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OMICS Group International is a pioneer and leading science event organizer, which publishes around 400 open access journals and conducts over 300 Medical, Clinical, Engineering, Life Sciences, Pharma scientific conferences all over the globe annually with the support of more than 1000 scientific associations and 30,000 editorial board members and 3.5 million followers to its credit.

OMICS Group has organized 500 conferences, workshops and national symposiums across the major cities including San Francisco, Las Vegas, San Antonio, Omaha, Orlando, Raleigh, Santa Clara, Chicago, Philadelphia, Baltimore, United Kingdom, Valencia, Dubai, Beijing, Hyderabad, Bengaluru and Mumbai.

Assessment of regional & global myocardial systolic function by 2D longitudinal speckle tracking in elderly patients with normal LV function

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Associate Professor,Cardiology
GMC & Sir JJ group of Research Hospitals,Mumbai,India;
CVRF;Cleveland Clinic,Cleveland ;USA

Echo assessment of Ventricular function

- **M-mode, 2D echo**.
- **Tissue Doppler**

  low-velocity, high amplitude Doppler signals in the myocardium.

- **Speckle tracking**

  Follows acoustic markers called speckles in typically acquired grey scale images from frame to frame through the cardiac cycle

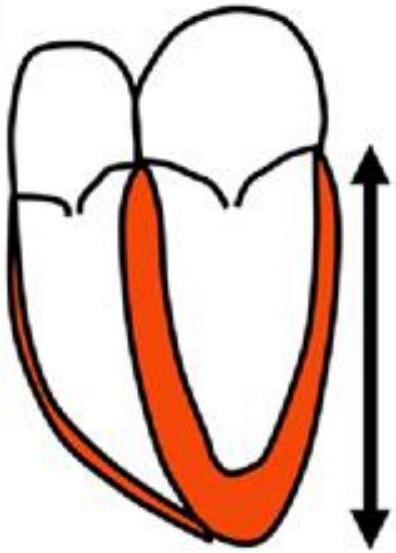
- *The LV myocardium is comprised of one continuous sheet of myofibers that is arranged in the form of a double helix.*

- *The long-axis function is governed primarily by the subendocardial fibers which run almost parallel to the long-axis of the LV.*

- *In contrast, the mid-layer and subepicardial fibers, which are relatively parallel to the circumference of the LV, determine primarily the short-axis function .*

RADIAL and
CIRCUMFERENTIAL

LONGITUDINAL



ROTATIONAL

Strain Imaging

- *Types of Strain:*
- Strain has been divided into three types—
- longitudinal, circumferential, and radial—to capture the 3D nature of cardiac motion.

- *In general, the subendocardial fibers are most susceptible*

- *Therefore, **the long-axis function of the LV is one of <u>the earliest markers</u>** to be affected in disease states.*
- *With progression of the disease process, the myocardial involvement becomes increasingly transmural & SAX function gets progressively compromised.*

- *In contrast, the pathologies that involve the epicardial layers, such as constrictive pericarditis, are characterized by the loss of short-axis function first whereas the long axis function remains relatively preserved*

Longitudinal ,circumferential and radial strain

The ability to calculate strain using three-dimensional data is now being perfected and represents an upcoming modality to analyze the complex motion of the heart .

Out-of-Plane’ motion of the myocardium during the cardiac cycle precludes satisfactory tracking of the speckles.

The problem is particularly relevant for the short-axis views as the movement of the LV along its long-axis leads to considerable ‘out-of-plane’ motion in the short-axis.

Thus the accuracy and the reproducibility of radial and circumferential measurements are lower than for the longitudinal measurements

- **Postprocessing algorithm**
- tracking algorithm such that images acquired on a specific machine can only be analyzed with that vendor’s postprocessing software.

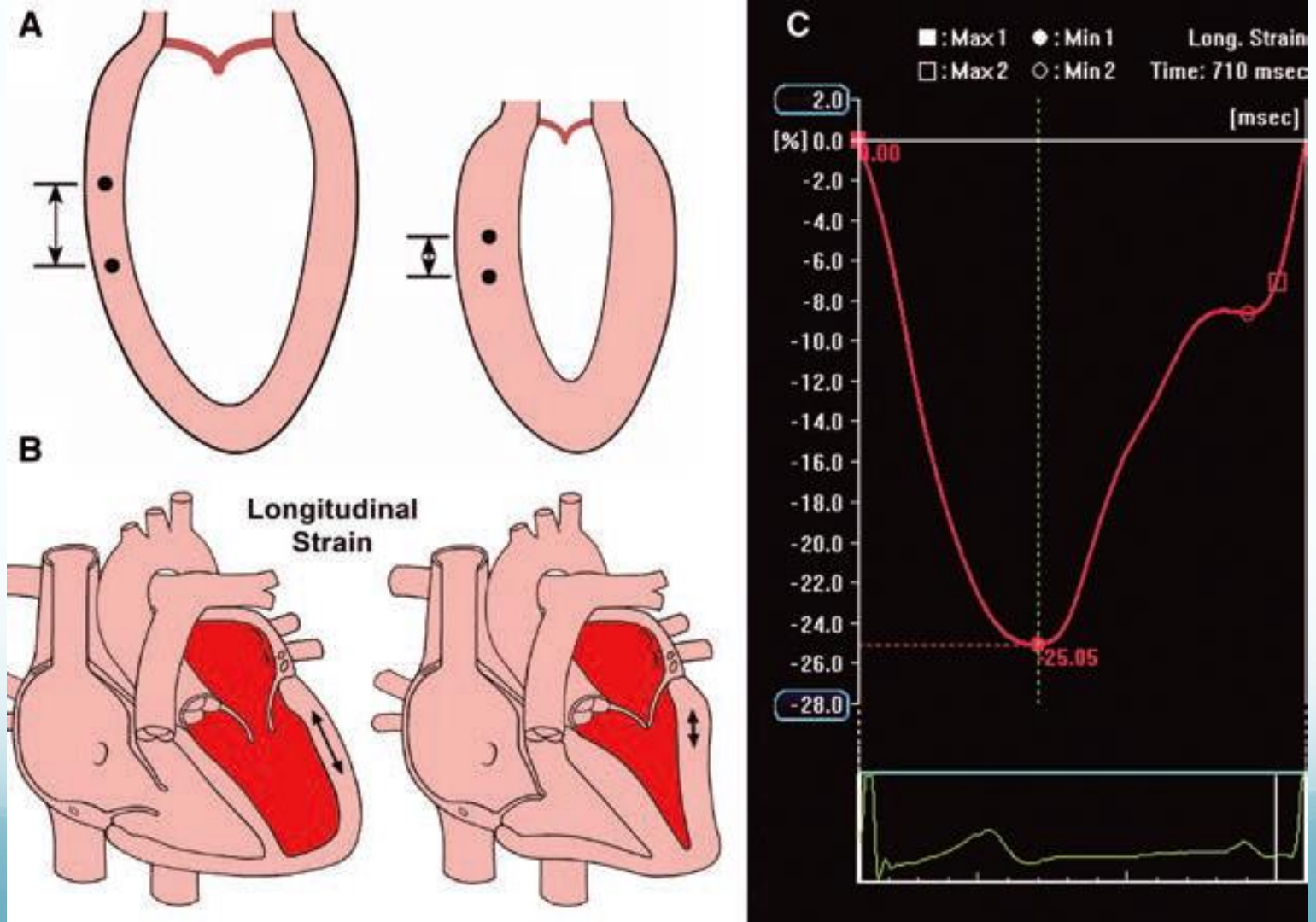
***Longitudinal strain**:* This is measured in apical long-axis views to capture the longitudinal movement, which occurs primarily at the base of the ventricle, with the apex holding its station in systole, close to the chest. toward the LV apex that results in:

Strain = (end-systolic length−end-diastolic length/
end-diastolic length)

Change in length normalized to original length

Dimensionless

In general, the subendocardial fibers are the most susceptible


A
B
Longitudinal
Strain
C
■: Max 1
●: Min 1
Long. Strain
□: Max 2
○: Min 2
Time: 710 msec
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[%] 0.0
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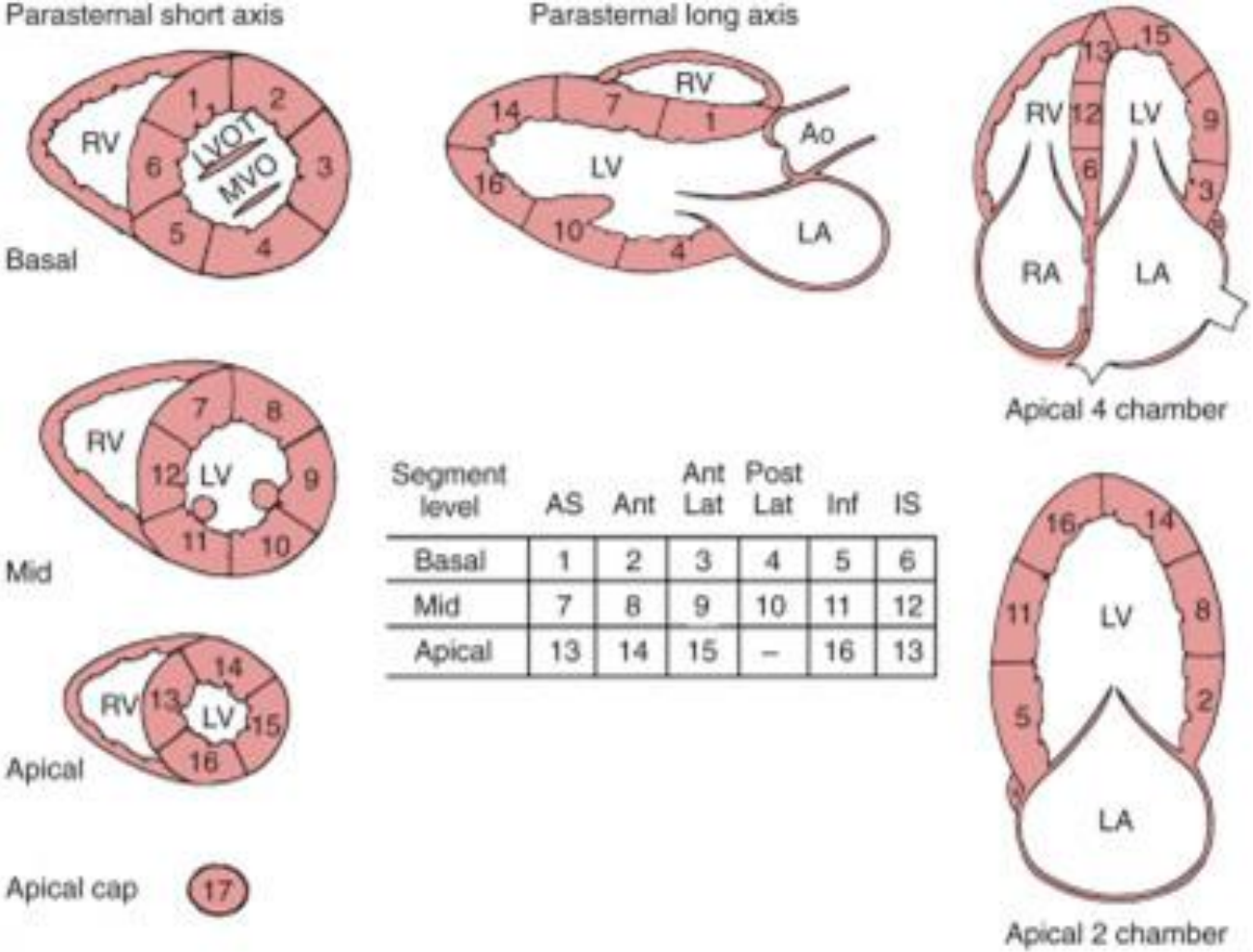
Parasternal short axis
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Parasternal long axis
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Segment level | AS | Ant | Ant Lat | Post Lat | Inf | IS
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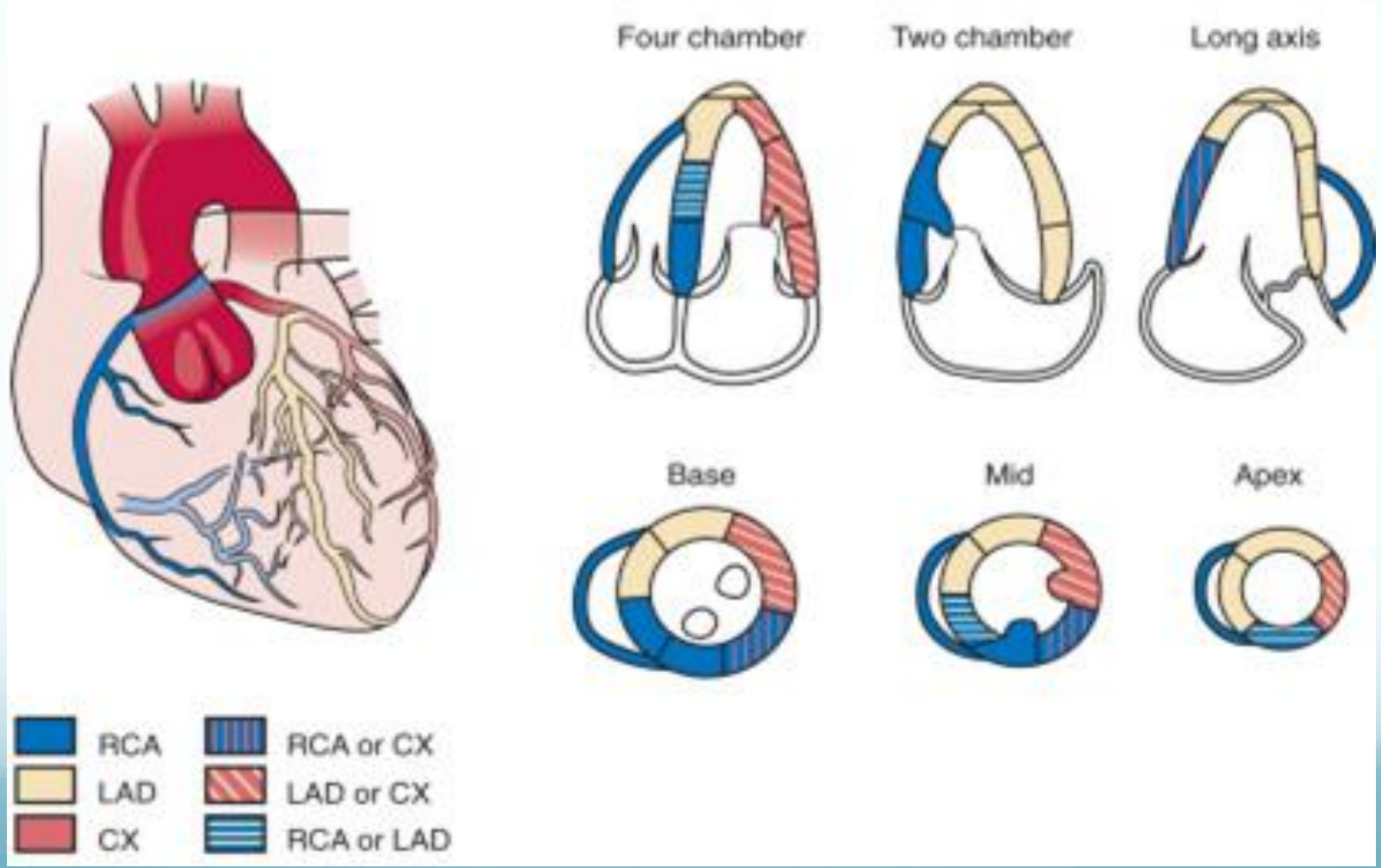
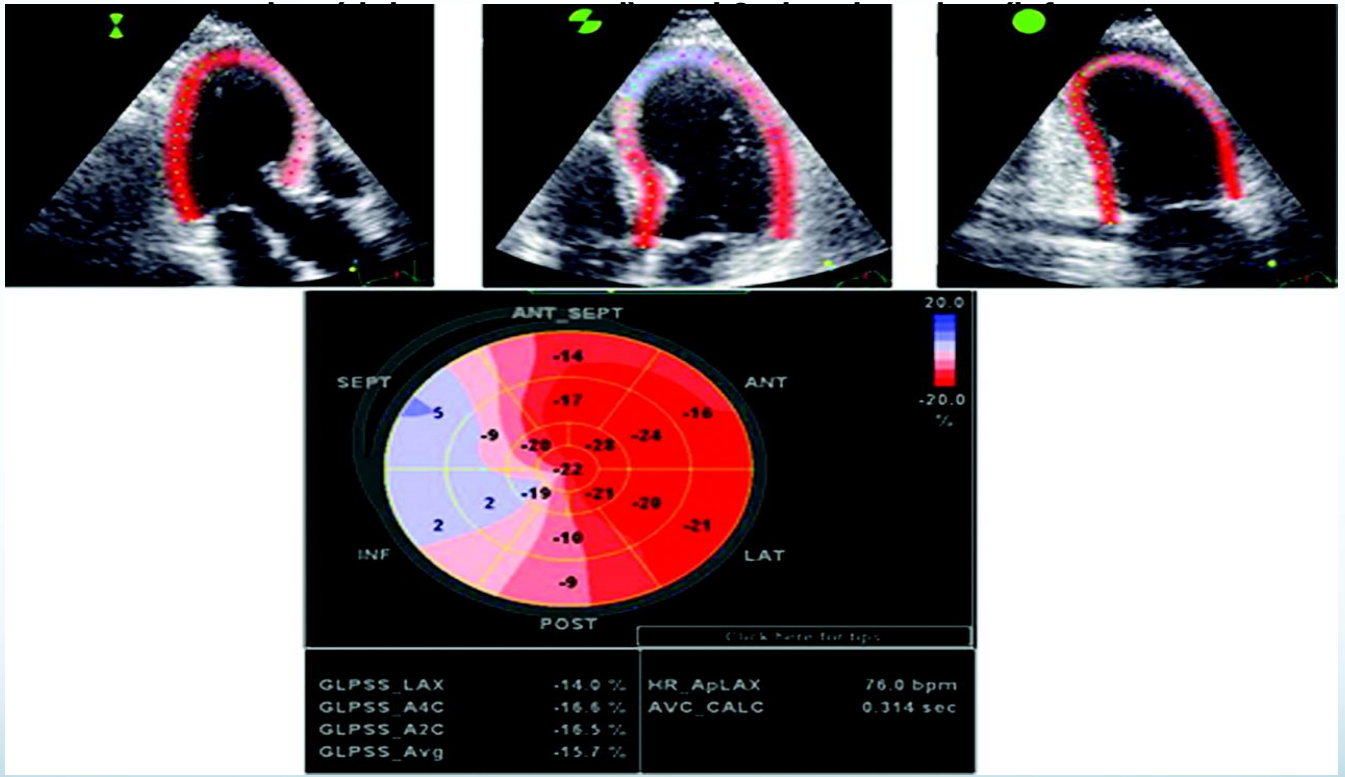
Apical 2 chamber


Four chamber
Two chamber
Long axis
Base
Mid
Apex
RCA
LAD
CX
RCA or CX
LAD or CX
RCA or LAD

Example of assessment of global longitudinal myocardial strain (GLS) as provided by the EchoPAC software: apical long-axis view, in which the closure of aortic valve is defined (left upper panel), 4-chamber



Bertini M et al. Circ Cardiovasc Imaging 2012;5:383-391

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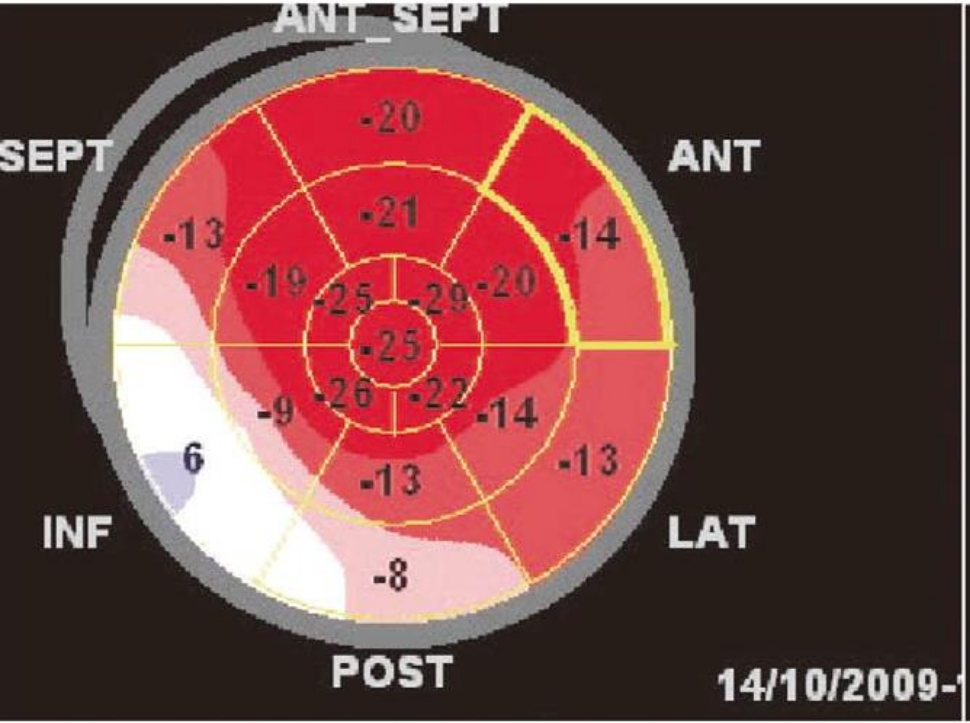
Learn and Live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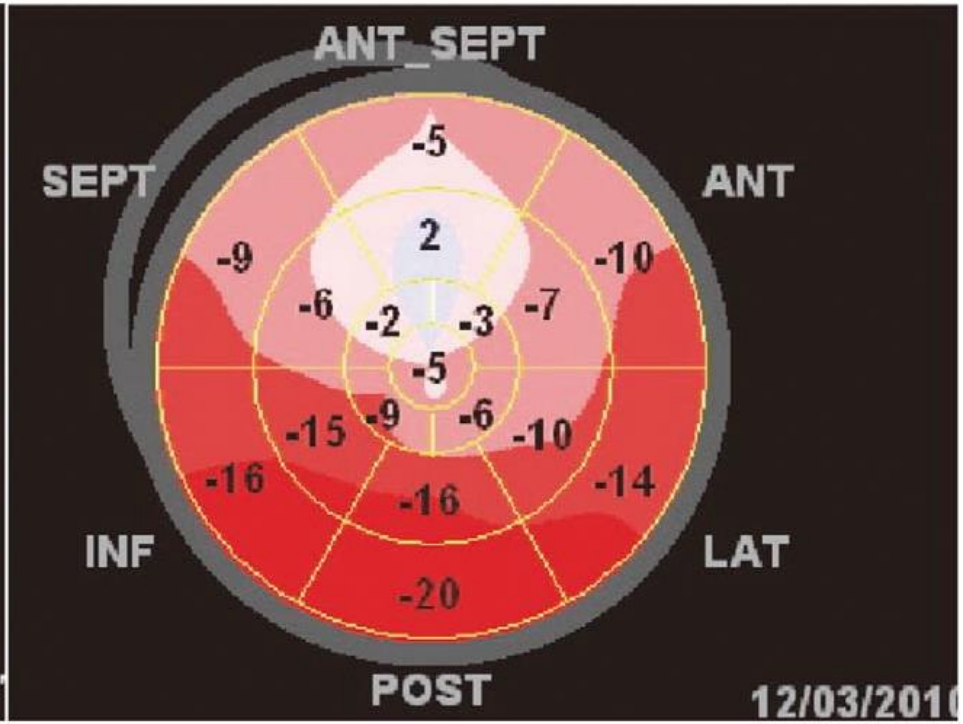
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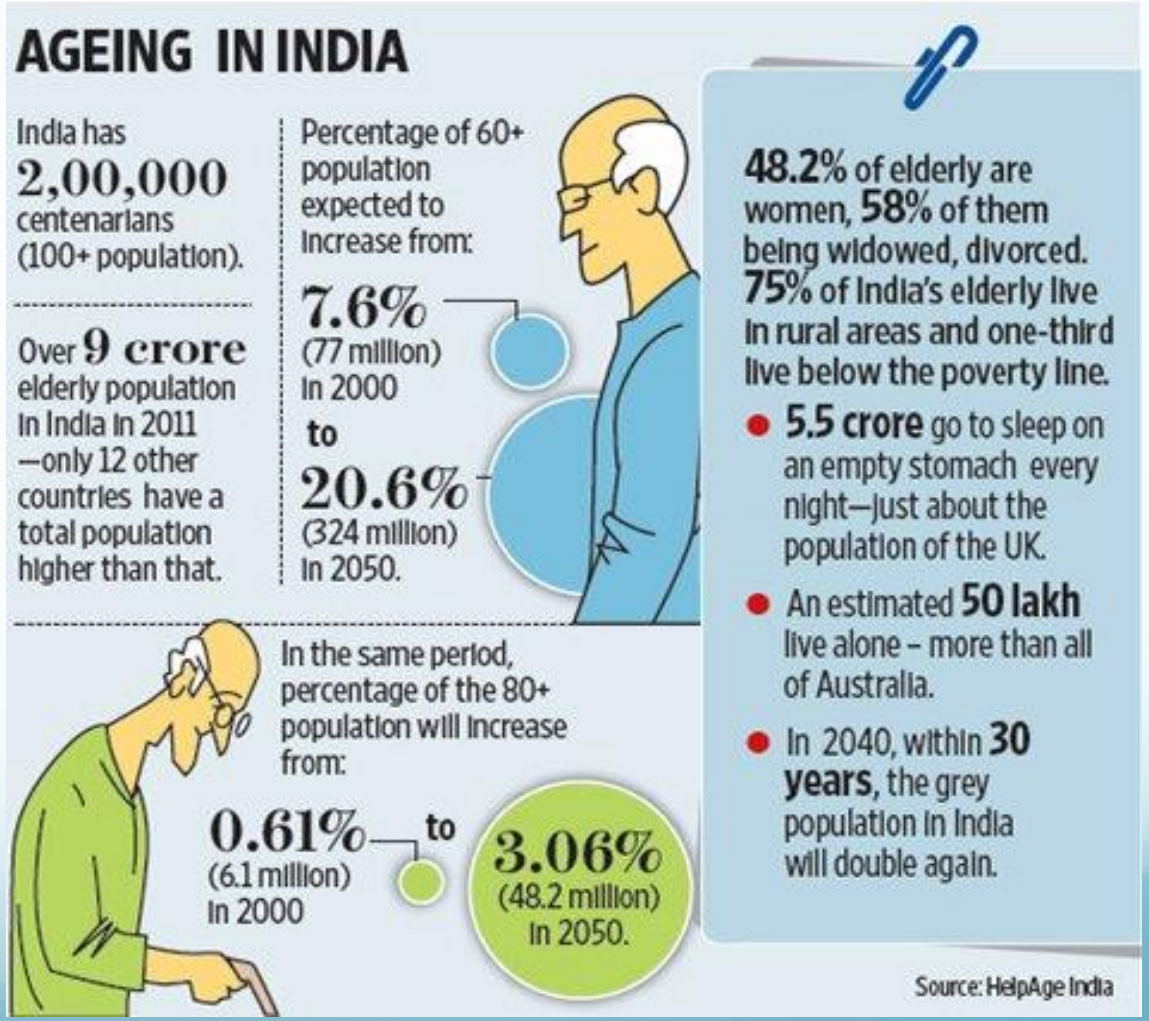
Aims & Objectives:

Assessment of Regional and Global Myocardial Systolic Function by 2D longitudinal speckle tracking in elderly patients with normal LV function.

The overall goal of analysis is to detect the presence of early myocardial disease.

Background

DHR grant: Cardiology Department Grant Medical College & Sir JJ group of Hospitals,Mumbai,India



- **Background:** The detection of altered longitudinal mechanics alone may suffice if the overall goal of analysis is to detect the presence of early myocardial disease.

Inclusion & Exclusion criteria

- Prospective observational (Mar 2012-Sep2012)
- LV dysfunction (segmental hypo or akinesia or LVEF ≤55%)
- LVH, LVIDD>55 mm
- Significant valvular dysfunction (≥ grade 2)
- Atrial fibrillation.

Methods

- M-mode
- Simpson’s bi-plane method
- PW Doppler flow we obtained the peak of early filling velocity (E), the peak of atrial filling velocity (A).
- LV centered digital loops with 3 successive cardiac cycles were acquired. The frame rate was between 50 and 60 Hz.

2D longitudinal speckle tracking Imaging

- 3 consecutive cardiac cycles were recorded and averaged for each measurement.
- The SR profiles show the one negative and two positive waves during systole and diastole, respectively.
- We measured peak systolic SR (SSR).

.

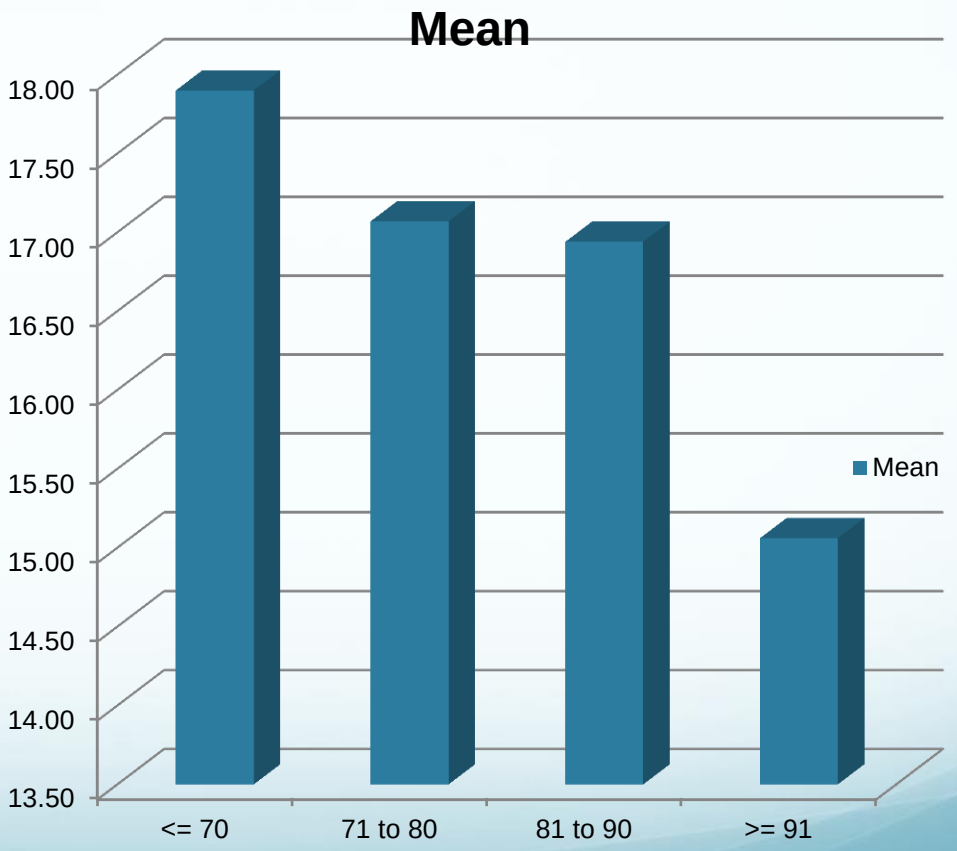
Our study included 100 patients divided in 4 groups according to age in years <= 70, 71 to 80, 81 to 90, >= 91; 25 patients in each group. Patient characteristics and the echocardiographic parameters are shown in Tables 1, 2, 3 and fig 1.

Table 1:- Association between Age (yrs) and Sex.

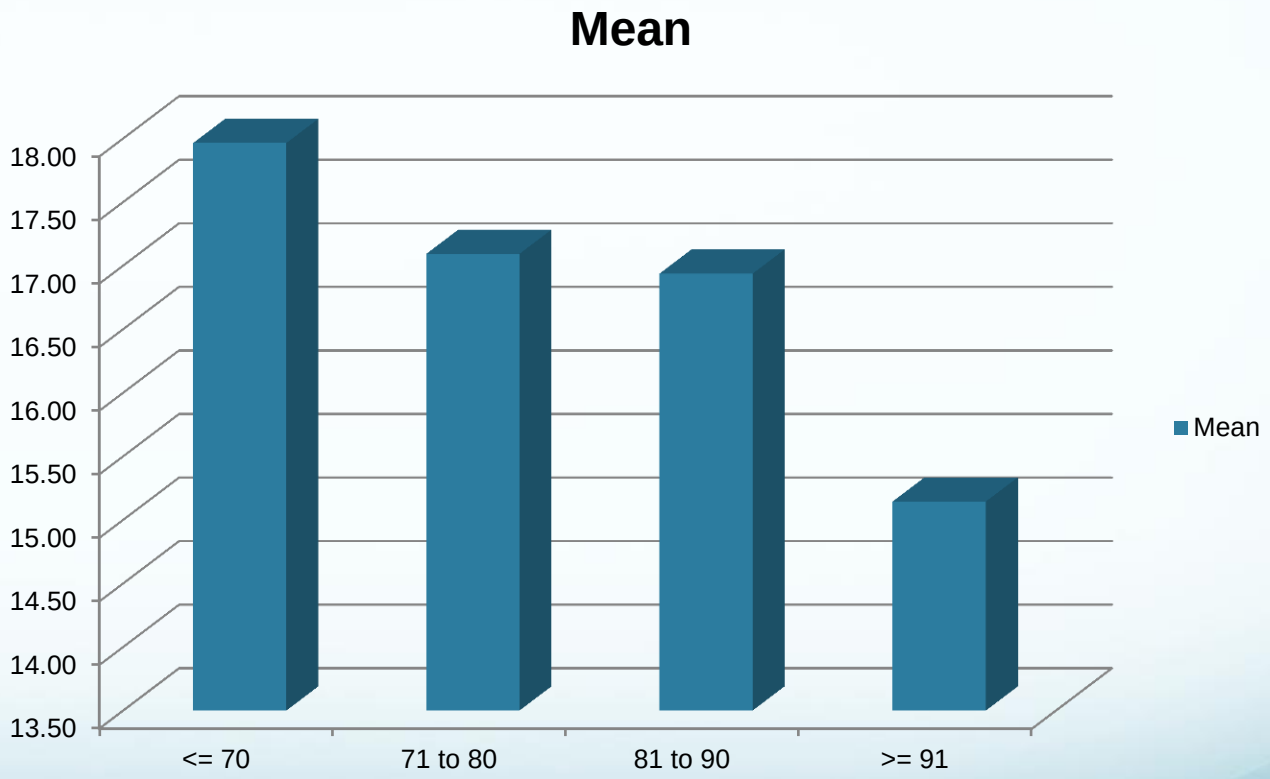
Age (yrs)		Sex		Total
		Female	Male	
<= 70	No.	9	16	25
	%	36.0%	64.0%	100.0%
71 to 80	No.	10	15	25
	%	40.0%	60.0%	100.0%
81 to 90	No.	9	16	25
	%	36.0%	64.0%	100.0%
>= 91	No.	8	17	25
	%	32.0%	68.0%	100.0%
Total	No.	36	64	100
	%	36.0%	64.0%	100.0%

Variables	Age <= 70 yrs (n=25)		Age 71 to 80 yrs (n=25)		Age 81 to 90 yrs (n=25)		Age >= 91 yrs (n=25)		P value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Age	**57.76**	**4.66**	**75.48**	**3.06**	**85.28**	**2.56**	**96.60**	**4.47**	**NS**
Diastolic BP (mmHg)	78.48	5.72	77.44	6.21	78.00	6.71	80.24	6.28	NS
Systolic BP (mmHg)	126.88	8.53	124.24	7.71	129.84	7.77	126.00	7.23	NS
HR	72.04	10.79	65.44	7.54	66.60	6.55	64.52	5.19	NS
LVIDd	43.44	3.08	41.96	4.05	43.00	4.02	43.48	3.91	NS
LVEF	65.92	5.17	63.84	4.31	65.40	5.80	62.72	4.74	NS
E/A	1.07	0.17	1.00	0.28	0.88	0.27	0.76	0.21	<0.05

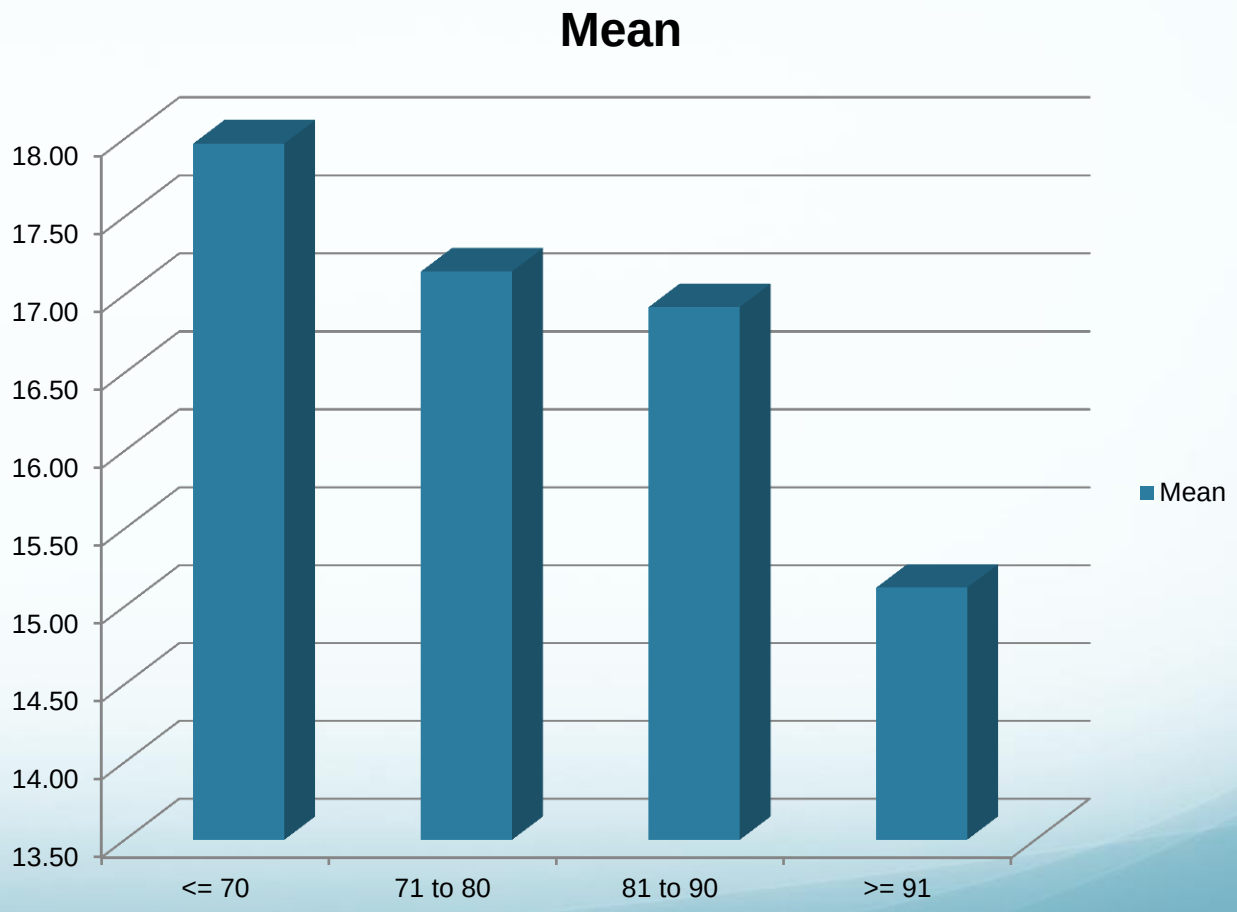
- Comparison of basal Longitudinal strain between age-group



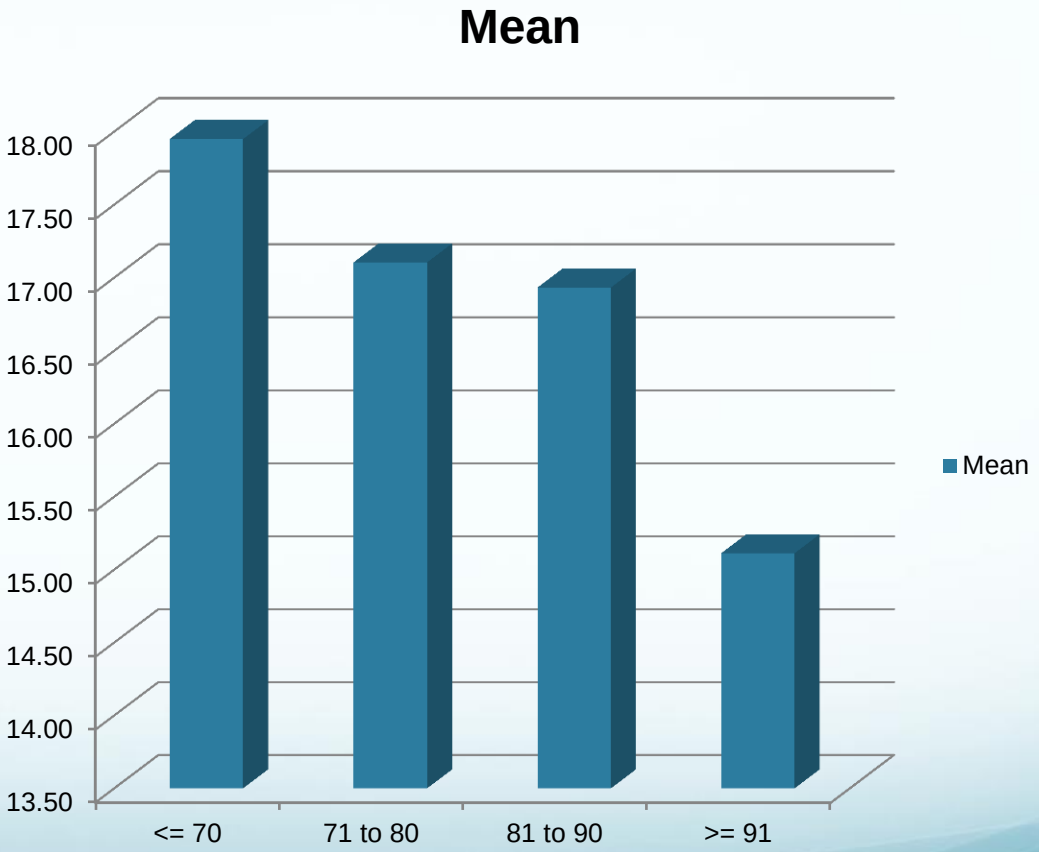
Comparison of mid Longitudinal strain



Comparison of apical Longitudinal strain



Comparison of Global longitudinal strain



Conclusions

- Ageing heart undergoes many structural and biological changes in the myocardium
- lead to heart failure with normal ejection fraction.
- Stimulate to research whether drugs like ACE inhibitors, ARBs could prevent or delay such structural changes.

However, a large scale study in the elderly population would be required

Thank You

Thanks' for your kind attention!!!!!!

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