

Rins & Coração

A relação na Doença Renal Crónica

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11 de fevereiro de 2022

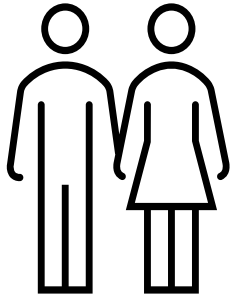
Definição

Síndrome Cardiorrenal¹⁻³

- Tipo I – Doença renal aguda causada por disfunção cardíaca aguda
- Tipo II – Doença renal crónica progressiva secundária a disfunção cardíaca crónica
- Tipo III – Disfunção cardíaca aguda precipitada por falência renal aguda
- **Tipo IV – Disfunção cardíaca crónica secundária a doença renal crónica**
- Tipo V – Disfunção cardíaca e disfunção renal secundárias a patologia sistémica

➤ Coexistência de disfunção cardíaca e de disfunção renal, na qual a falência aguda ou crónica de um dos órgãos precipita a falência aguda ou crónica do outro¹⁻³

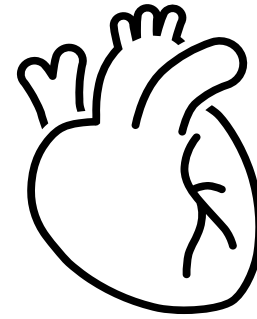
Epidemiologia



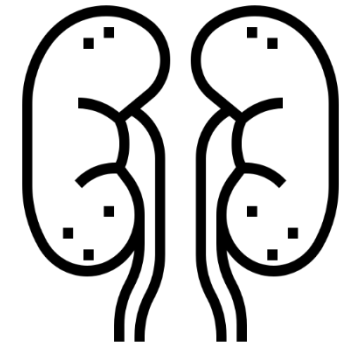
Afeta 6,1%
da população
portuguesa ⁴



Pais com maior
incidência de
doença terminal
na UE ⁴



50% óbitos por
DRC são devido a
causas cardíacas ⁴



DRC: ↓ da
filtração
glomerular < 60
ml/min ^{1,3}

1. Laffin LJ, Bakris GL. *Intersection Between Chronic Kidney Disease and Cardiovascular Disease* (2021)

3. Di Lullo L, House A, Gorini A, Santoboni A, Russo D, Ronco C. *Chronic kidney disease and cardiovascular complications* (2015)

4. Nolasco F, Loureiro A, Ferreira A, Macário F, Barata JD, Oliveira Sá H, et al. *Rede Nacional de Especialidade Hospitalar e Referênciação: Nefrologia* (2017)

Aspetos Clínicos

❖ Comorbilidades ^{1,3}

Doença arterial coronária
Síndrome coronária aguda
Hipertrofia ventricular esquerda

Hipertensão Arterial
Diabetes Mellitus
Cardiopatia Isquémica
Insuficiência Cardíaca
Dislipidemia

Diagnóstico

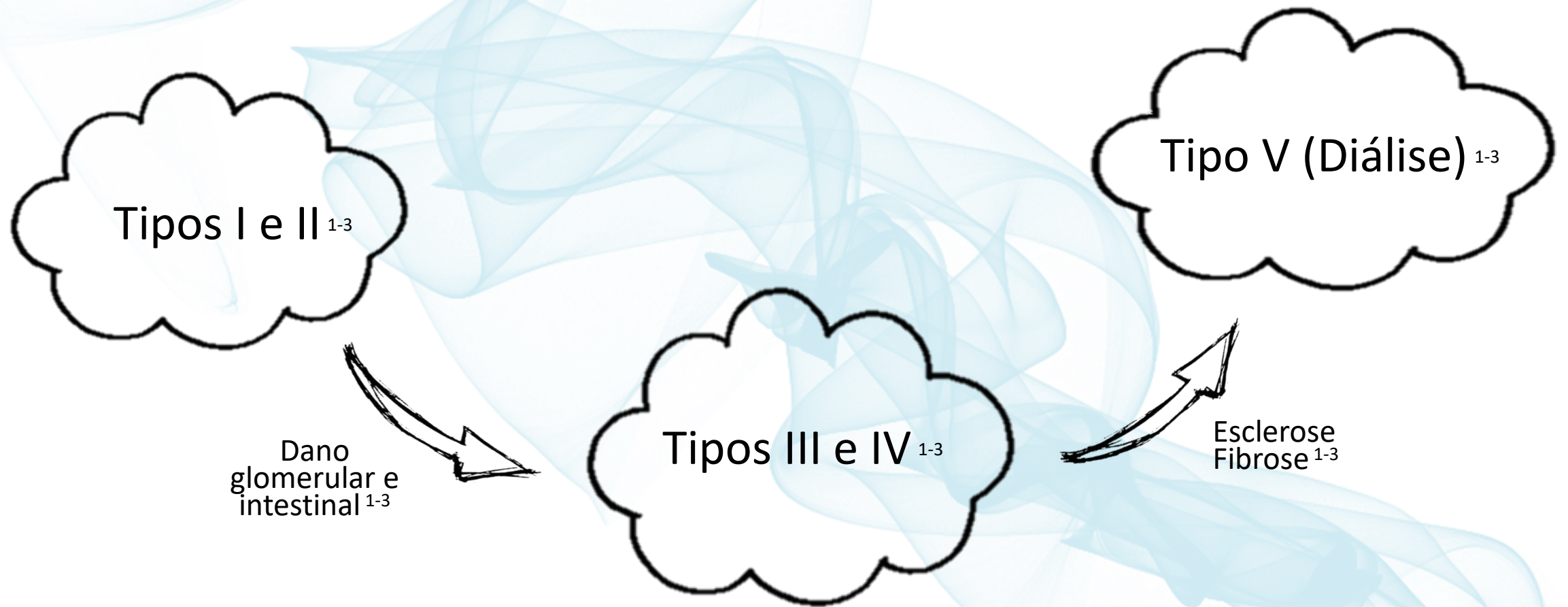
- ❖ Sintomatologia ^{2,3}
- ❖ Imagiologia ^{2,3} →
- ❖ Marcadores Laboratoriais ^{2,3}
 - Eletrólitos, ureia, creatinina, fosfato, cálcio, hemograma completo
 - Urinálise
 - Proteína quantitativa urinária
- ❖ Biópsia renal ^{2,3}

Ultrassonografia cardiovascular
Ultrassonografia renal
Tomografia Computorizada (TC)
Ressonância Magnética Cardíaca (RMC) ^{2,3}

2. Deferrari G, Cipriani A, La Porta E. *Renal dysfunction in cardiovascular diseases and its consequences* (2020)

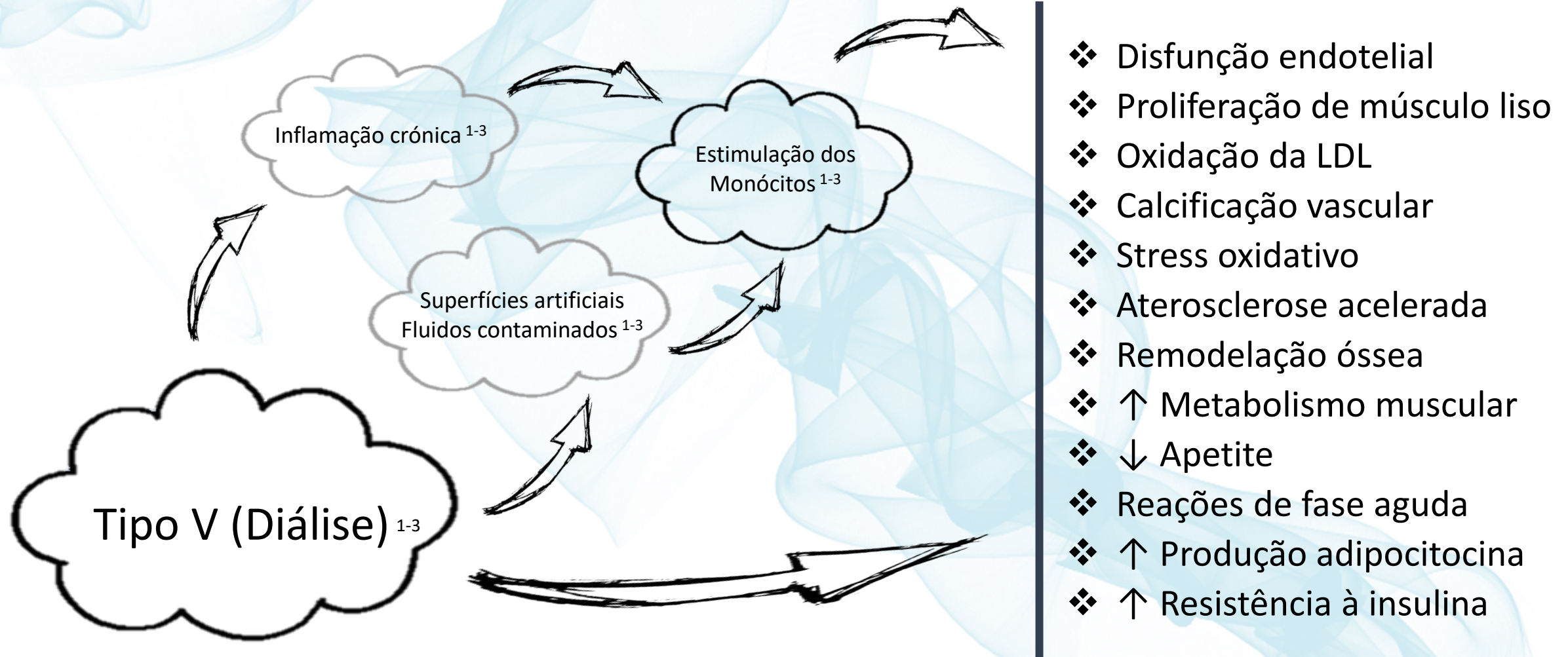
3. Di Lullo L, House A, Gorini A, Santoboni A, Russo D, Ronco C. *Chronic kidney disease and cardiovascular complications* (2015)

Evolução da Doença Renal Crónica



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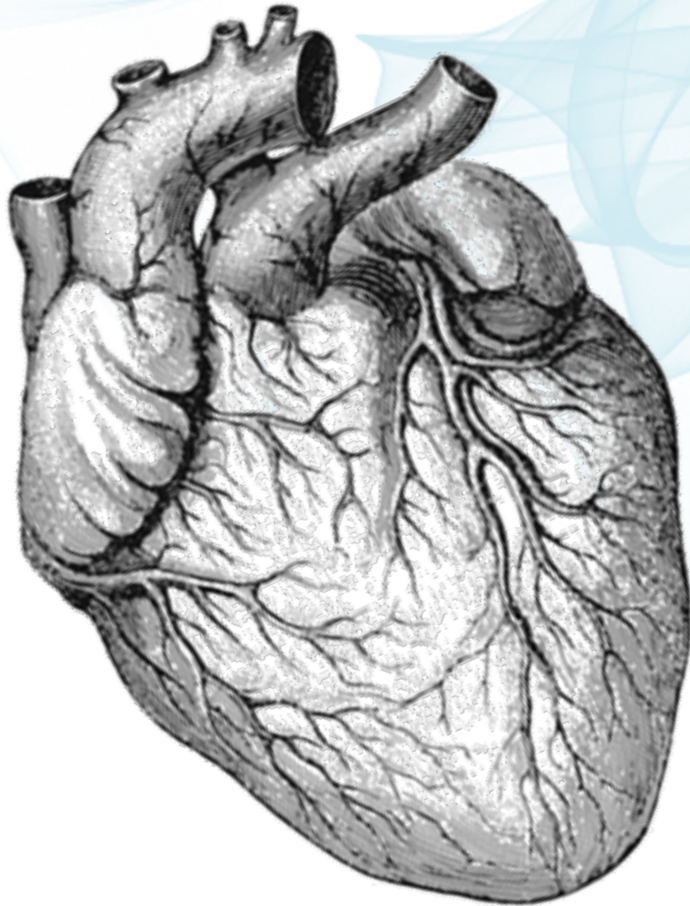
Evolução da Doença Renal Crónica



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Evolução da Doença Renal Crónica

Coração



- ❖ **Remodeling cardíaco** ^{1,3}
- ❖ Anomalias neuro-hormonais ^{1,3}
- ❖ ↑ Risco sistémico ^{1,3}
- ❖ **Hipertrofia ventricular esquerda** ^{1,3}
- ❖ **Disfunção diastólica esquerda** ^{1,3}
- ❖ **Disfunção sistólica** ^{1,3}
- ❖ ↓ Perfusão coronária ^{1,3}
- ❖ Inflamação ^{1,3}
- ❖ **Calcificação coronária e dos tecidos** ^{1,3}
- ❖ **Sobrecarga de volume** ^{1,3}
- ❖ Biomarcadores ^{1,3}

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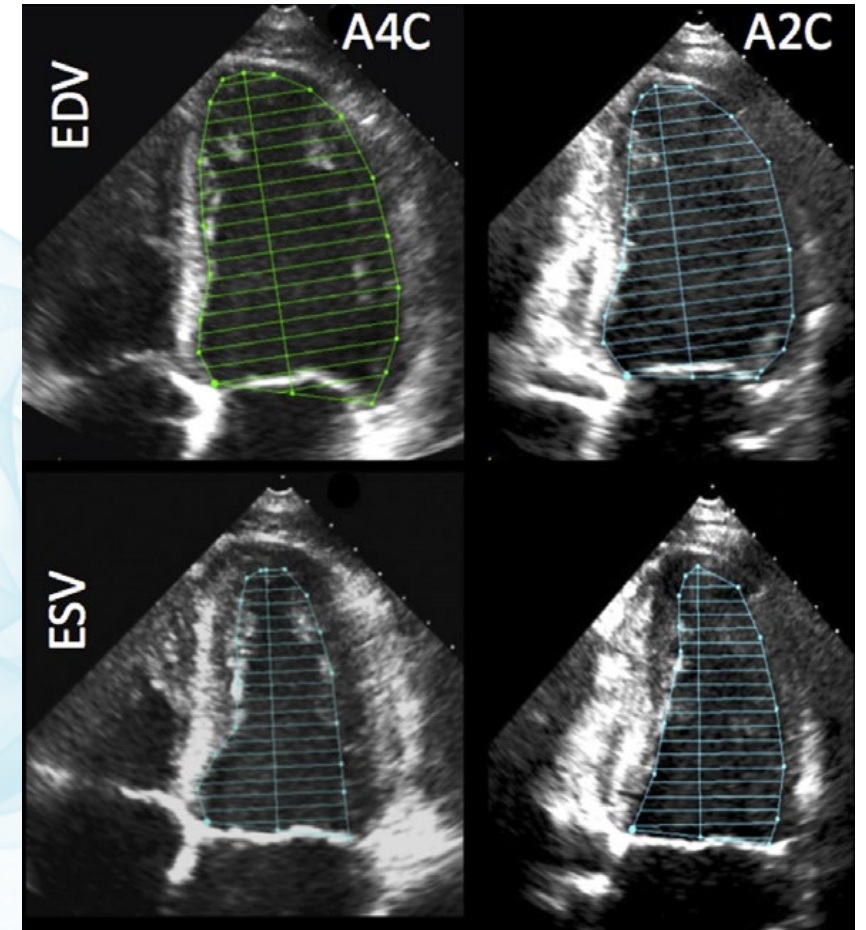
Ecocardiografia Transtorácica

Aurículas Direita e Esquerda⁵

❖ Volumes ↑

Table 4 Normal ranges and severity partition cutoff values for 2DE-derived LV EF and LA volume

	Male				Female			
	Normal range	Mildly abnormal	Moderately abnormal	Severely abnormal	Normal range	Mildly abnormal	Moderately abnormal	Severely abnormal
LV EF (%)	52–72	41–51	30–40	<30	54–74	41–53	30–40	<30
Maximum LA volume/BSA (mL/m ²)	16–34	35–41	42–48	>48	16–34	35–41	42–48	>48



Ecocardiografia Transtorácica

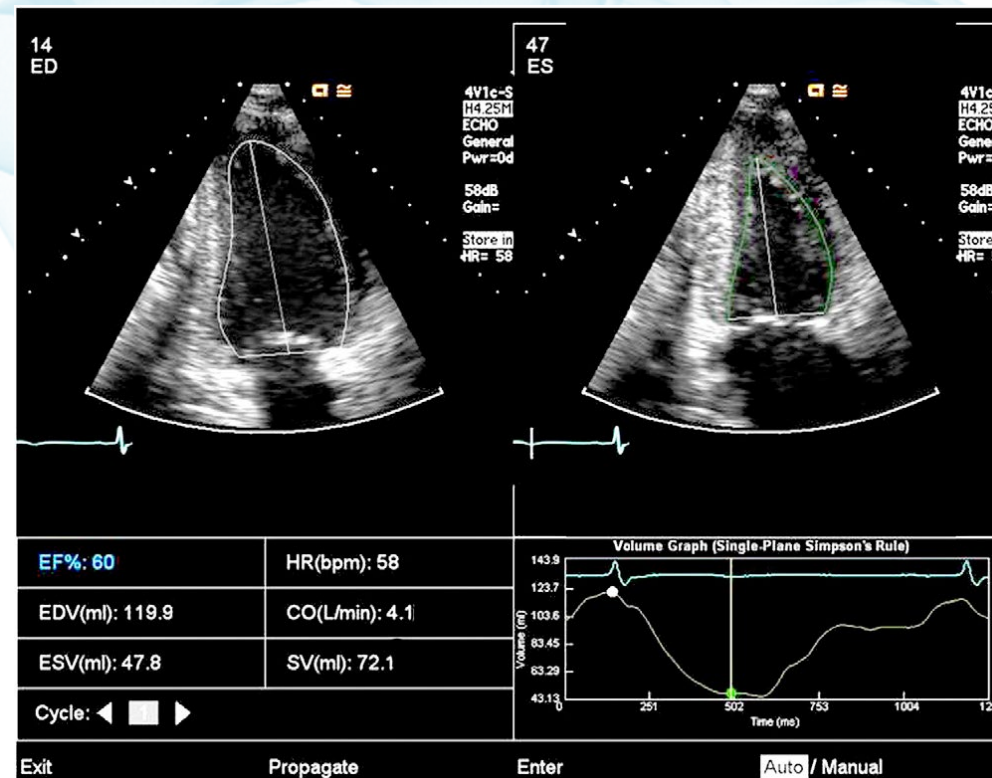
Função Ventricular Esquerda⁶

❖ Fração de ejeção ↓

$$\rightarrow FE = \frac{VDVE - VSVE}{VDVE} \times 100 (\%)$$

❖ Fração de encurtamento ↓

$$\rightarrow FEnc = \frac{DDVE - DSVE}{DDVE} \times 100 (\%)$$



Ecocardiografia Transtorácica

Função Ventricular Esquerda⁵

❖ Massa do ventrículo esquerdo ↑

→ Espessura relativa = $\frac{2 \times PPVEd}{VEd}$

❖ Débito cardíaco e Índice cardíaco ↓

→ DC = SV x FC (l/min)

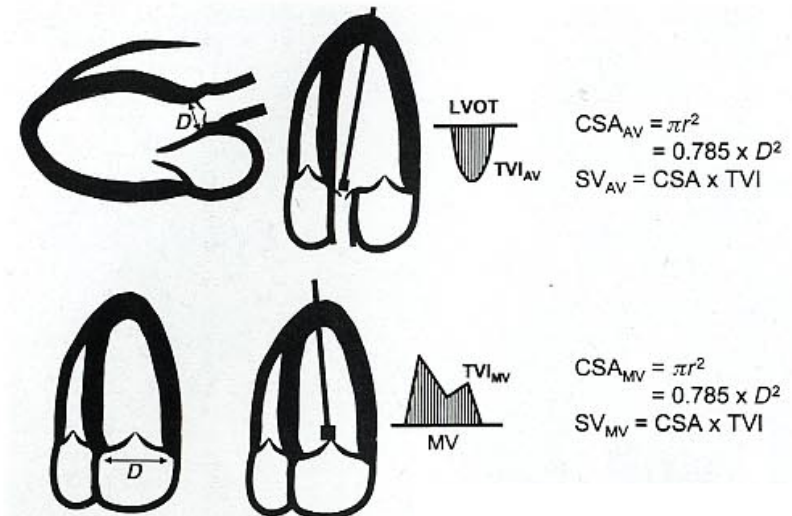
→ IC = DC / ASC (l/min/m²)

Table 6 Normal ranges for LV mass indices

	Women	Men
Linear method		
LV mass (g)	67–162	88–224
<i>LV mass/BSA (g/m²)</i>	<i>43–95</i>	<i>49–115</i>
Relative wall thickness (cm)	0.22–0.42	0.24–0.42
<i>Septal thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
<i>Posterior wall thickness (cm)</i>	<i>0.6–0.9</i>	<i>0.6–1.0</i>
2D method		
LV mass (g)	66–150	90–200
<i>LV mass/BSA (g/m²)</i>	<i>44–88</i>	<i>50–102</i>

Bold italic values: recommended and best validated.

❖ Volume sistólico (*Stroke volume*) ↓



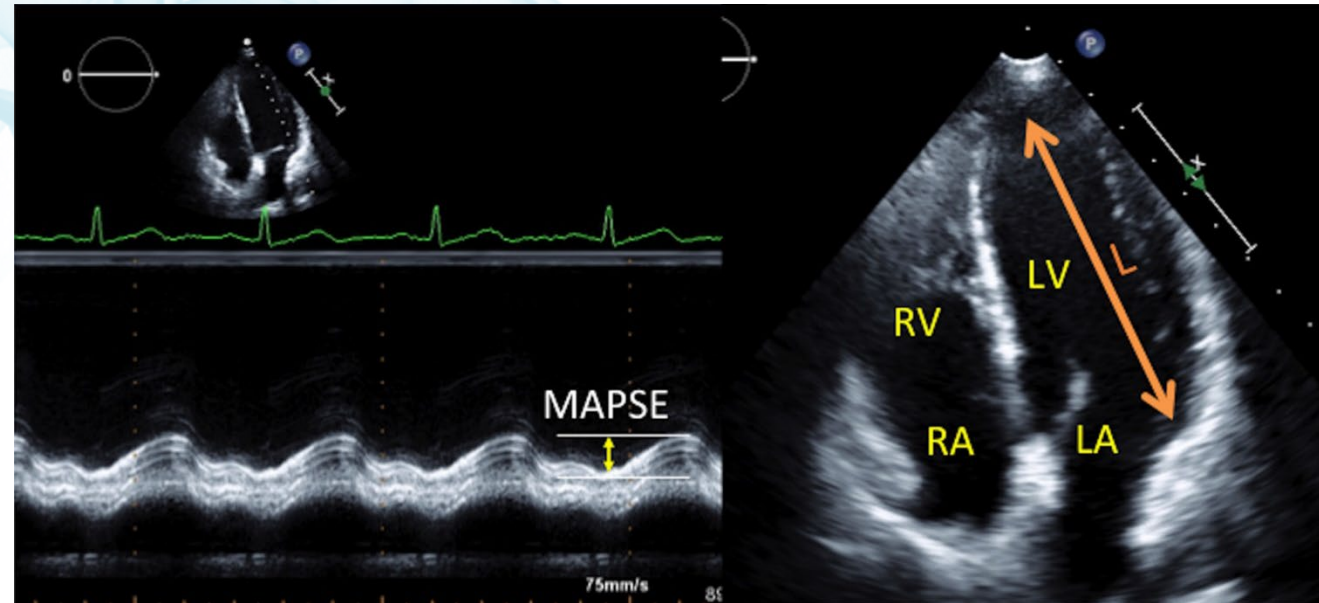
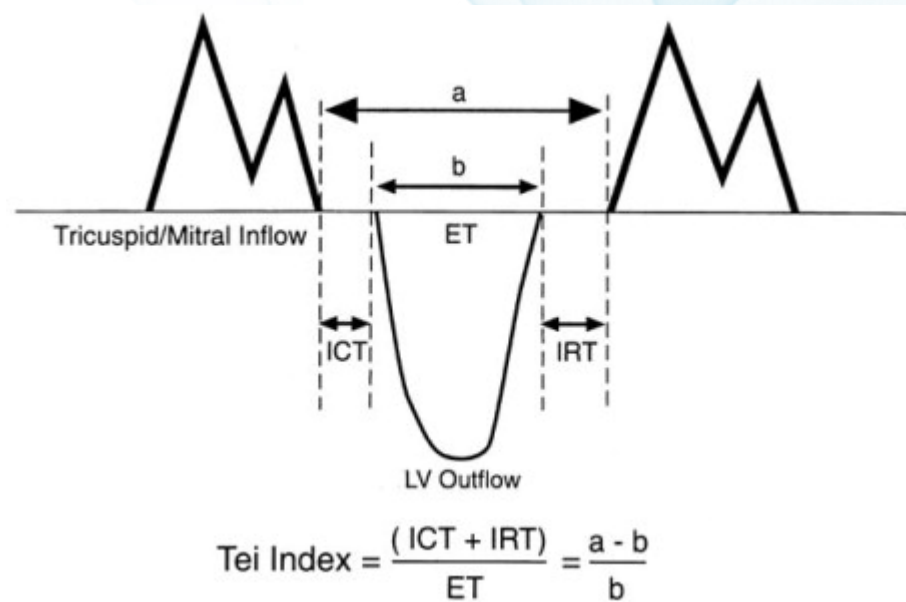
5. Lang RM, Badano LP, Mor avi V, Afilalo J, Armstrong A, Ernande L, et al. Recommendations for Cardiac Chamber Quantification by Echocardiography in Adults : An Update from the American Society of Echocardiography and the European Association of Cardiovascular Imaging (2015)

Ecocardiografia Transtorácica

Função Ventricular Esquerda^{7,8}

❖ MPI (*Myocardial Performance Index*) ou Índice de Tei ↑

❖ MAPSE ↓



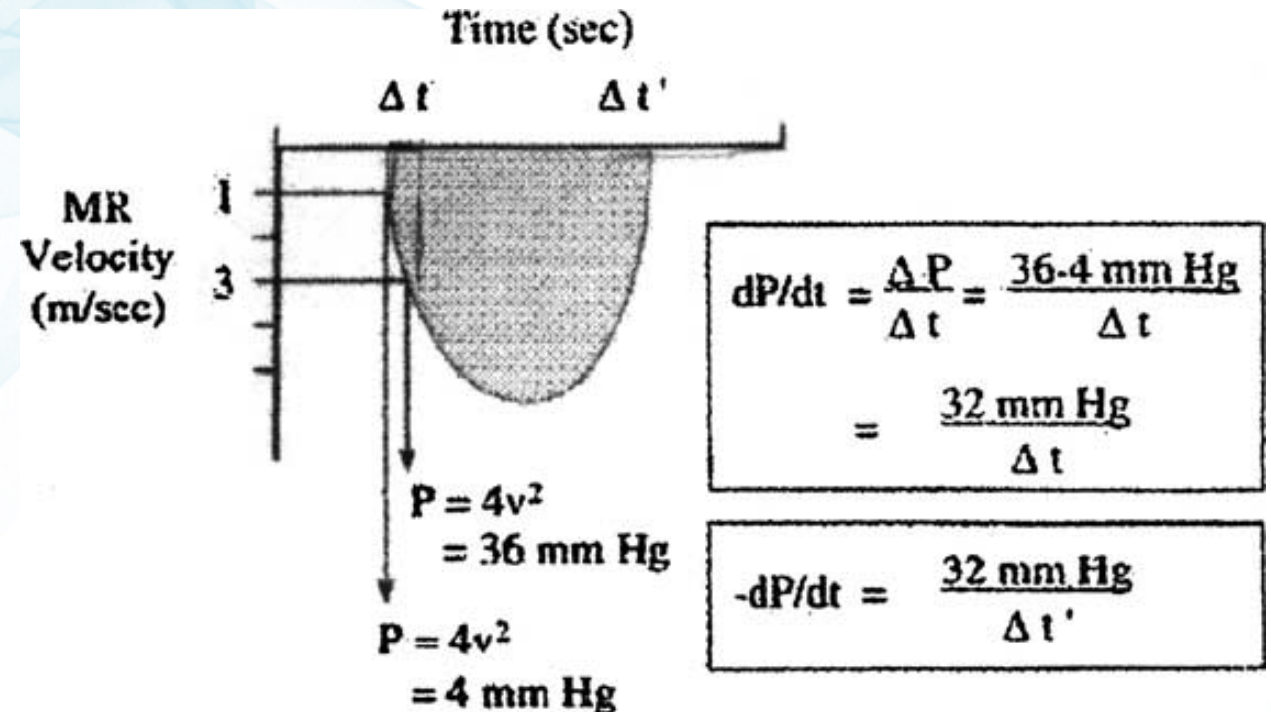
7. Terada T, Mori K, Inoue M, Yasunobu H. Mitral annular plane systolic excursion/left ventricular length (MAPSE/L) as a simple index for assessing left ventricular longitudinal function in children (2016)
8. Harjai KJ, Scott L, Vivekananthan K, Nunez E, Edupuganti R. The Tei index: A new prognostic index for patients with symptomatic heart failure (2002)

Ecocardiografia Transtorácica

Função Ventricular Esquerda⁹

❖ dP/dT ↓

→ Regurgitação Mitral



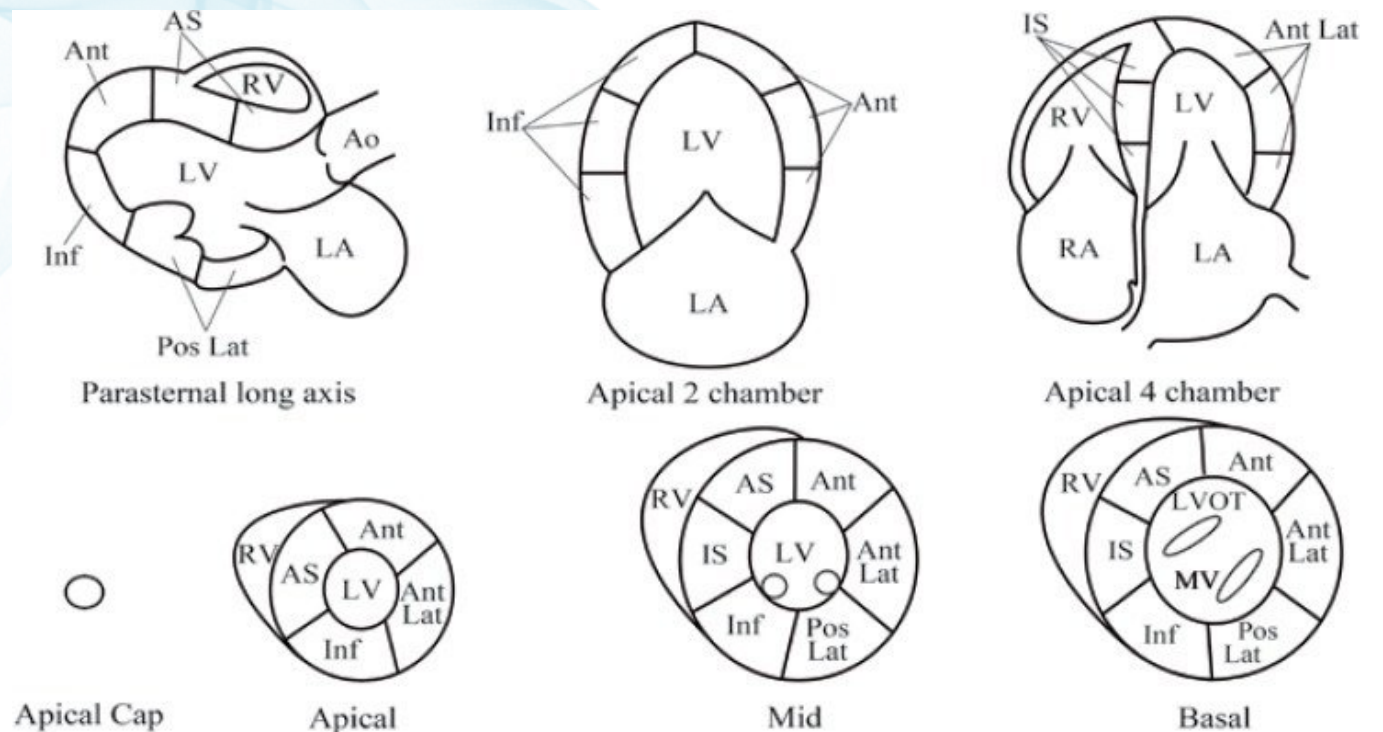
Ecocardiografia Transtorácica

Função Ventricular Esquerda¹⁰

❖ Índice de movimento das paredes (IMP) ↑

→ $IMP = \frac{\text{Soma do nº de tipos de movimento}}{\text{Soma do nº de segmentos visualizados}}$

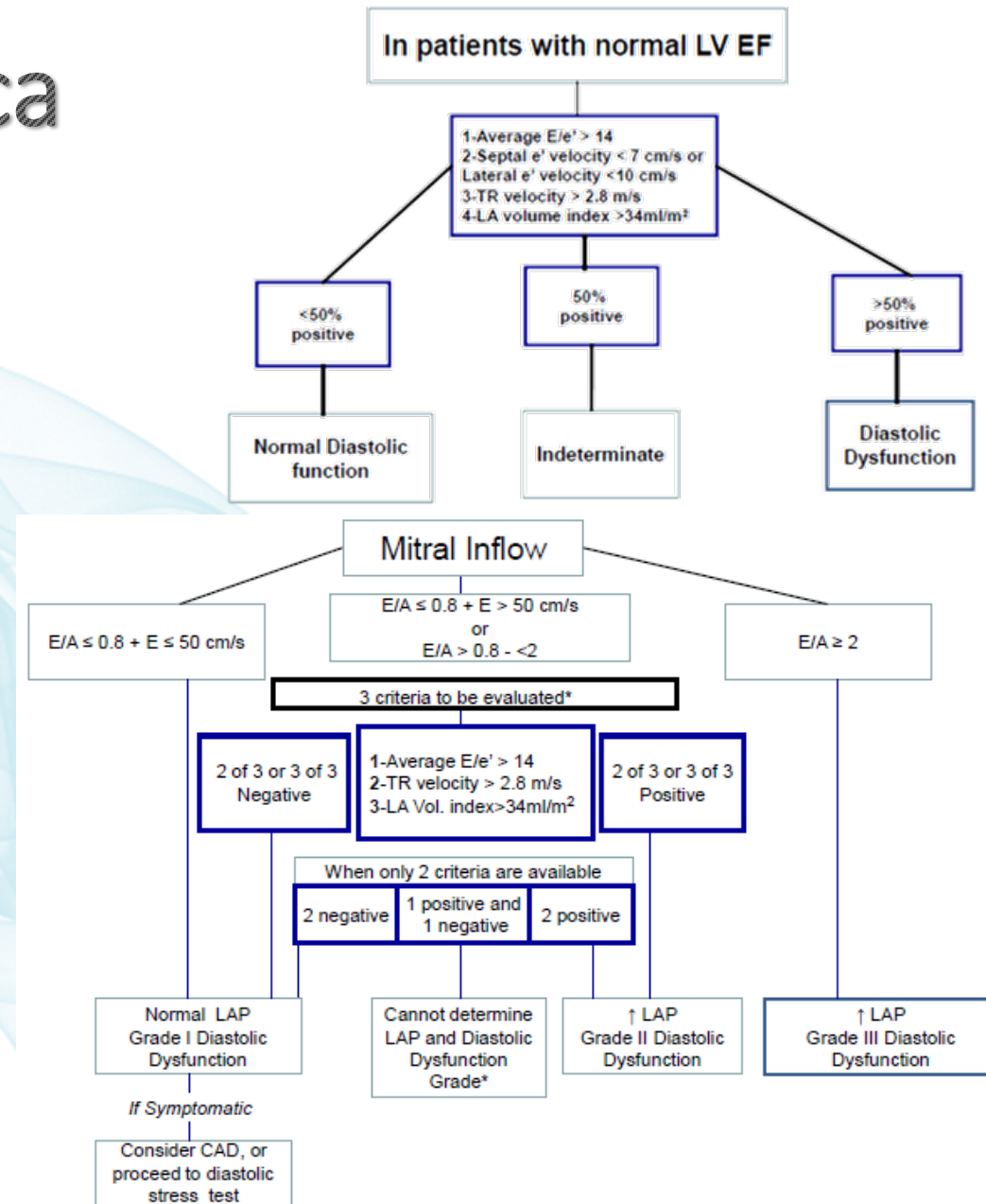
→ IMP > 2 é anómalo



Ecocardiografia Transtorácica

Função Diastólica¹¹

- ❖ Velocidade da Onda E (septal e lateral) ↓
- ❖ Rácio E/A aumentado ↑
- ❖ Rácio E/e' aumentado ↑
- ❖ Dilatação da aurícula esquerda
- ❖ Regurgitação tricúspide



Ecocardiografia Transtorácica

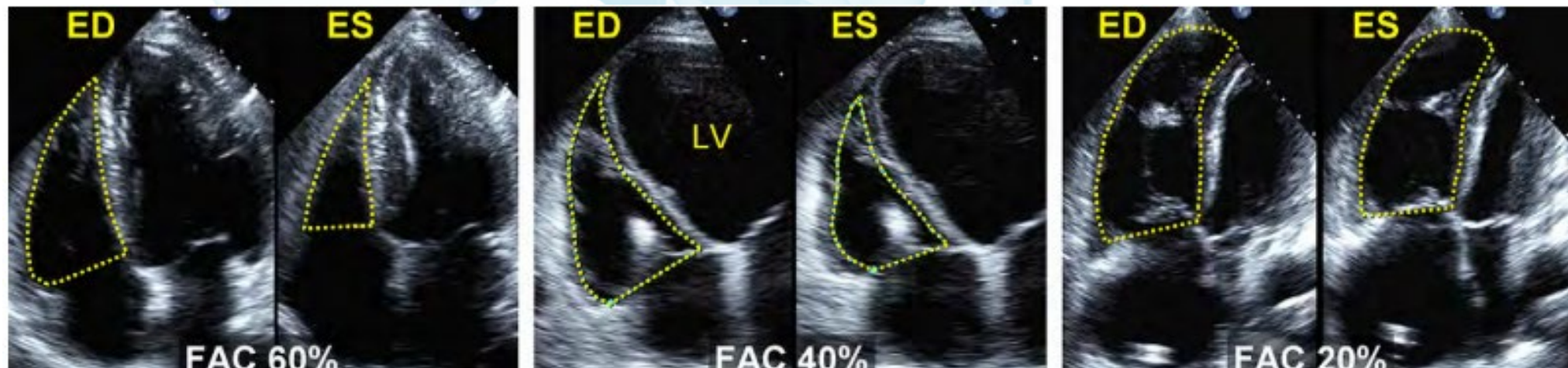
Função Ventricular Direita¹²

❖ TAPSE ↓

❖ Dilatação das cavidades direitas

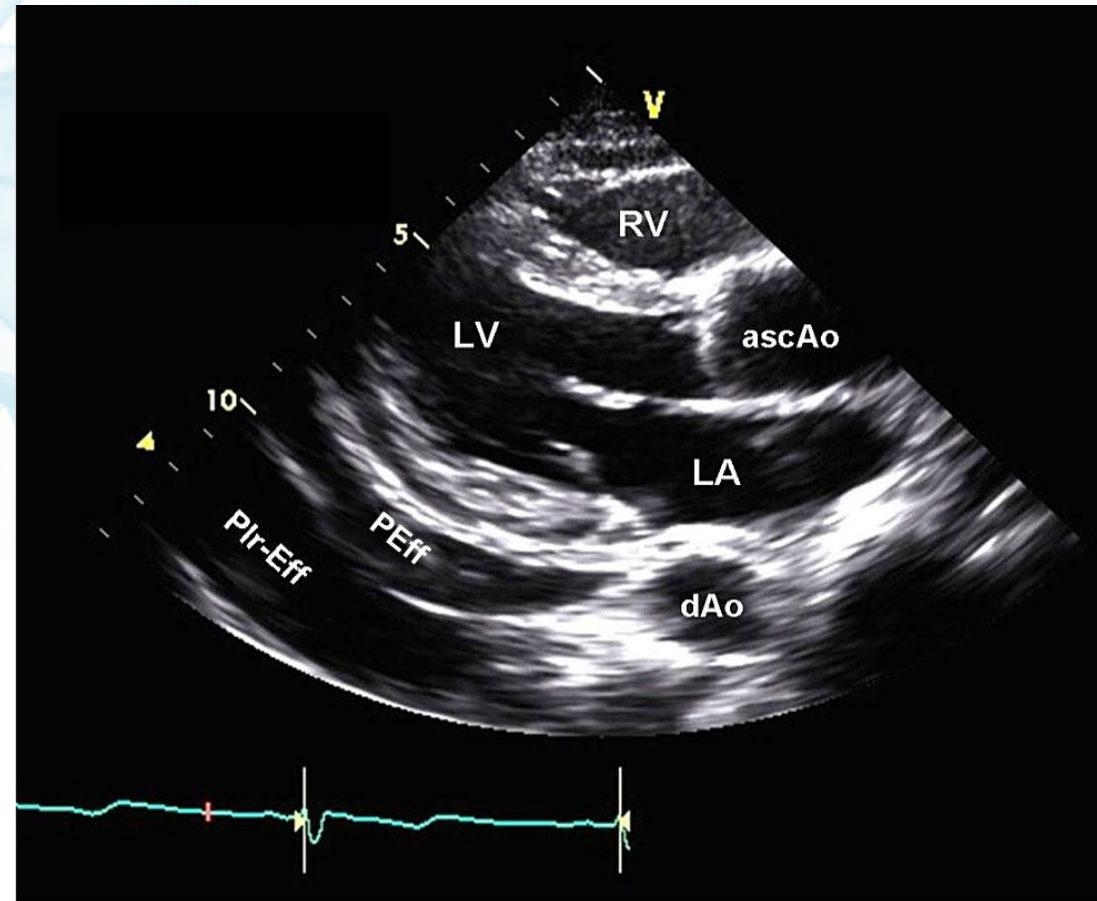
❖ *Fractional area change (FAC)* ↓

$$\rightarrow \text{FAC} = \frac{\text{ADVD} - \text{ASVD}}{\text{ADVD}} \times 100 (\%)$$



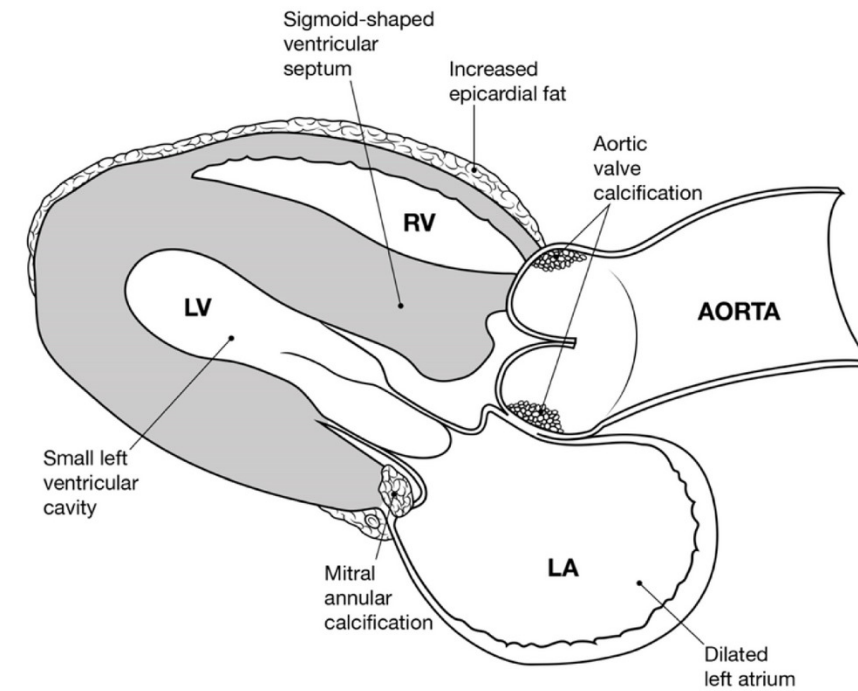
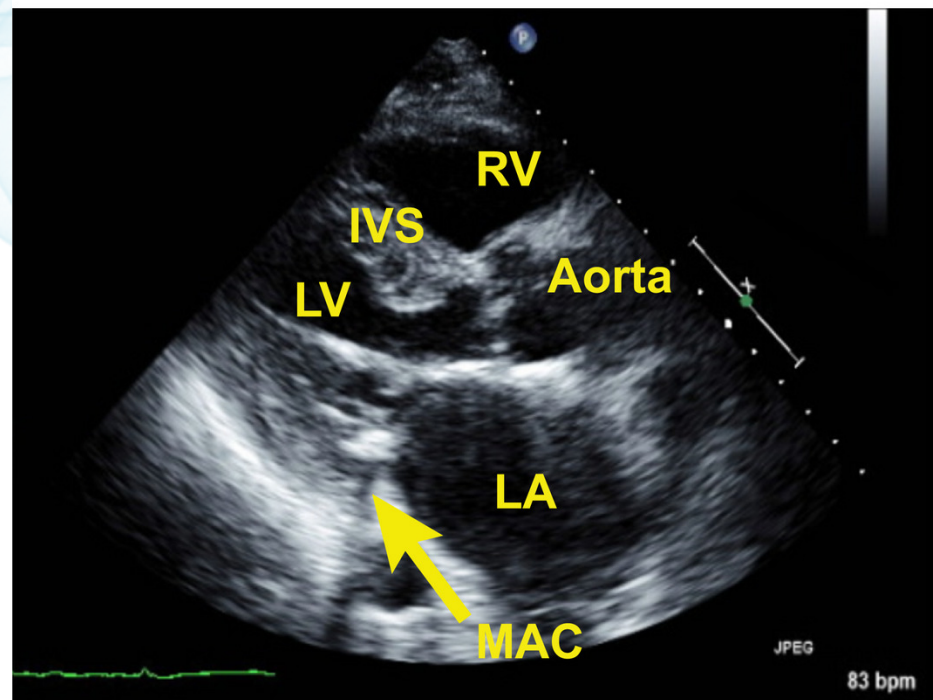
Ecocardiografia Transtorácica

❖ Derrame pleural e/ou pericárdico¹³



Ecocardiografia Transtorácica

❖ Calcificação valvular¹⁴



Ecocardiografia Transtorácica

Disfunção
Diastólica

Dilatação
Auricular
Esquerda

Hipertrofia
Ventricular
Esquerda

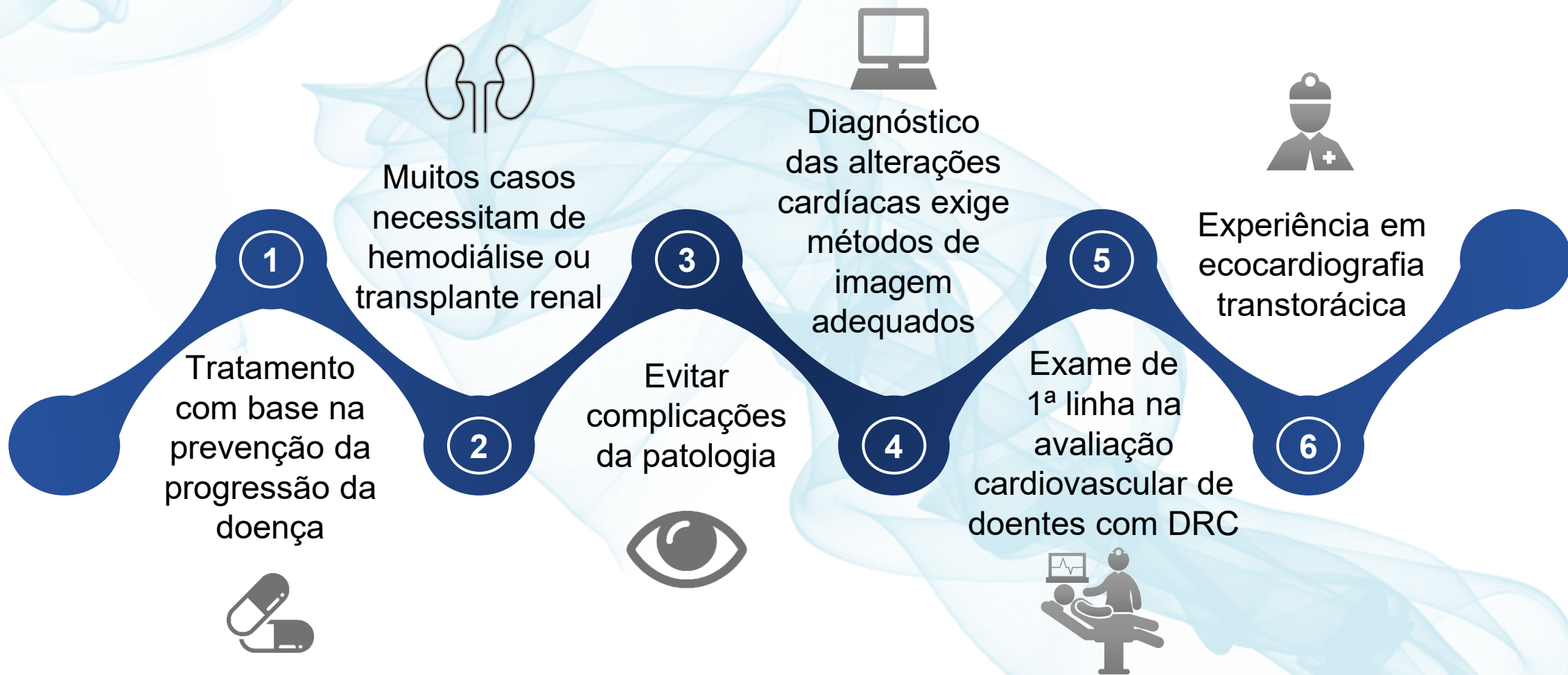
Ecocardiografia Transtorácica

Vantagens e Desvantagens³

- Maior sensibilidade
- Não invasiva
- Mais segura (sem agentes de contraste tóxicos ou radiação)
- Maior acessibilidade
- Relativo baixo custo

- Operador-dependente
- Má janela > geometria ventricular esquerda
- Avaliação da massa ventricular esquerda (ressonância magnética)
- Variabilidade dos parâmetros ecocardiográficos > ultima sessão de diálise

Conclusão



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Muito obrigada pela vossa
atenção