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Ekkokardiografi

Asbjørn Støylen, 1. amanuensis, dr. med.
ISB

www.ntnu.no

Om du ønsker, kan du sette inn navn, tittel på foredraget, o.l. her.

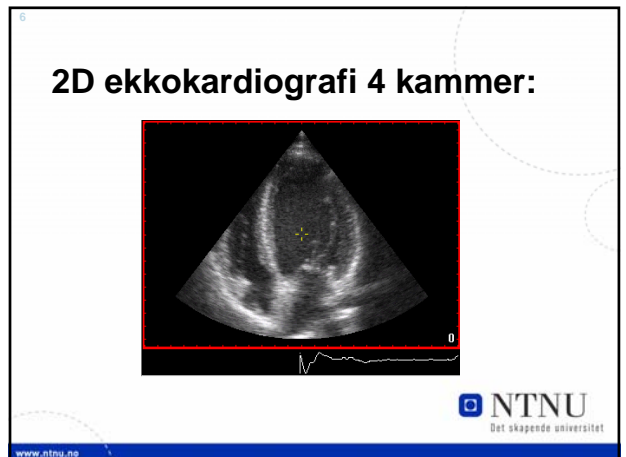
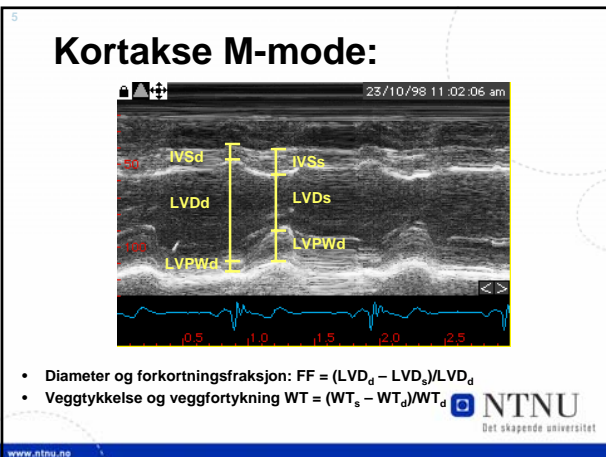
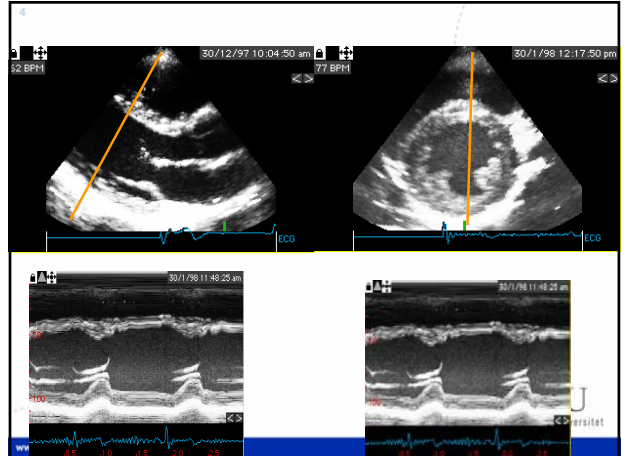
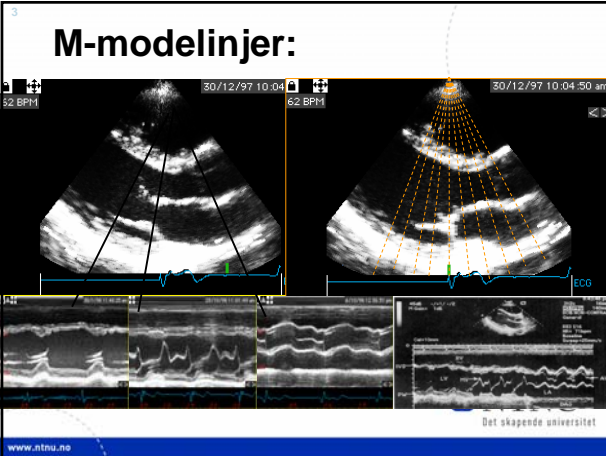
2

Historikk:

- 1954: M-mode
- 1957: Doppler flow.
- 1976: 2D Ekko
- 1989: Vevsdoppler




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7

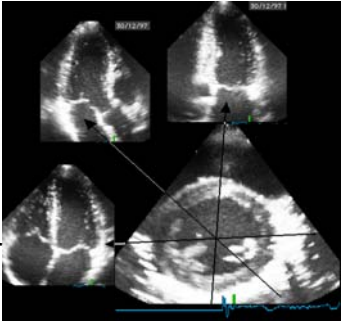
Parasternal langakse:



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8



Apical langakse

Apical firekammer

Apical tokammer

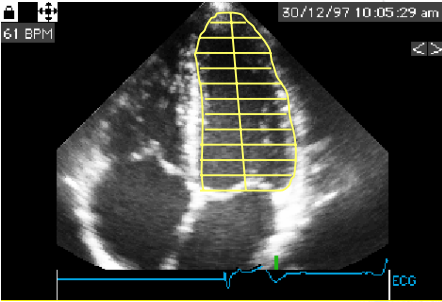
Parasternal kortakse

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9

Modifisert Simpson:



61 BPM

30/12/97 10:05:29 am

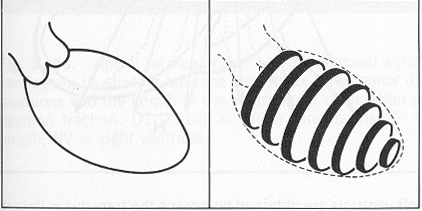
ECG

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10

2D ekko – Simpson's metode:



Feigenbaum 4th ed

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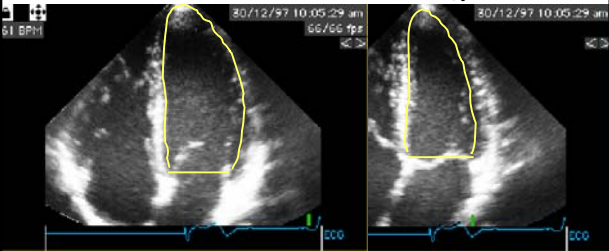
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11

Ejeksjonsfraksjon:

Diastole

Systole



61 BPM

30/12/97 10:05:29 am

66/66 fps

ECG

ECG

$SV = EDV - ESV$

Normalt $> 45 \text{ ml} / \text{m}^2$

$EF = SV / EDV$

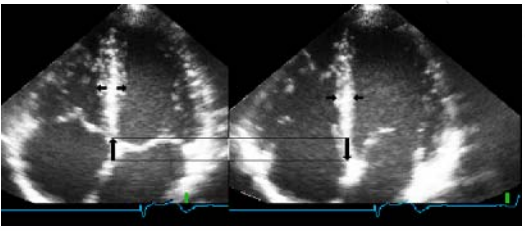
Normalt $> 50\%$

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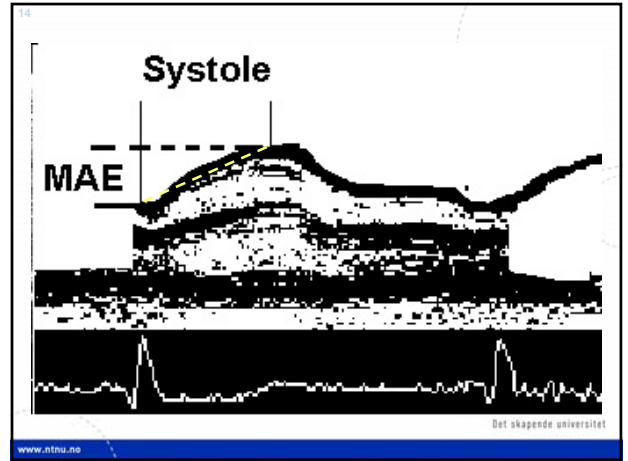
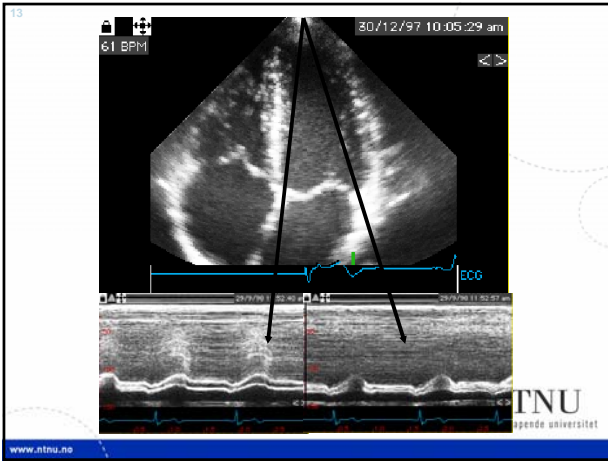
12

Langaksebevegelsen:



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15

- MAE > 10 mm tilsvarer EF > 50%
- MAE < 7 mm Tilsvarer EF < 30%

Alam et al 1992

- Korrelasjon MAE og EF 0,80

Støylen et al 2003

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16

Regional funksjon

50 BPM

20/3/98 10:11:04 am

57/57 fps

ECG

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17

Nedre veggs infarkt

72 BPM

27/4/98 10:18:22 am

61/61 fps

ECG

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18

Fremre veggs infarkt med trombe i apex:

31 BPM

25/9/96 11:36:09 am

34/36 fps

ECG

61 BPM

1/6/12/96 1:21:22 pm

45/42 fps

ECG

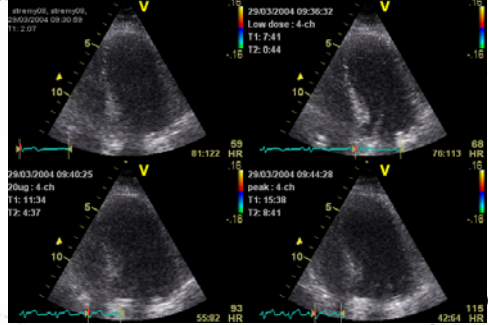
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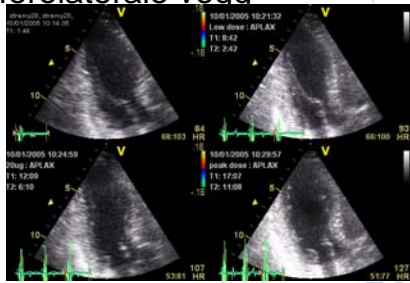
Stressekkokardiografi:



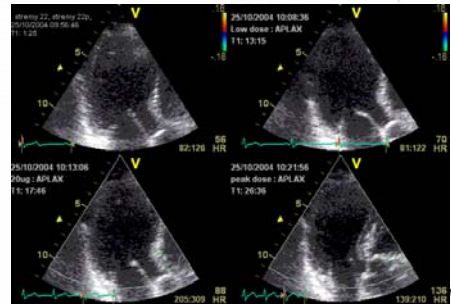
Stressekkokardiografi – akinesi i anex



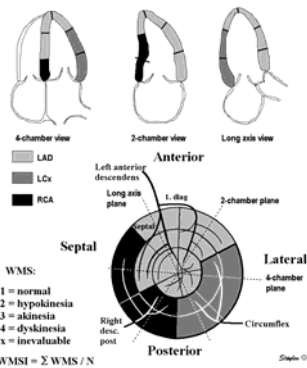
Stressekkokardiografi – dyskinesi i inferolaterale vegg



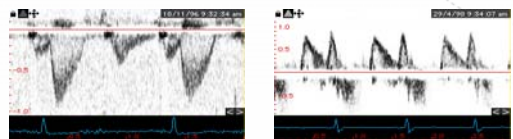
Stressekkokinesi tardykinesi i inferolaterale vegg



Tolkning:



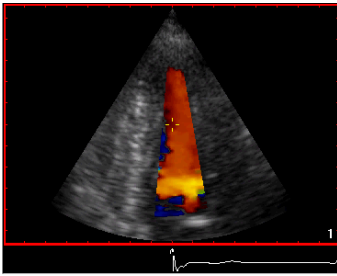
Flowhastighet med Doppler:



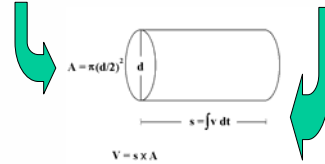
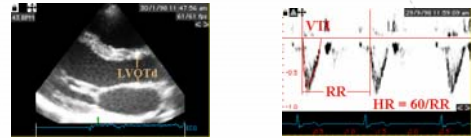
• LVOT

• Mitralostiet

Farge Doppler



Minuttvolum (CO) med ekko:



$$V = s \times A$$

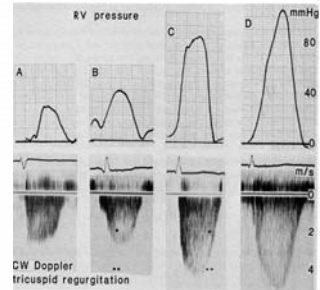
$$SV = s \times A = \int v dt \times \pi(d/2)^2$$

$$CO = SV \times HR = \int v dt \times \pi(d/2)^2 \times HR$$

Sammenheng mellom hastighet og trykkdifferanse:

- Jo høyere trykkforskjell, desto høyere hastighet, evt. jo høyere hastighet, desto større trykkfall
 - $pV = \frac{1}{2} m v^2 \Leftrightarrow p = \frac{1}{2} \rho v^2$
- Bernoullis ligning:
 - $\Delta P = \frac{1}{2}(v_2^2 - v_1^2) + \rho[(dv/dt)ds + R(v)]$
- Den forenklete Bernoulliligningen:
 - $\Delta P = 4v^2$

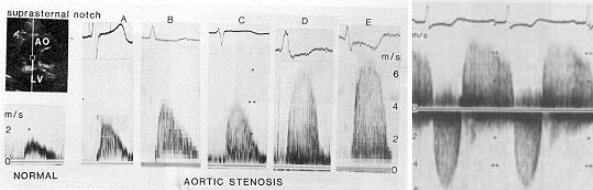
Non-invasive høyresidige trykk:



Tricuspidal regurgitasjon

Hatle -85

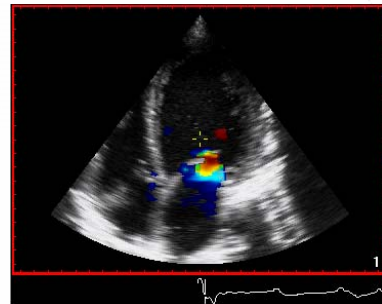
Aortastenose:

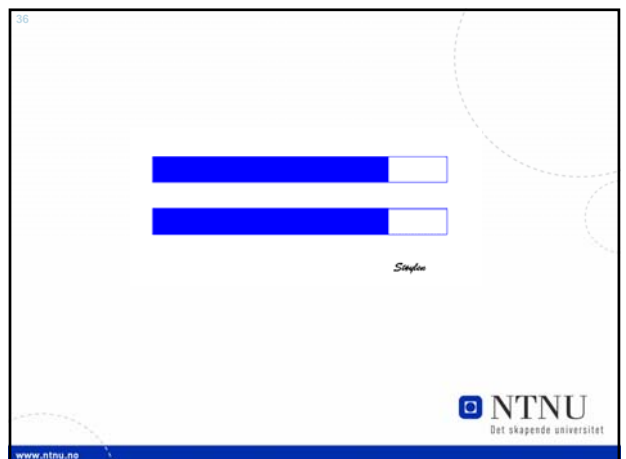
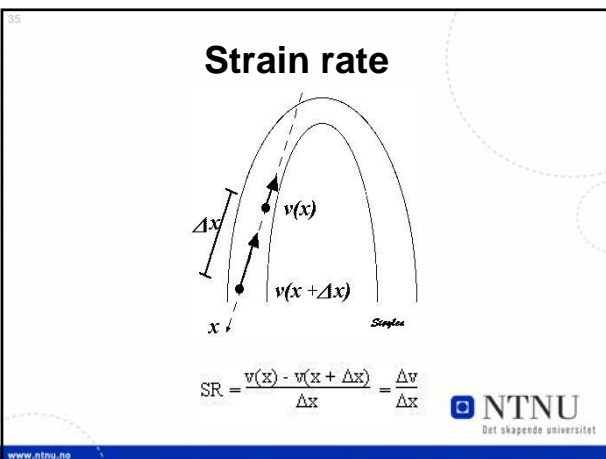
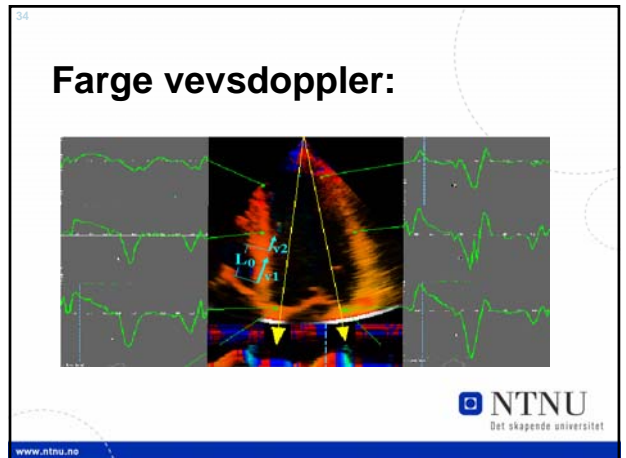
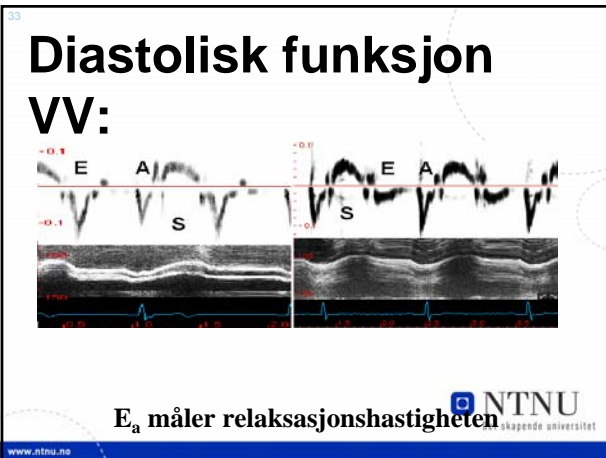
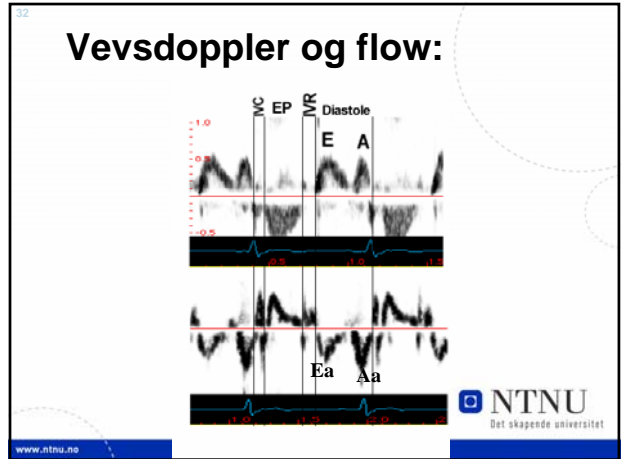
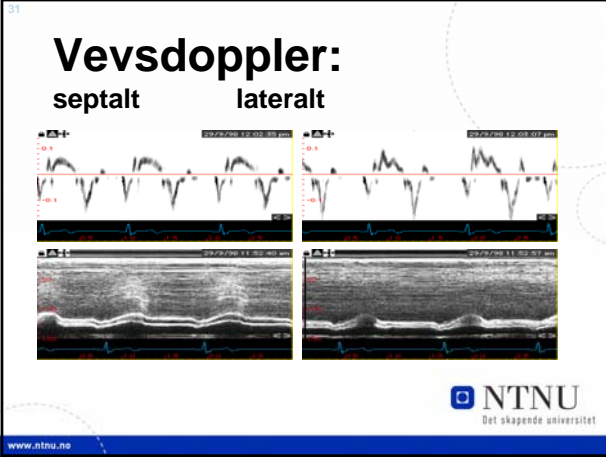


Maksgradient: $P_{max} = 4 v_{max}^2$

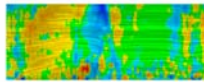
Stenoseareal: $AVA = A_{LVOT} * \frac{VTI_{LVOT}}{VTI_{Ao}}$

Mitral insuffisiens

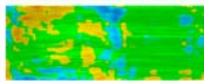




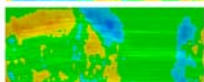
1: Normal:



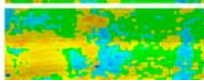
2: Hypokinetic:
(two basal segs.)



3: Aknetic:
(two basal segs.)

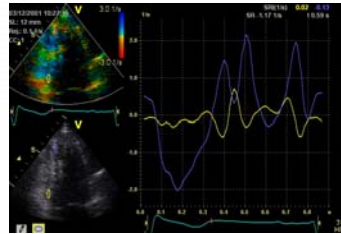


4: Dyskinetic:
(apical segm.)



Støylen et al 2000

Strain rate imaging:



Asynchrony peak:

