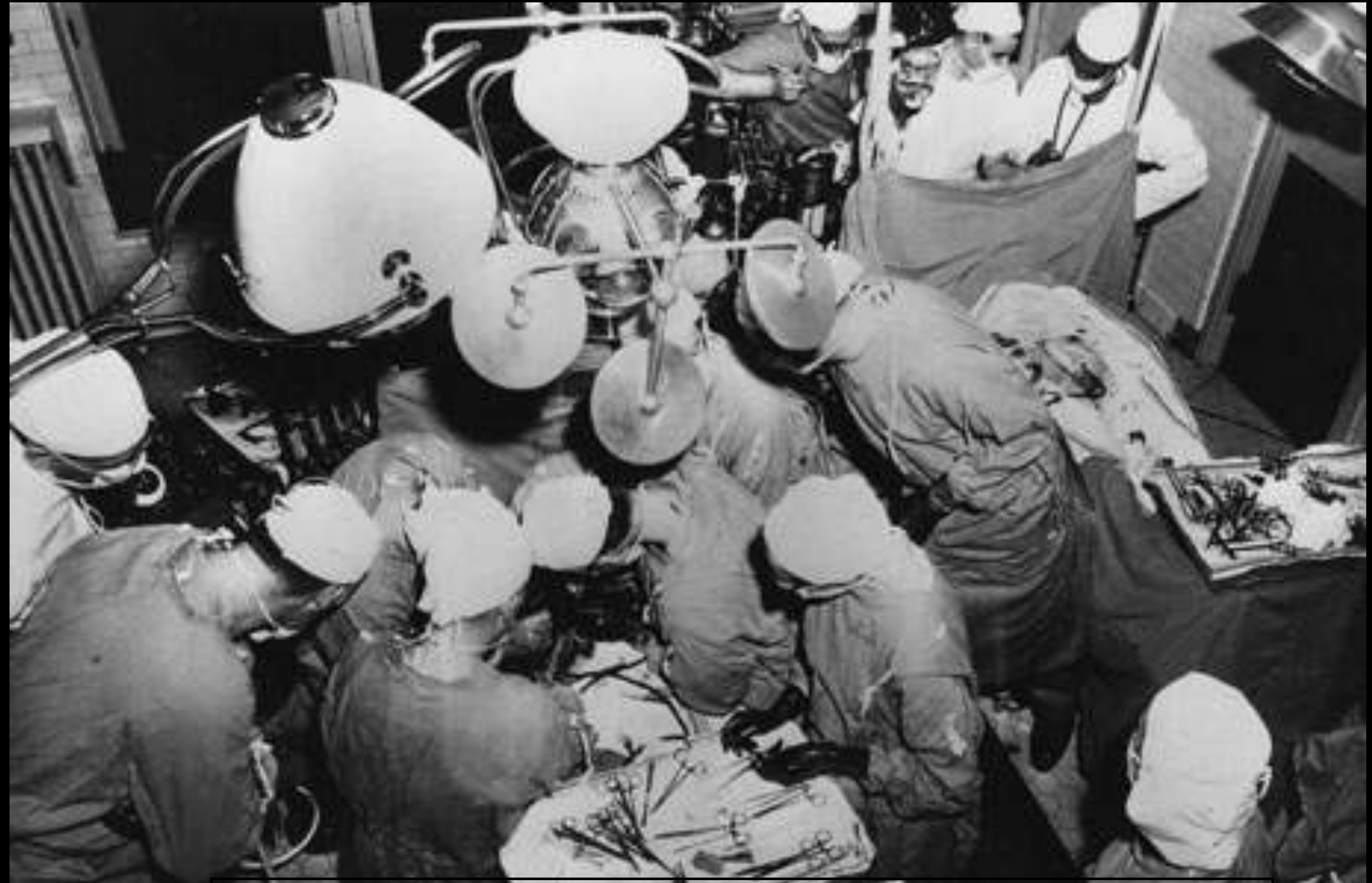
First VSD closure
March 26, 1954

First AVSD closure
August 6, 1954

First Tetralogy of
Fallot repair
August 31, 1954

45
operations

28
survivors



62% survival cross-circulation
vs.

6% survival CPB

C Walt Lillehei



Brash Charismatic Driven Maverick

C Walt Lillehei



- ✓ X-circulation
- ✓ first operations CHD
- ✓ first pacemakers
- ✓ mechanical heart valves
- ✓ drove research into transplantation
- ✓ trained 150 world-leading surgeons
- ✓ Med Director of St Jude Inc
- ✓ Bravery medal in WW2 (Italy)

Brash

Charismatic

Driven

Maverick

John W Kirklin



Calm

Clear-Thinking

Legendary Hard Worker

Academic

John W Kirklin



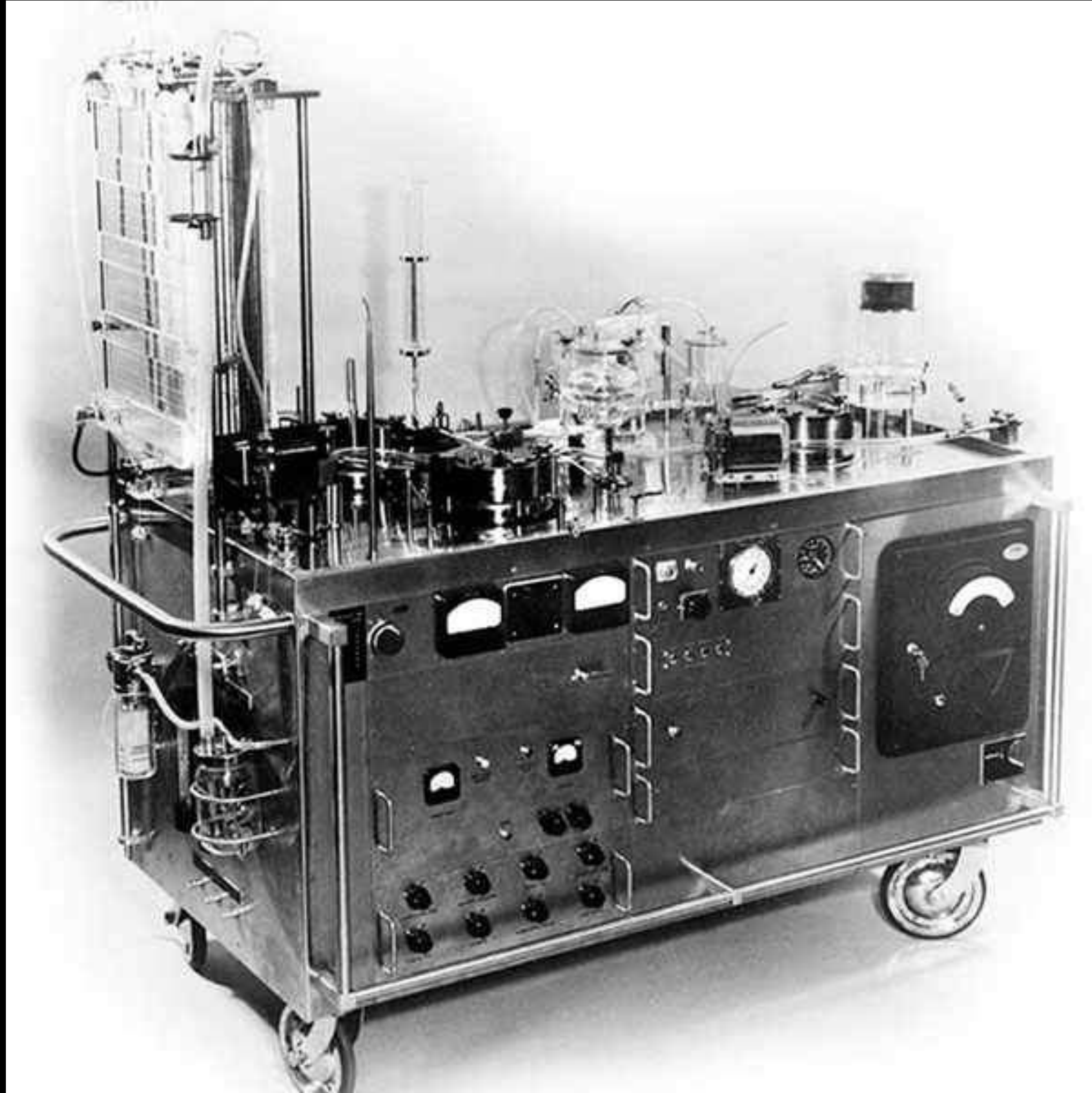
- ✓ took CPB to next stage
- ✓ obsessional and scientific
- ✓ wrote 'definitive' text book
- ✓ outcome-driven
- ✓ academic leader
- ✓ role model for modern surgery

Calm

Clear-Thinking

Legendary Hard Worker

Academic



John W. Kirklin (1917-2004) and colleagues at the Mayo Clinic launched their open heart program on March 5, 1955. They used a heart-lung machine based on the Gibbon-IBM machine.

IBM machine
machine based on the Gibbon-
1955. They used a heart-lung



De Wall -Lillehei Bubble oxygenator

simple in concept
mass producible

brought open-heart surgery to the world

Denis Melrose



Stop the Heart Moving!

Denis Melrose



Stop the Heart Moving!

to **stop**, replace the blood flowing through the coronary arteries with cold, potassium-containing fluid

Denis Melrose



Stop the Heart Moving!

to **stop**, replace the blood flowing through the coronary arteries with cold, potassium-containing fluid

to **restart**, flush out the cold fluid with warm blood

All the Ingredients were now Prepared

All the Ingredients were now Prepared

the underlying need was clear

All the Ingredients were now Prepared

the underlying need was clear

the heart could be bypassed

All the Ingredients were now Prepared

the **underlying need** was clear

the heart could be **bypassed**

the heart be **stopped**, and **restarted**

All the Ingredients were now Prepared

the **underlying need** was clear

the heart could be **bypassed**

the heart be **stopped**, and **restarted**

people were being **trained**

All the Ingredients were now Prepared

the **underlying need** was clear

the heart could be **bypassed**

the heart be **stopped**, and **restarted**

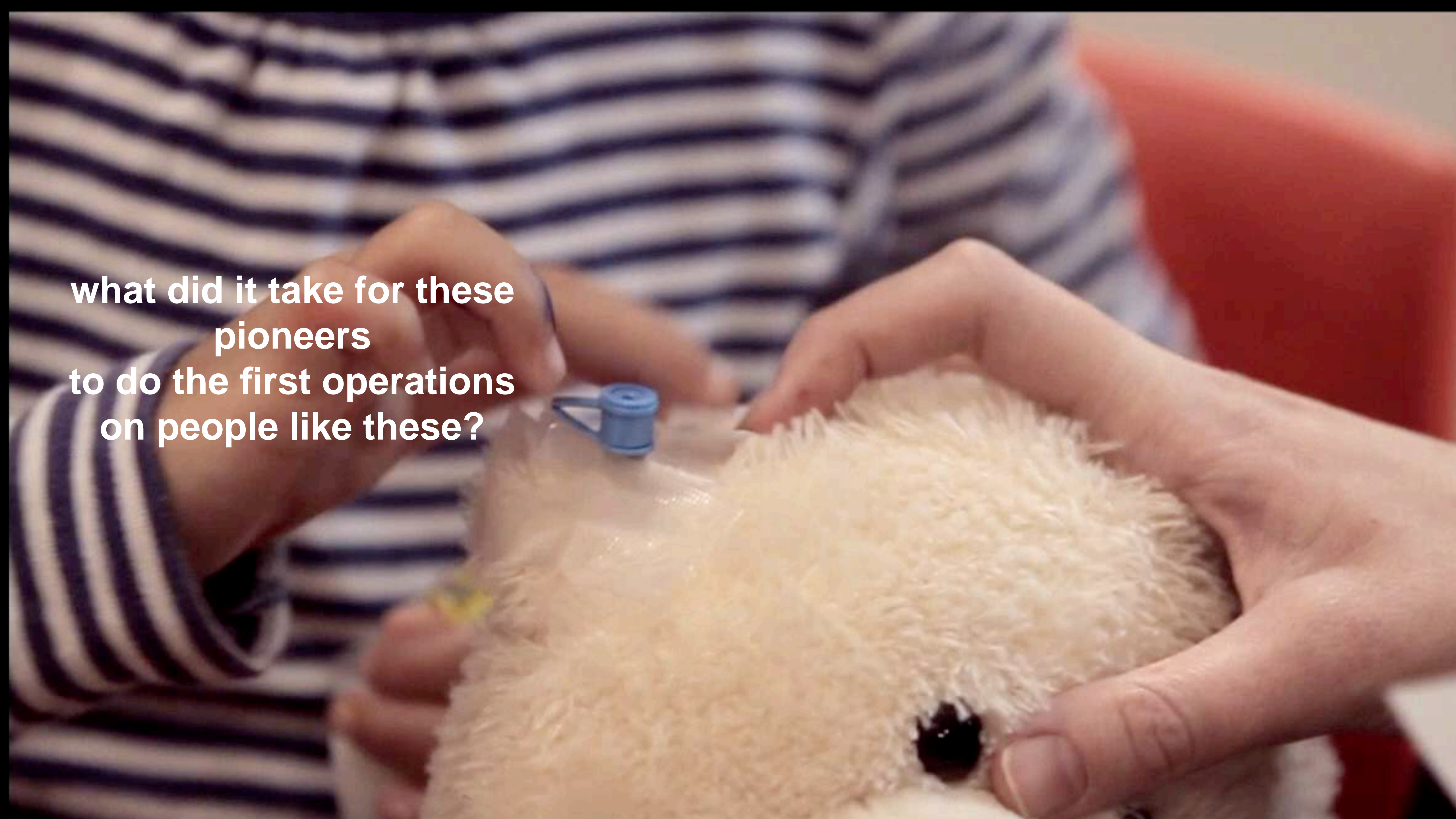
people were being **trained**

all that was needed was the **correct operations**





**what did it take for these
pioneers
to do the first operations
on people like these?**



Just imagine it was you....you *must*

Just imagine it was you....you *must*

understand what is wrong, and in 3-D

Just imagine it was you....you *must*

understand what is wrong, and in 3-D

know what to do, and have a back-up plan

Just imagine it was you....you *must*

understand what is wrong, and in 3-D

know what to do, and have a back-up plan

explain, orchestrate & lead

Just imagine it was you....you *must*

understand what is wrong, and in 3-D

know what to do, and have a back-up plan

explain, orchestrate & lead

have confidence to make the first cut

Just imagine it was you....you *must*

understand what is wrong, and in 3-D

know what to do, and have a back-up plan

explain, orchestrate & lead

have confidence to make the first cut

have technical skill, and speed

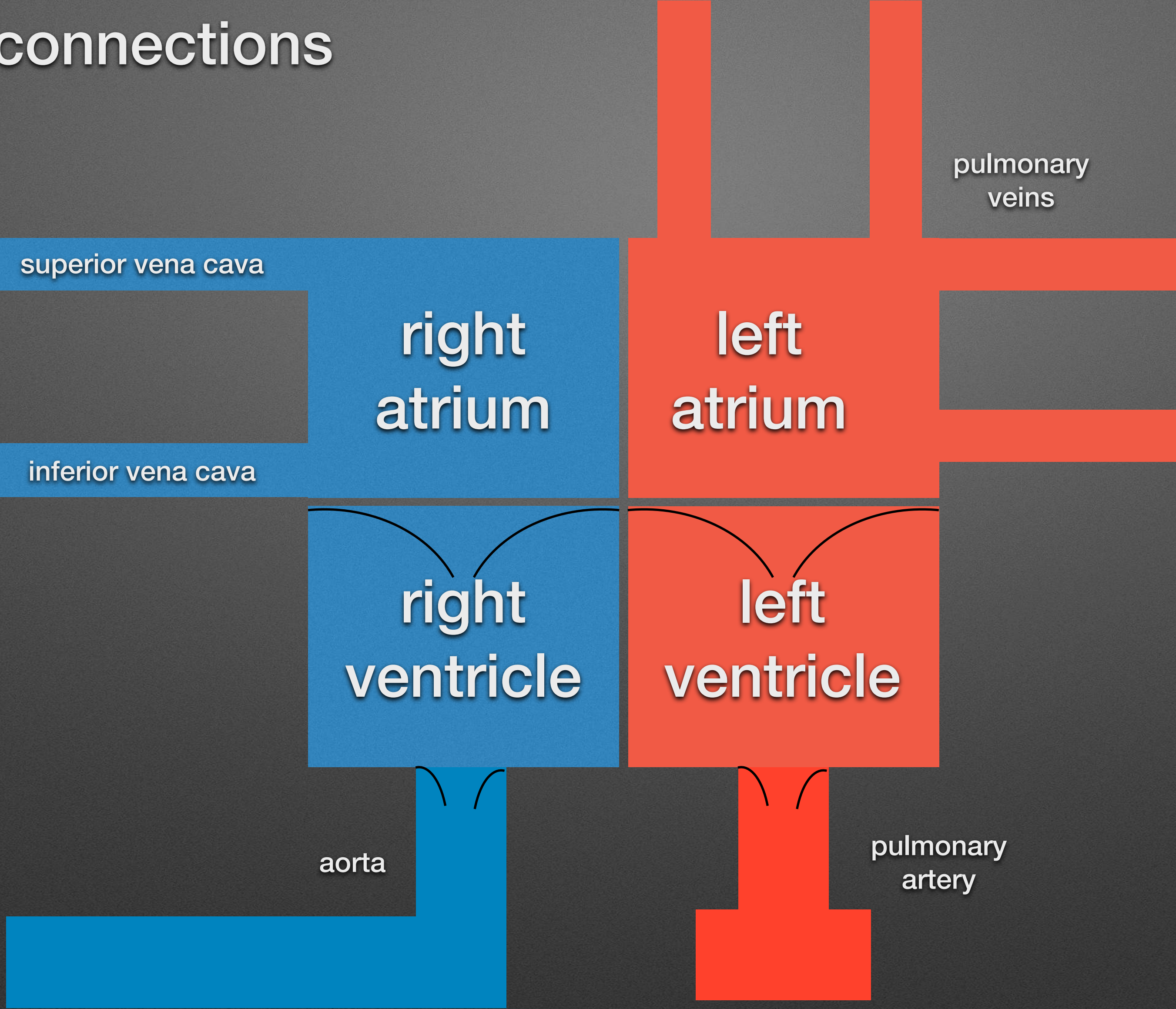
Eponymous Operations

Eponymous Operations

making a name for yourself

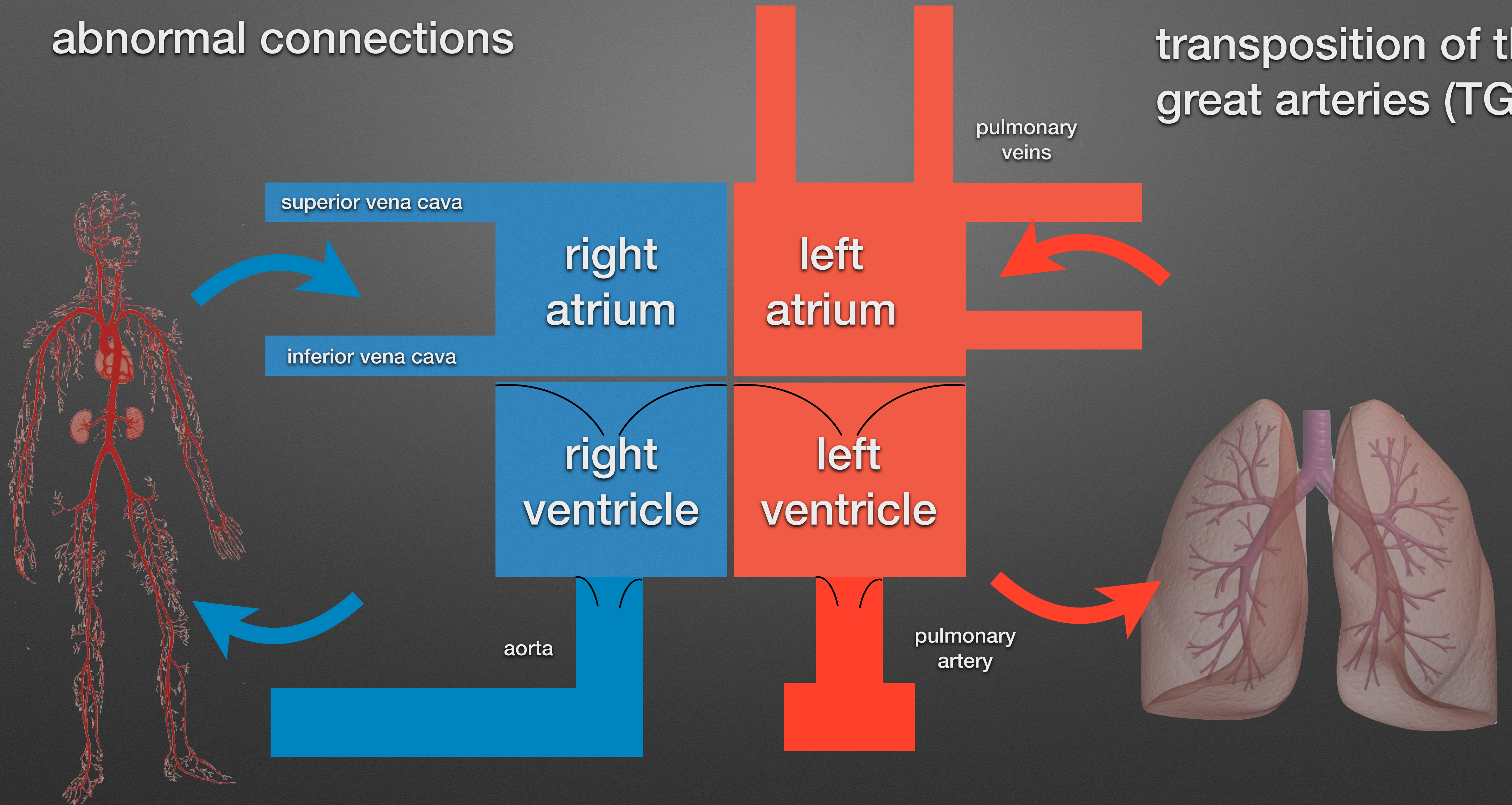
abnormal connections

transposition of the
great arteries (TGA)



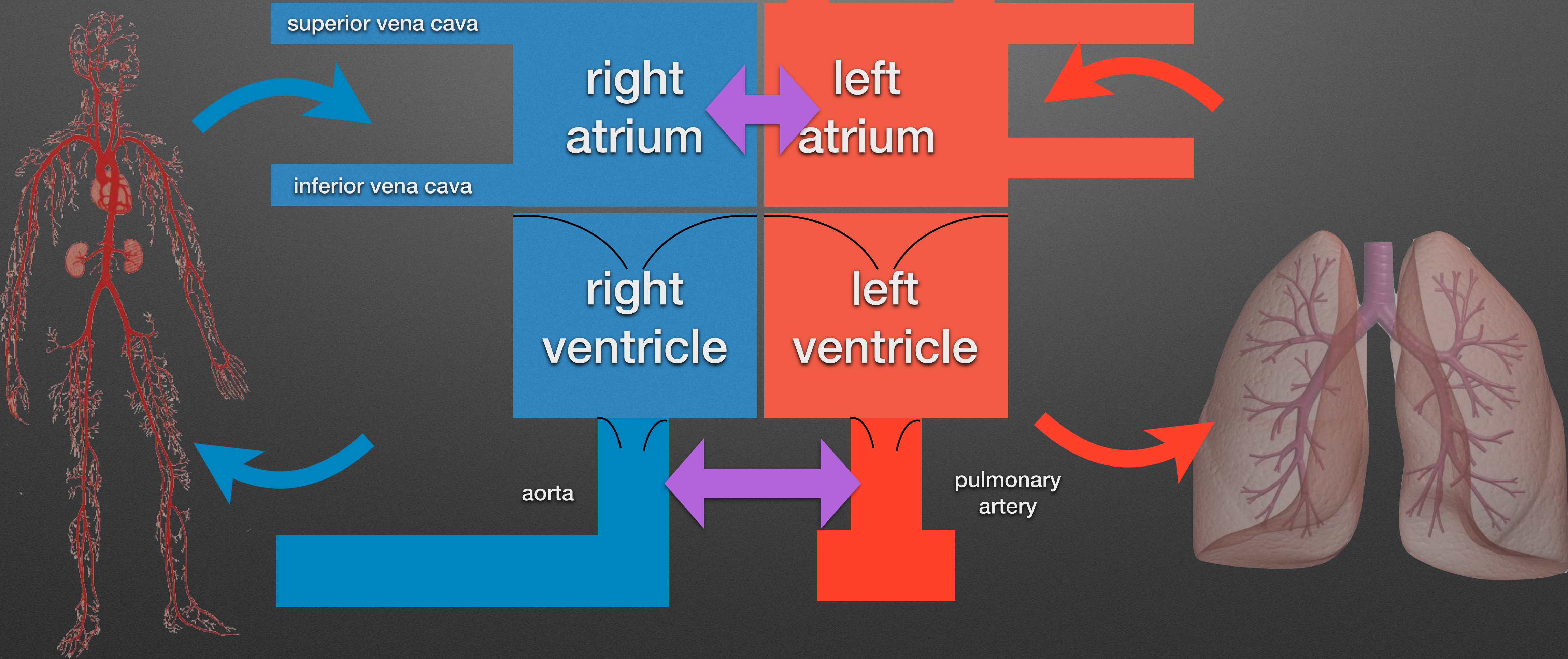
abnormal connections

transposition of the great arteries (TGA)



abnormal connections

transposition of the great arteries (TGA)



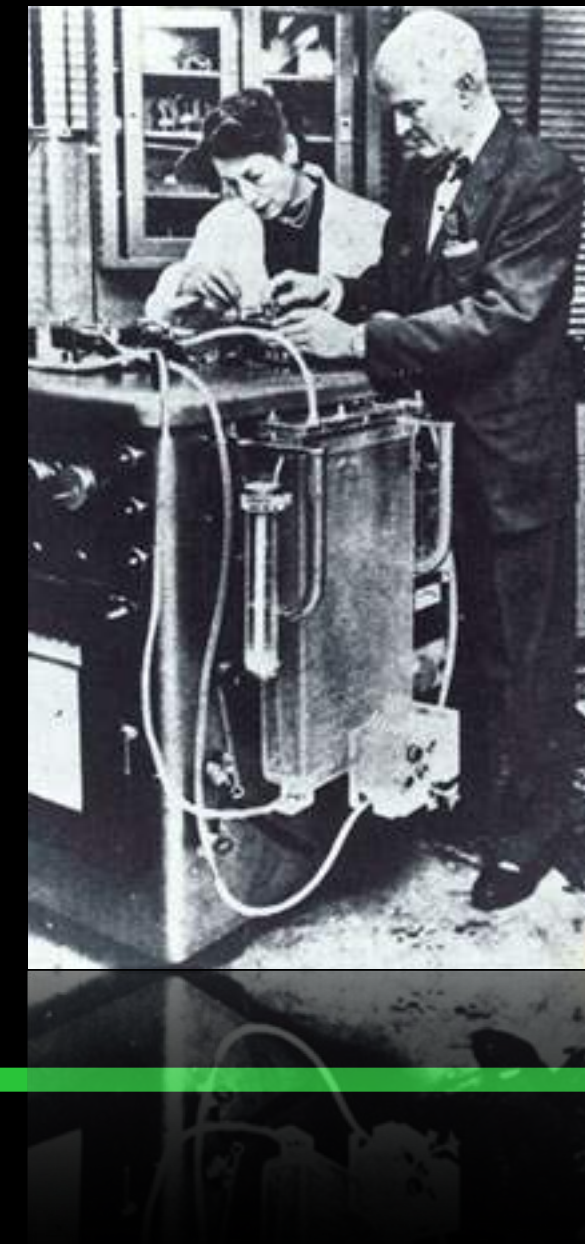
1931

Sir George
Newman

1947

Hamilton
Hartridge

1952



1955

John Leonard
d'Silva

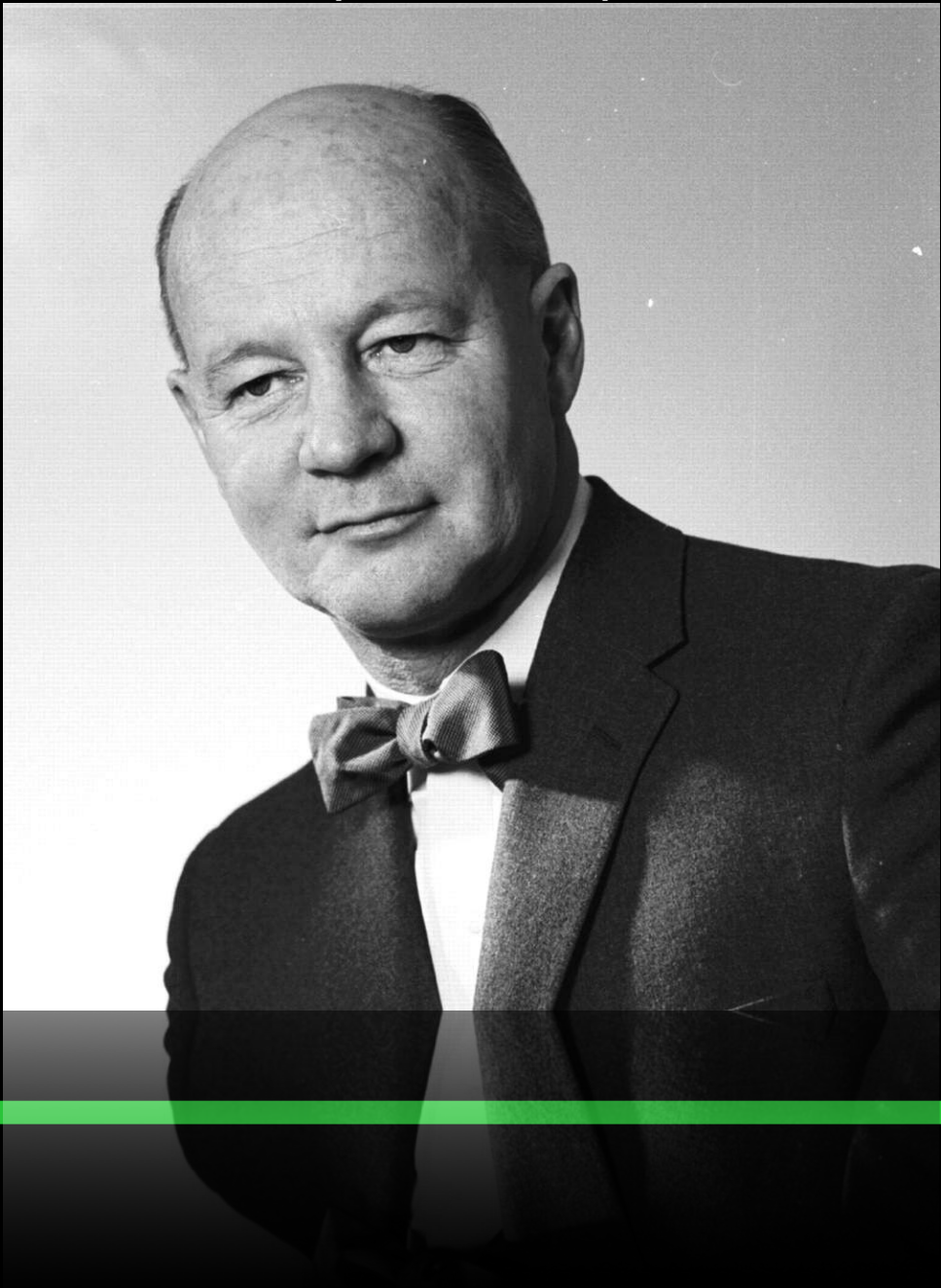
1931

Sir George
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1947

Hamilton
Hartridge

1952



William Mustard
(Toronto)

1955

John Leonard
d'Silva

1931

Sir George
Newman

1947

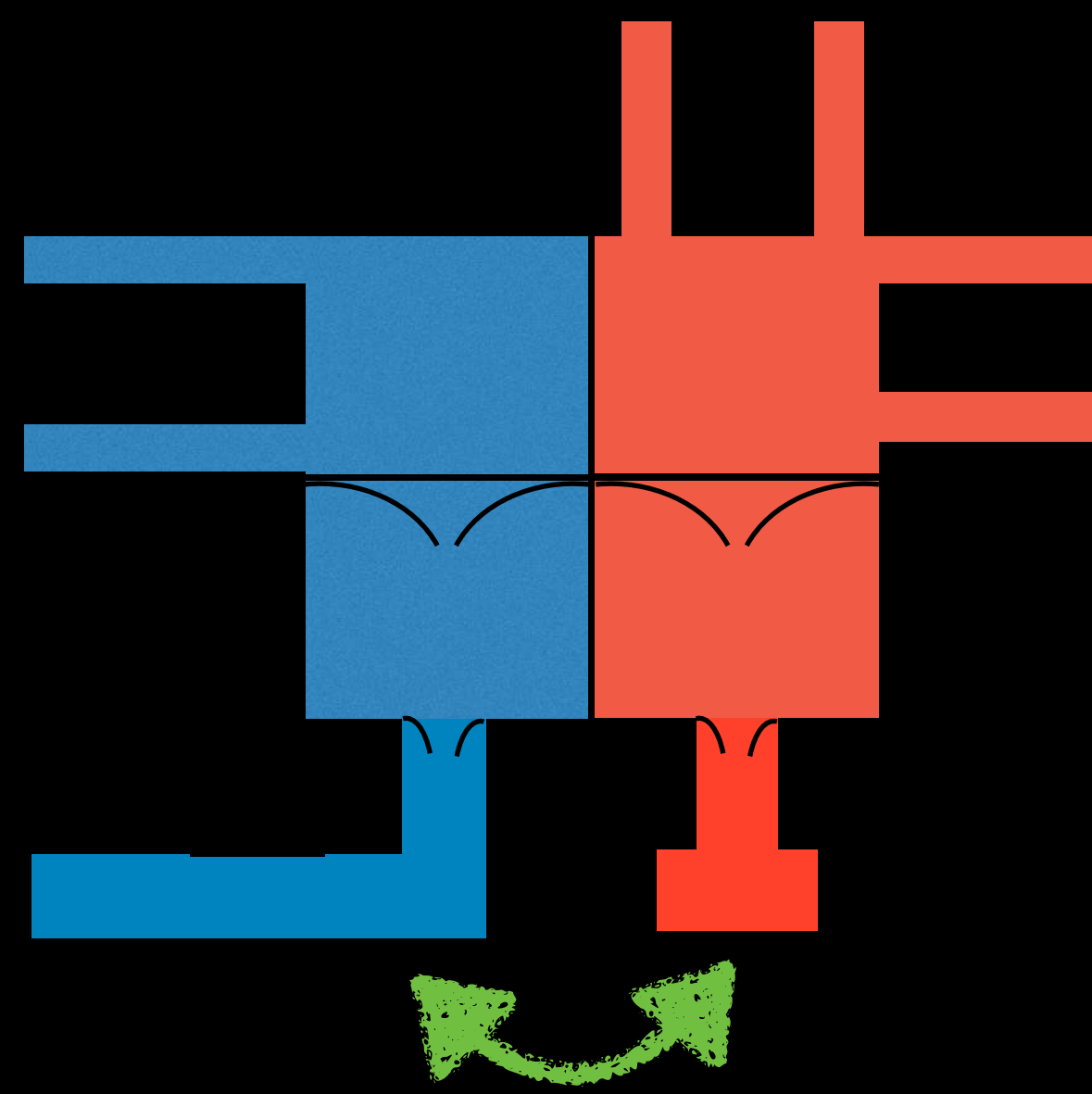
Hamilton
Hartridge

1952



1955

John Leonard
d'Silva



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Sir George
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Hamilton
Hartridge

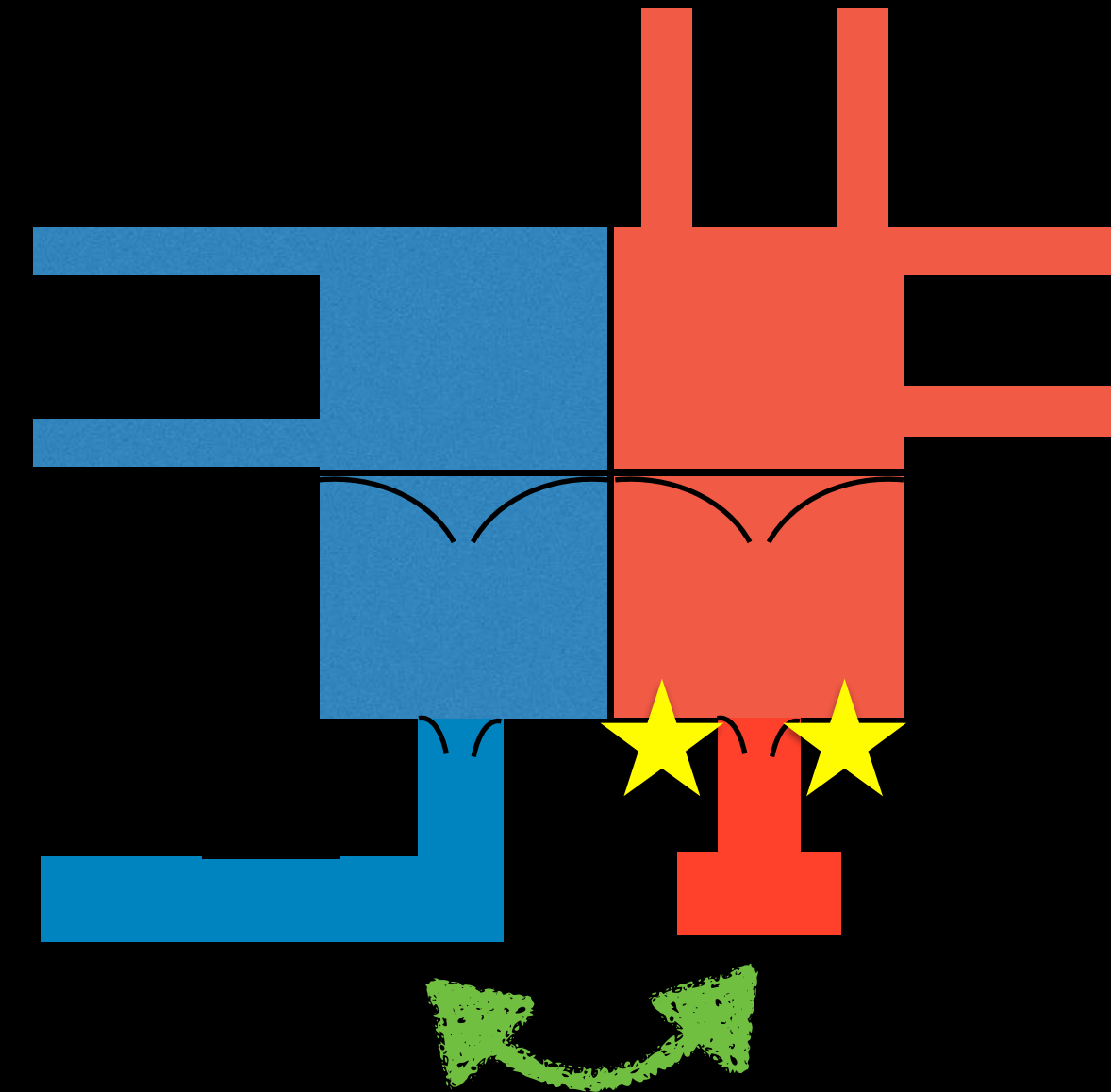
1952



William Mustard
(Toronto)

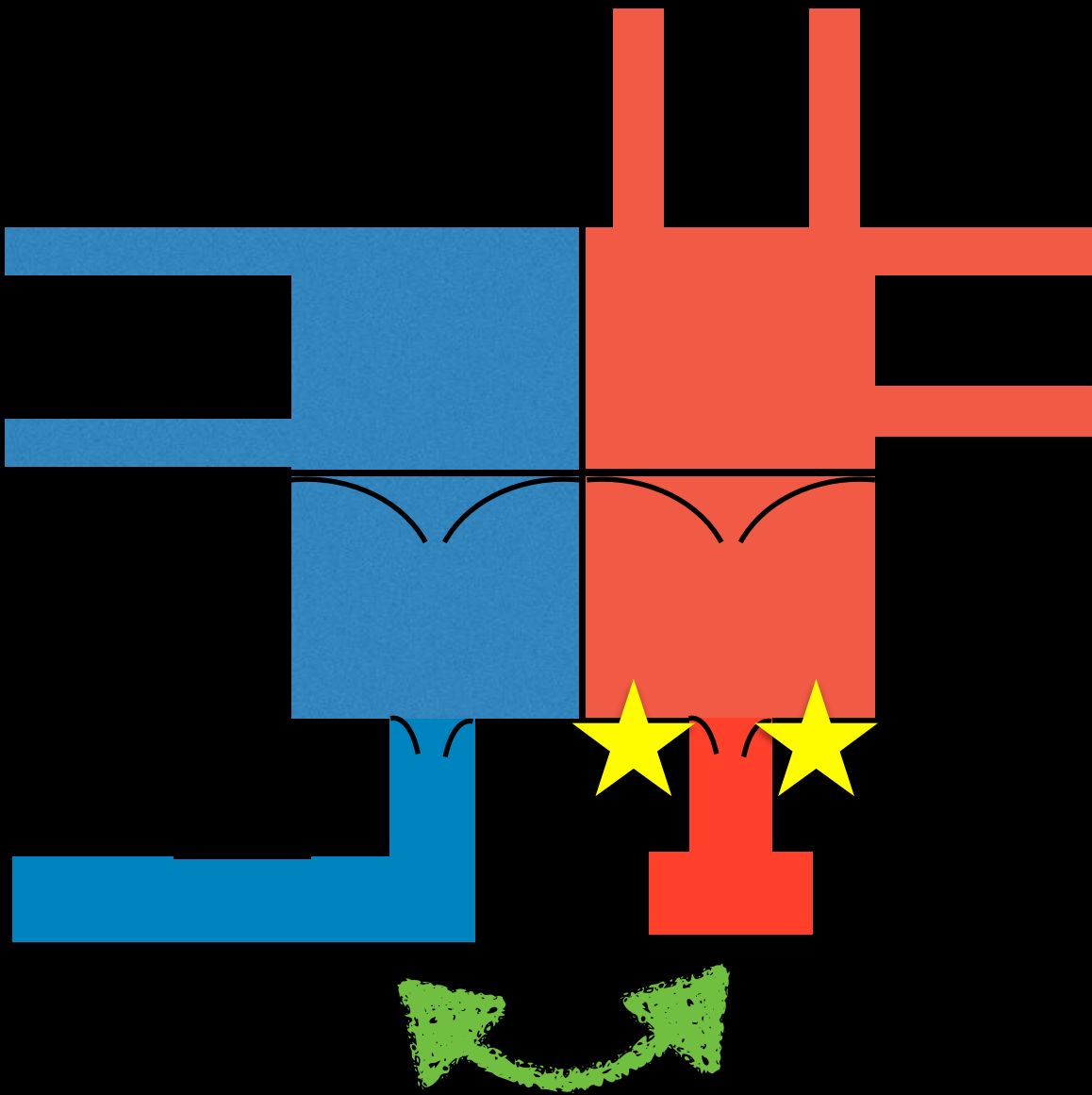
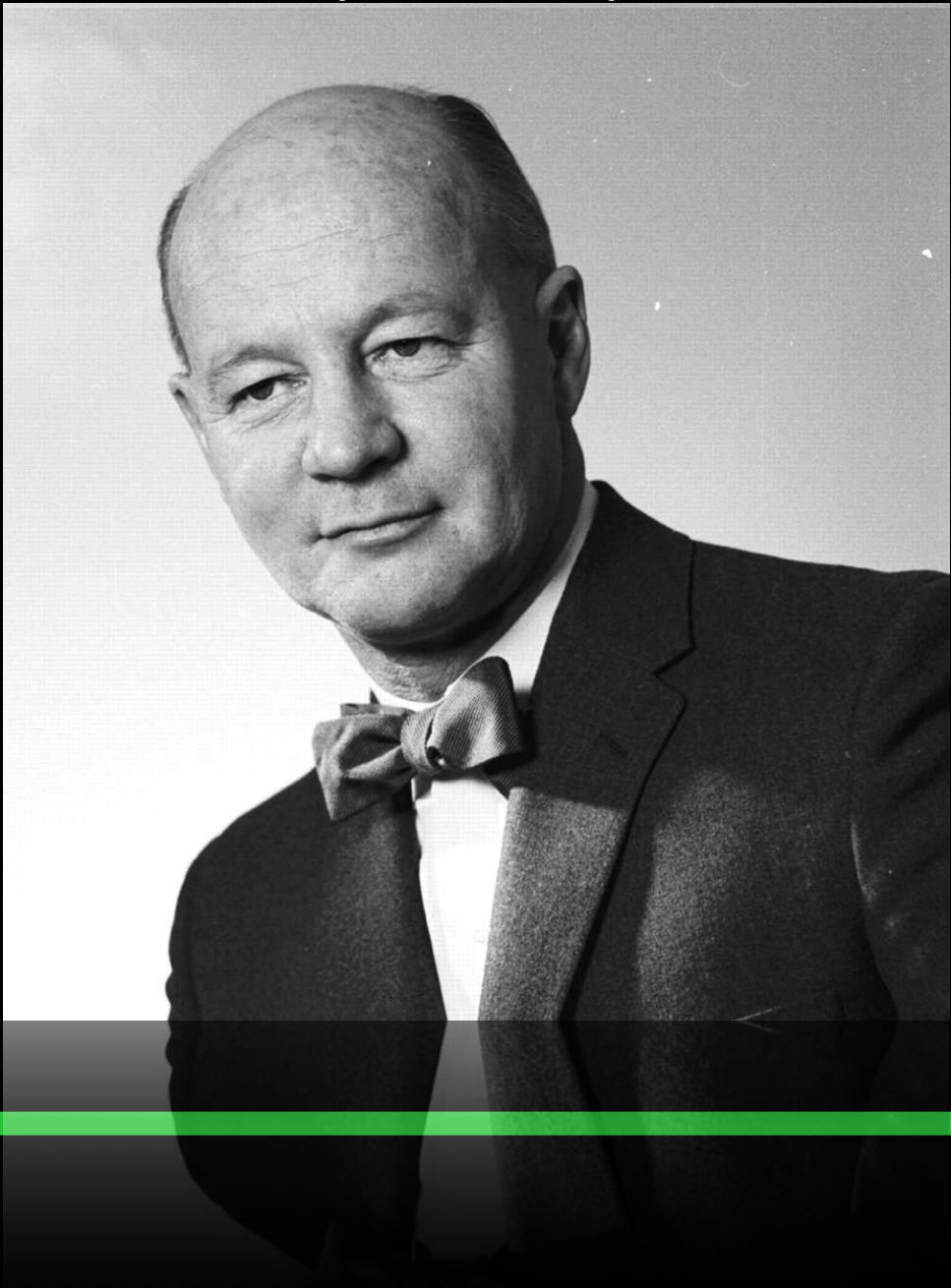
1955

John Leonard
d'Silva



using a monkey lung as oxygenator

William Mustard
(Toronto)



1931

Sir George
Newman

1947

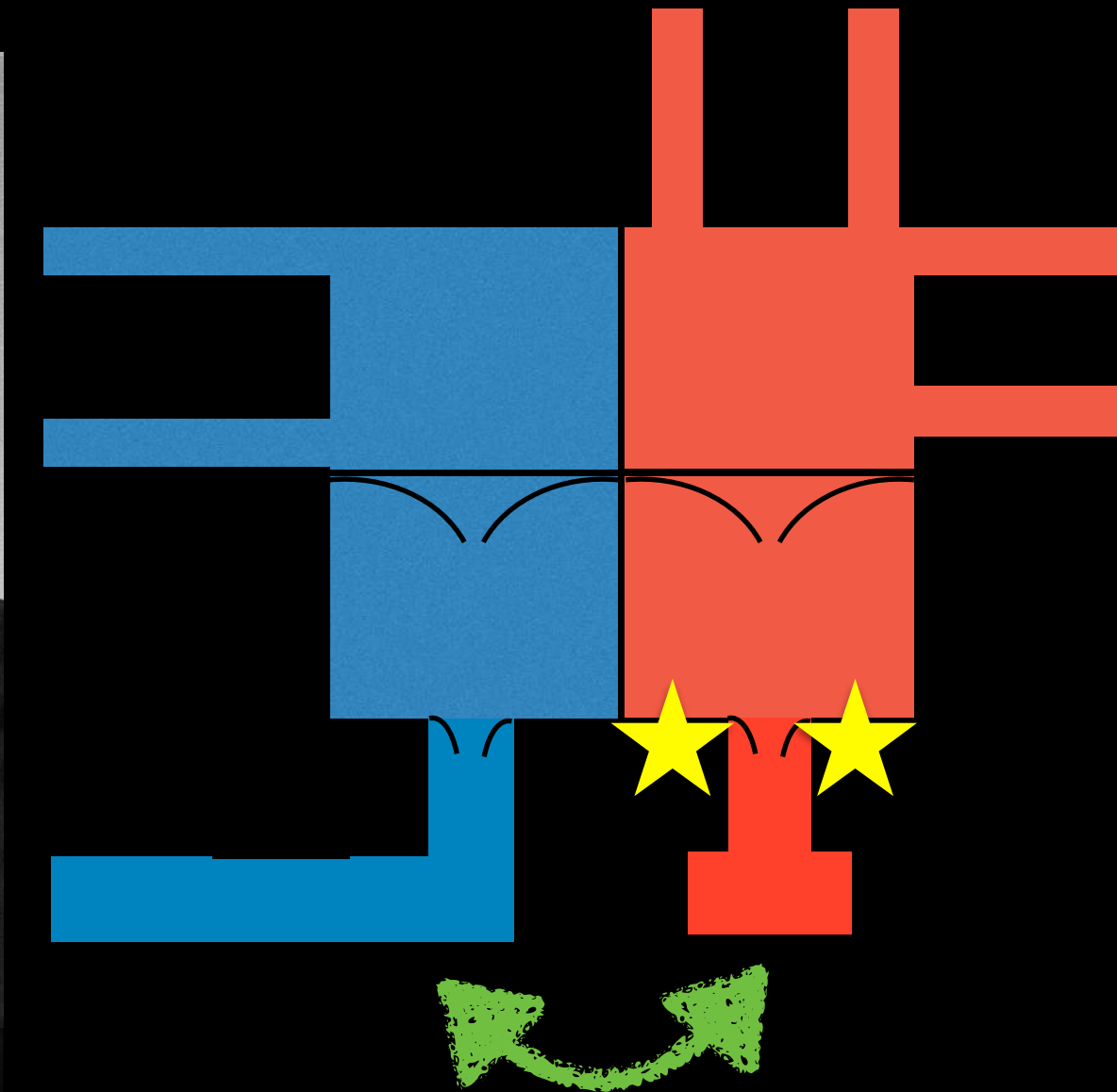
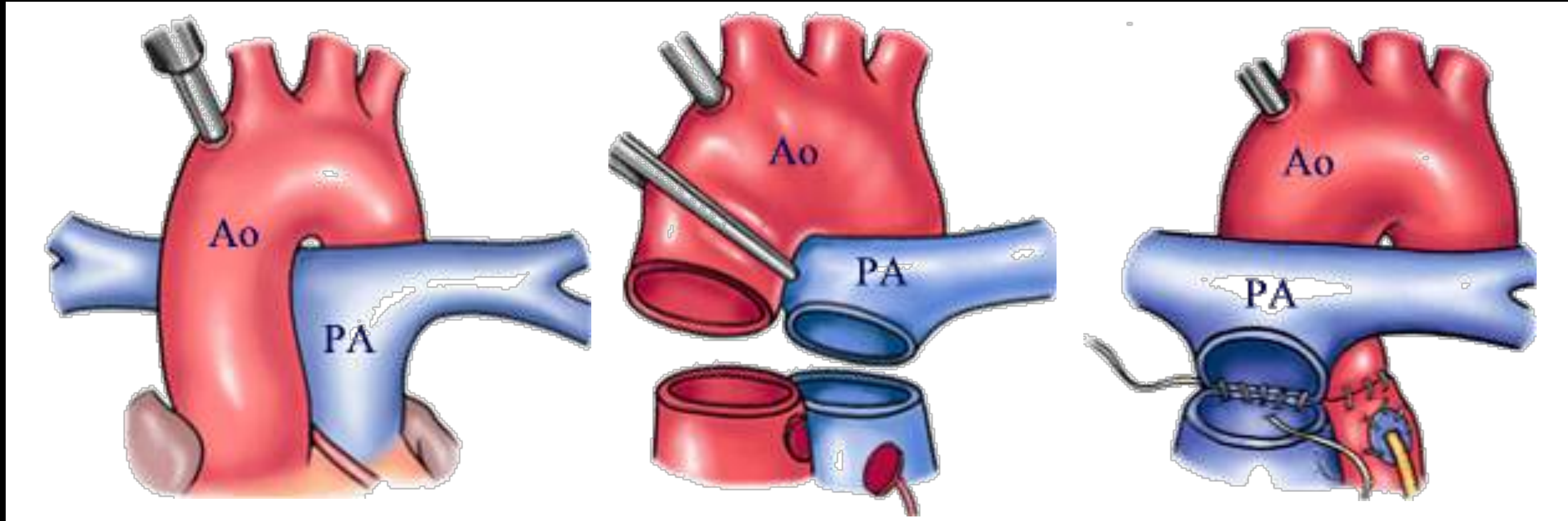
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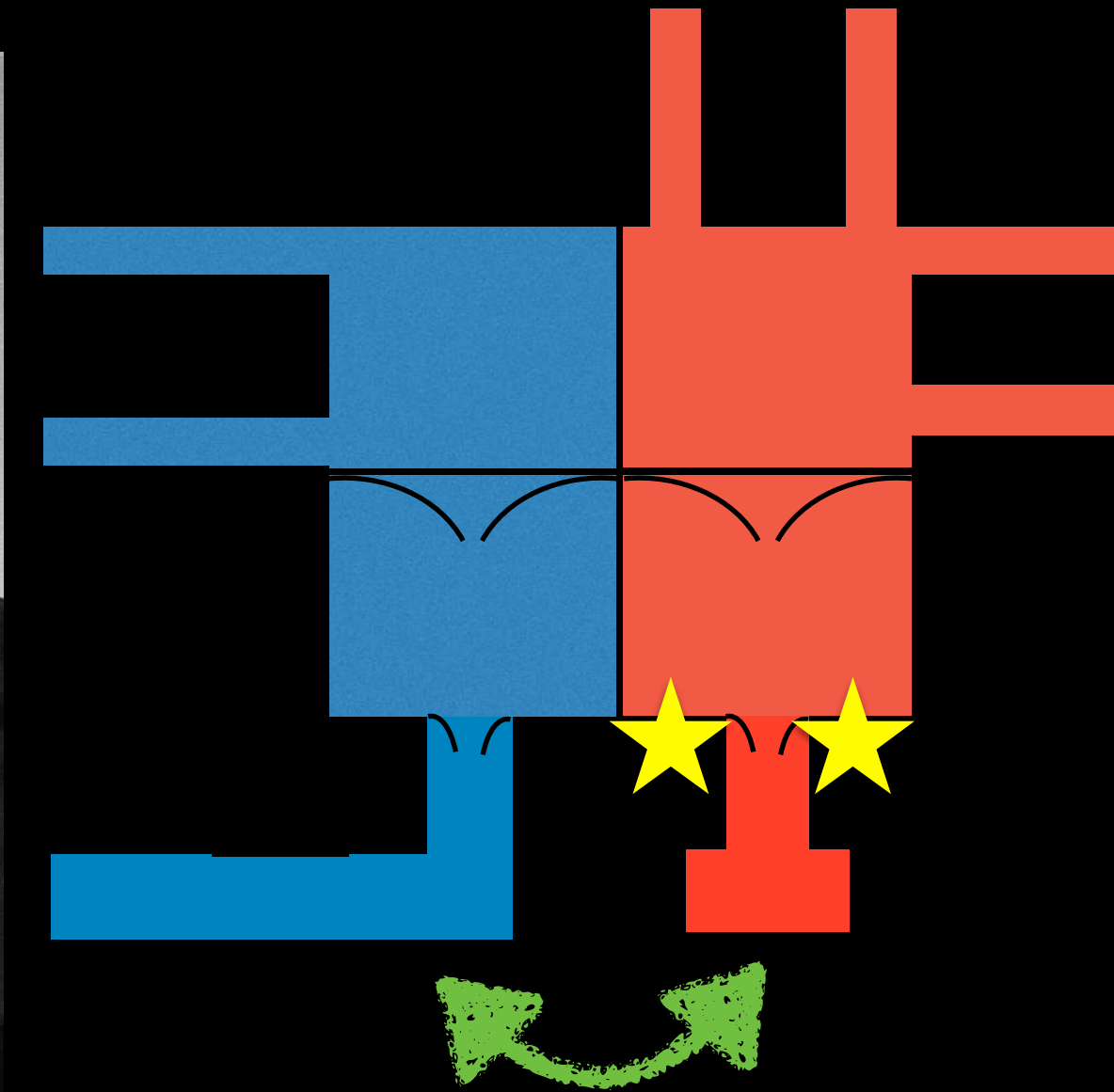
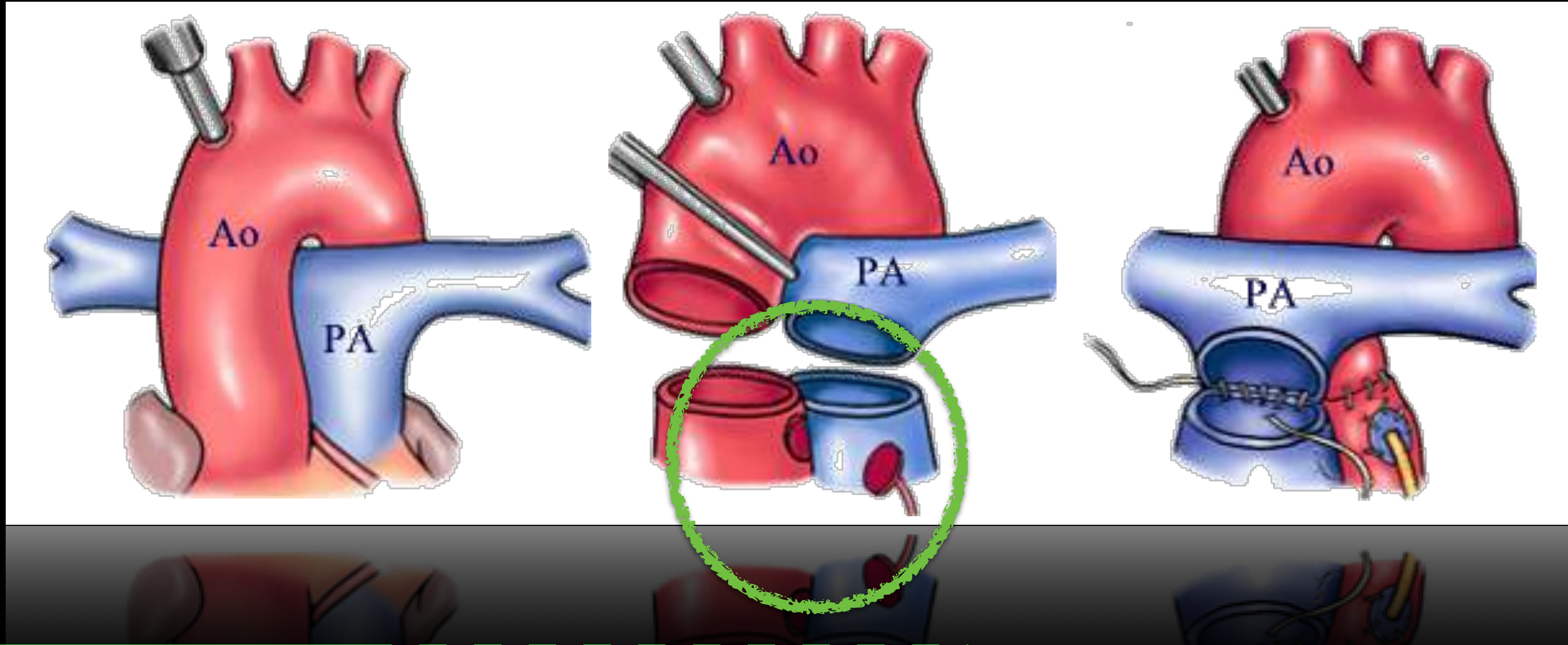
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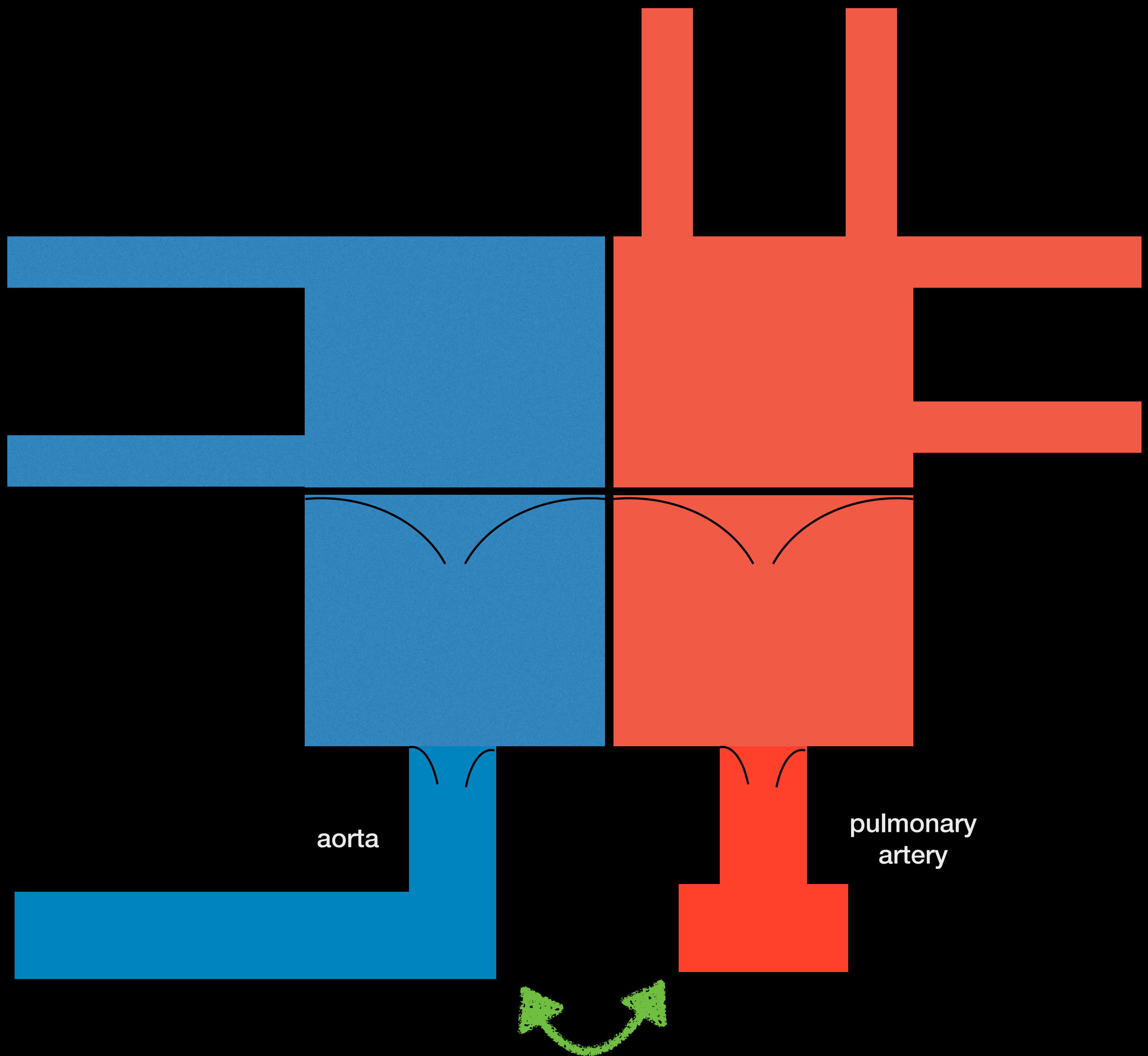
**William Mustard
(Toronto)**

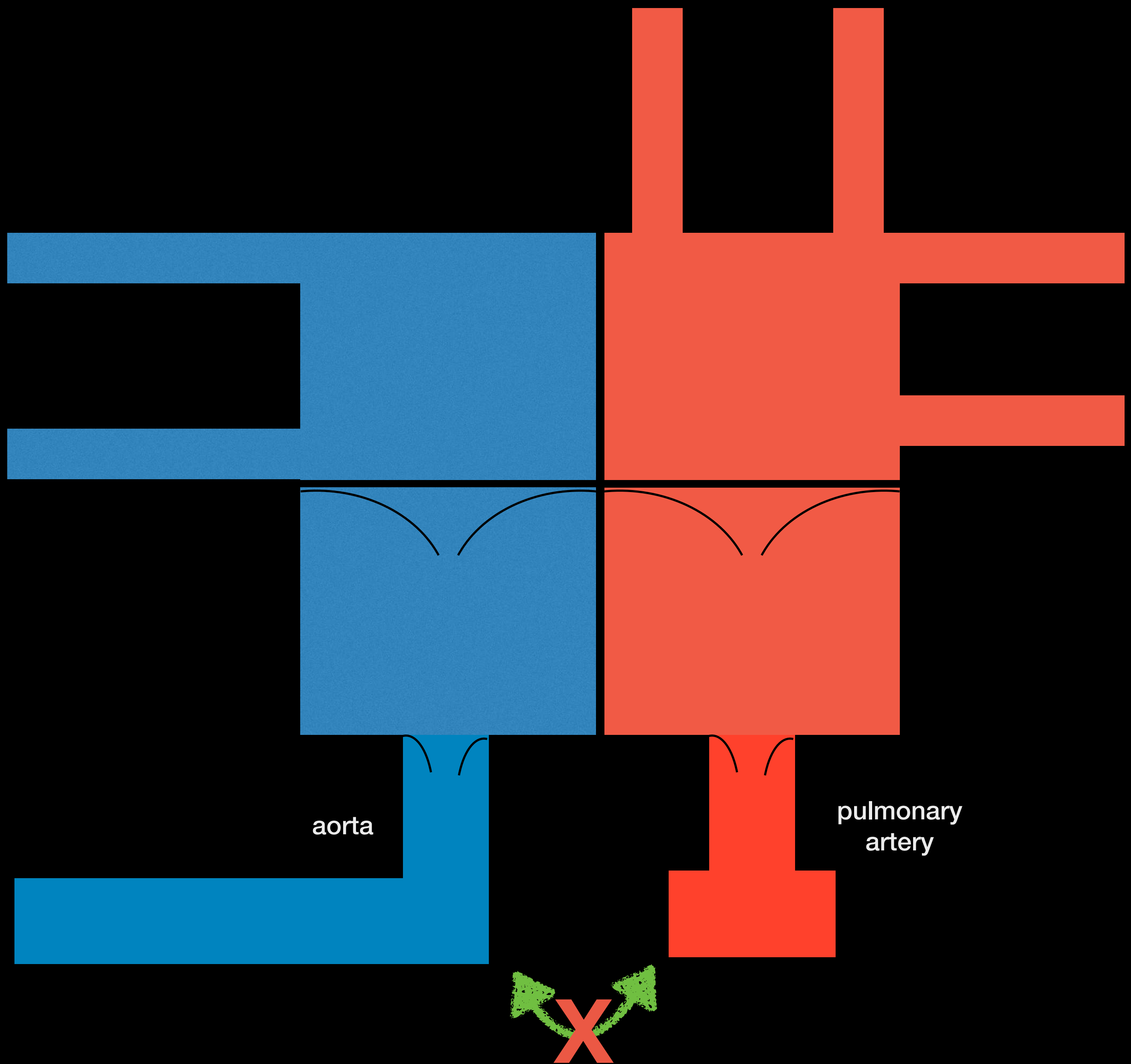


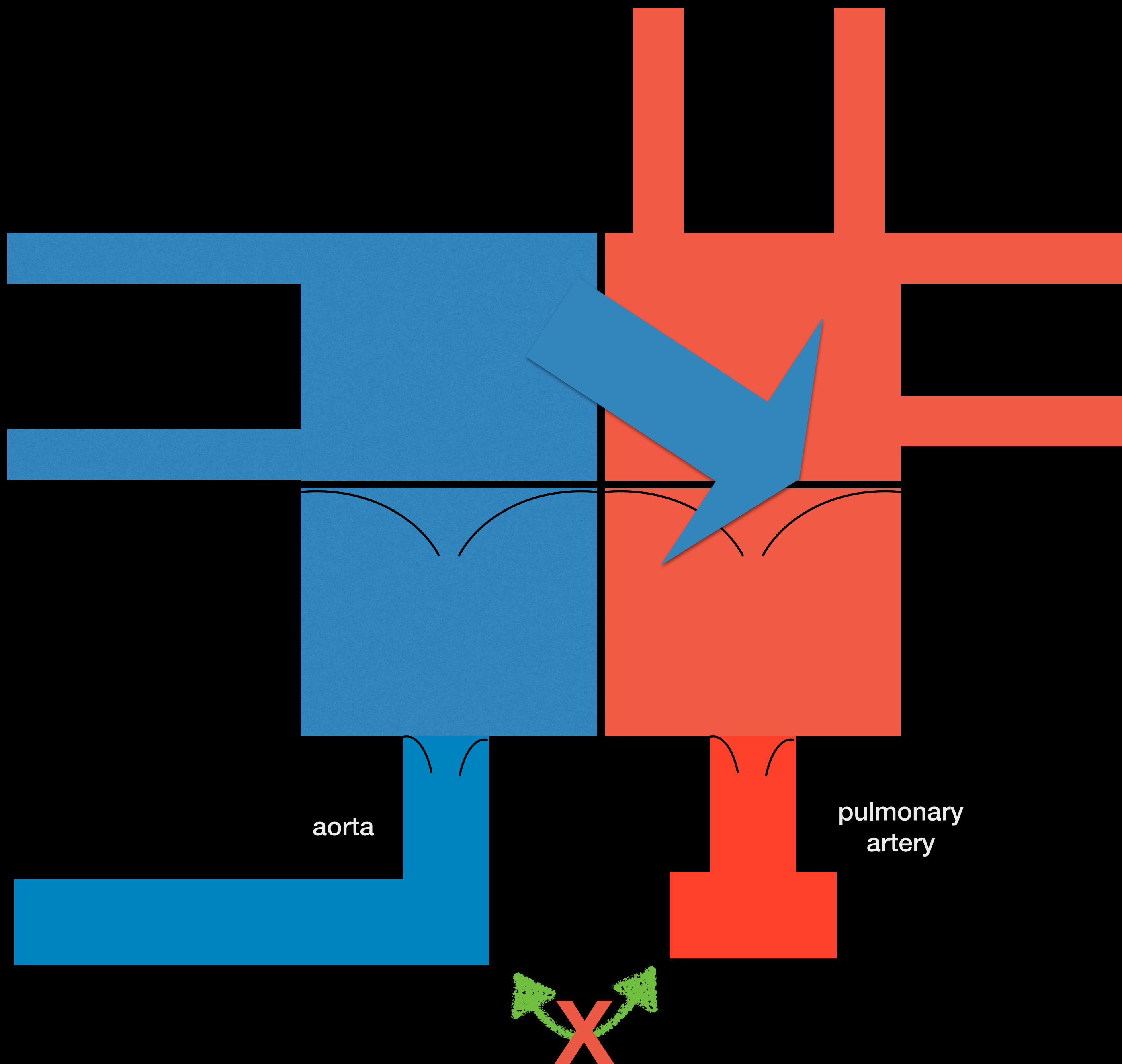
7 cases in a year

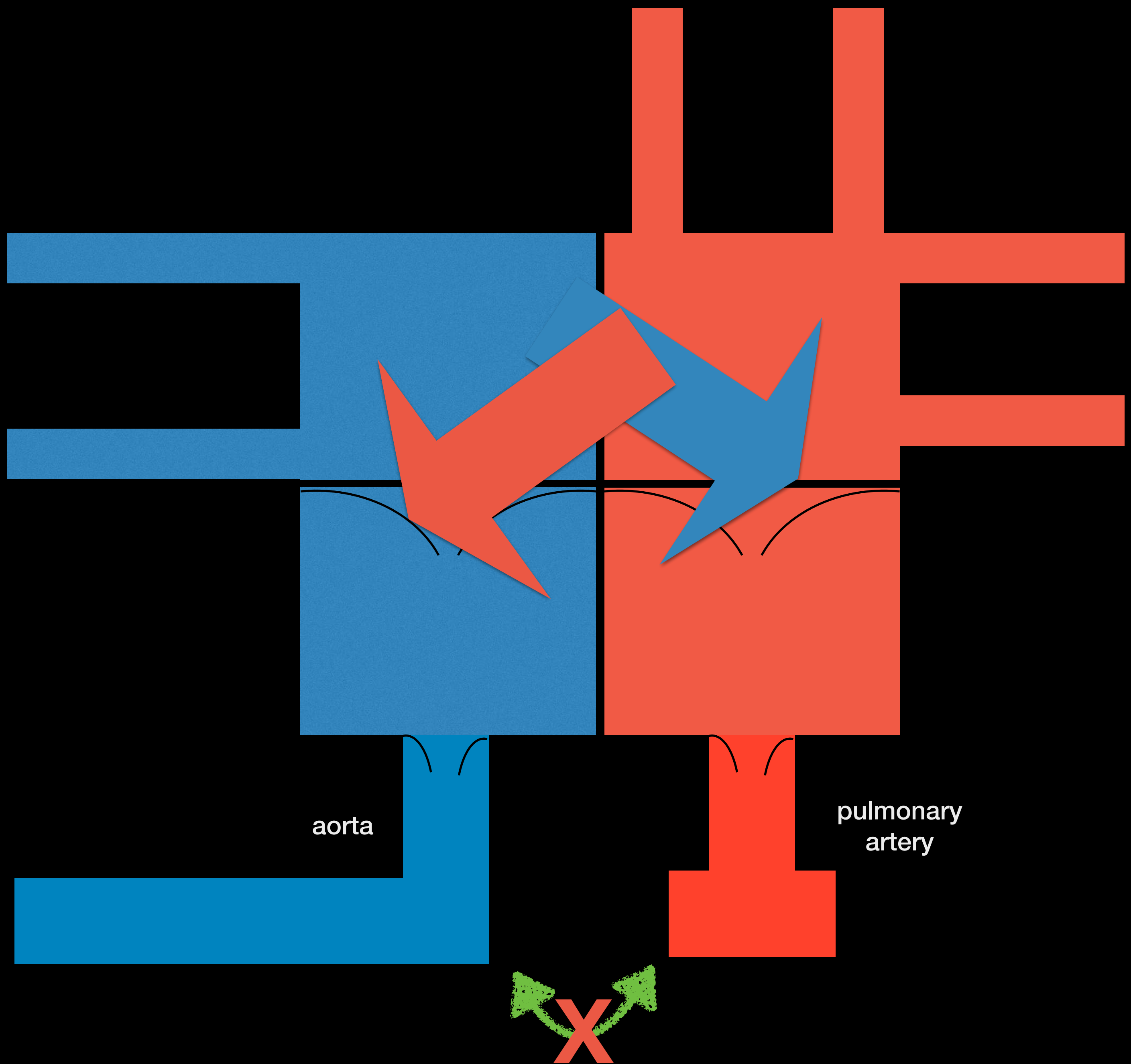
ALL died within a few hours

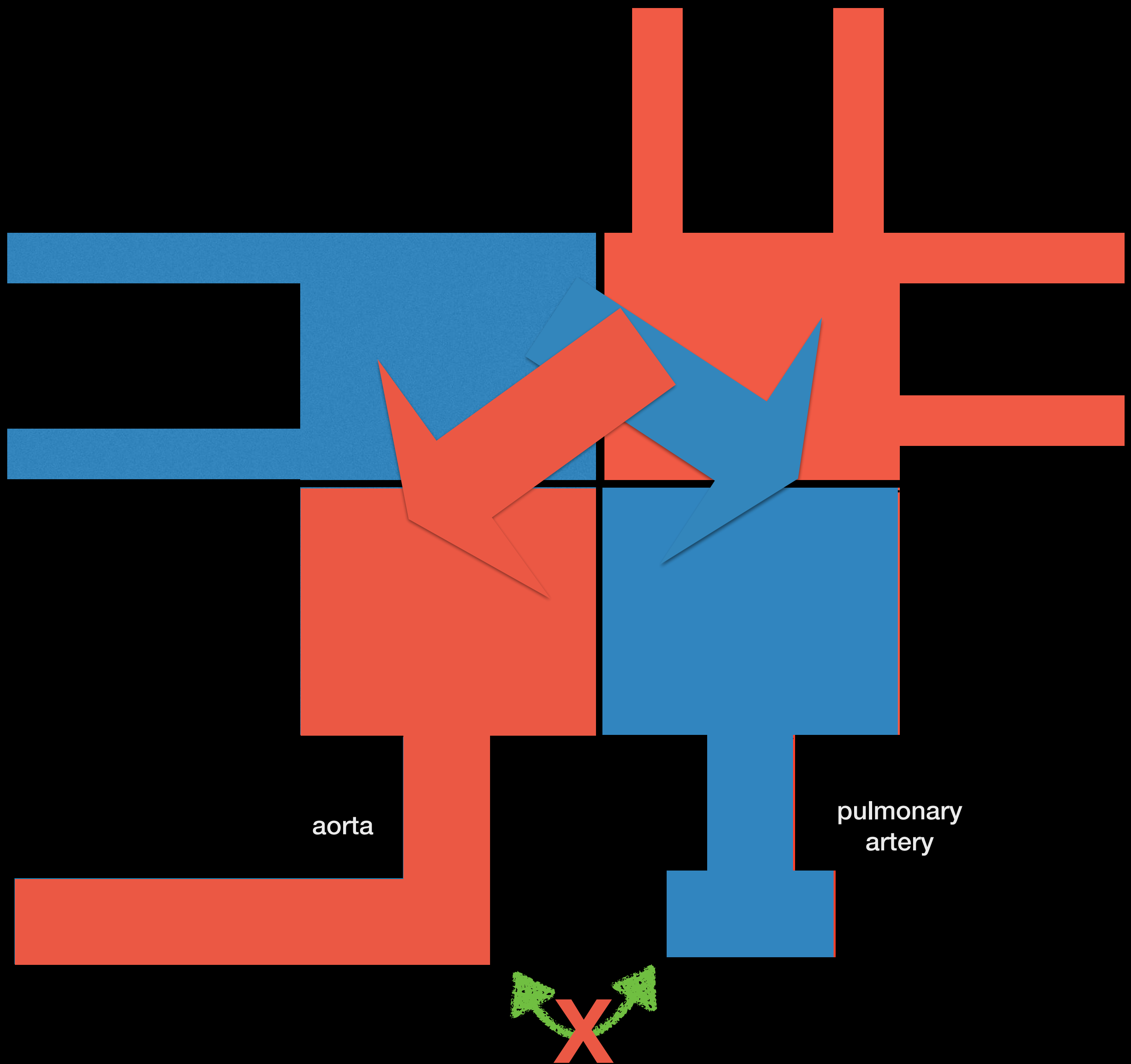
Bailey (1953), Senning (1954)
same result

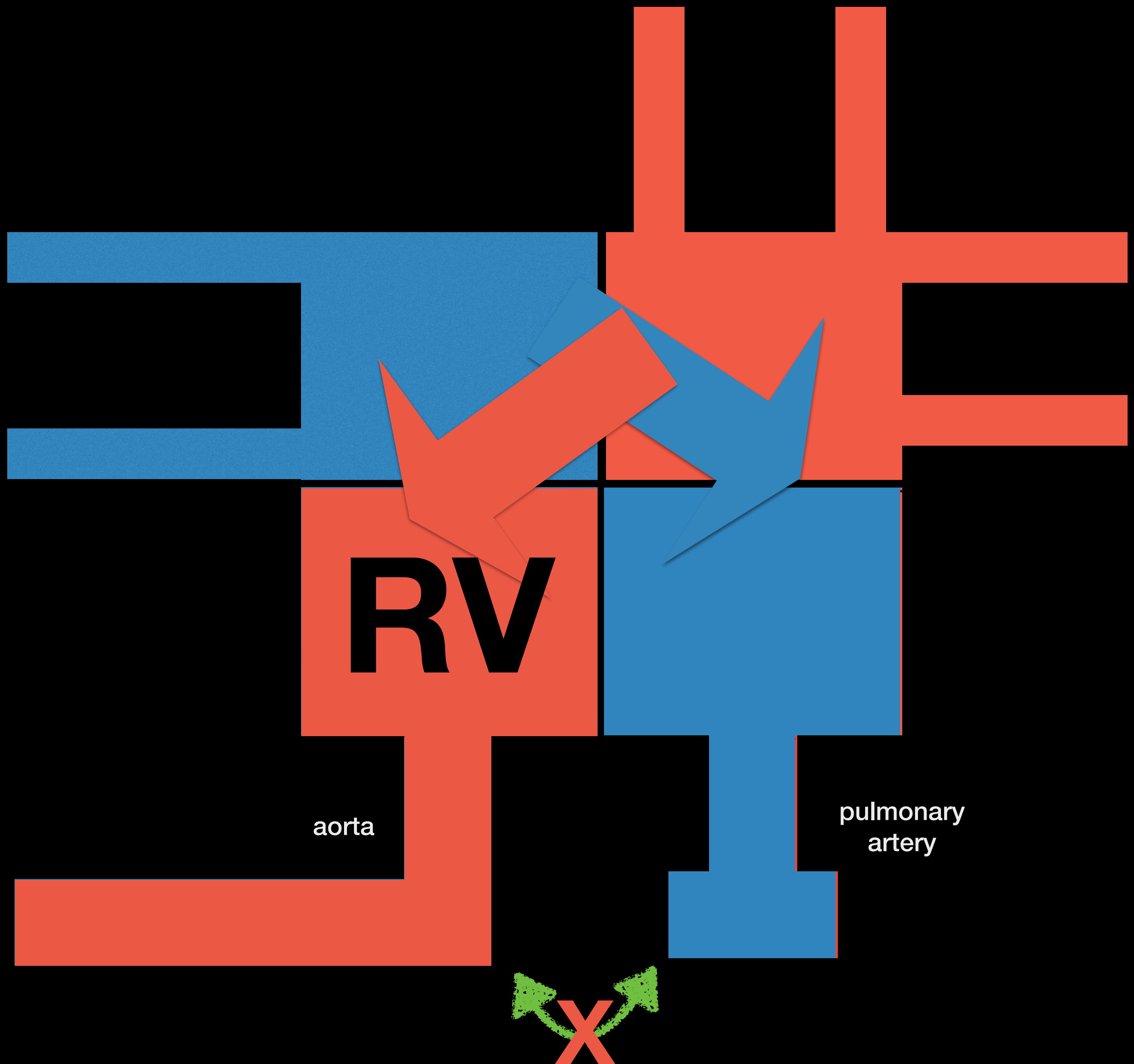




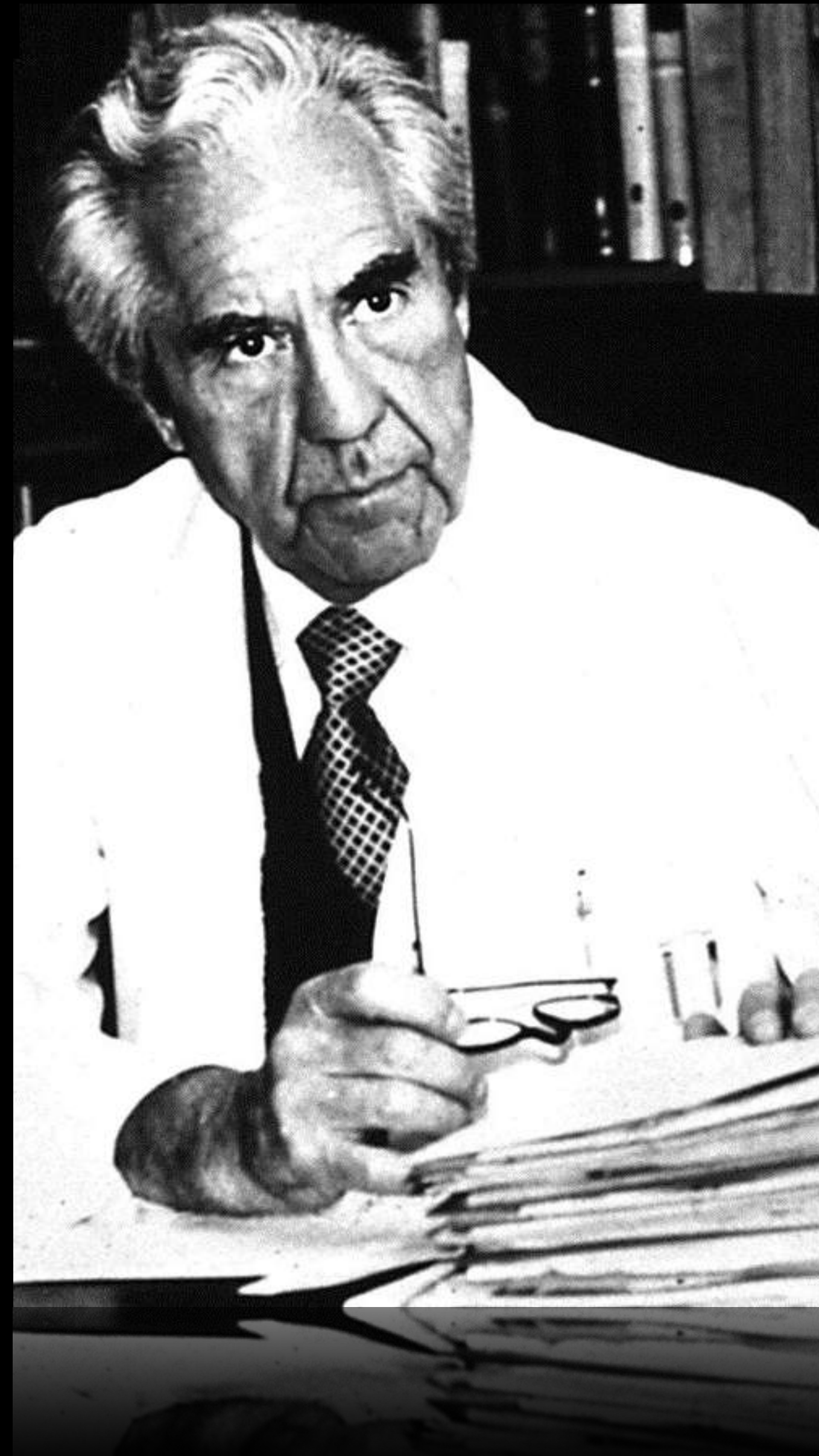
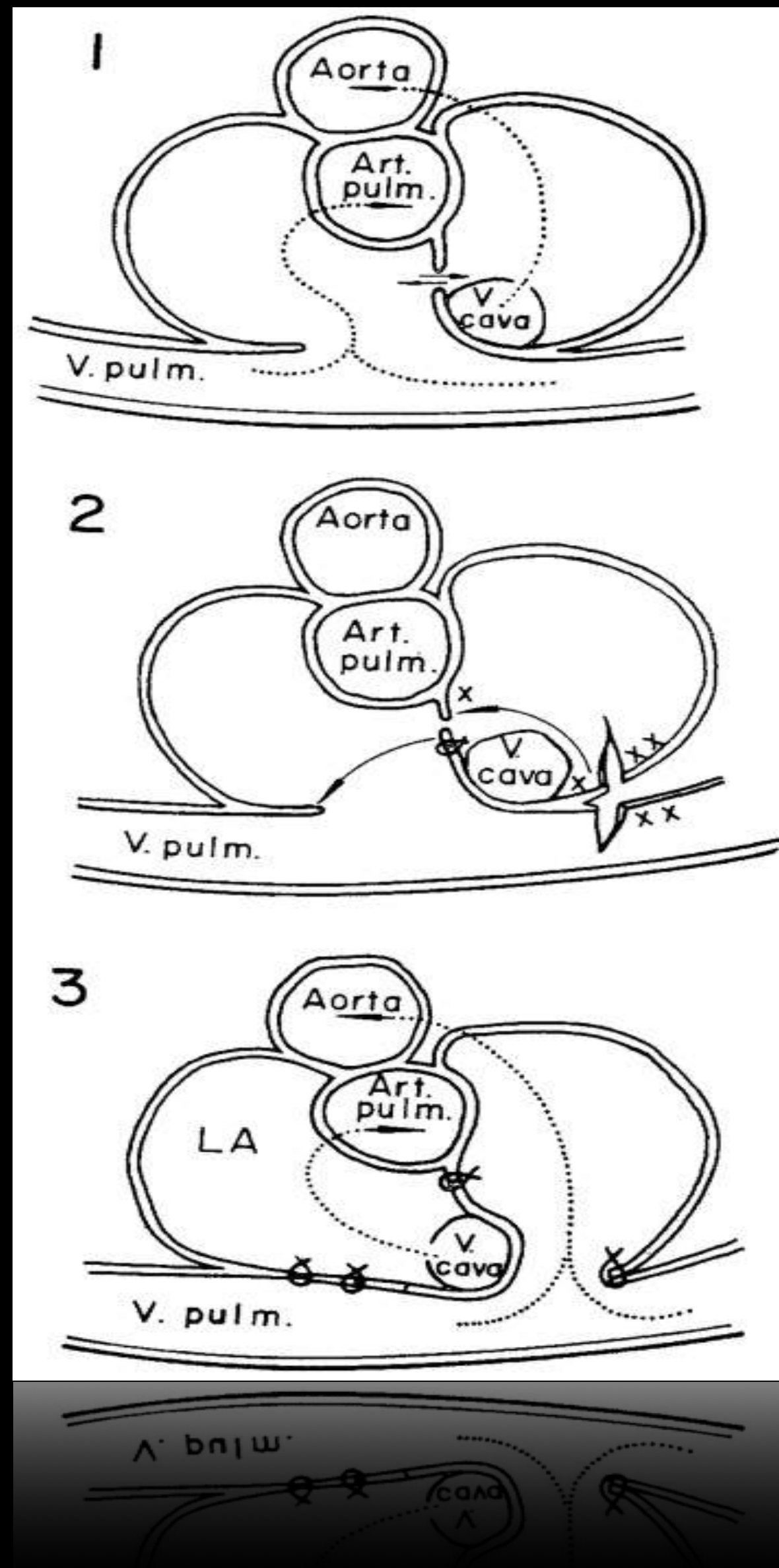






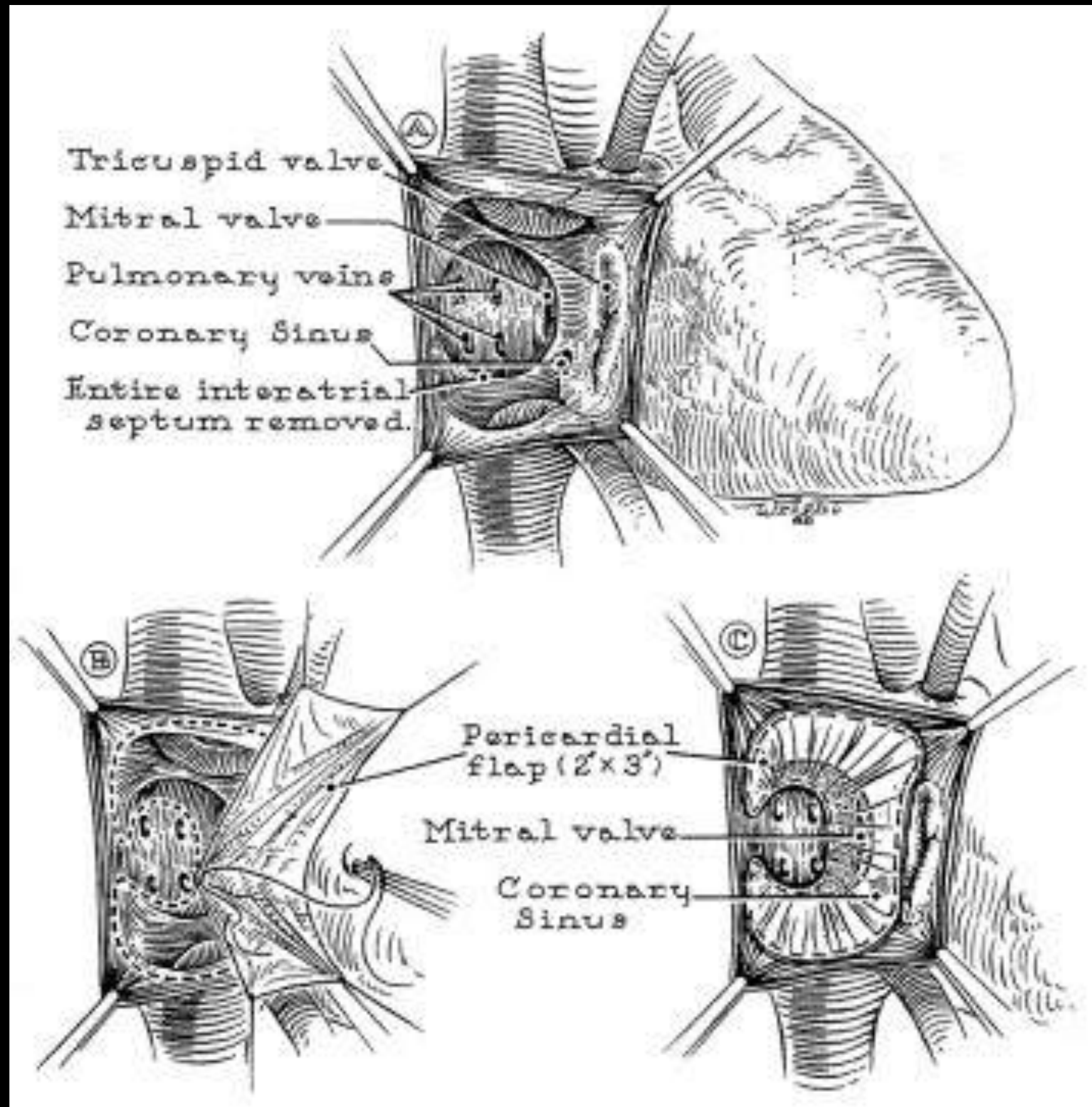


Senning procedure, Stockholm, 1957



Ake Senning
1915-2000

Mustard procedure, Toronto, 1963



William Mustard 1914-1987



1966

1966



Daily Mirror

BRADY AND HINDLEY GO TO JAIL FOR LIFE

'Calculated, cruel murders,' says judge

WATERY BEAR UPSETS AN MP



IAN BRADY



MYRA HINDLEY



Daily Mirror

BRADY AND HINDLEY GO TO JAIL FOR LIFE

'Calculated, cruel murders,' says judge

WATERY BEAR UPSETS AN MP



IAN BRADY



MYRA HINDLEY



IAN BRADY **MYRA HINDLEY**

These infamous members of the Moors Murders, who killed the young Martin (above) and his friend, were hanged in 1964



William Rashkind (Philadelphia)

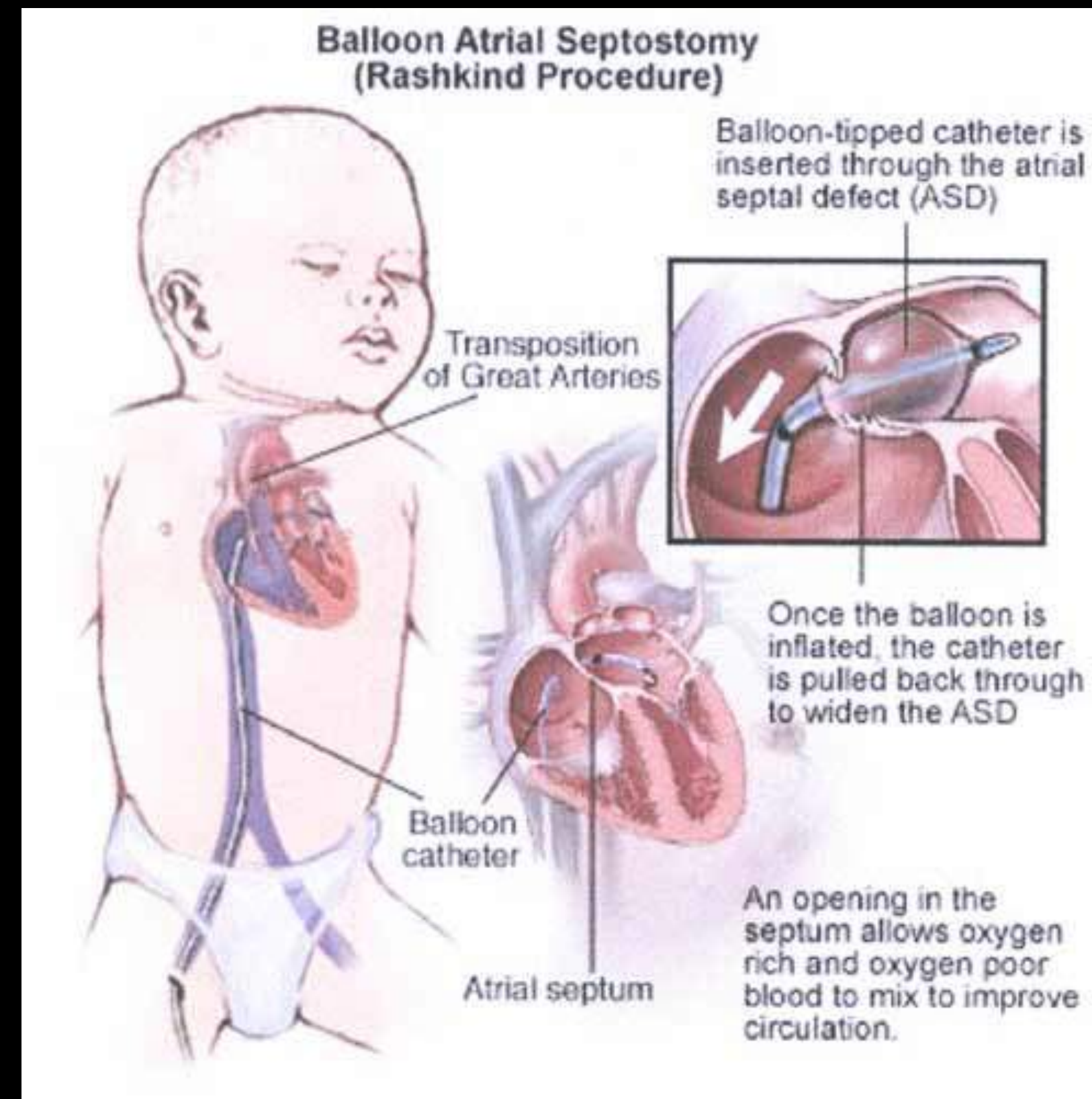
1966



<http://users.skynet.be/bbnc/hartafw/Rashkind.jpg>

William Rashkind (Philadelphia)

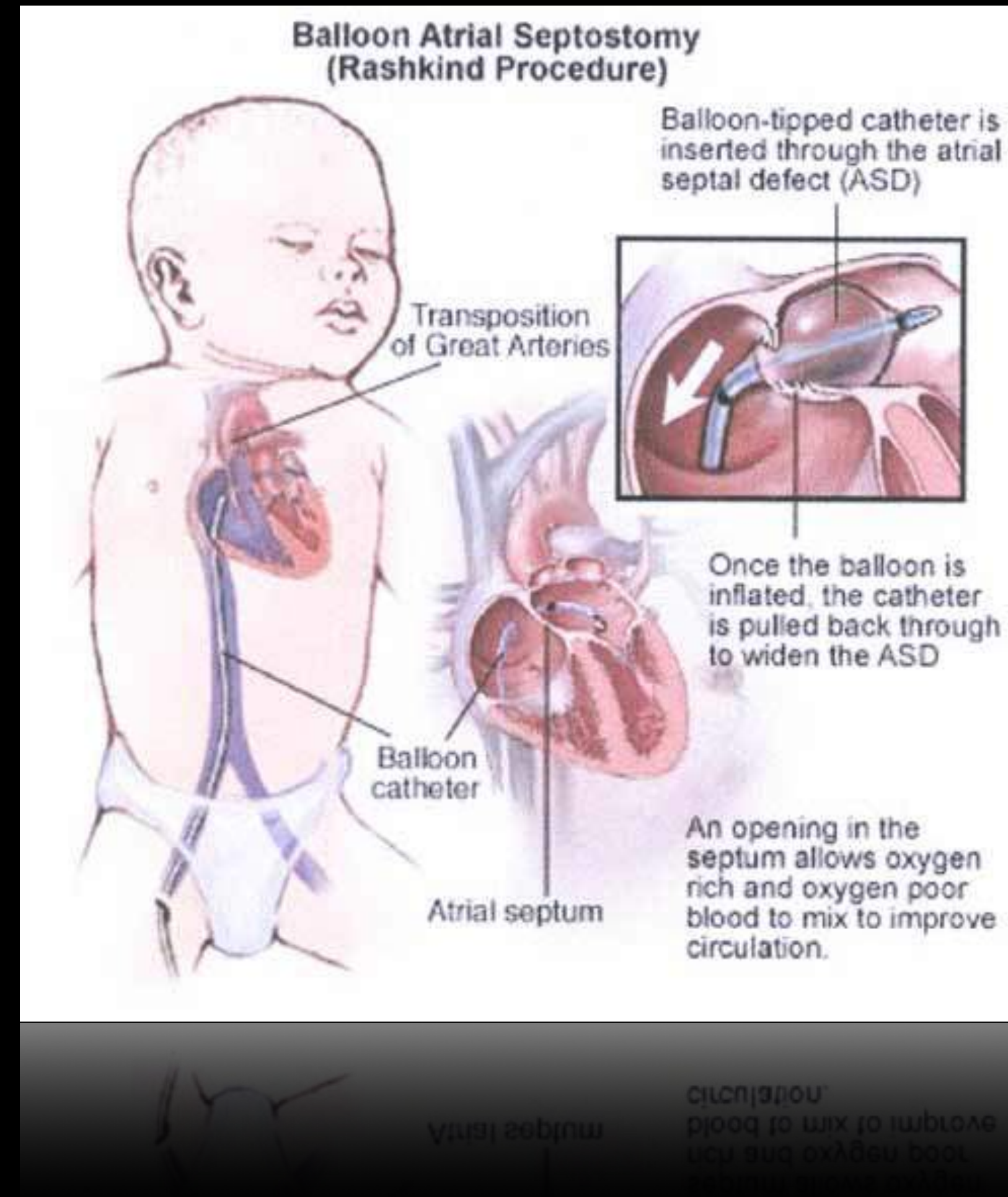
1966



<http://users.skynet.be/bbnc/hartafw/Rashkind.jpg>

William Rashkind (Philadelphia)

1966

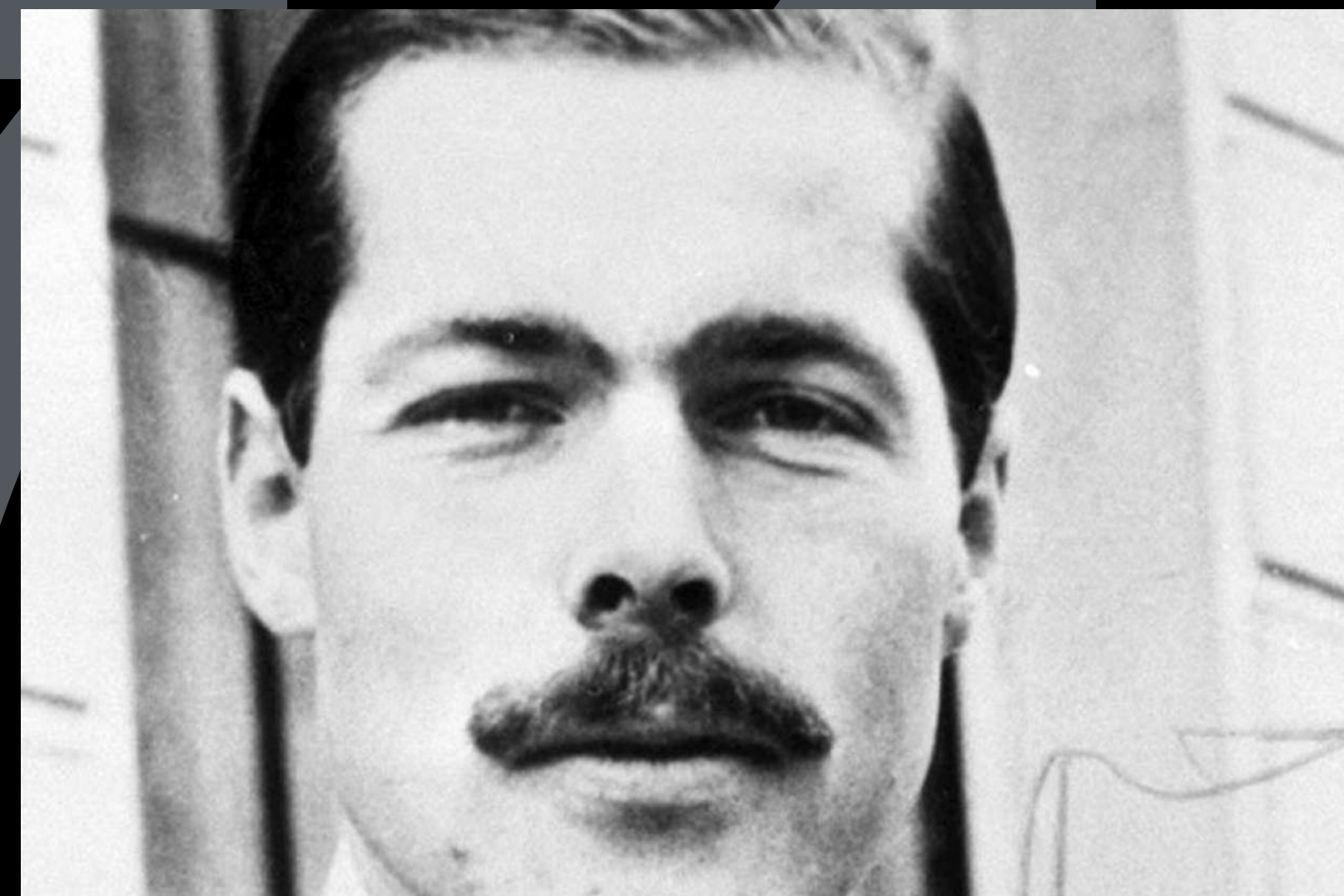


“It’s not the science,
it’s **the jerk on the
end of the catheter**
that matters”

1974



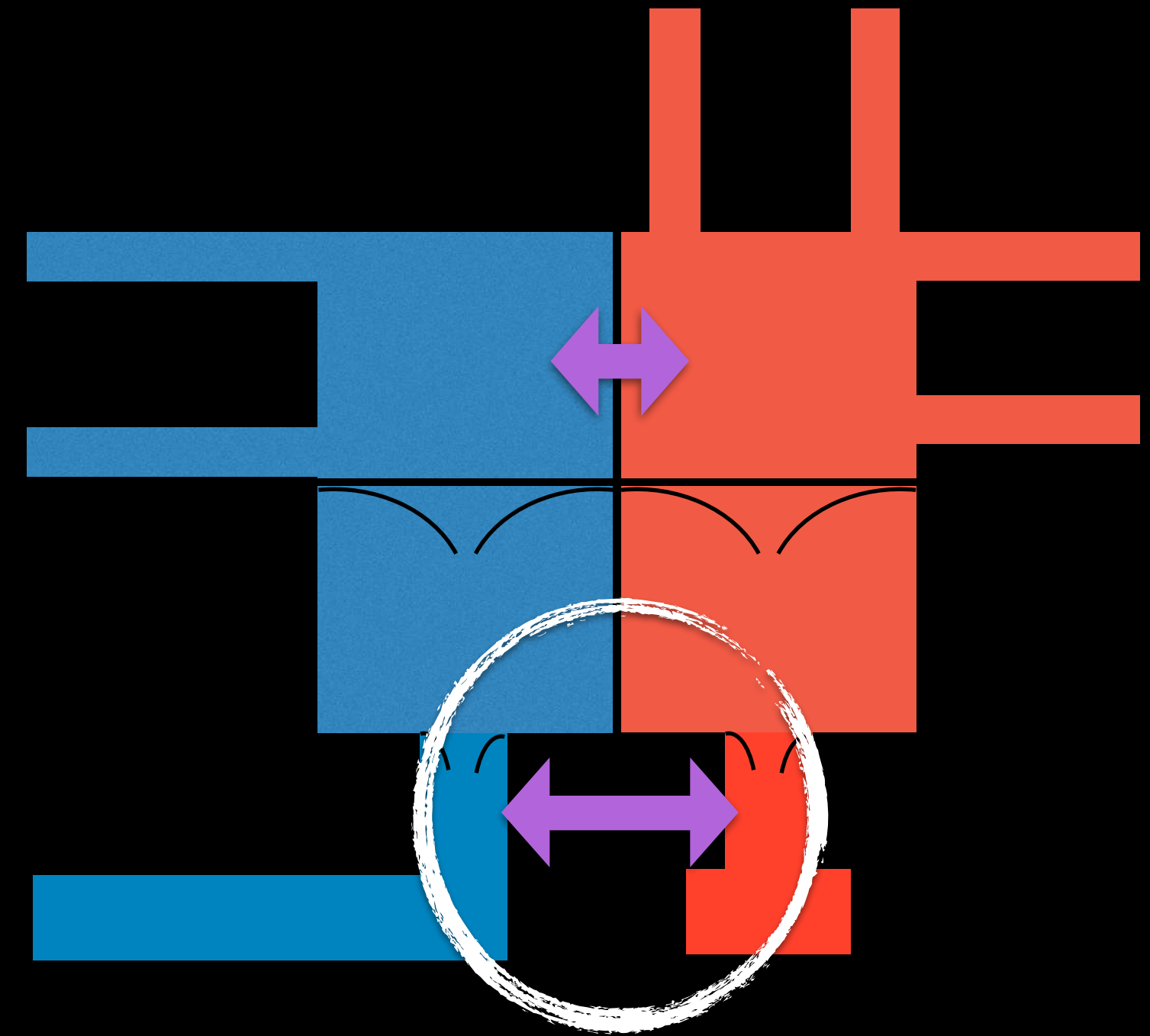
The detective who got the man







Prostaglandin E1



By the mid-1980's
Senning > Mustard

Mortality < 5%

By the mid-1980's
Senning > Mustard

Mortality < 5%

BUT

By the mid-1980's
Senning > Mustard

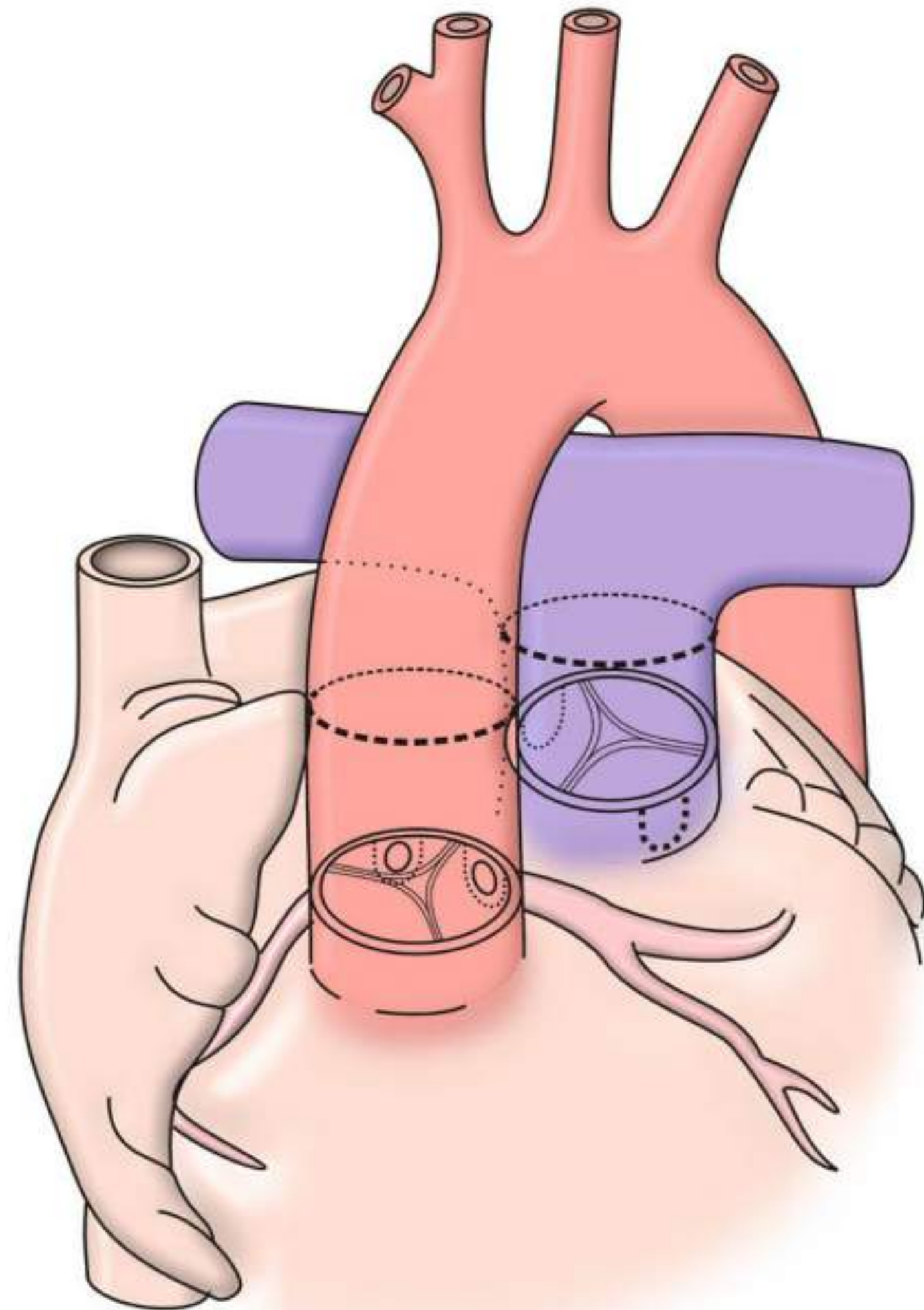
Mortality < 5%

Pre-op (delay)

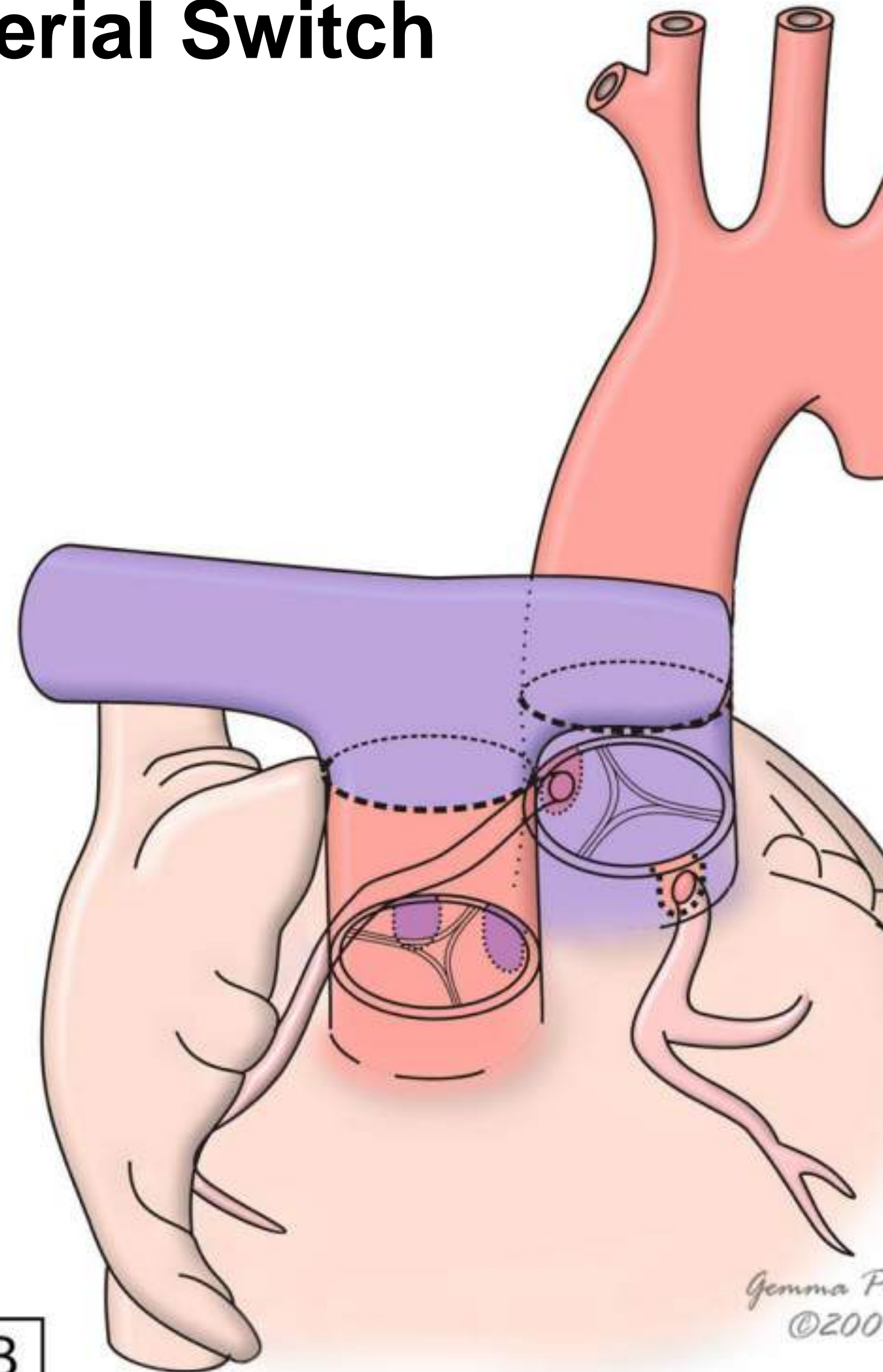
BUT

Late (RV)

Switching the Outlets; the Arterial Switch



A



B

Gemma P
©2007

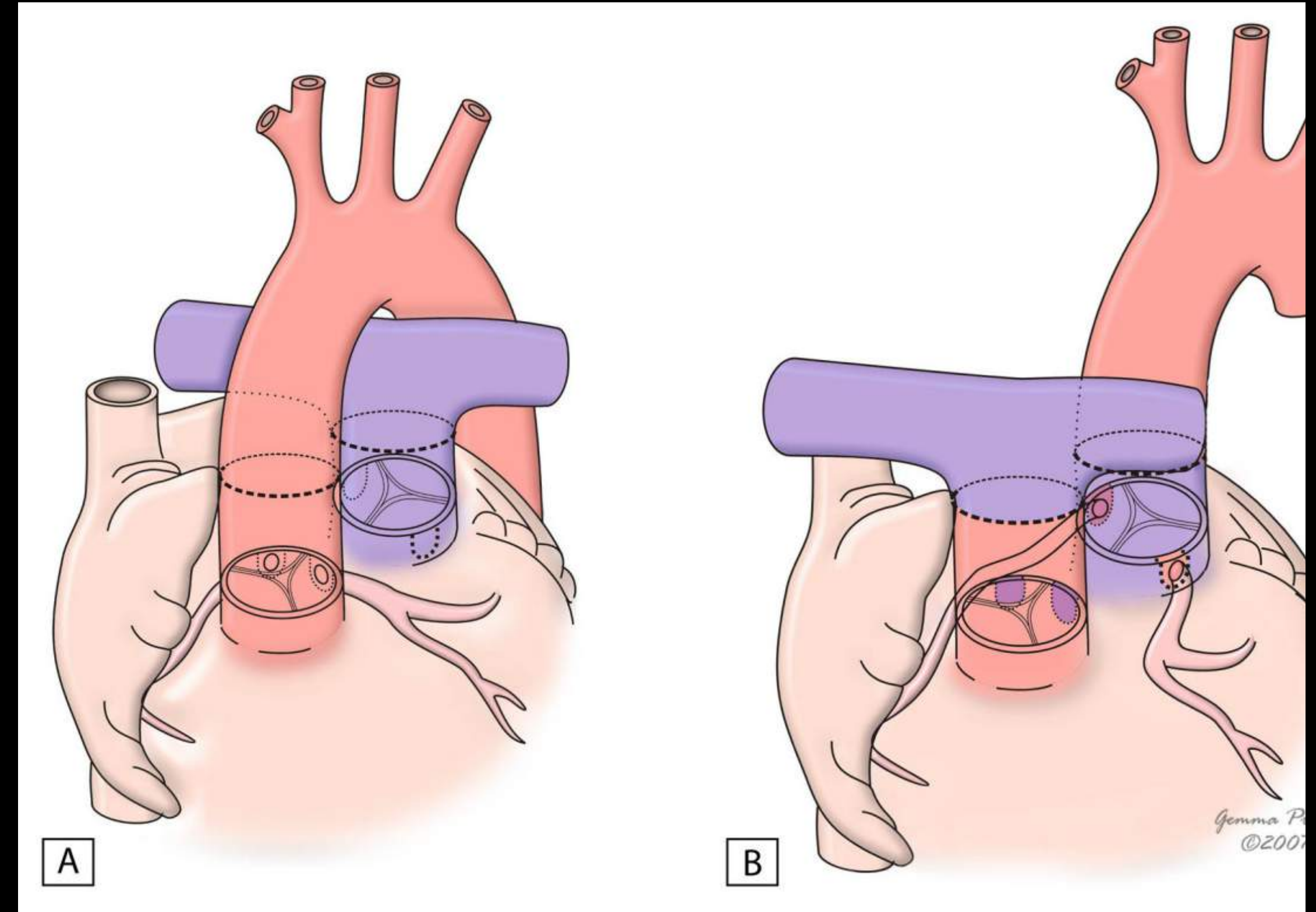
A

B

1982



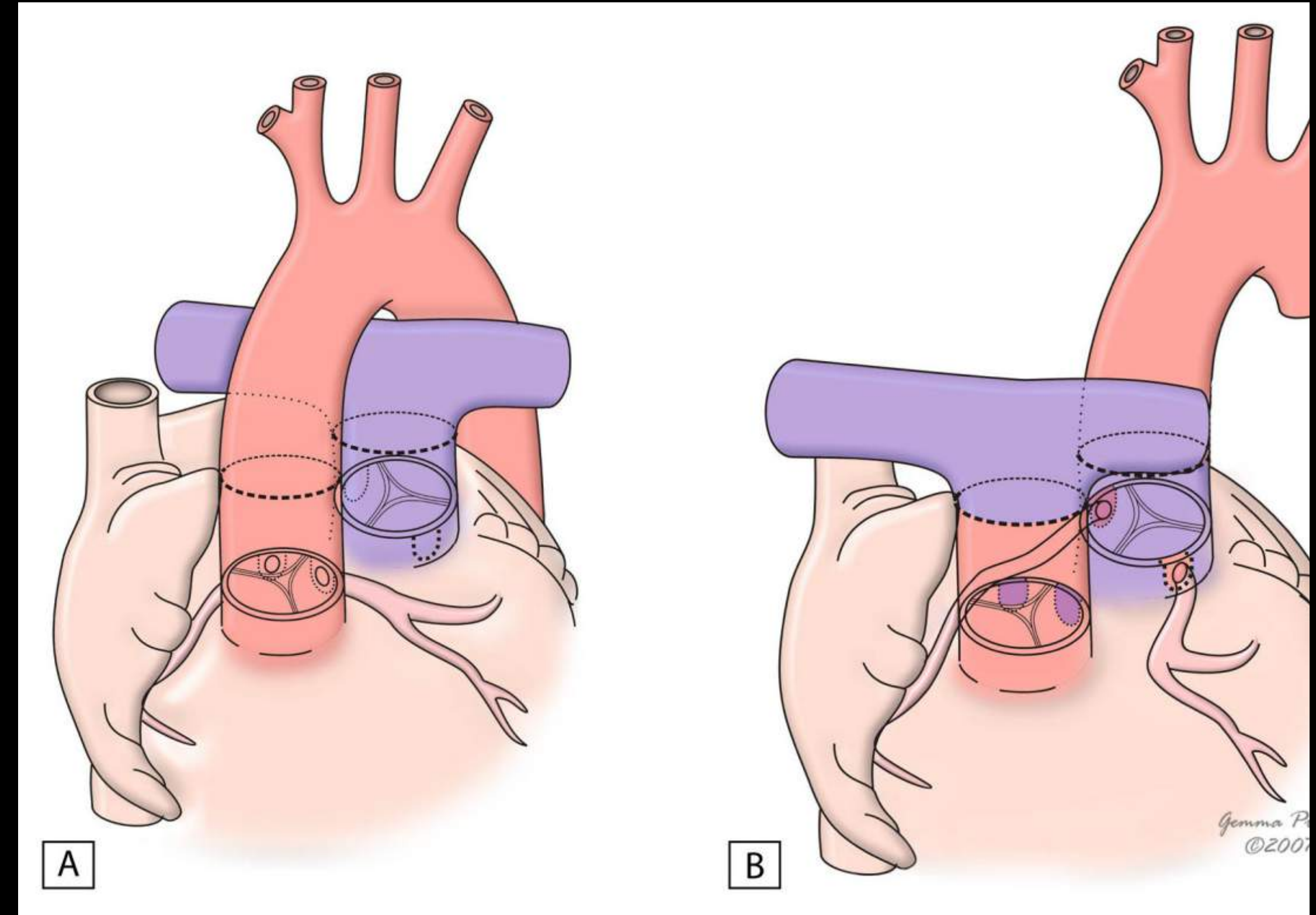
Adib Jatene (Sao Paulo)



A

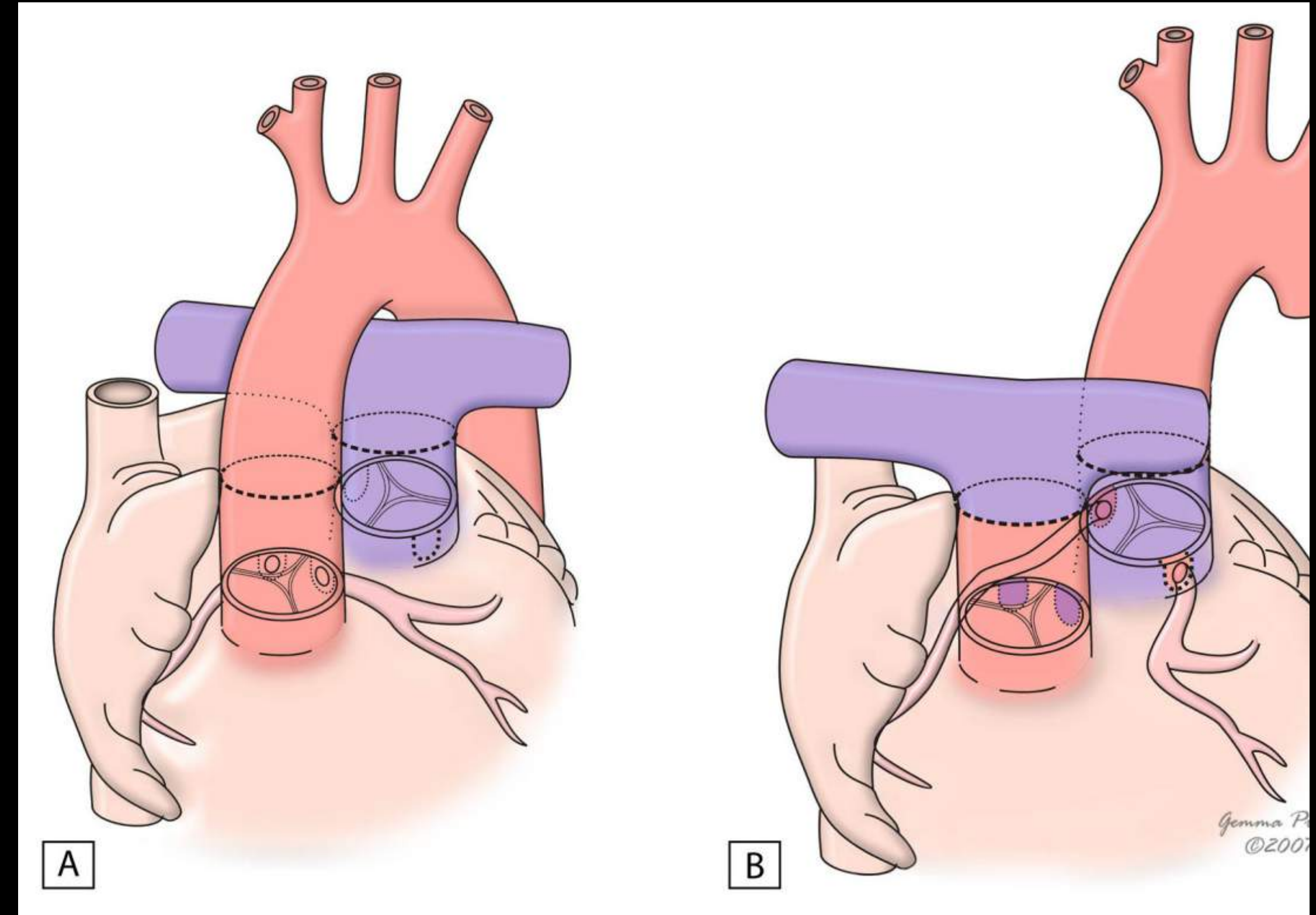
B

Adib Jatene (Sao Paulo)



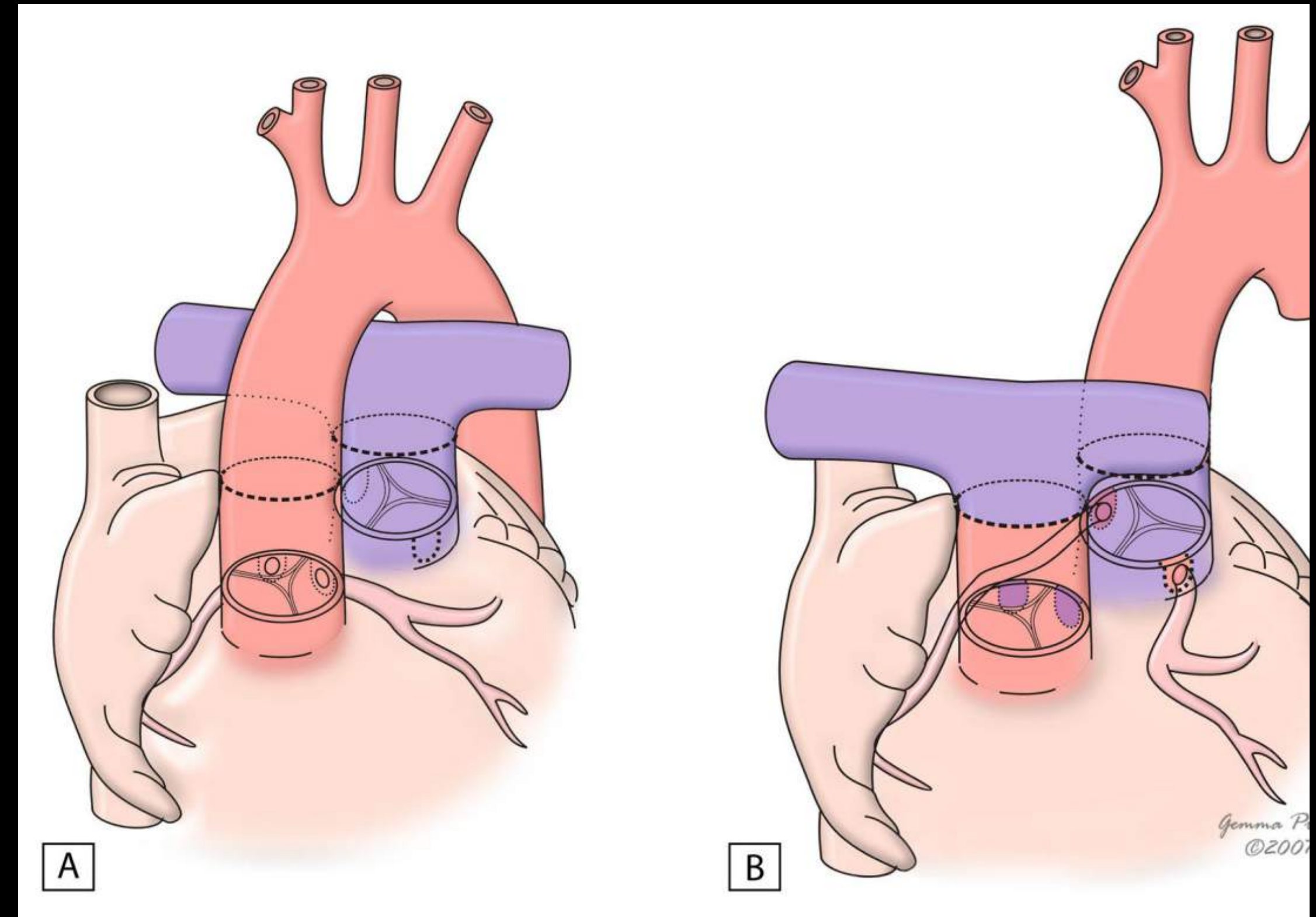
Yacoub, Planché, Casteneda, Mee, de Leval, Brawn and others

Adib Jatene (Sao Paulo)



> 30% Yacoub, Planché, Casteneda, Mee, de Leval, Brawn and others

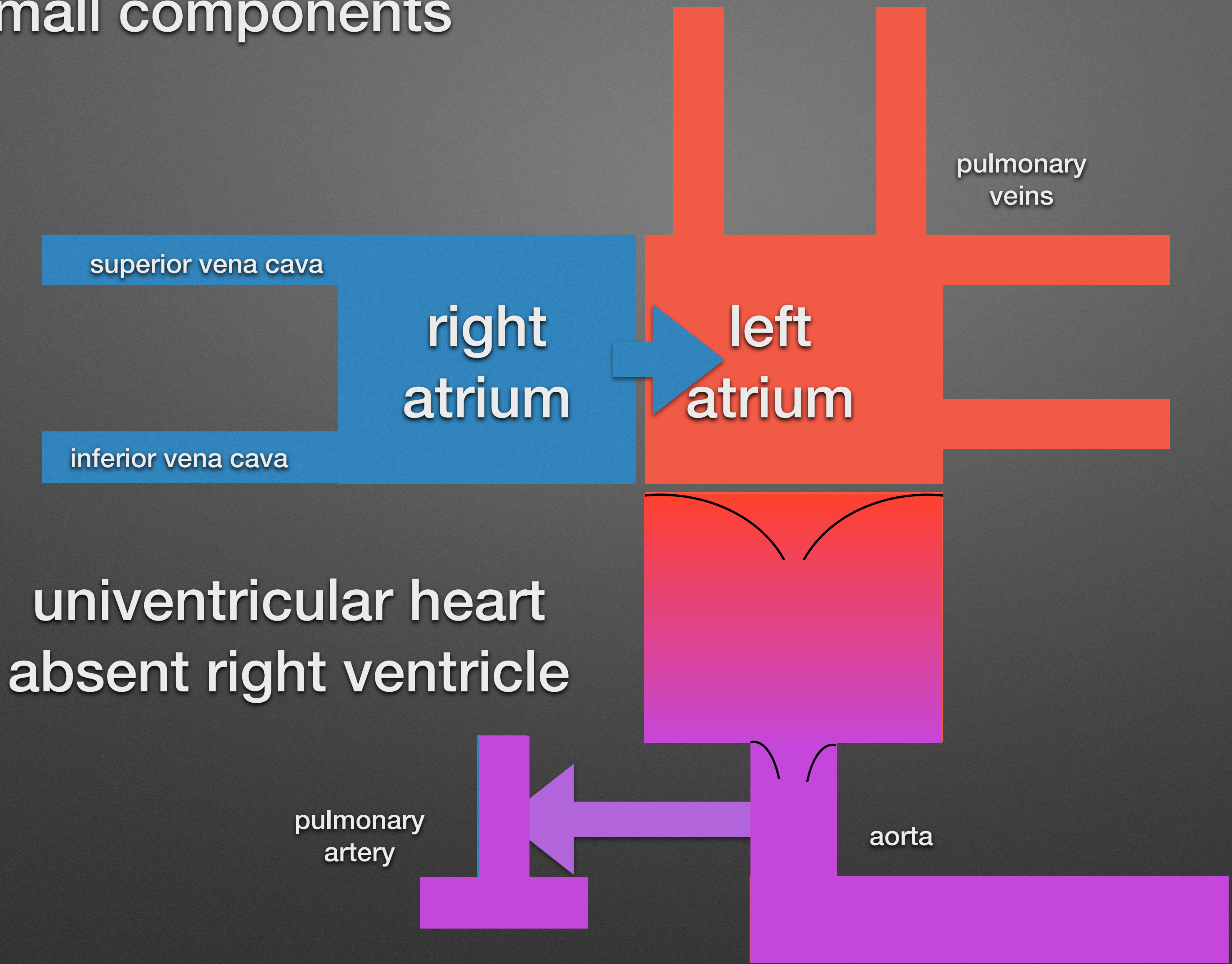
Adib Jatene (Sao Paulo)



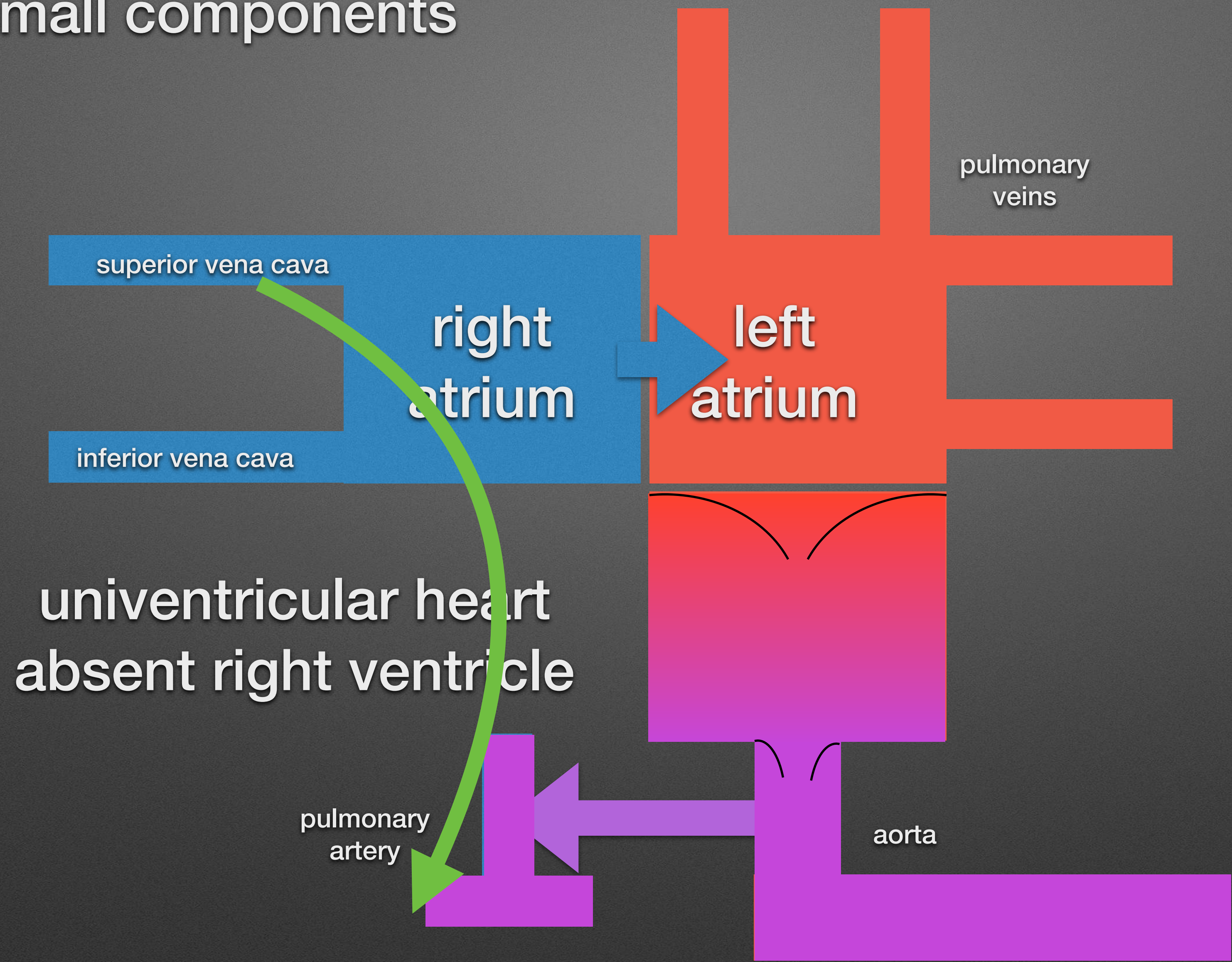
> 30% Yacoub, Planché, Casteneda, Mee, de Leval, Brawn and others

> 2%

missing or small components



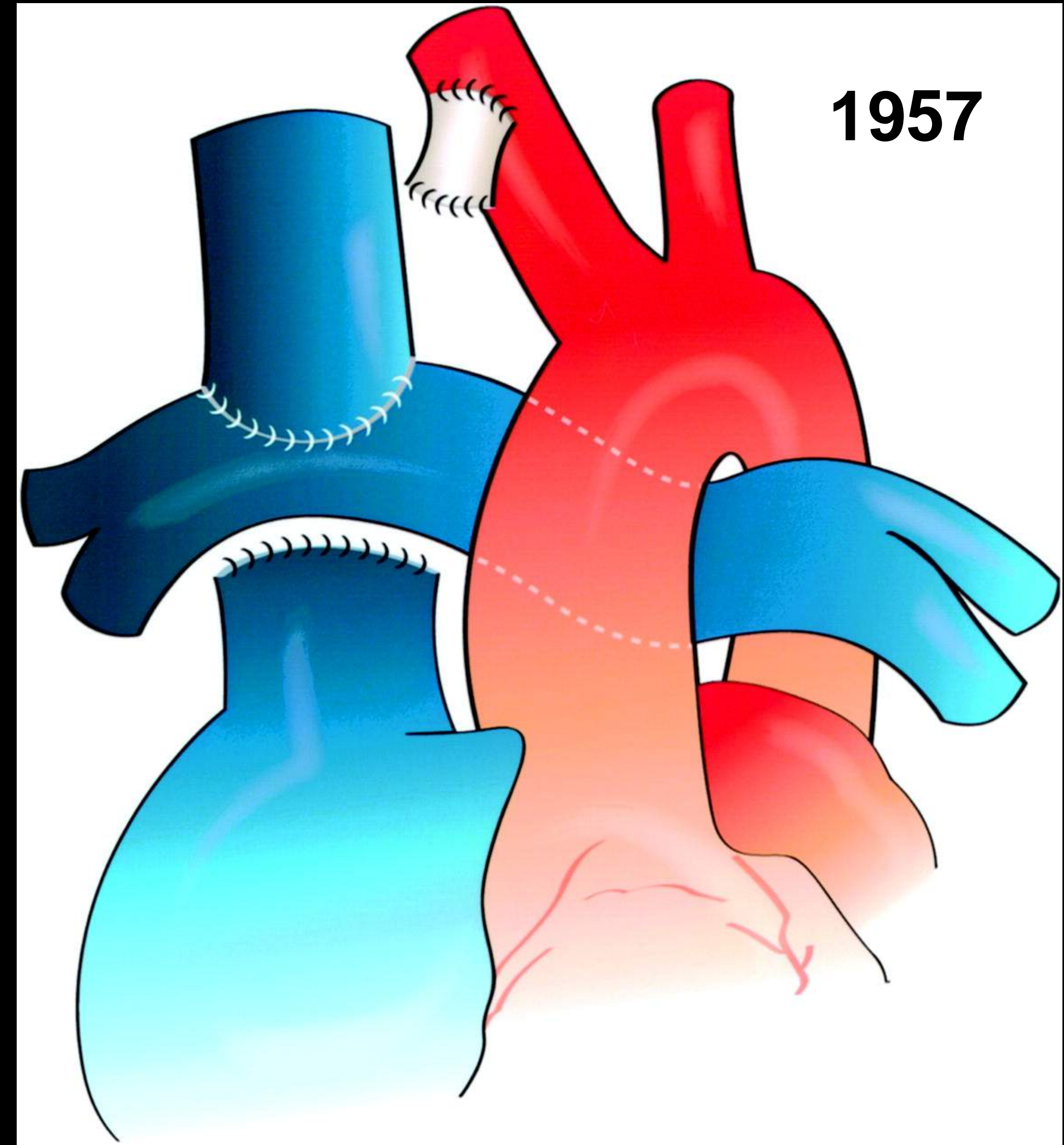
missing or small components



William Glenn (Yale)



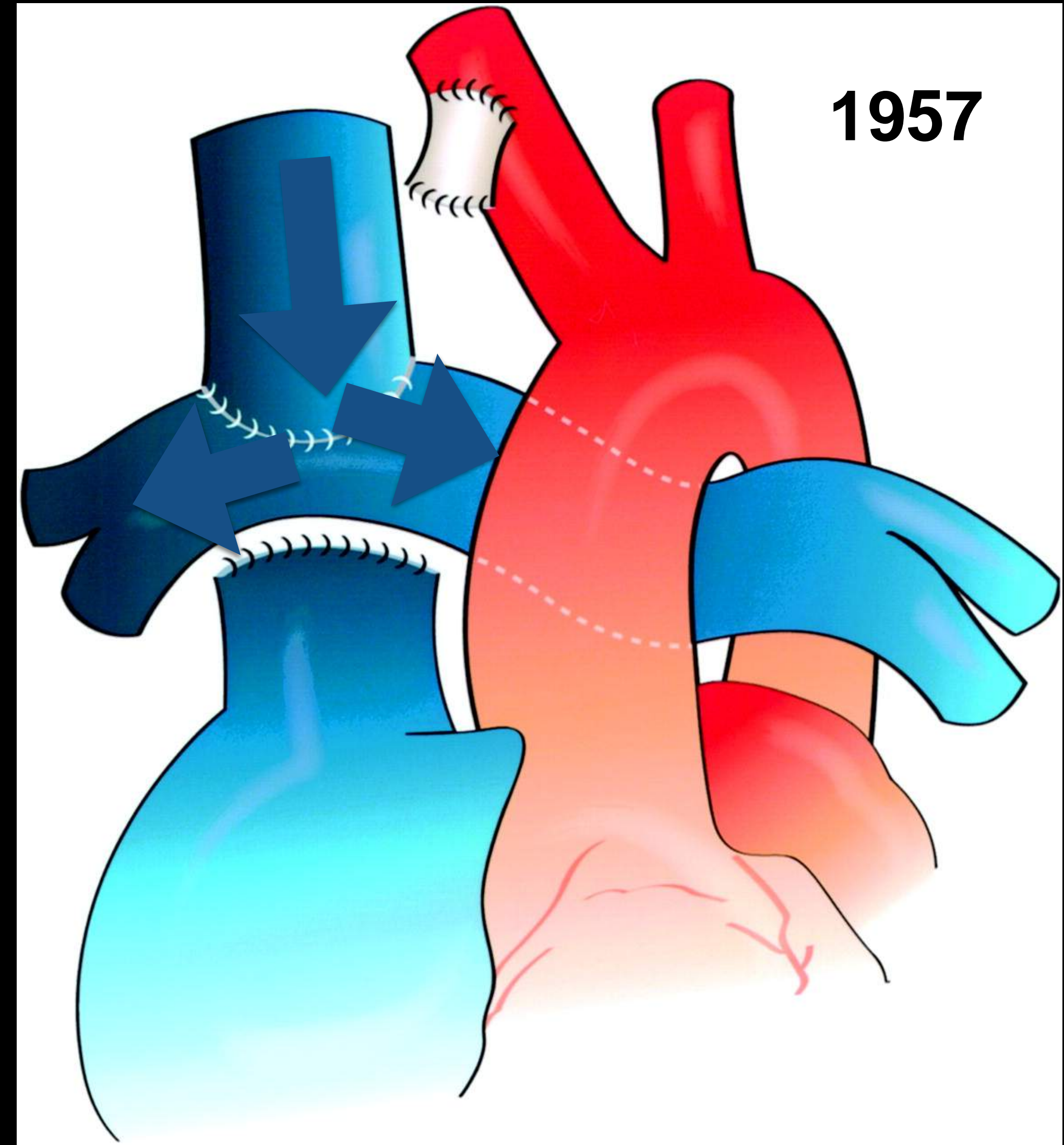
<http://www.averybiomedical.com/images/williamGlenn.gif>



William Glenn (Yale)



<http://www.averybiomedical.com/images/williamGlenn.gif>



1968

Robert Kennedy lies with a bullet in his head—and a supporter cries...

GOD! NOT AGAIN!



SPRAWLED on a hotel floor the Senator Robert Kennedy... shot there suddenly in the moment of greatest triumph. Emotion before his face was slight with grief, jubilation, the happiness of a young man who truly felt he was living his life in a glorious cause. Then, killed by a

gunman's bullet, he lay with his face upward, his eyes... regarding only heaven, as if he were waiting for a final judgment. We did not know... the instant knew in the heart of that moment in Los Angeles early yesterday. "God! Not again!"

JOHN PILGER, the Mirror's journalist of the hour, and GEORGE GALE, the Mirror's columnist, were in the hotel. Pilger's report is on the back page. Gale's is on page 2.

DR. KING FATALLY SHOT BY ASSASSIN IN MEMPHIS

U.S. Shocked, Saddened by Slaying, Johnson Says

Memphis, 12.15 am

ANGUISH VOICED BY U.S. LEADERS

WASHINGTON (AP) — President Lyndon B. Johnson today said the assassination of Dr. Martin Luther King Jr. was a "terrible tragedy" and a "national disaster."

Shock, Grief, In Knoxville Violence Fanned

King was in Memphis to lead a march for the civil rights of Negroes. He was shot as he walked down a city street.

King was shot as he walked down a city street.

There also was fear that the slaying would lead to more violence.

The President appeared in the company of his wife and children in the White House.

"I feel today's tragedy is a tragedy," he said. "We cannot let this tragedy lead to more violence."

The President urged people to pray and to refrain from violence.

He said he hoped all Americans would join in prayer for the people of Memphis.

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DR. MARTIN LUTHER KING
Killed by a Bullet Felt by King, Graham

King: Been to Mountaintop No Matter What Happens

NEGROES SMASH AUTO WINDOWS

Jackie Stone of Dover shot in News of Death

AN ASSASSIN, WHO SHOT King, Was Killed

One Hour After Slaying, Images Received

By DOUG STONE

MEMPHIS, Tenn., (AP) — Dr. Martin Luther King Jr. today was shot as he walked down a city street.

King, 39, was shot in the back as he walked down a city street.

There also was fear that the slaying would lead to more violence.

The President appeared in the company of his wife and children in the White House.

"I feel today's tragedy is a tragedy," he said. "We cannot let this tragedy lead to more violence."

The President urged people to pray and to refrain from violence.

He said he hoped all Americans would join in prayer for the people of Memphis.

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He said he hoped all Americans would join in prayer for the people of Memphis.



Robert Kennedy lies with a bullet in his head—and a supporter cries...

GOD! NOT AGAIN!



SPRAWLED as he died, Sen. Robert Kennedy lay on the ground, surrounded by people, with a large American flag draped over him. The assassination of the senator, who was shot in the head, ended a campaign for the Democratic nomination for the 1968 presidential election.

DR. KING FATALLY SHOT BY ASSASSIN IN MEMPHIS

U.S. Shocked, Saddened by Slaying, Johnson Says

ANGUISH VOICED BY U.S. LEADERS

WASHINGTON (AP)—President Lyndon B. Johnson said today he was shocked and saddened by the assassination of Dr. Martin Luther King Jr. in Memphis, Tenn., last night.

Johnson said he had been informed of the killing at 10:50 p.m. and that he had immediately called for a moment of national mourning.

He said he had also called for a moment of silence for the slain leader.

Johnson said he was "deeply shocked and saddened" by the killing.

He said he had also called for a moment of national mourning.

He said he had also called for a moment of silence for the slain leader.



DR. MARTIN LUTHER KING

King: Been to Mountaintop No Matter What Happens

NEGROES SMASH AUTO WINDOWS

One Hour After Slaying, Images Revealed

By DONALD STONE

MEMPHIS, Tenn. (AP)—A black and white photograph of Dr. Martin Luther King Jr. lying on the ground, surrounded by people, was shown today on television.

The photograph was taken by a newsman who was standing near the site of the killing.

The photograph was shown on television at 11:30 p.m.

The photograph was shown on television at 11:30 p.m.



JIMI HENDRIX EXPERIENCE

SUNDAY, MARCH 31 8 P.M.

ARENA 46th and MARKET STS.

also

SOFT MACHINE and WOODYS TRUCK STOP

TICKETS ON SALE

ARENA BOX OFFICE
ELECTRIC FACTORY, 22nd Arch St.
GLASSMAN'S, 13th and Locust Sts.

CENTRAL CITY TICKET OFFICE,
1422 Chestnut St.

QIMBELS-JOHN WANAMAKER STORES

MAIL ORDERS
ELECTRIC FACTORY, 2201 Arch St.

Admission \$3.00-\$4.00 \$5.00

An epic drama of adventure and exploration

2001: a space odyssey

20th Century Fox Film Corporation

22:00
23:00-24:00
Admission

2106
14000

Daily Mirror

LOS ANGELES, WEDNESDAY, 12.15 am

Robert Kennedy lies with a bullet in his head—and a supporter cries...

GOD! NOT AGAIN!

SPRAWLED on a hotel floor, the Senator, Robert Kennedy, lay motionless, his head bleeding from a bullet wound. A crowd of people gathered around him, some crying, others shouting. The scene was chaotic and heartbreaking.

DR. KING FATALLY SHOT
BY ASSASSIN IN MEMPHIS

U.S. Shocked, Saddened by Slaying, Johnson Says

U.S. Shocked, Saddened by Slaying, Johnson Says

ANGUISH VOICED BY U.S. LEADERS

Stocks, Great, In Reaction Violence Fanned

Dr. Martin Luther King Jr. was shot and killed in Memphis, Tenn., today, after a day of rioting and looting. The assassination of the civil rights leader has shocked the nation and set off a wave of violence in several cities.

JIMI HENDRIX EXPERIENCE

SUNDAY, MARCH 31 8 P.M.

ARENA 46th and MARKET STS.

also SOFT MACHINE and WOODYS TRUCK STOP

Admission \$3.00 - \$4.00 \$5.00

TICKETS ON SALE ARENA BOX OFFICE ELECTRIC FACTORY, 22nd Arch St. GLASSMAN'S, 13th and Locust St. CENTRAL CITY TICKET OFFICE, 1422 Chestnut St. GIMBELS-JOHN WANAMAKER STORES MAIL ORDERS ELECTRIC FACTORY, 2201 Arch St. P.O. Box 1000

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An epic drama of adventure and exploration

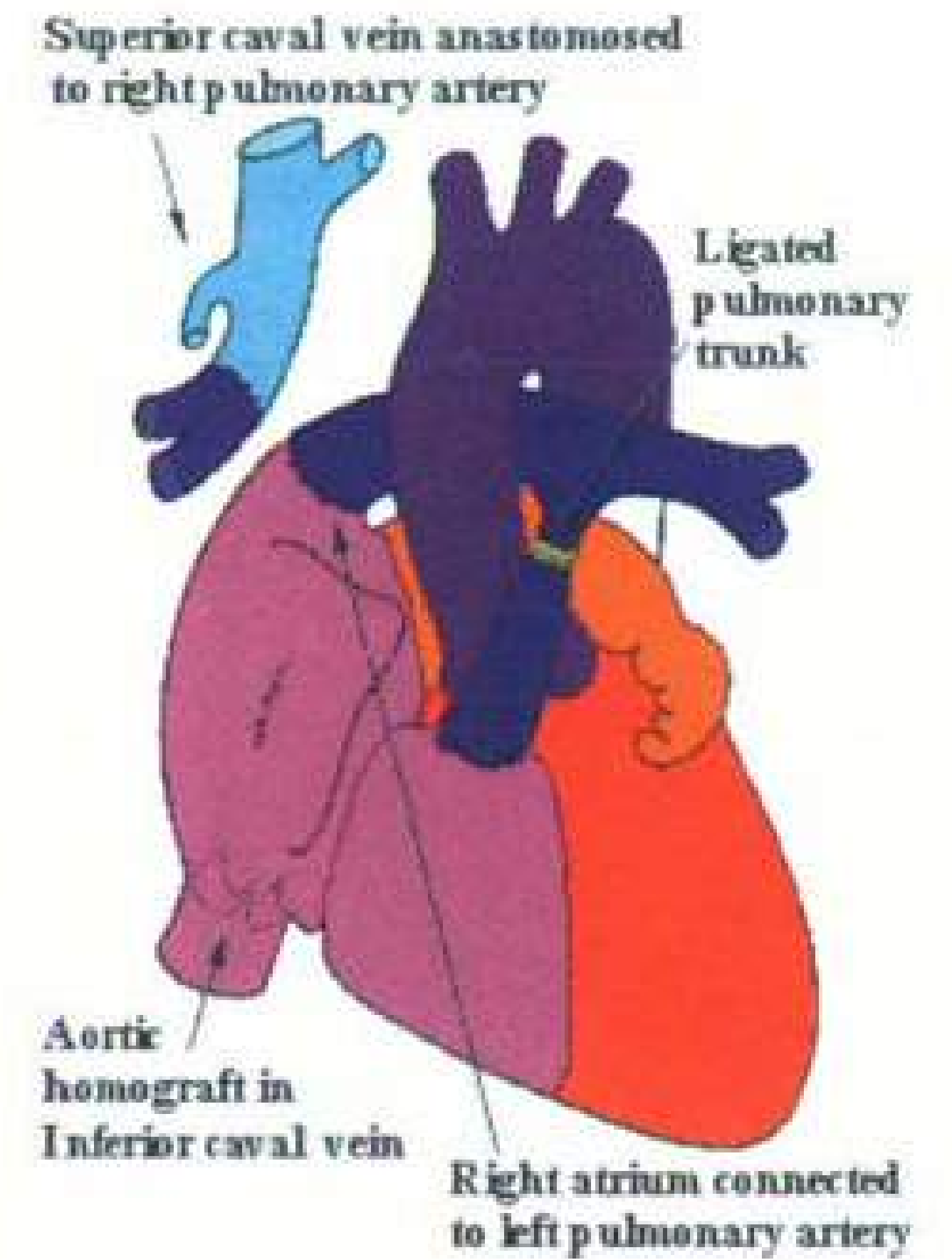
2001: a space odyssey

MAI 68

DEBUT D'UNE LUTTE PROLONGEE

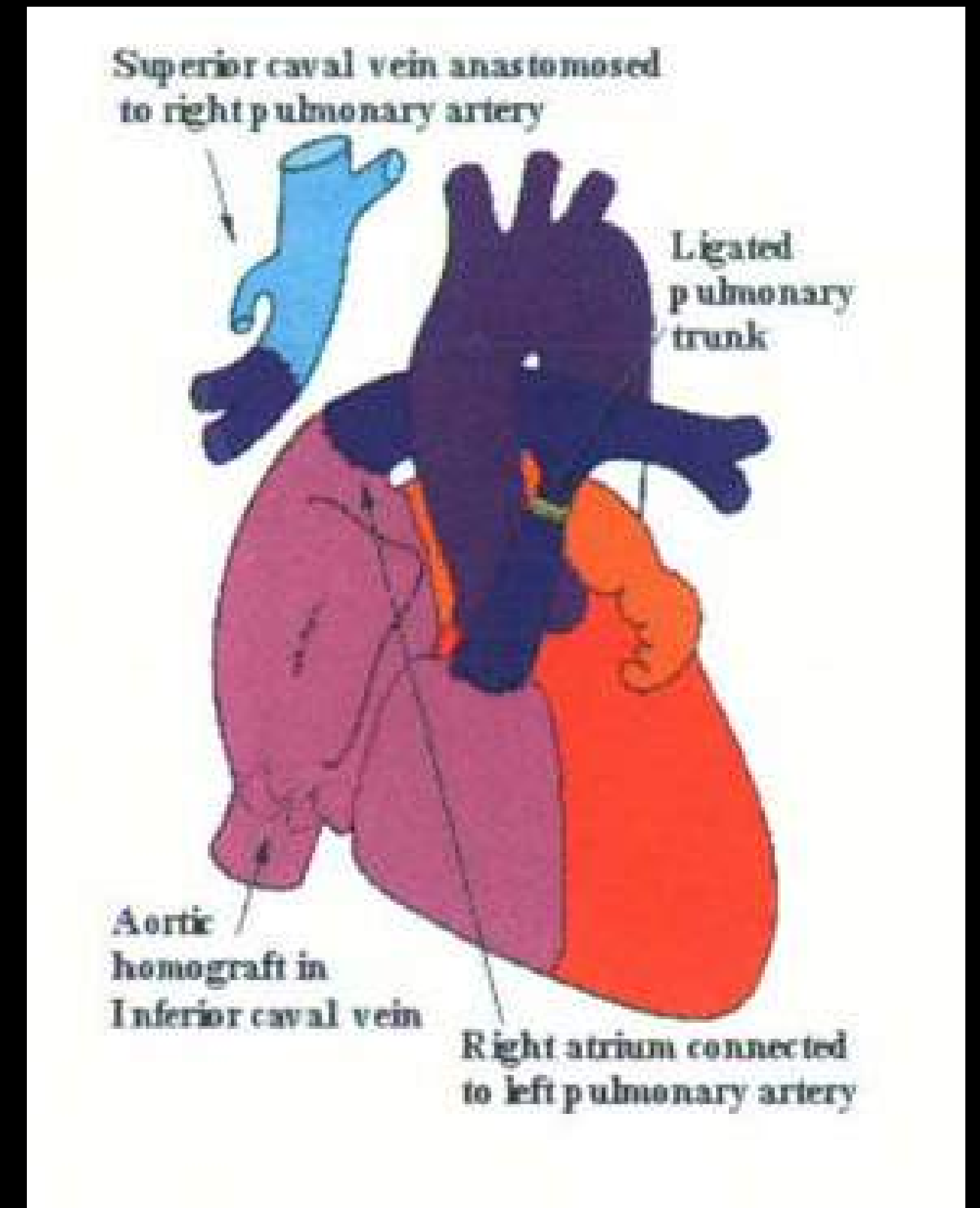
ВЪОГОМЦЕЕ

Francis Fontan (Bordeaux)



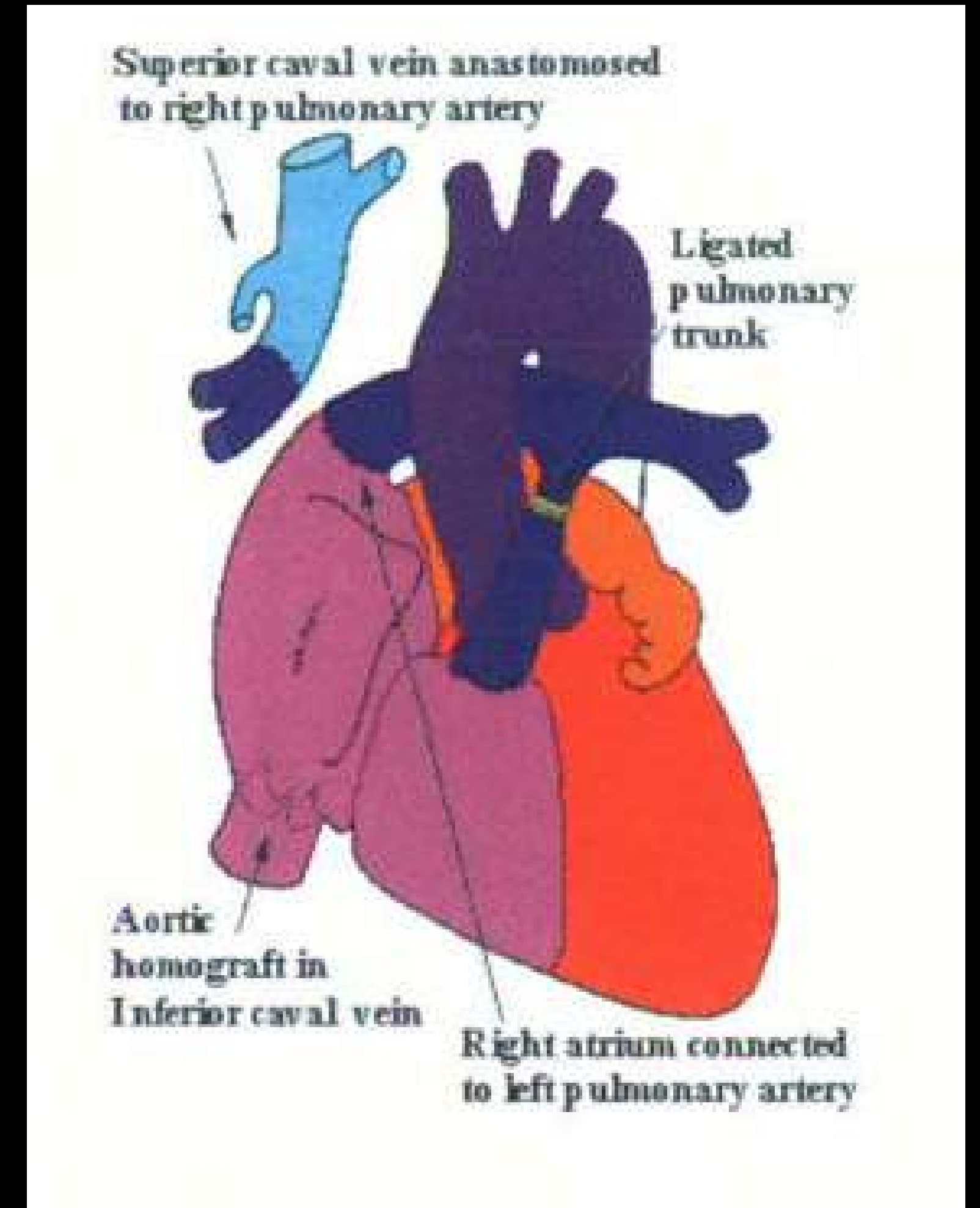
10 km h παρουσία σελίδα
10 km h παρουσία σελίδα

Francis Fontan (Bordeaux)



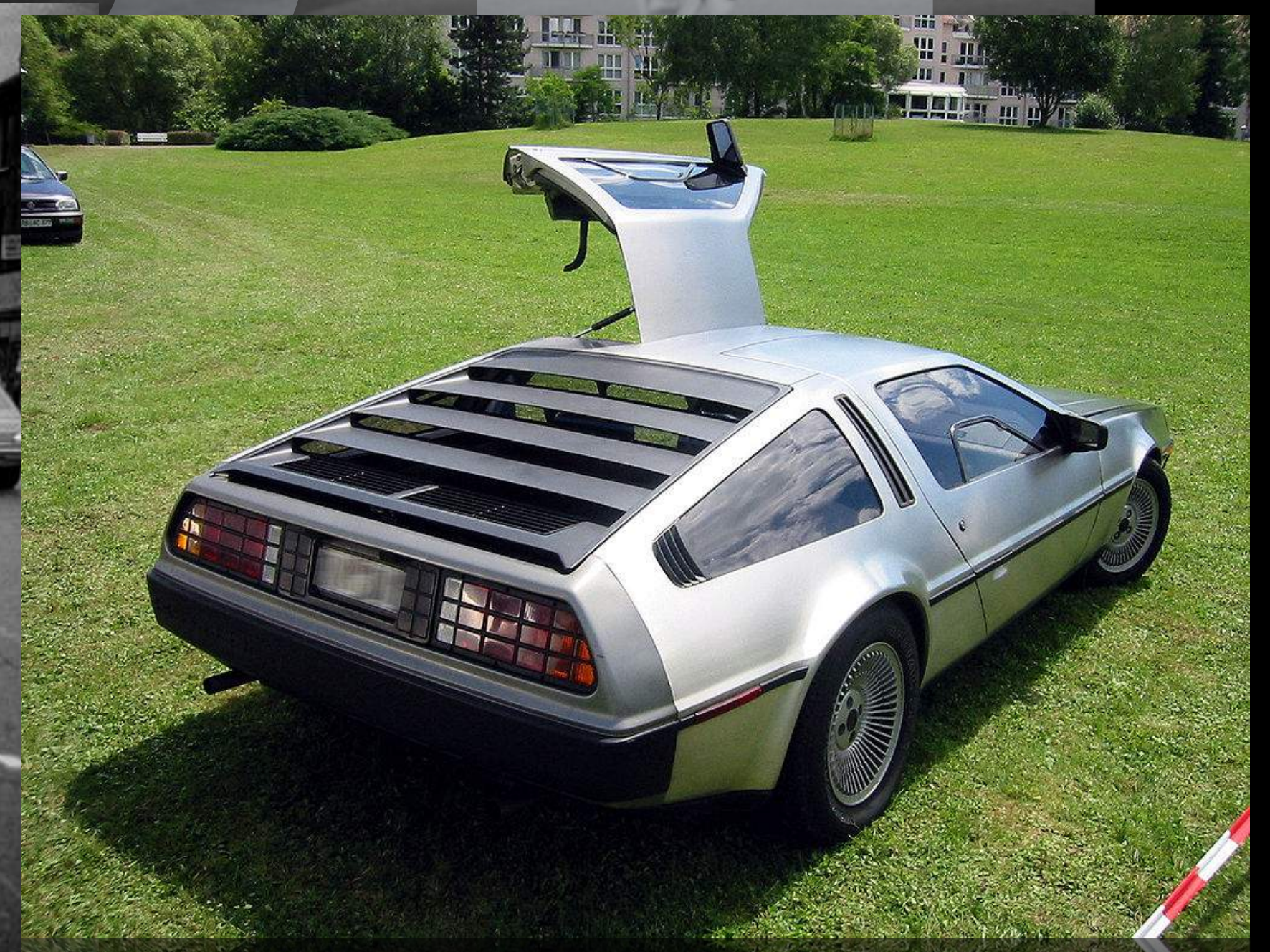
He was trusted to do this by his boss, Broustet, despite it never having been done before

Francis Fontan (Bordeaux)



He was trusted to do this by his boss, Broustet, despite it never having been done before

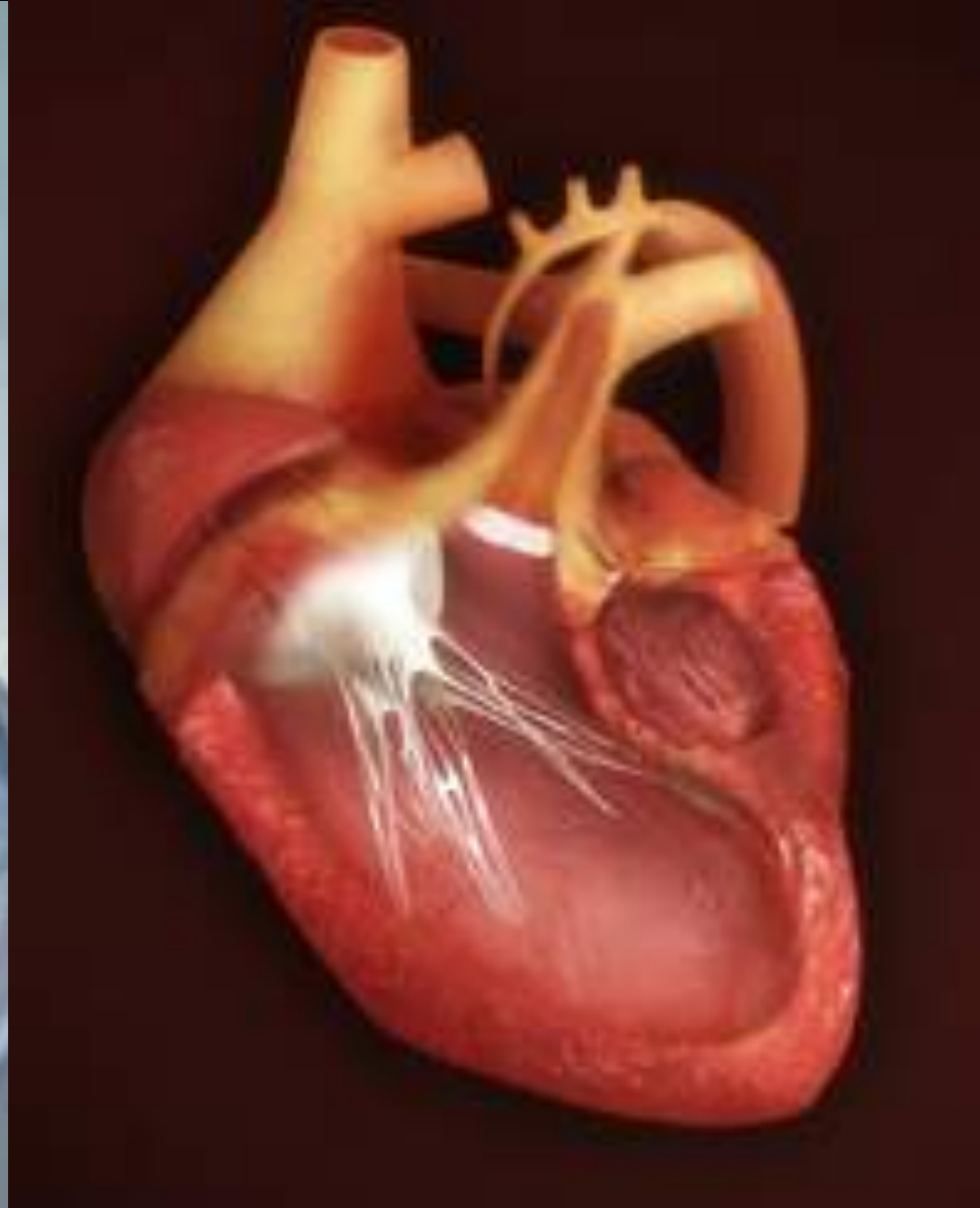
1981



Bill Norwood
(Boston & Philadelphia)

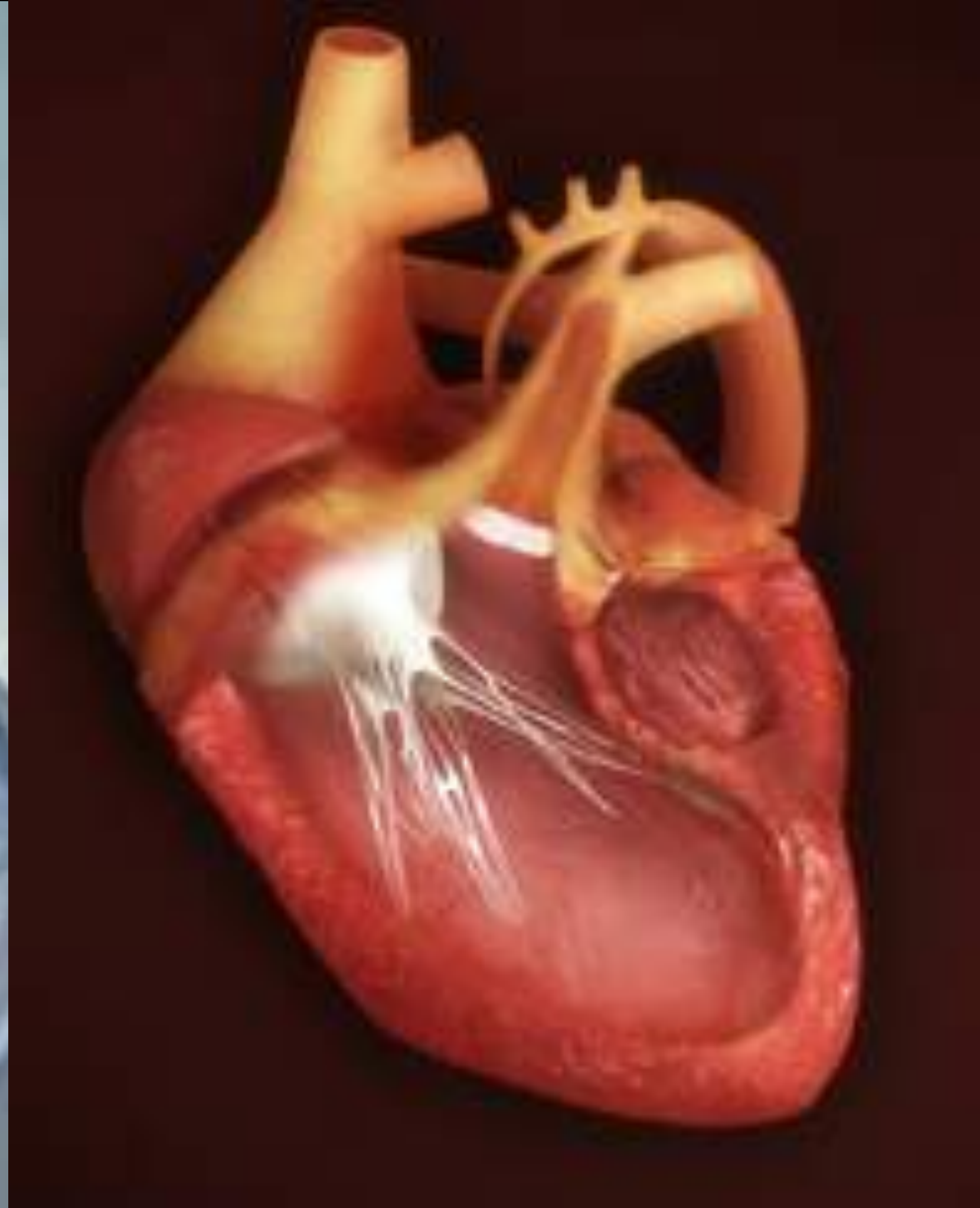


Bill Norwood
(Boston & Philadelphia)



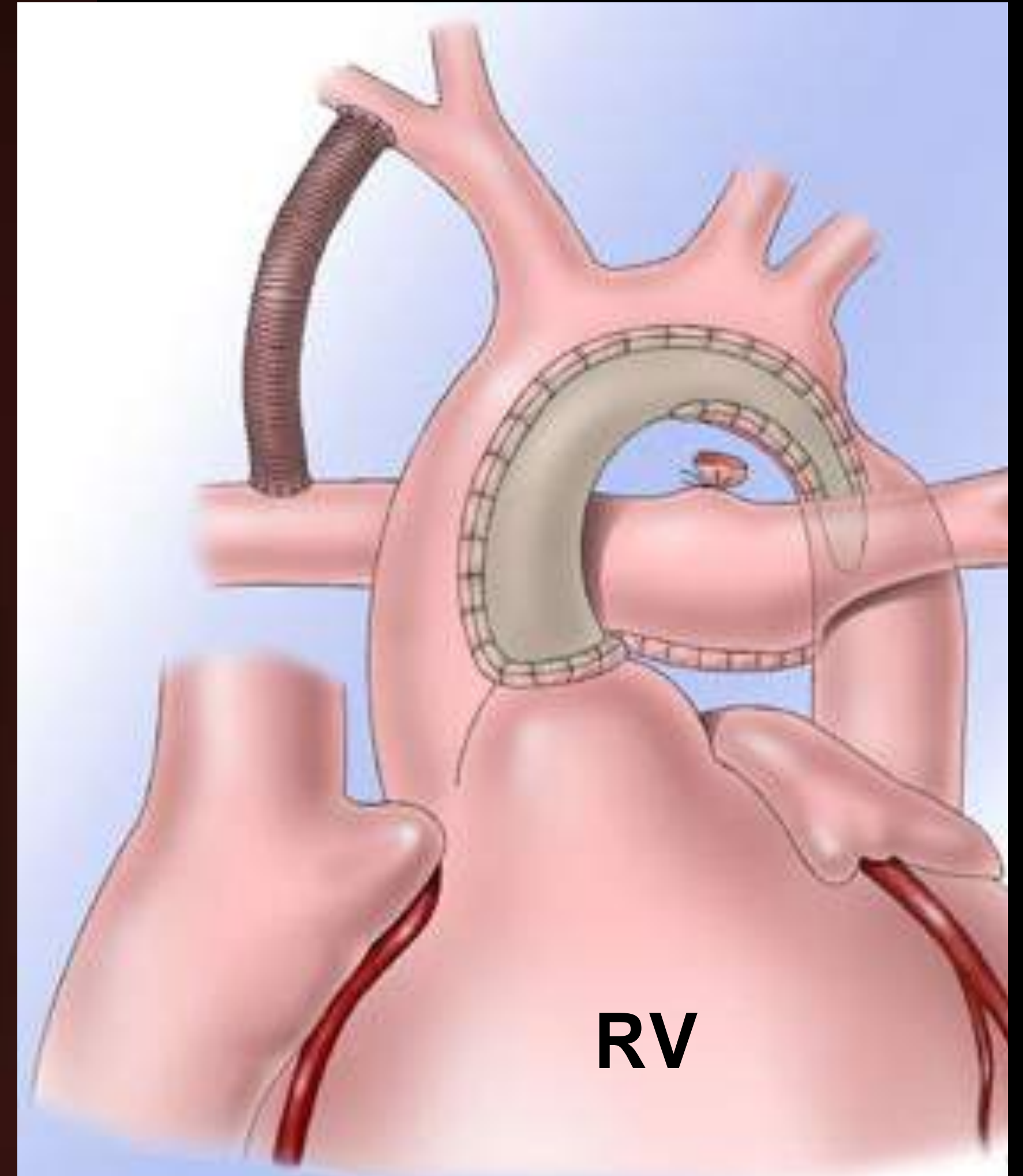
Bill Norwood
(Boston & Philadelphia)

untreated, all neonates
with HLHS will die in < 4 weeks



Bill Norwood
(Boston & Philadelphia)

untreated, all neonates
with HLHS will die in < 4 weeks

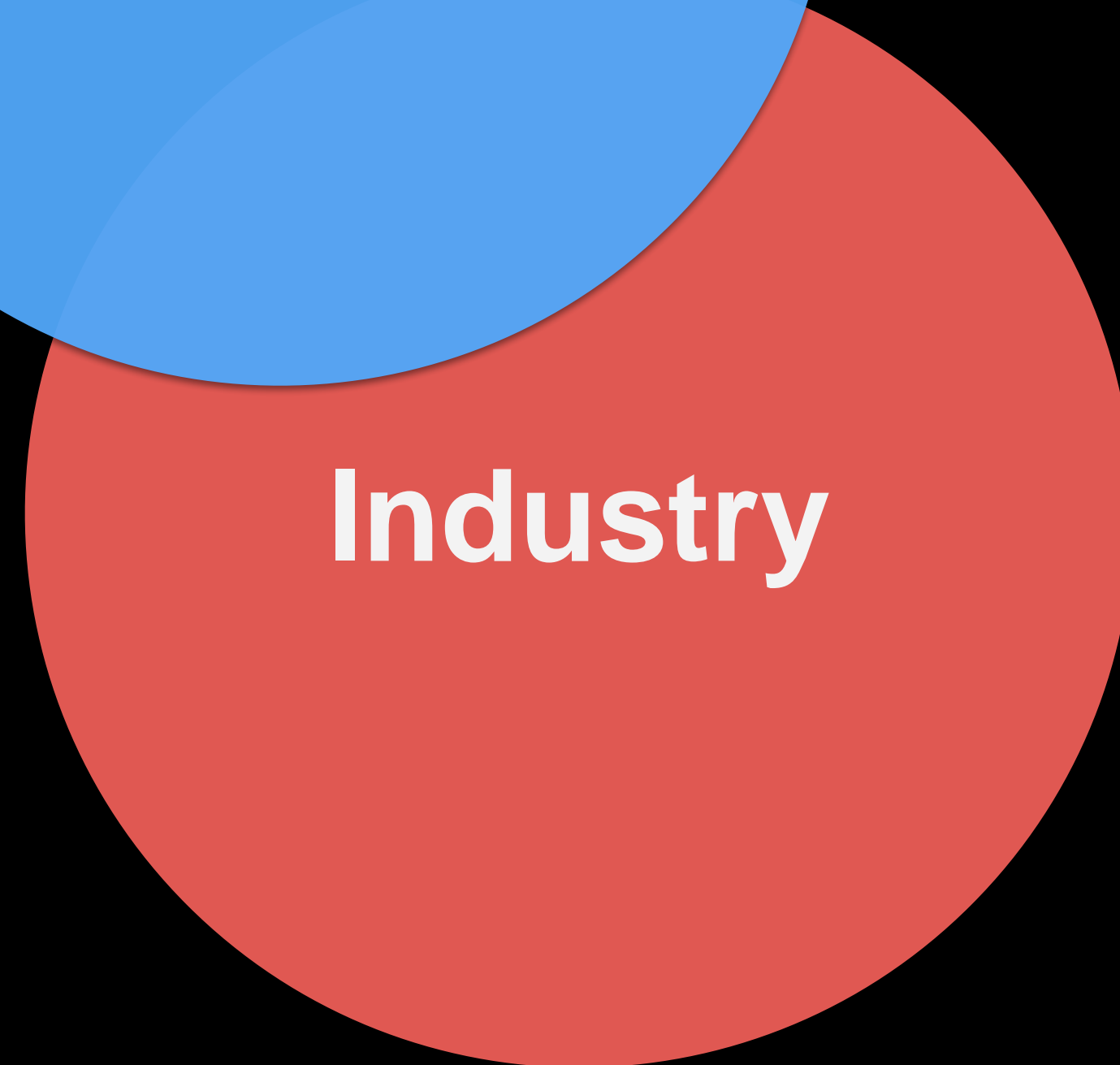
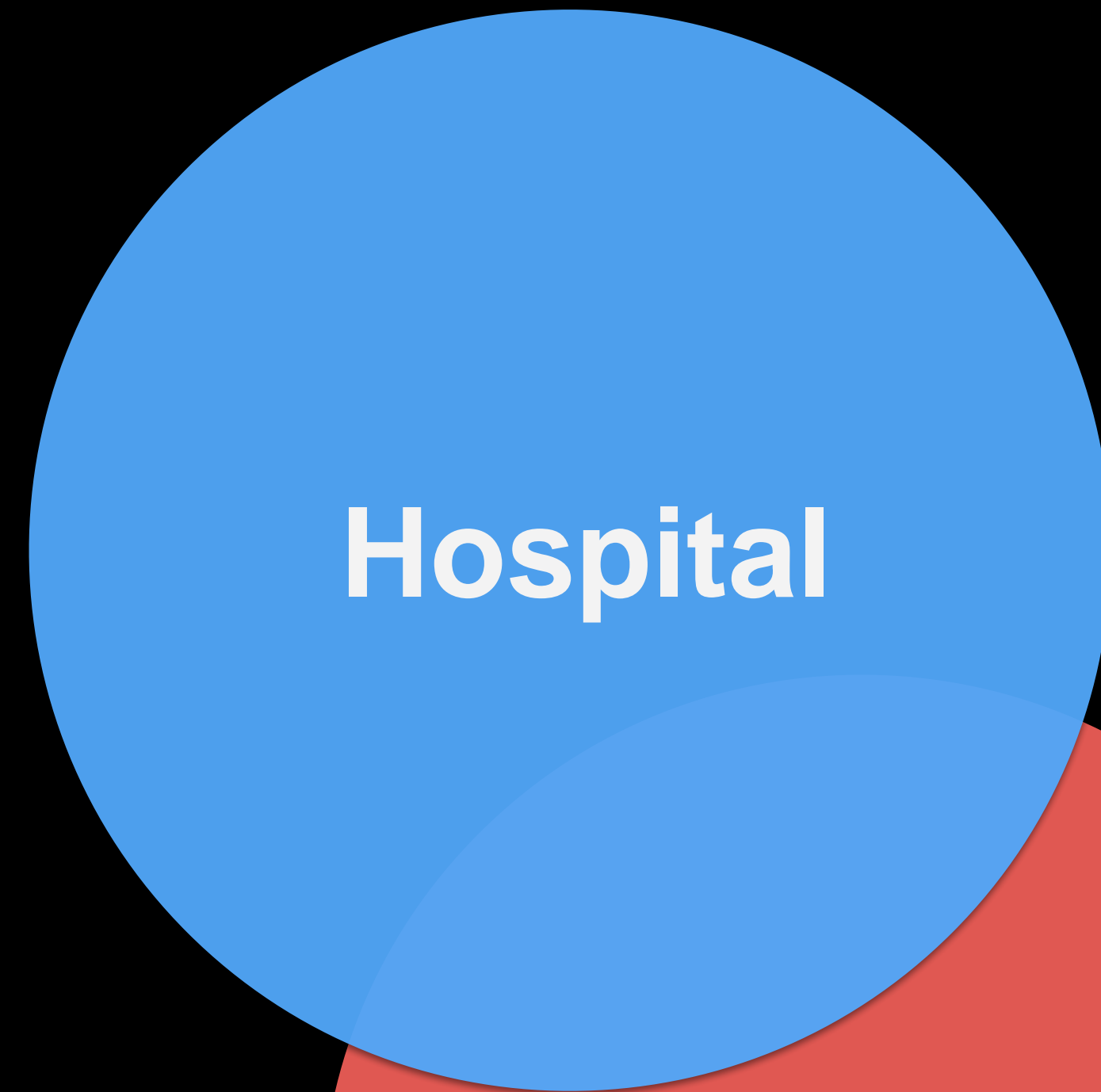


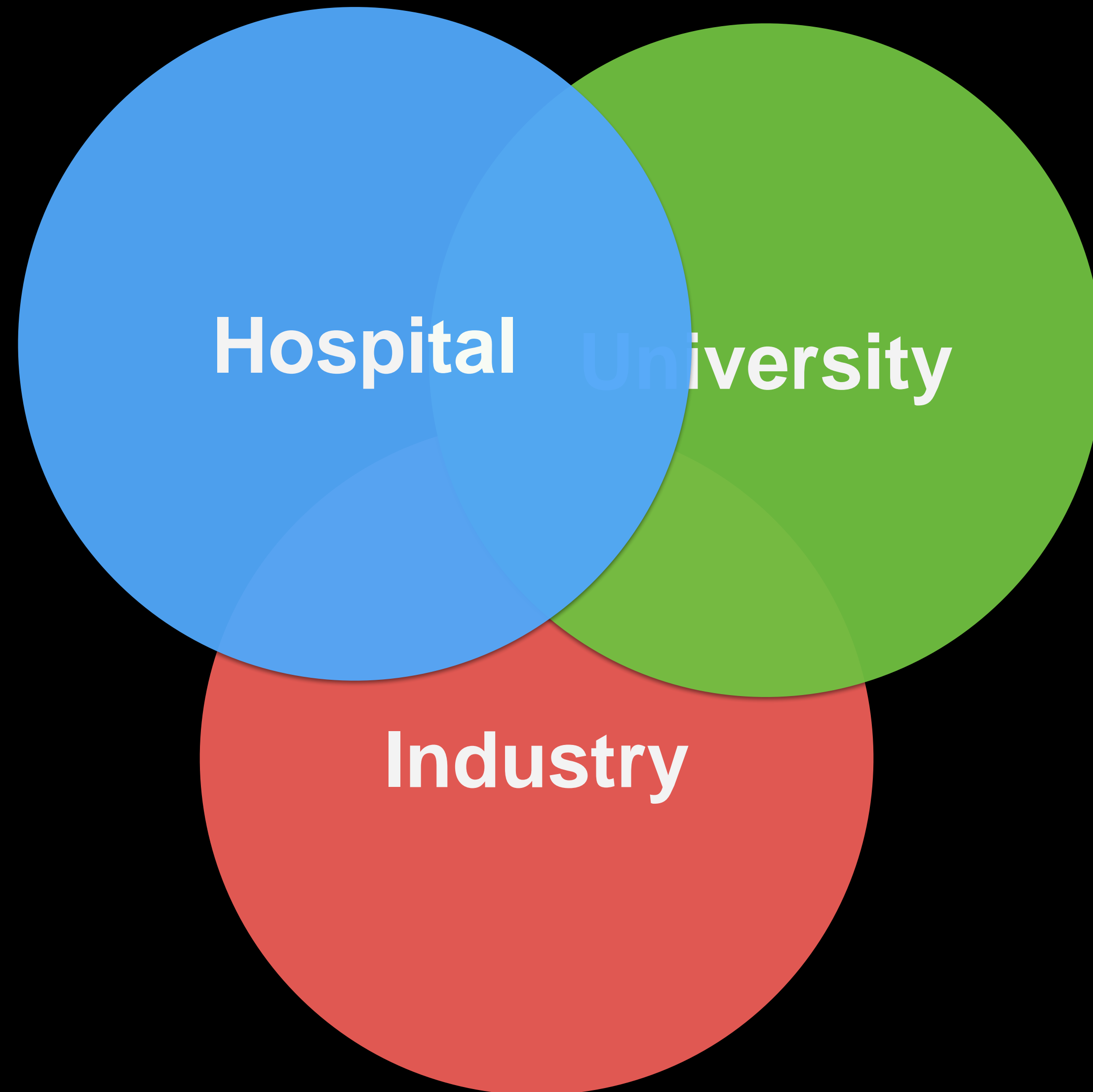


Hospital

University

Industry



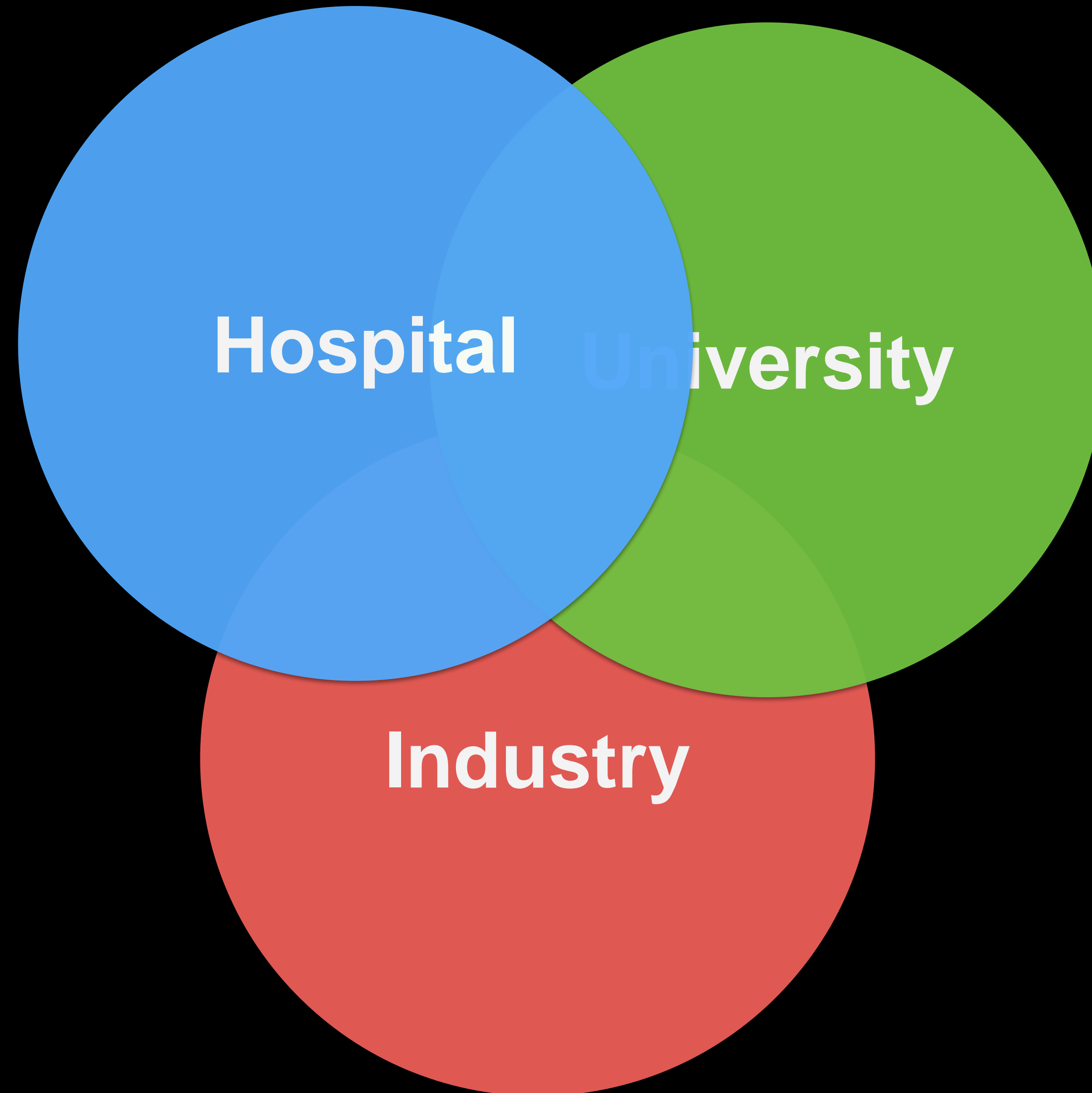


Hospital

University

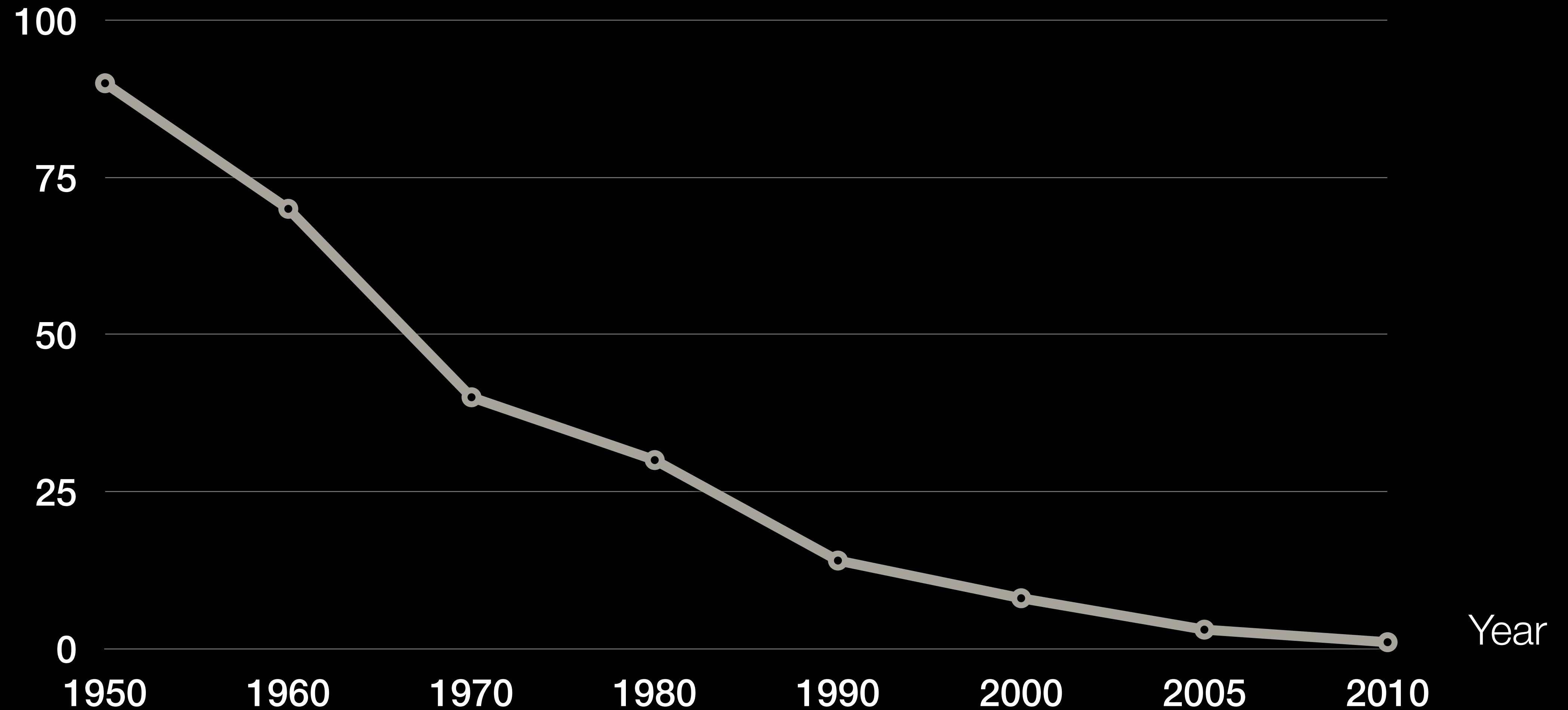
Industry

Symbiosis?



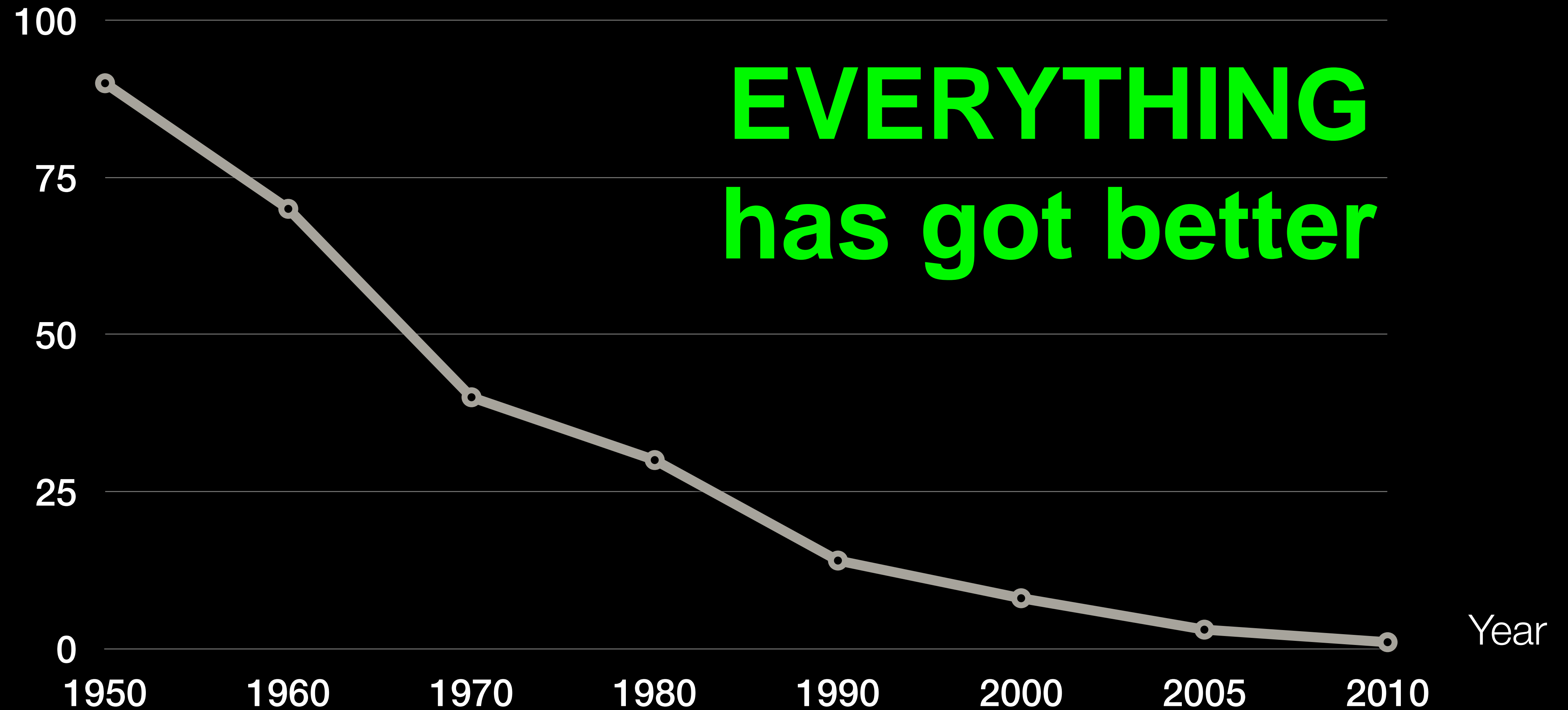
mortality of surgery for congenital heart disease

○ Mortality (%)



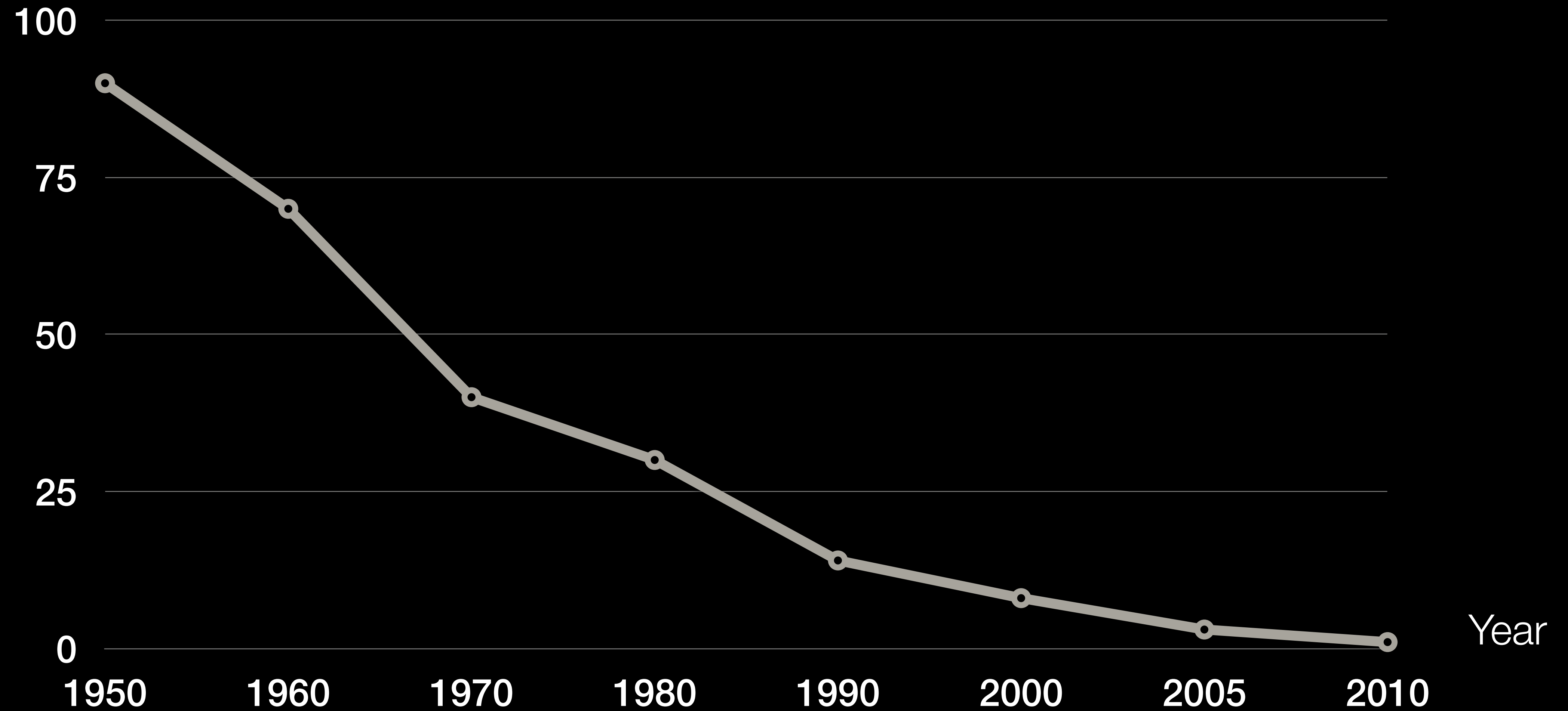
mortality of surgery for congenital heart disease

○ Mortality (%)



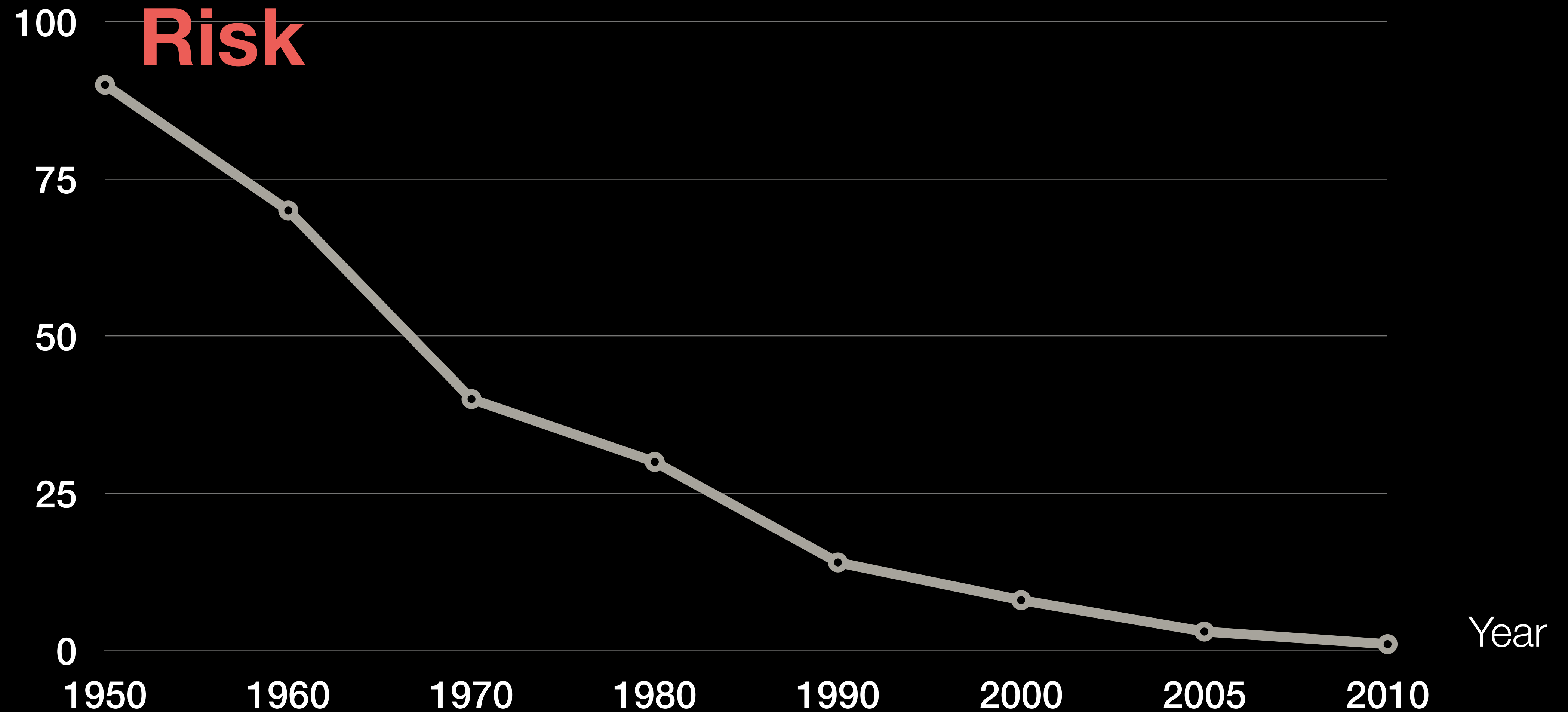
mortality of surgery for congenital heart disease

○ Mortality (%)



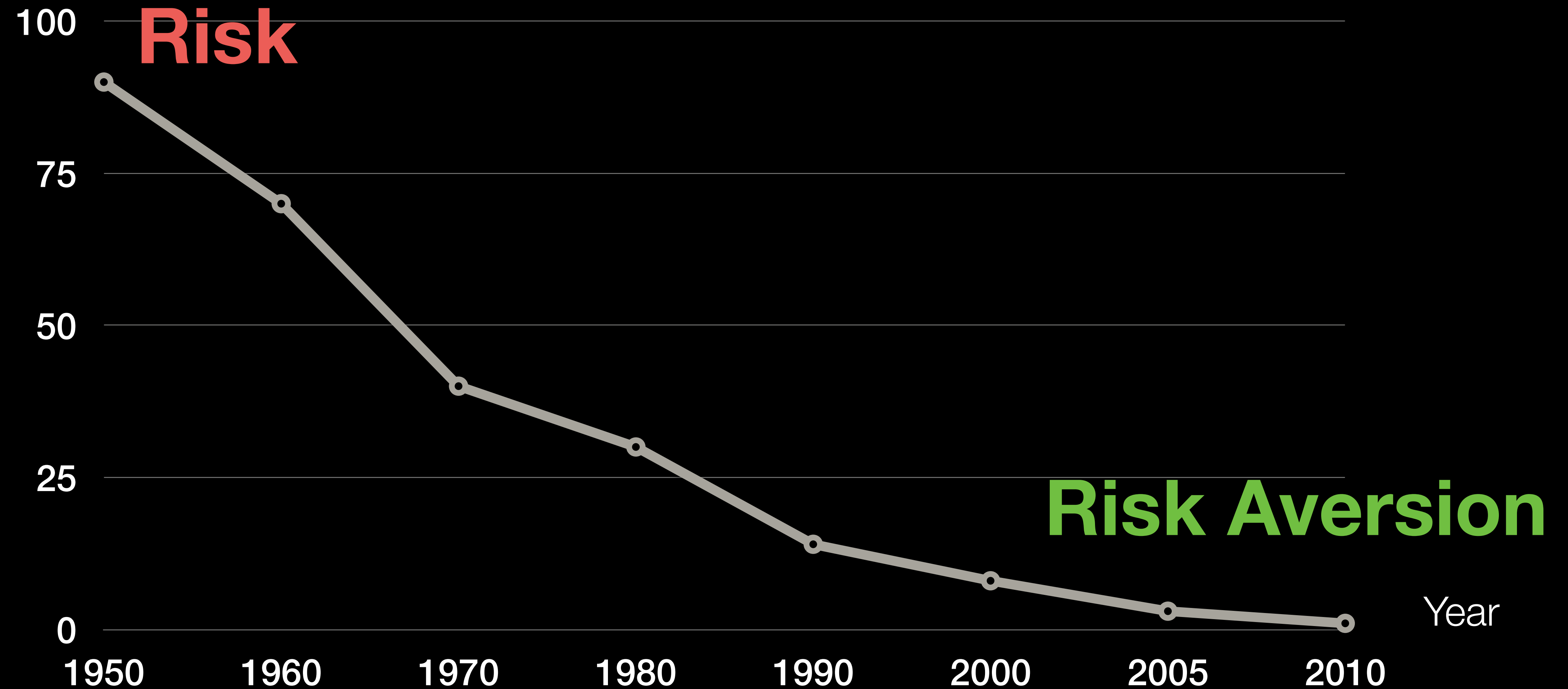
mortality of surgery for congenital heart disease

○ Mortality (%)



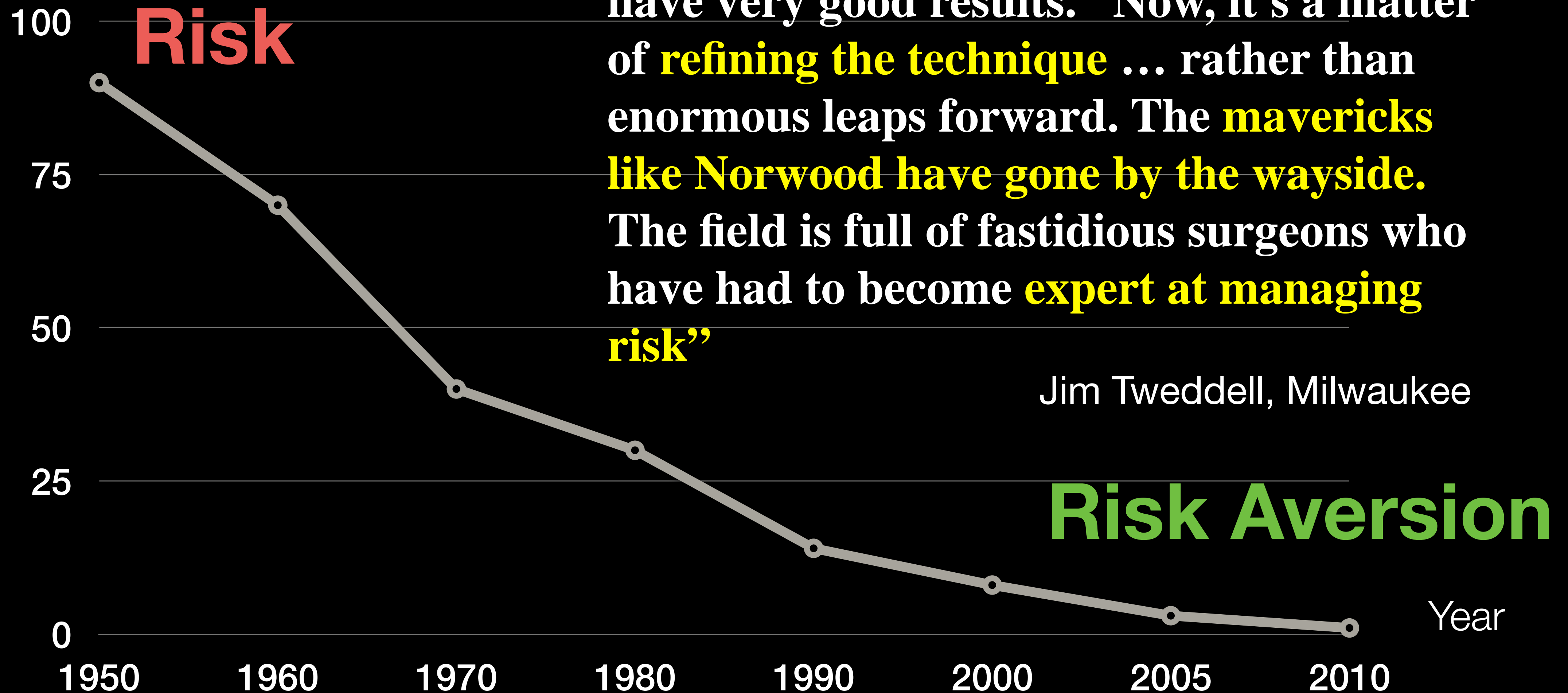
mortality of surgery for congenital heart disease

○ Mortality (%)



mortality of surgery for
congenital heart disease

○ Mortality (%)



Back in Norwood's Boston days, there were still big problems left to solve. It's different now. Today, most heart-defect operations have very good results. “Now, it's a matter of **refining the technique** ... rather than enormous leaps forward. The **mavericks like Norwood have gone by the wayside**. The field is full of fastidious surgeons who have had to become **expert at managing risk**”

Jim Tweddell, Milwaukee



Science



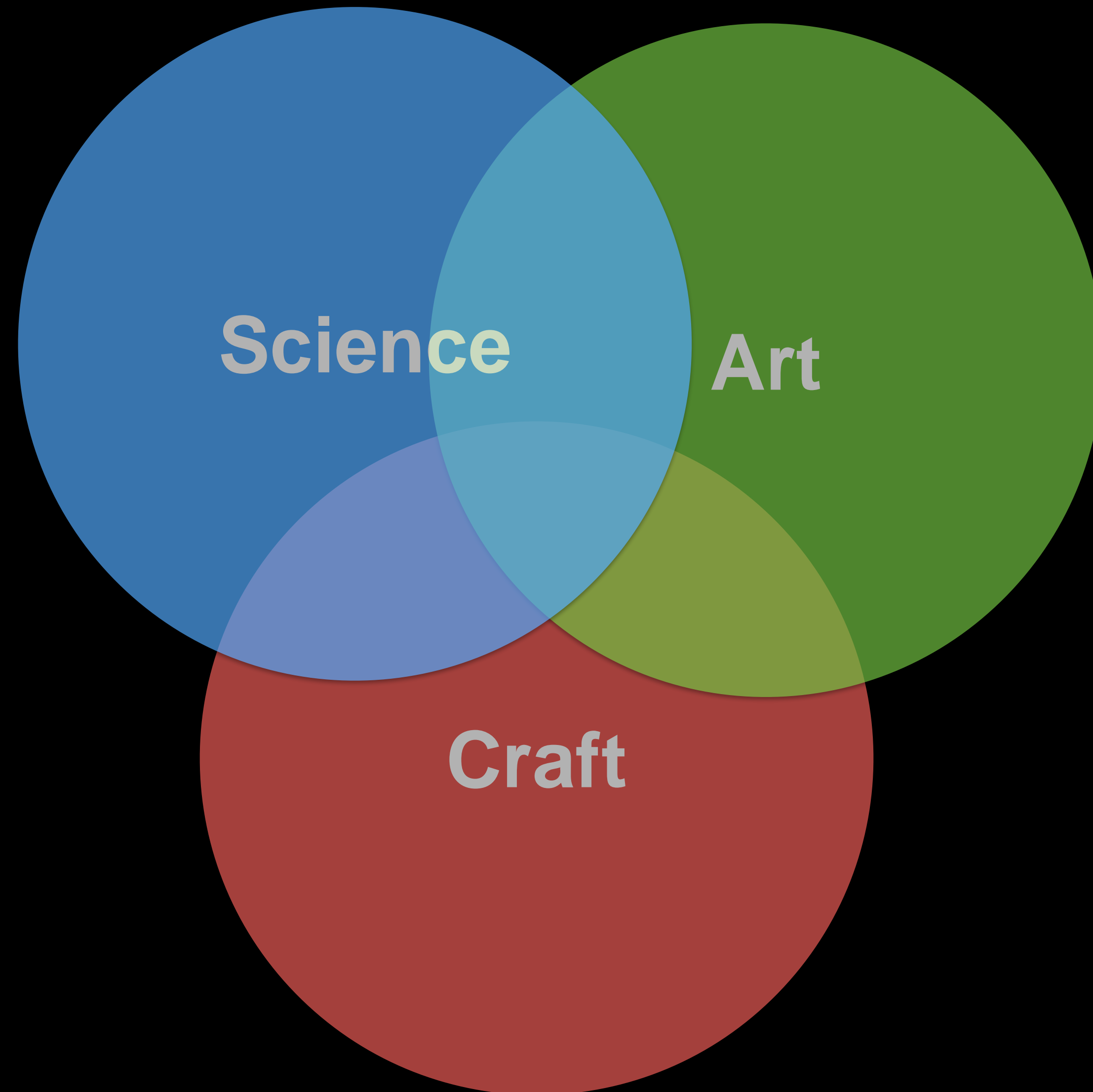
Art



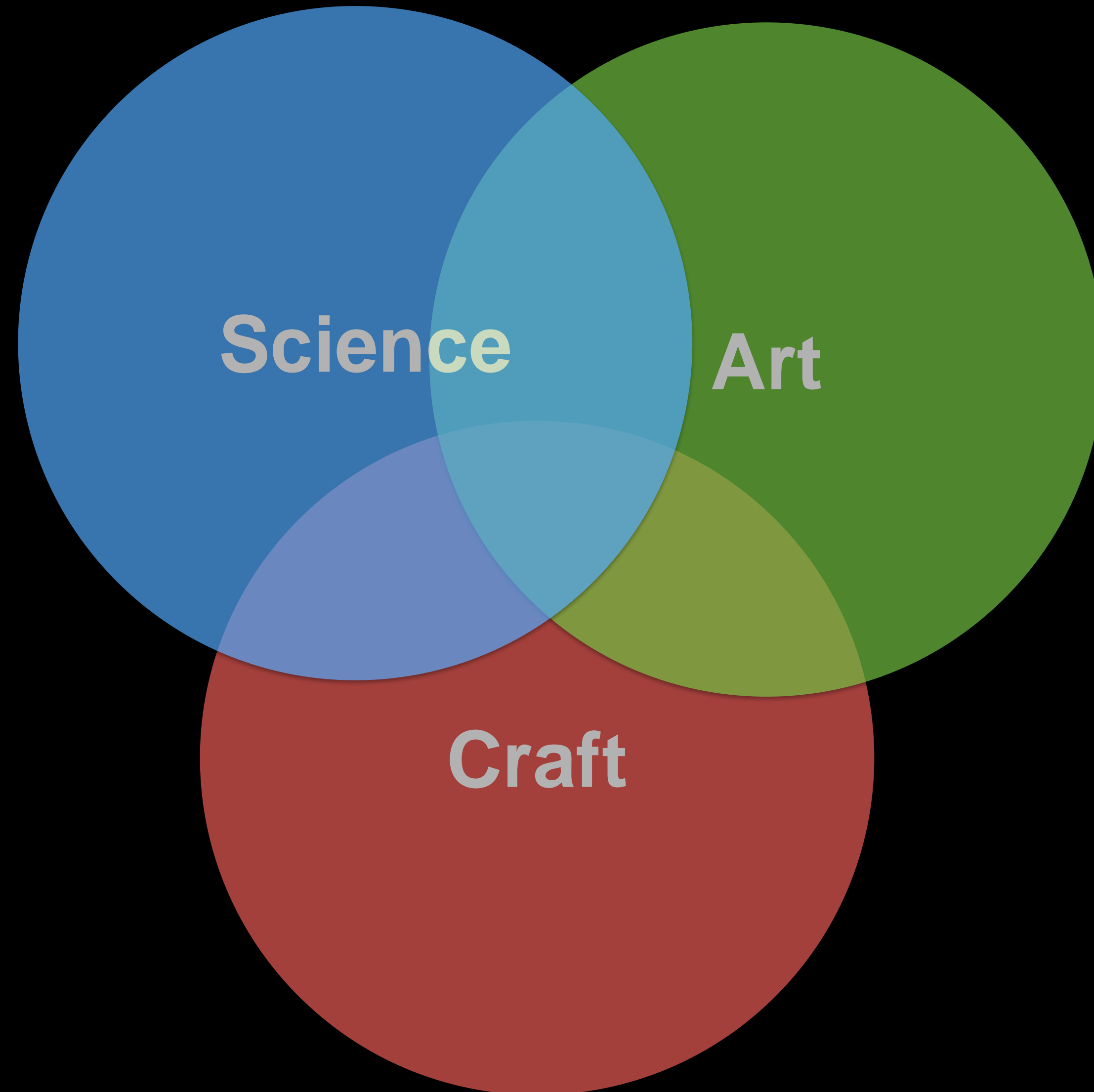
Science

Art

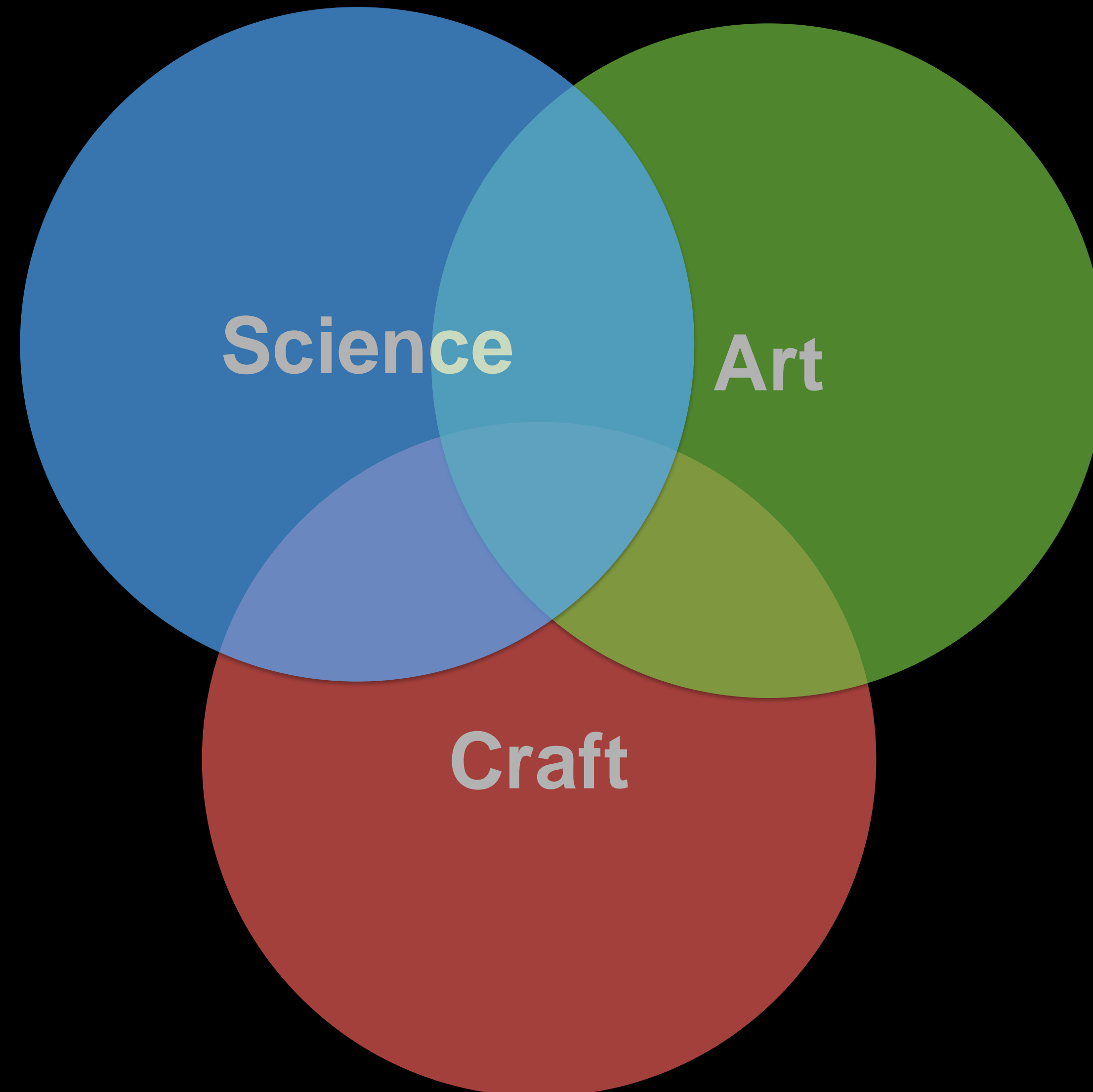
Craft



efficient, gentle, graceful



efficient, gentle, graceful
& the best cardiologists



Thank you to all my
colleagues,
and especially
Michiel Vriesendorp

"I was born
with half a
heart, not
half a life."

Thank you to all my
colleagues,
and especially
Michiel Vriesendorp

Could we do now what we did then?

21st January 2015



M a r t i n E l l i o t t
37th Gresham Professor of Physic
Professor of Cardiothoracic Surgery at UCL
Consultant Paediatric Cardiothoracic Surgeon
&
co-Medical Director
The Great Ormond Street Hospital for Children

