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VIVEKANANDHA MEDICAL CARE HOSPITAL

ALLIED HEALTH SCIENCES

SPOTLIGHT

THEME: CHRONICLES OF ECHO

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THE BEAT BEGINS HERE

Retro

Hope

Real

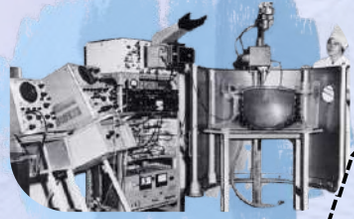
THE HEART'S REFLECTION

- *ECHO stands at the forefront of non-invasive cardiac imaging, offering a dynamic window into the beating heart through the use of high frequency ultrasound waves. Its inception was in the mid 20th century.*

- *Echocardiography has transformed from a rudimentary M-mode tool into a comprehensive diagnostic platform capable of assessing cardiac anatomy function and hemodynamics in real time.*

- *It's versatility spans a wide range of clinical applications - from routine evaluations of cardiac chambers to complex intraoperative monitoring and advanced myocardial strain analysis.*

ECHOES THROUGH TIME
The Evolution of Echocardiography



1959

1968

1990

2006

2015

2016

RETRO

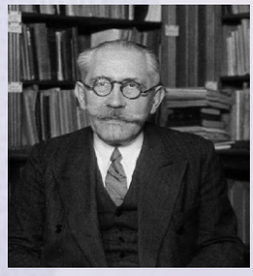
PIEZOELECTRICITY DISCOVERY:

01. JACQUES AND PIERRE CURIE: (1880)

In 1880 two brilliant French physicists Facques curie (1855-1941) and his younger brother pierre curie (1859-1906) - uncovered one of physics most transformation phenomena: piezoelectricity.

Pierre curie found that certain crytals generate an electric charge when subjected to mechanical stress. This discovery became the foundation for technologies like ultrasound, sonar, microphones and Quartz watches.

02. PAUL LANGEVIN (1915)



During world war I, French physicist "paul Langevin applied piezoelectric principles to build one of the first active sonar system" using quartz Crystals to generate high-frequency sound waves that could detect Submarines underwater

"This invention marked the first real-world use of piezoelectricity in imaging technology"

03.Sergei Y. Sokolov (1937)

Russian physicist sergei sokolov proposed using ultrasound to detect defects in solids and even in biological tissues.

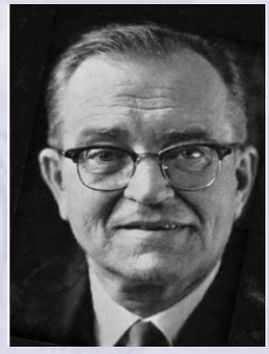
Although his ideas were not widely adopted immediately, they represented one of the First known mentions of ultrasound's medical potential

"Conceptual leap from industrial ultrasound to medical diagnostics."

04.K.T. Dussik's: (1941)

Dr. Karl Theo Dussik (1908-1968) *an Austrian neurologist, is widely recognized as one of the pioneers in the medical uses of ultrasound although his contributions were not specific to echocardiography.*

He Demonstrated that us could be used non-invasively to explore internal human anatomy



His experiments inspired further research into using ultrasound for soft tissue imaging - an essential prerequisite for cardiac applications

"Opened the door to the use of ultrasound as a non - invasive diagnostic tool in clinical medicine".

05. Inge Edler and Hellmuth Hertz (1950)

These two Swedish pioneers collaborated in the early 1950s to create this first successful cardiac ultrasound examination making the birth of echocardiogram

Developed M-mode echocardiography - first real-time cardiac imaging using ultrasound.

Edler, a cardiologist, collaborated with Hertz, a physicist.

They used a modified industrial ultrasound device to visualize heart valves.

Their work marks the birth of cardiac ultrasound.

THE HEART HAS ITS OWN "MINI BRAIN." IT CAN SEND SIGNALS TO THE BRAIN - NOT JUST RECEIVE THEM!

THE HEART CREATES ENOUGH ENERGY EVERY DAY TO DRIVE A TRUCK FOR 20 MILES!

OVER A LIFETIME, THAT'S LIKE DRIVING TO THE MOON AND BACK - MORE THAN ONCE! EVEN THOUGH IT'S ONLY THE SIZE OF YOUR FIST, YOUR HEART IS ONE OF THE HARDEST-WORKING MUSCLES IN YOUR BODY.

REAL
2D M-MODE DOPPLER

EARLY FOUNDATIONS

In the 1950s, Inge Edler and Carl hellmuth hertz used ultrasound to view the heart's motion. This started the field of echocardiography (M-mode).

1970S - 2D ECHOCARDIOGRAPHY

2D (two-dimensional) imaging was introduced, allowing real-time cross-sectional images of the heart.

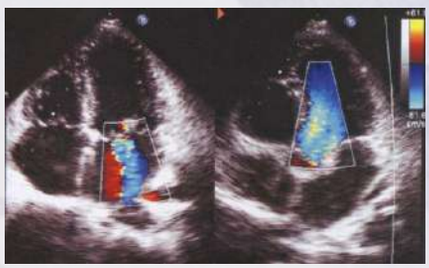
Dr. Harvey feigenbaum in the U.S. helped popularize 2D echo for clinical use

DOPPLER ECHOCARDIOGRAPHY

The Doppler principle (named after Christian Doppler, 1842) was used to measure blood flow velocity

First applied to the heart in the 1970s using pulsed Doppler to assess valve flow and detect heart defects.

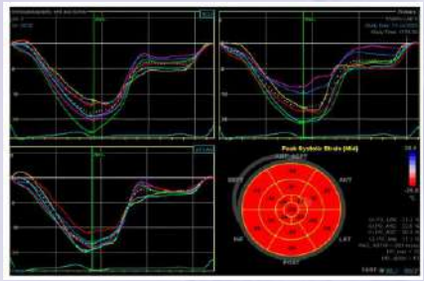
1980S - COMBINED 2D + DOPPLER



Color Doppler (introduced mid-1980s) made it possible to see blood flow direction and speed using color coding (red/ blue).

Strain Echo

1990s - Concept of Myocardial Deformation



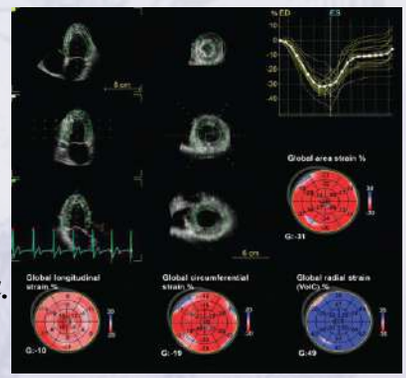
The idea of studying how the heart muscle stretches and contracts (called "strain") began in the 1990s. Initially, it was used in research to study myocardial (heart muscle) function.

Early 2000s - Tissue Doppler Imaging (TDI)

Strain was first measured using Tissue Doppler Imaging (TDI). TDI-based strain could detect early myocardial dysfunction, but it had limitations like angle dependency .

Mid-2000s - Speckle Tracking Echocardiography

This method tracked natural acoustic markers ("speckles") in the heart muscle on 2D images. 2010s - Clinical use expands. Strain imaging became standard in assessing heart failure, cardiotoxicity (e.g., in cancer patients), valvular disease, and early myocardial dysfunction. Global Longitudinal Strain (GLS) became the most commonly used strain parameter.



2020s - 3D Strain and AI Integration:

Advanced 3D strain imaging started gaining popularity. Artificial Intelligence and automated analysis improved accuracy and workflow.

HOPE

3D ECHO

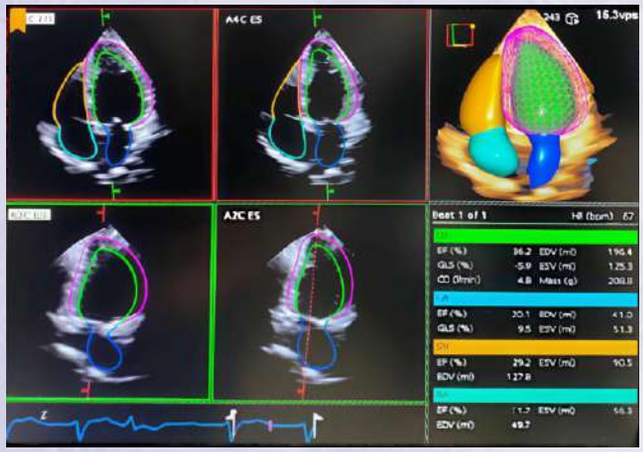
Modern 3DE system now offer real time imaging capabilities, allowing clinicans to visualize cardiac structures dynamically. The transducers provide High-quality images, facilitating accurate assessment of cardiac anatomy & Function

Integration of Artificial Intelligence (AI) AI has been integrated into echocardiography system to enhance imaging analysis interpretation. For instance, AI-enabled platforms can automatically qualify mitral regurgitation volumes and assist in segmental wall motion scoring, leading to more Objective and efficient evaluations.

CLINICAL APPLICATION

- Valvular HD
- MV-Assesment, RV morphology
- AV, TV-assesment
- Surgicals Percutaneous planning
- CHD-ASD, VSD
- LVC Functional Analysis

4D Echocardiography



Four Dimensional Echo - essentially realtime 3D imaging has emerged as a transinformative force in cardiovascular diagnostic and interventions. By integrating spatial and temporal Data, it offers dynamic visualization of cardiac structures, enhancing both diagnostic accuracy and proudural precision. Real time intra cardiac imaging.

The advert of 4D intracardiac echocardiography (ICE) has revolutionized structural heart interventions Devices like the Acuson Acular Volume, ICE Catheter provide real time, volumetric images from within the heart, facilitating procedures such as transcatheter tricuspid valve repair (T-TEER) with enhanced precision and reduced reliance on general Anesthesia.

4D Assesment

- *Financial LV function*
- *Full volume-RV*
- *TAPSE (tricuspid Annularplane systoli encrusior).*
- *RV longitudinal strain time resolved data*
- *Regurgitation :(4D venacontracta area and flow comerzence more accurate than 2D*

SIDE TALK

THE QUEST-ECHOCARDIOGRAPHY

E ➡ Eek! What's that squiggly line?

C ➡ Click-click goes the probe!

H ➡ Heartbeat or hamster wheel?

O ➡ OMG, is that my valve?

C ➡ Can't blink, it's moving!

A ➡ Aliens? Nope, just the septum

R ➡ Relax, it's not a spaceship

D ➡ Doctor's favorite joystick time

I ➡ I spy with my echo eye...

O ➡ Oops, that's a rib shadow.

G ➡ Gel all over again? Seriously?!

R ➡ Ready? Deep breath and freeze!

A ➡ Art of heart squiggle reading

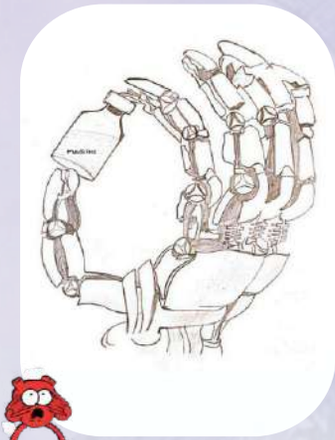
P ➡ Ping-pong valves in action!

H ➡ High-tech peek-a-bo

Y ➡ Yay! We found your heart!

M. R. HEMAVATHI
III-YEAR-CT-2002

CANVAS OF CARE



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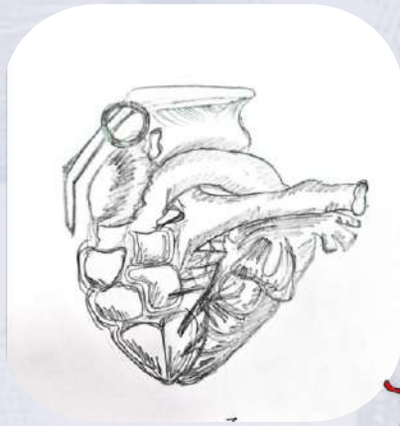
II-YEAR-CT-2023

S. SUDHARSHAN
II-YEAR-CT-2023



G. JOSHIKA
II-YEAR-CT-2023

A. DEVIKA
III-YEAR-CT-2023

S. SHANMUGAPRIYA
II-YEAR-CT-2023

PULSE LINES

I met the heart, not just in books,
But in the beats, the waves, the looks. A little sound, a tiny thud,
Yet holds the force that stirs the blood.

It called to me in silent ways,
In echo screens and bright displays. Each valve, each wall, a tale to tell,
Of joy, of fear, of rising swell

At first, I watched with learning eyes, Afraid to fail, yet dared to try.
But day by day, my hands grew still, My mind in tune, my growing skill.

I read its rhythm like a song,
A dance that moves the world along. And in that bond, both deep and true, The heart taught me as much I knew.

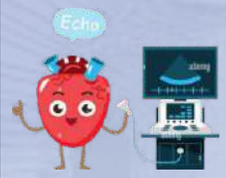
Not just a pump -a voice, a spark,
A flame that flickers in the dark.
And I, its student, proud and wise, Hold dreams that beat beneath the skies.

M. MINUMOL
III-YEAR-CT-2023

MYTHS VS FACTS

MYTH-1

Bigger color images on the heart scan always mean more severe disease

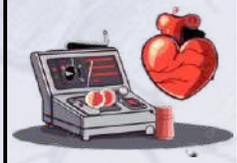


FACT-1

The colors on an echo show's blood flows. A big splash of color doesn't always mean a serious problem - the doctor uses many tests together to be sure.

MYTH-2

Heart valve problems are always dangerous.



FACT-2

Many people live normal lives with mild valve changes. Doctors just need to keep checking them regularly.

MYTH-3

If I don't feel chest pain, my heart must be fine

FACT-3

Some heart problems show no pain. Echo can reveal hidden issues even in people who feel normal

MYTH-4

The heart scan is harmful because it uses sound waves.

FACT-4

Echo uses safe sound waves - not radiation. It's painless and harmless, even for children and pregnant women

Welcome to Tour de Heart! Pack your plasma - you're about to travel first-class through the cardiovascular system

STOP 01

Right Atrium "The Grand Entry"

Customs checkpoint for used blood.Not much oxygen, but lots of character.

Popular with exhausted red blood cells coming back from long tissue tours.

STOP 02

Right Ventricle "The Launchpad"

Prepare for pulmonary lift-off! Experience a thrilling pressure boost as you're pumped into the lungs.

Detour: The Lungs - "Oxy-Gen-Z Hotspot" where blood comes to catch its breathliterally. Don't miss the oxygen bar!

STOP 04

Left Ventricle "The Powerhouse Pump"

Largest, strongest, busiest terminal.Warning: High-pressure zone ahead! Secure your hemoglobin.

STOP 04

Left Atrium "Chic & oxygen rish"

Now you're fresh, clean, and ready to mingle. VIP entry only - oxygenated travelers only!

FINAL DESTINATION

The Body - "Everywhere!"

From your toes to your brain, we deliver.Daily departures: ~100,000 beats a day. No booking needed.

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04	B.SC CARDIAC TECHNOLOGY	4 YEARS
05	B.SC PHYSICIAN ASSISTANT	4 YEARS
06	B.SC MEDICAL LABORATORY TECHNOLOGY	4 YEARS
07	B.SC DIALYSIS TECHNOLOGY	4 YEARS

KRISHNA INSTITUTE OF OPTOMETRY AND RESEARCH

01	B.SC OPTOMETRY	4 YEARS

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