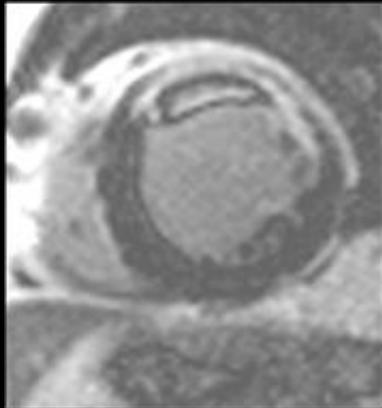


# "Utilidad de las Cardioimágenes en la Enfermedad Cardiovascular"



Dra. María Cecilia Ziadi

Clínica La Sagrada Familia

Imágenes Cardiovasculares No Invasivas

SIMI: XXV Semana del Intervencionismo Mínimamente Invasivo

Miércoles 06 de Julio de 2016, Buenos Aires, Argentina

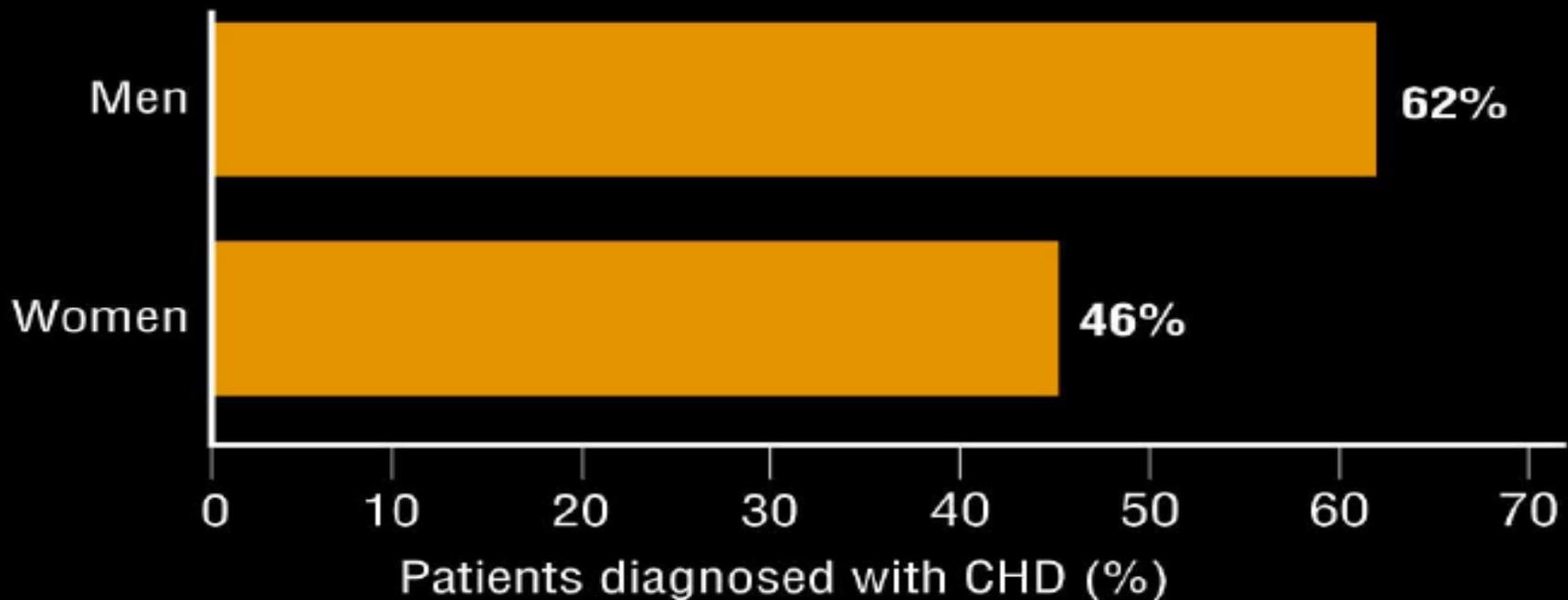


# Conflictos de Interés

- Ninguno

# Cardiopatía Isquémica: ¿Cuál es el problema?

**Myocardial infarction (MI) or death  
as initial presentation of CHD**



# Score de Riesgo de Framingham



NATIONAL CHOLESTEROL EDUCATION PROGRAM

Third Report of the Expert Panel on

Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III)

Risk Assessment Tool for Estimating Your 10-year Risk of Having a Heart

**Existen limitaciones!**

- Diabetes
- Antecedentes Familiares

[HDL Cholesterol:](#)

mg/dL

[Smoker:](#)

No  Yes

[Systolic Blood Pressure:](#)

mm/Hg

Are you currently on any medication to treat high blood pressure.

No  Yes

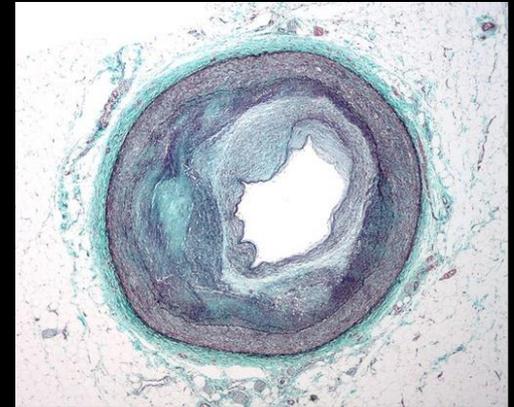
Calculate Your 10-Year Risk

# Paradigmas Emergentes en Cardiología

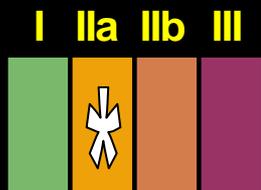
**Aterosclerosis  
Temprana  
(Preclínica)**



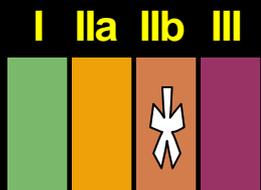
**Enfermedad Obstructiva  
(Etapa Sintomática)**



# 2010 ACC/AHA Guideline for Screening in Asymptomatic Adults



*Measurement of CAC is reasonable for cardiovascular risk assessment in asymptomatic adults at intermediate risk (10% to 20% 10-year risk).*

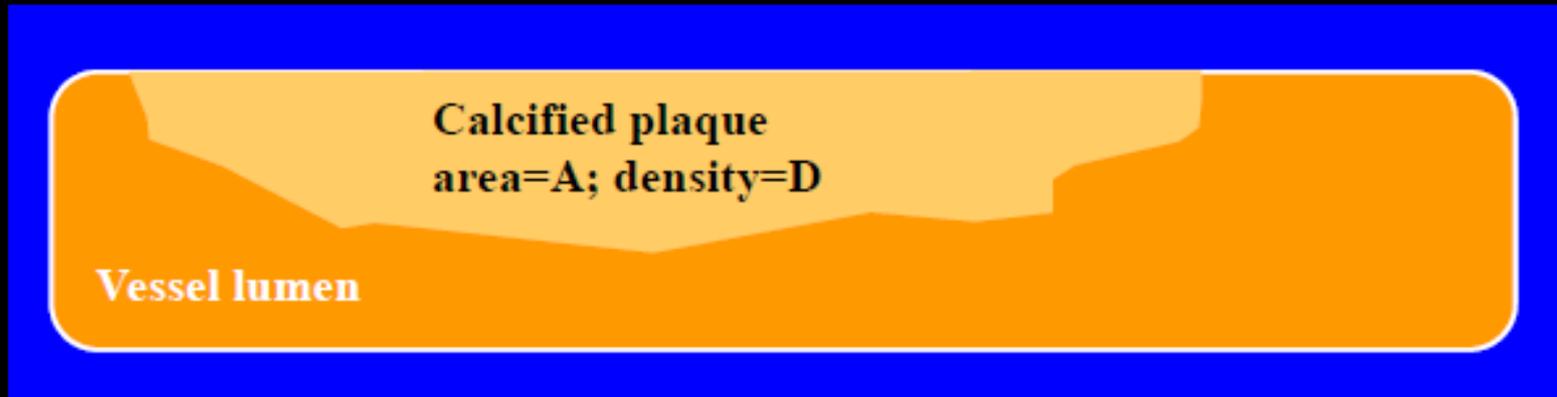


Measurement of CAC may be reasonable for cardiovascular risk assessment persons at low to intermediate risk (6% to 10% 10-year risk).



*In asymptomatic adults with diabetes, 40 years of age and older, measurement of CAC is reasonable for cardiovascular risk assessment.*

# Score de Agatston



**Area  $\geq 1\text{mm}$  ; Densidad  $\geq 130\text{UH}$**

## Densidad Placa (D)

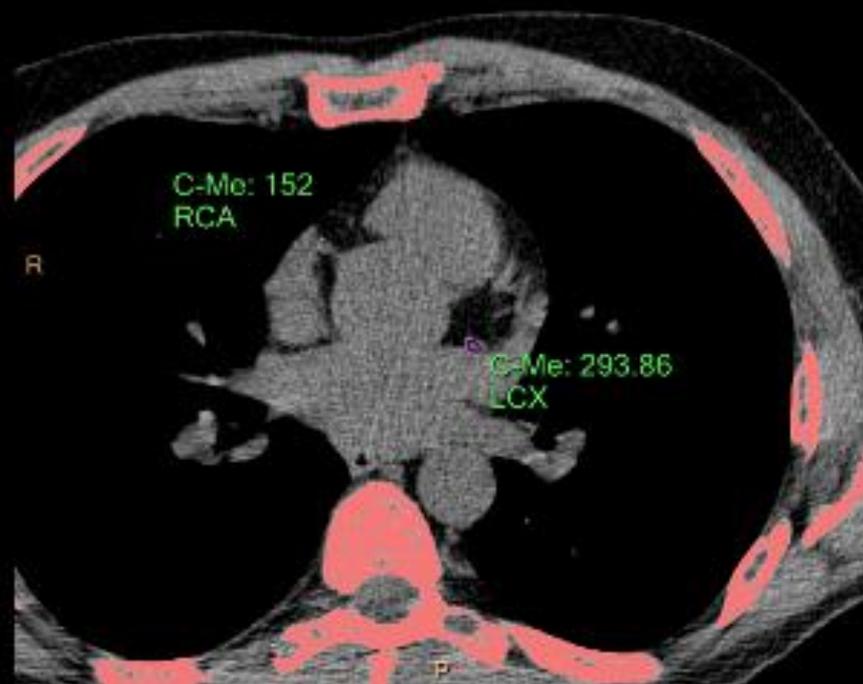
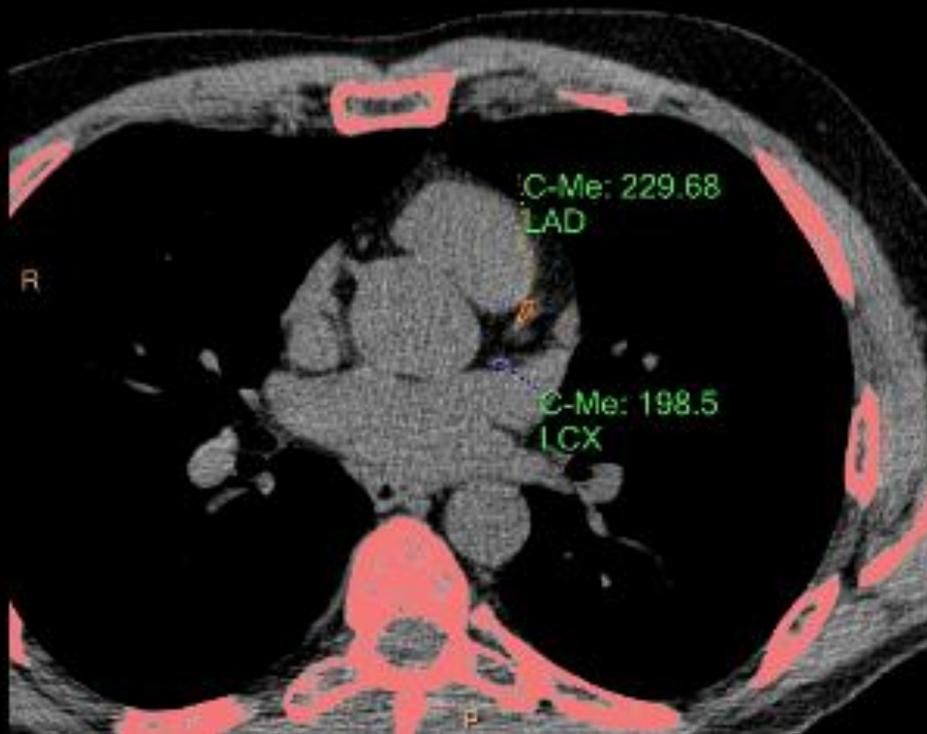
- 130 - 200 UH = coeficiente 1
- 201 - 300 UH = coeficiente 2
- 301 - 400 UH = coeficiente 3
- > 400 UH = coeficiente 4

**Score de Agatston = Area x  $D_{\text{coef}}$**

# Categorías del Score de Calcio

<b>Score de Calcio (Unidades Agatston)</b>	<b>Categoría de Calcificación Coronaria</b>
<b>0</b>	<b>Ausente</b>
<b>1-10</b>	<b>Mínima</b>
<b>11-100</b>	<b>Leve</b>
<b>101- 400</b>	<b>Moderada</b>
<b>401-1000</b>	<b>Severa</b>
<b>&gt; 1000</b>	<b>Difusa</b>

# Score de Calcio



Resultados de puntuación: Agatston Score, protocolo				
	LAD	LCX	RCA	Coronarias totales
Nº de ROI	3	6	4	13
Área cuad. (mm2)	54.25	32.5	9.72	96.47
Coincidencia base datos: Hombre, 55-59Y; percentil: 83%				

# Score de Calcio= 0

## Valor Pronóstico

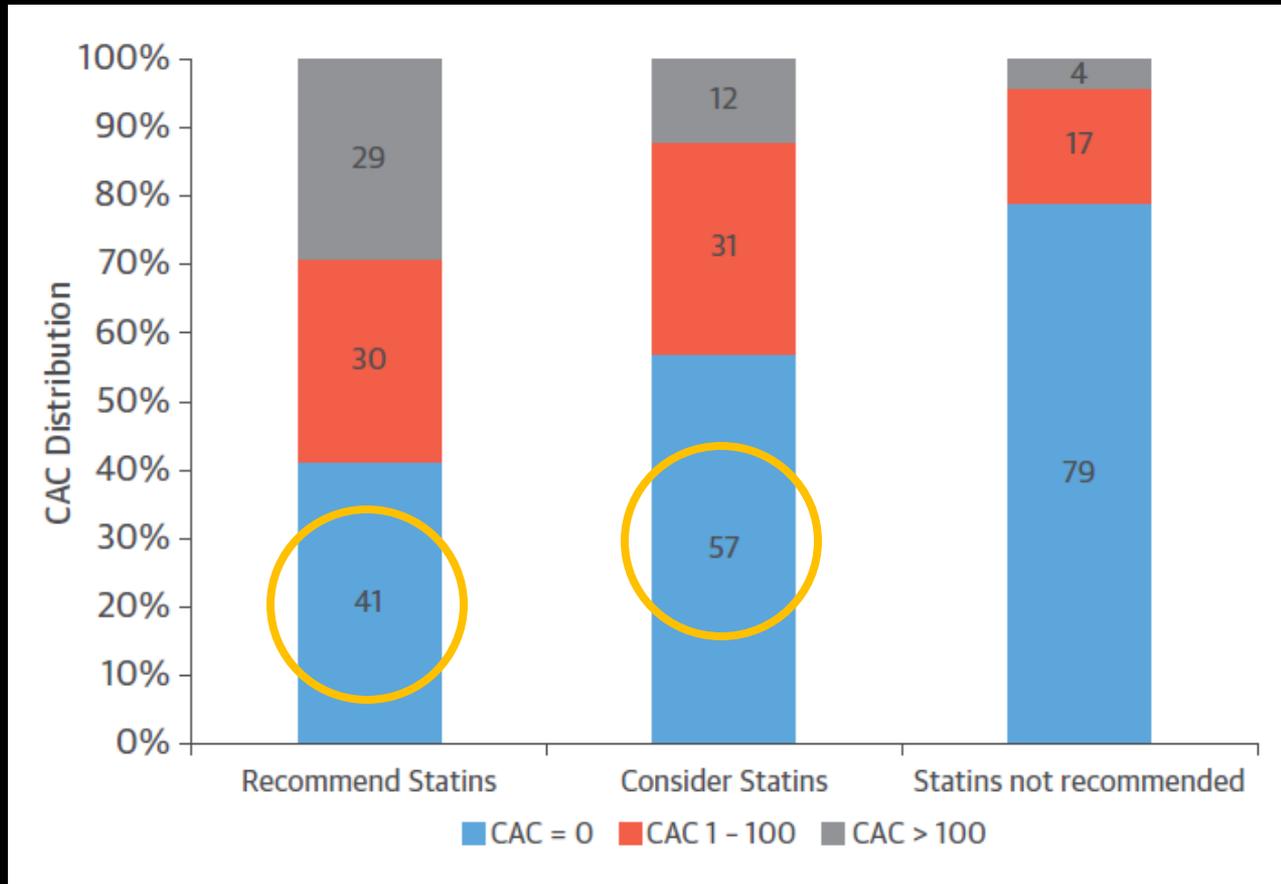
Study Type	Population (n)	CAC=0 (%)	FU (Years)	Number of events (%)
<b>Meta-Analysis *</b>	71,595	29,312 (41%)	4.3	154 (0.47%) CVD events
<b>Retrospective**</b>	44,052	19,898 (45%)	5.6	104 (0.52%) Deaths
<b>Prospective***</b>	6,809	3,414 (50%)	4.1	17 (0.52%) CHD events

\*Sarwar A, Shaw LJ, Shapiro MD, Blankstein R, Hoffman U, Brady TJ, Cury R, Budoff MJ, Blumenthal RS, Nasir K. JACC Imaging 2009

\*\* Blaha M, Budoff MJ, Shaw LJ, Khosa F, Rumberger JA, Berman D, Callister T, Raggi P, Blumenthal RS, Nasir K. JACC Imaging 2009

\*\*\* Budoff M, McClelland R, Nasir K, Greenland P, Kronmal RA, Kondos G, Shea S, Lima JAC, Blumenthal RS. Am Heart J 2009

# CAC Distribution Across Statin Eligibility Groups\*



CAC 0 reclassifies ~ 1/2 of candidates as not eligible for statins  
10 year event rates in CAC 0.

0.5%/year in recommend statins (high intensity)

0.1%/year in consider statins (moderate intensity)

# Visualización no Invasiva de las Arterias Coronarias

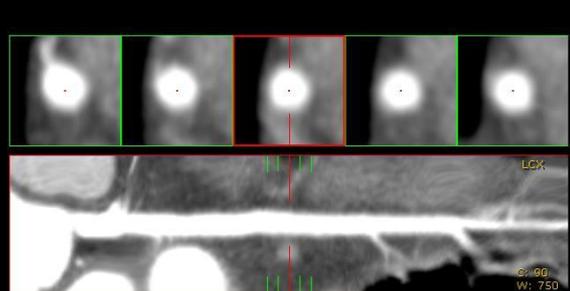
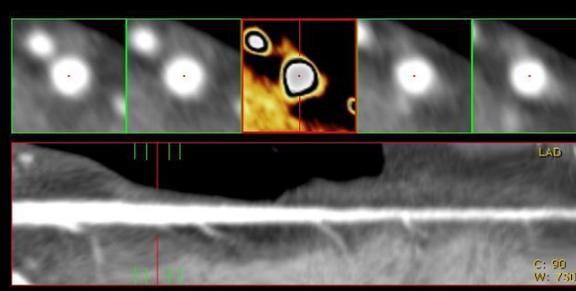
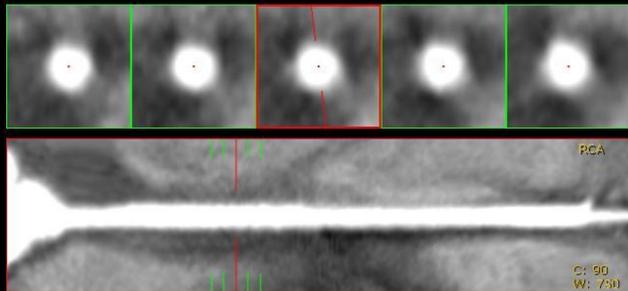
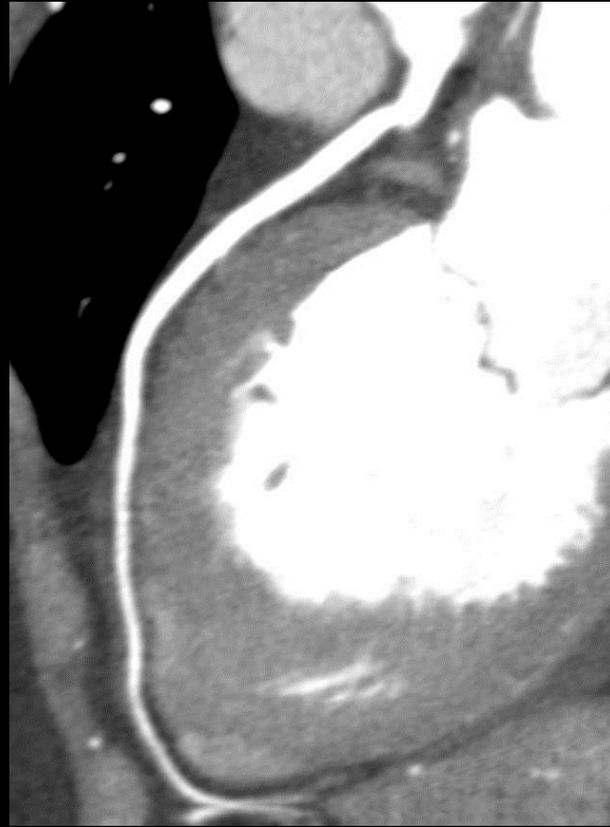


# Alto Valor predictivo negativo

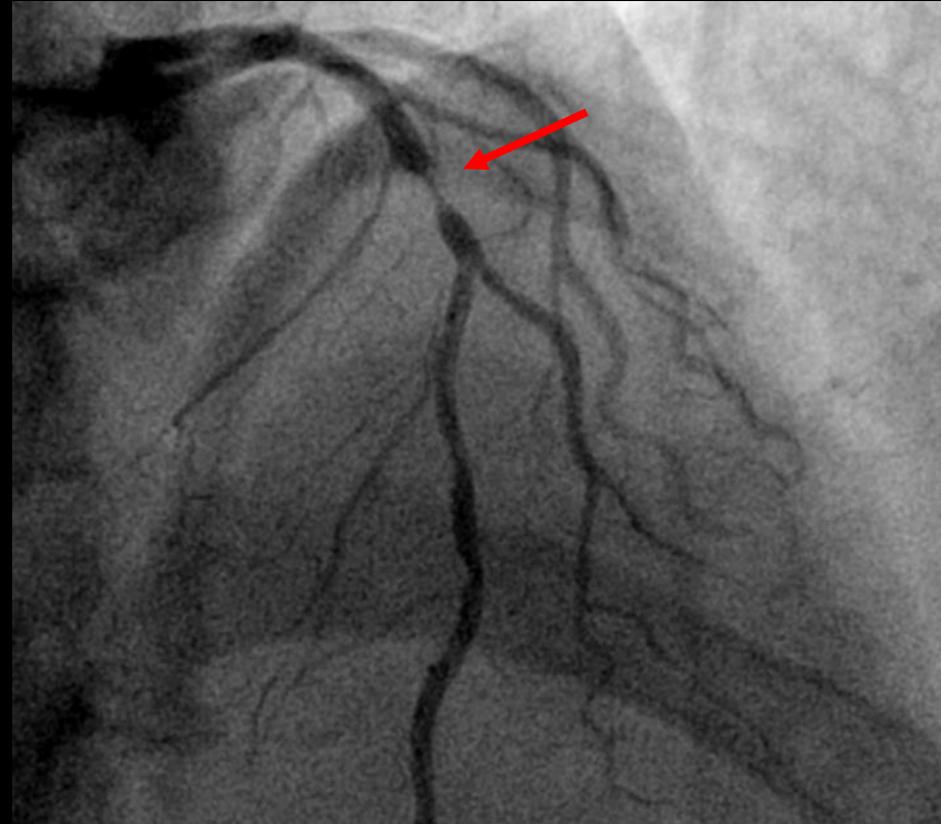
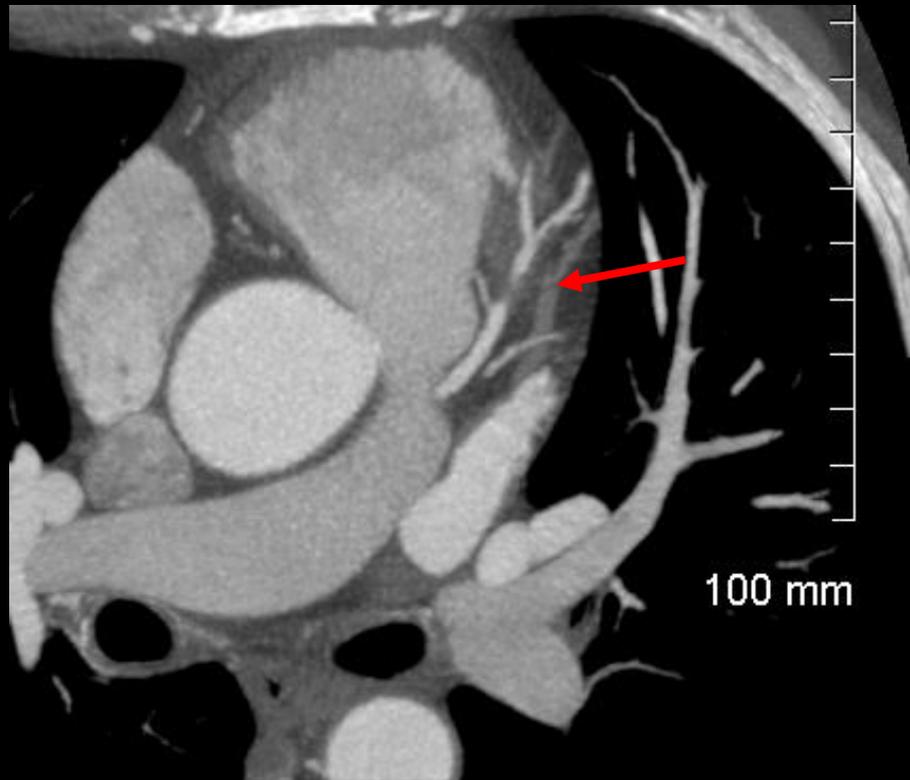
Art. CD

Art. DA

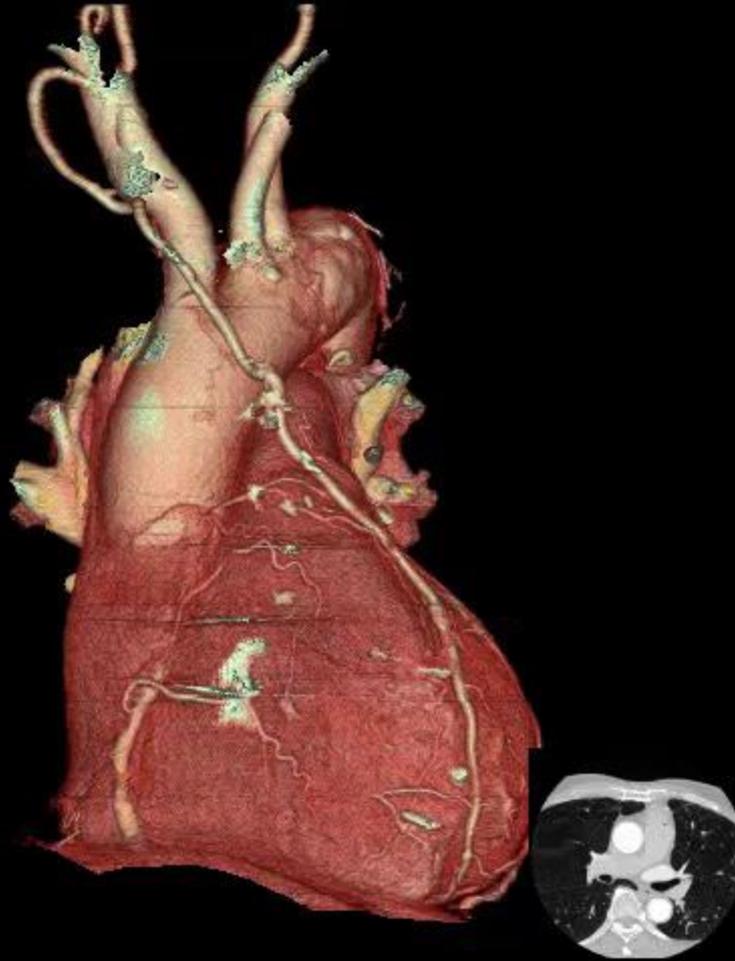
Art. CX



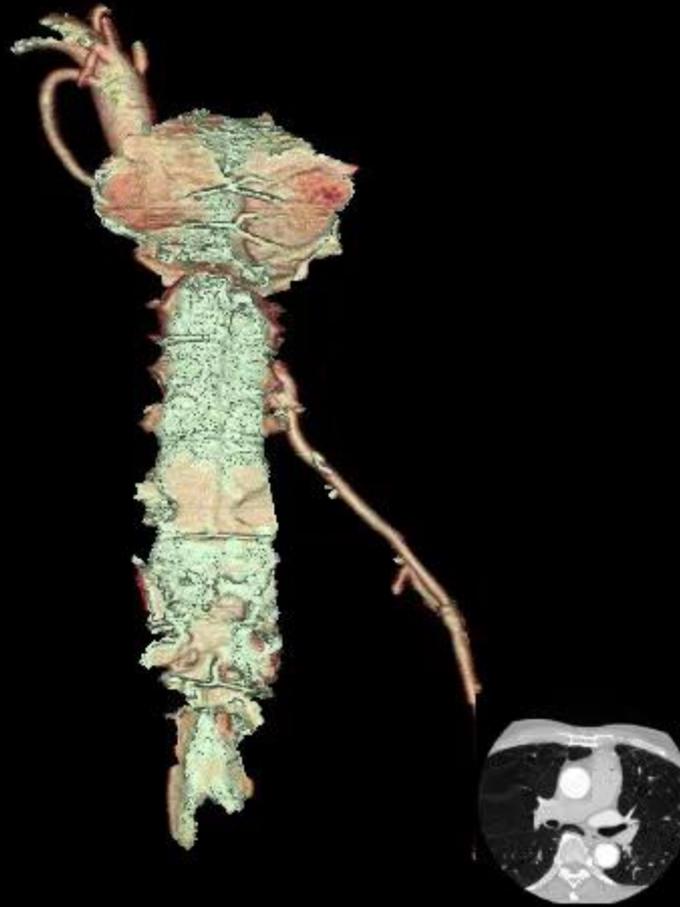
# Correlación con Angiografía Invasiva



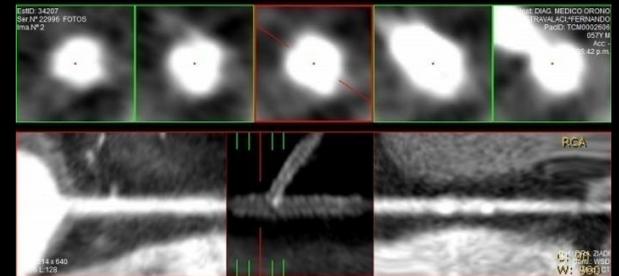
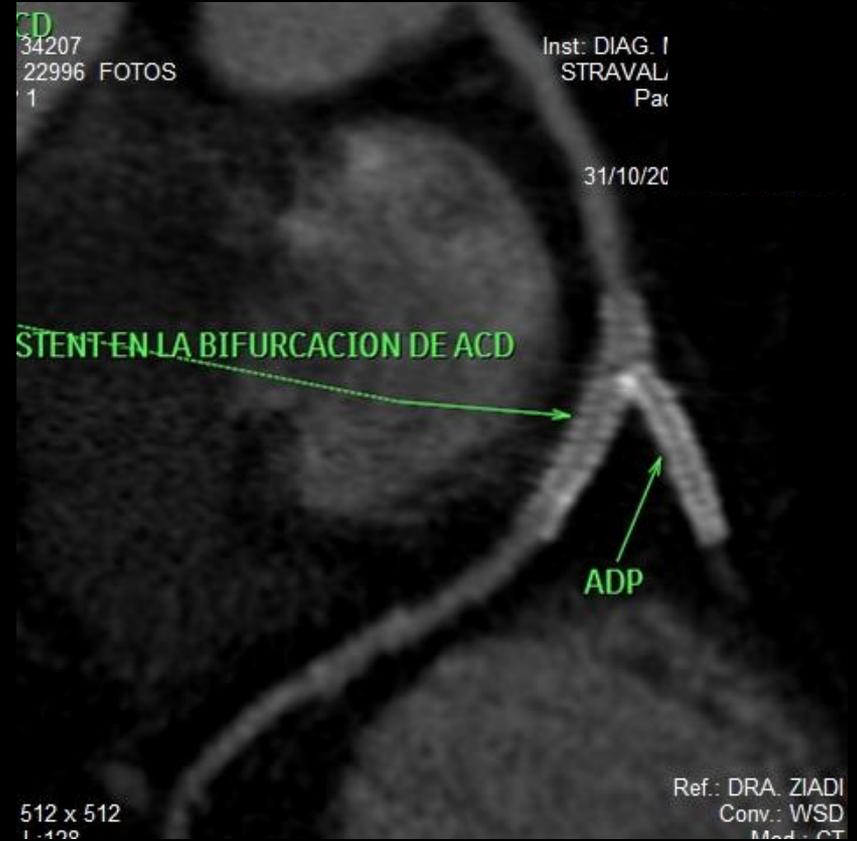
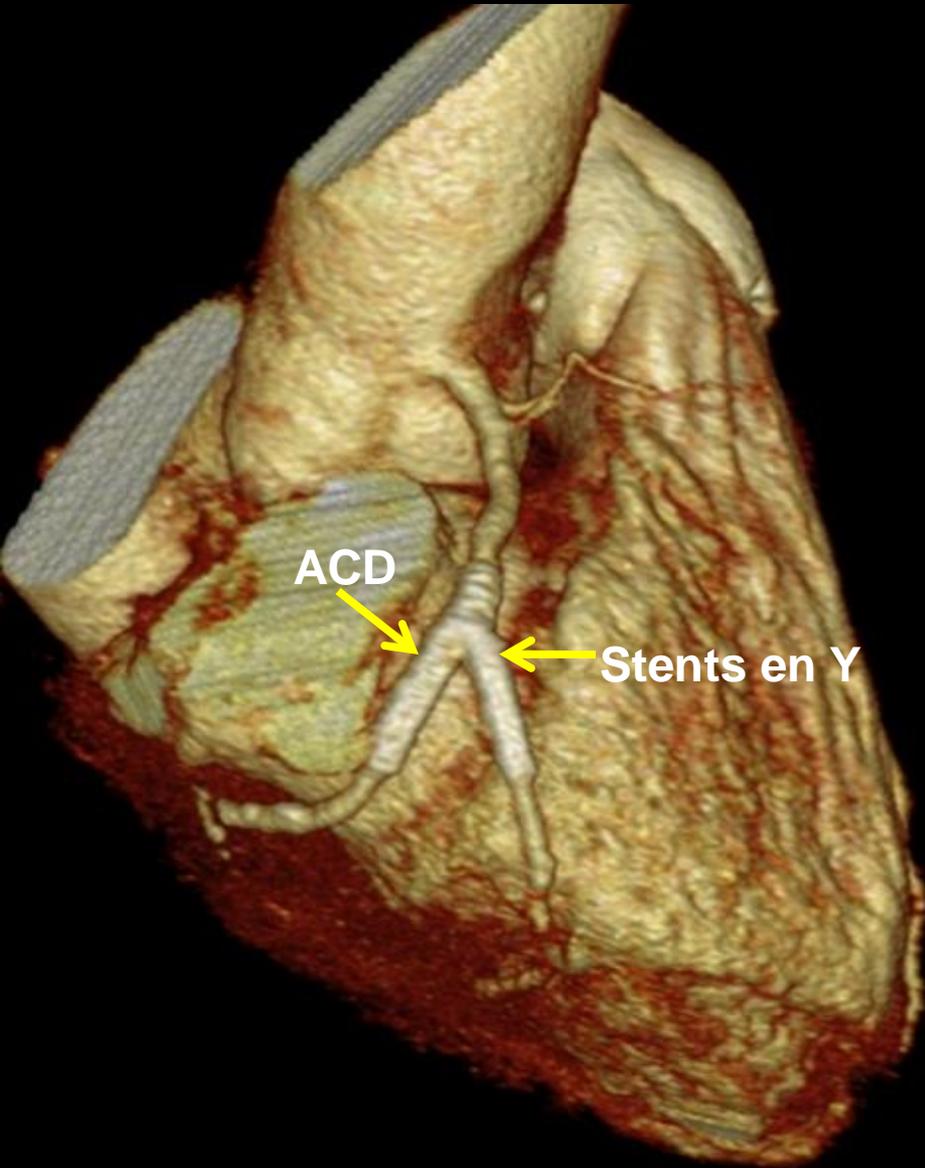
# By-Pass Aorto-Coronarios



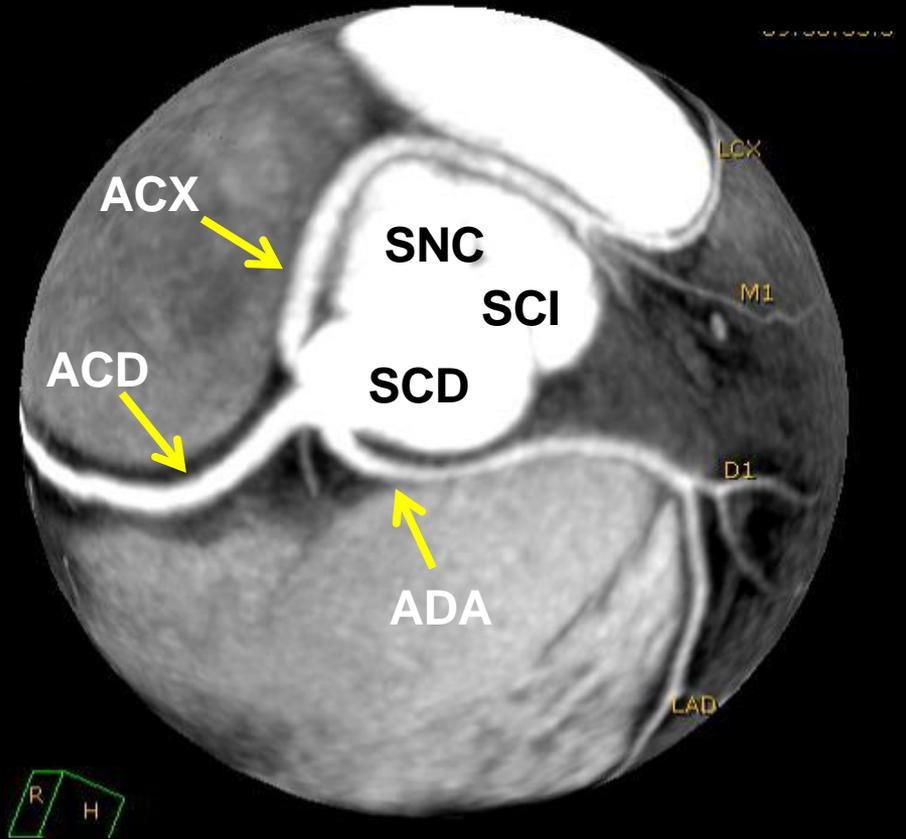
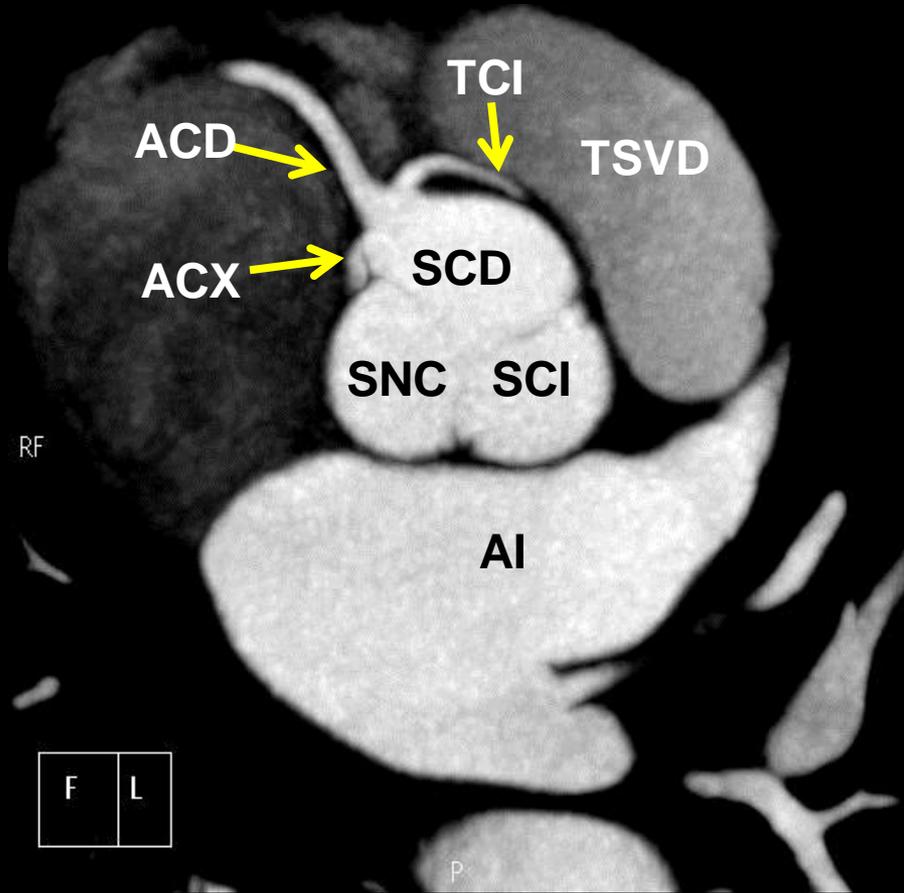
# By-Pass Aorto-Coronarios



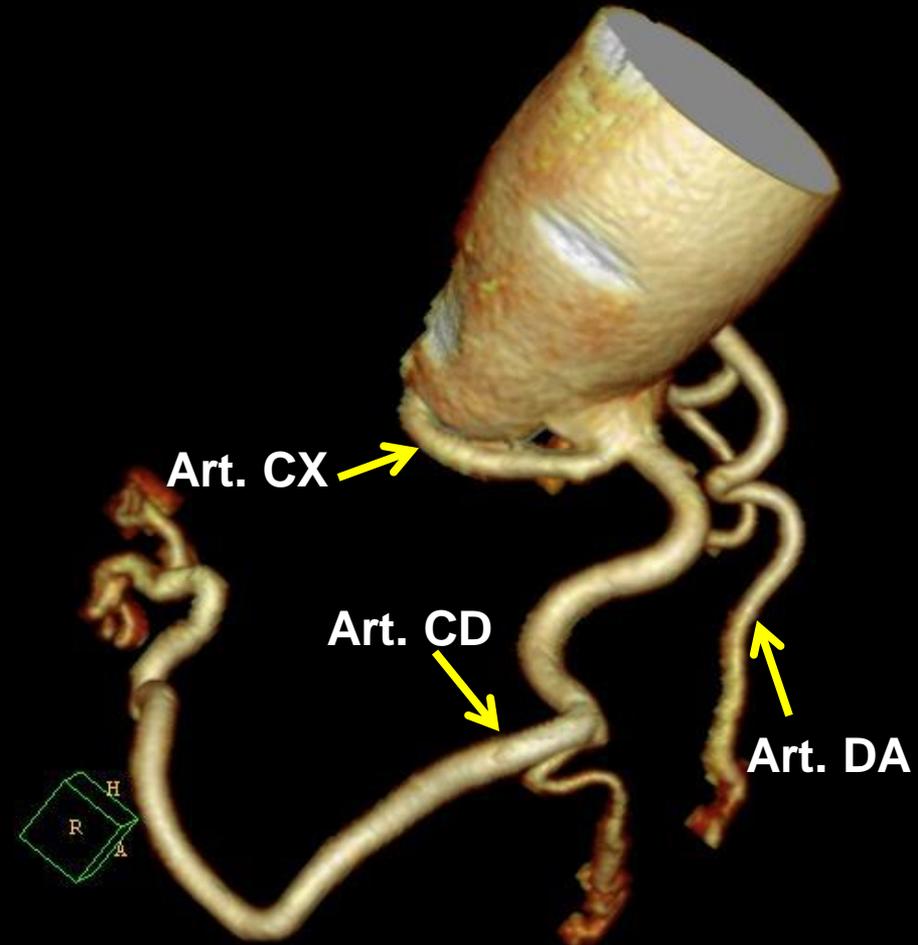
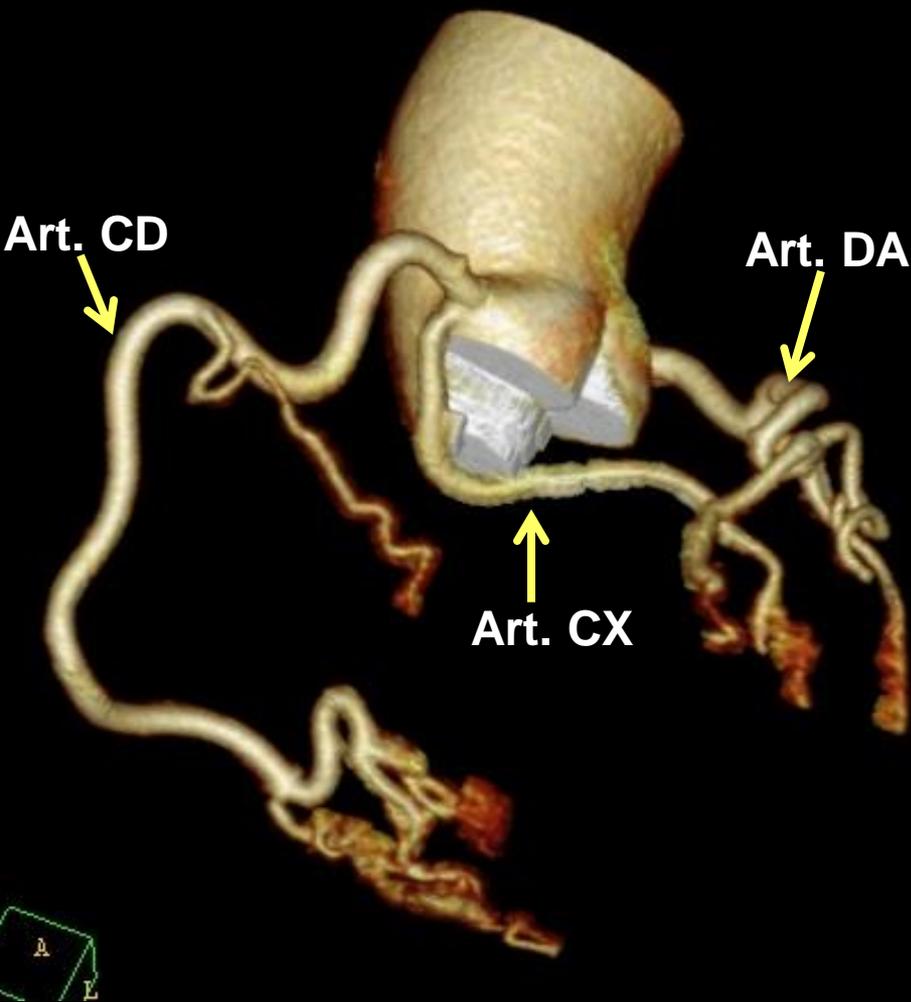
# Stents Coronarios



# Anomalías Coronarias

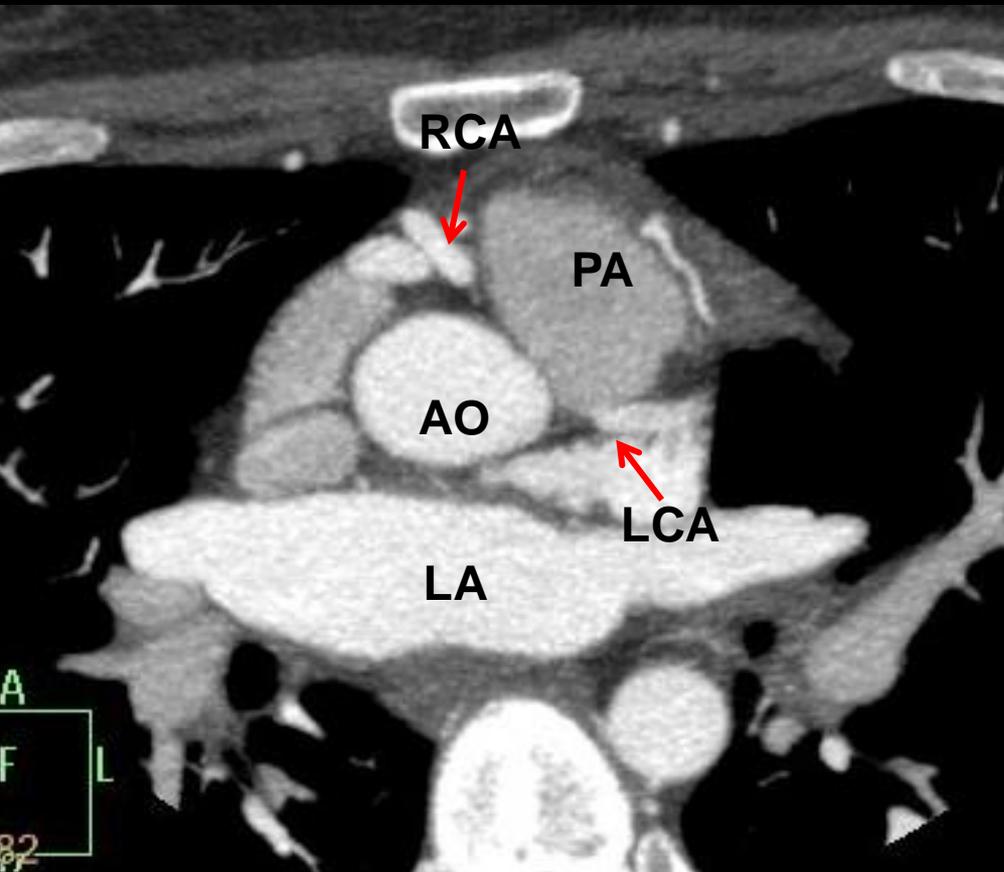


# Anomalías Coronarias

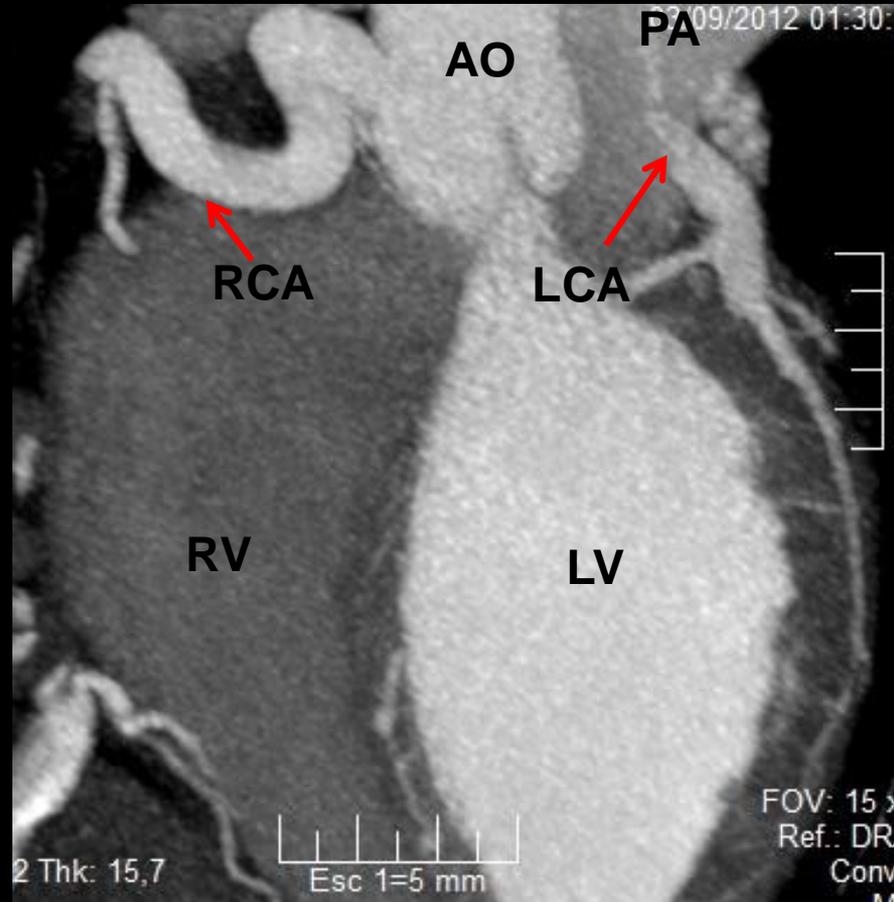


# Síndrome de ALCAPA

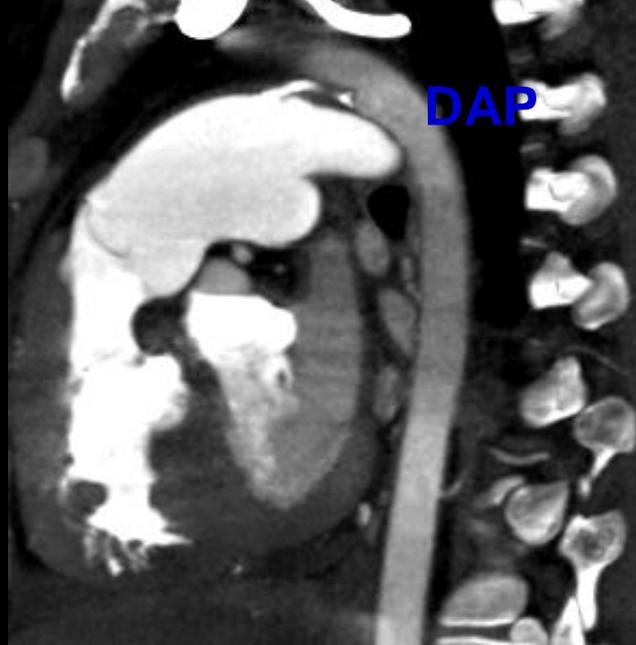
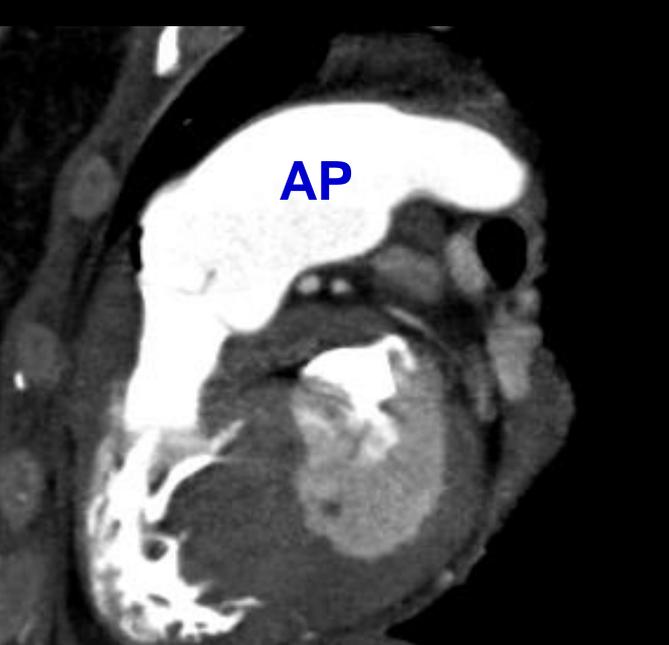
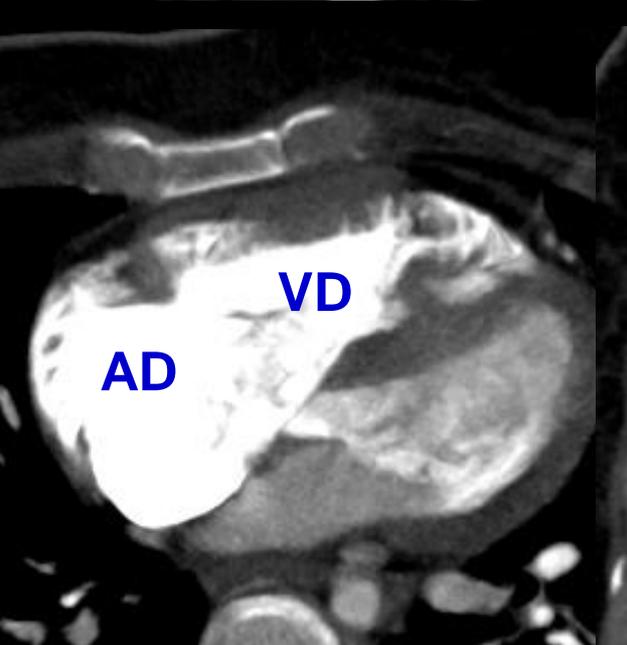
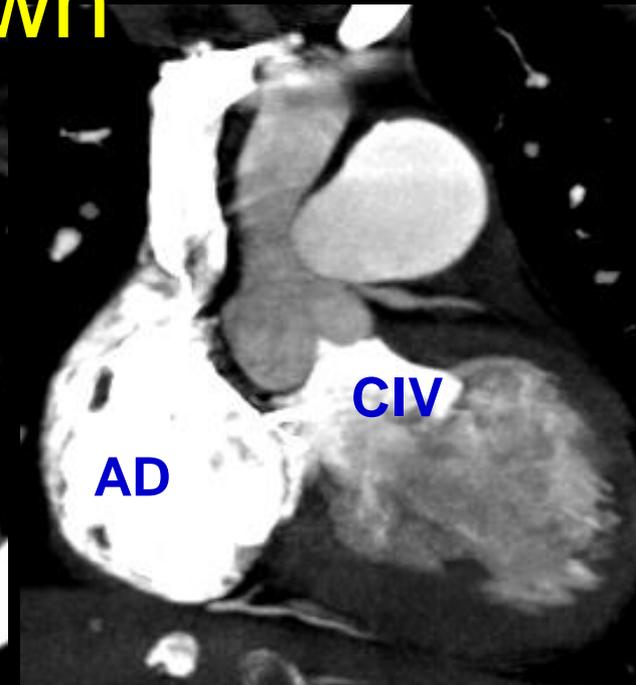
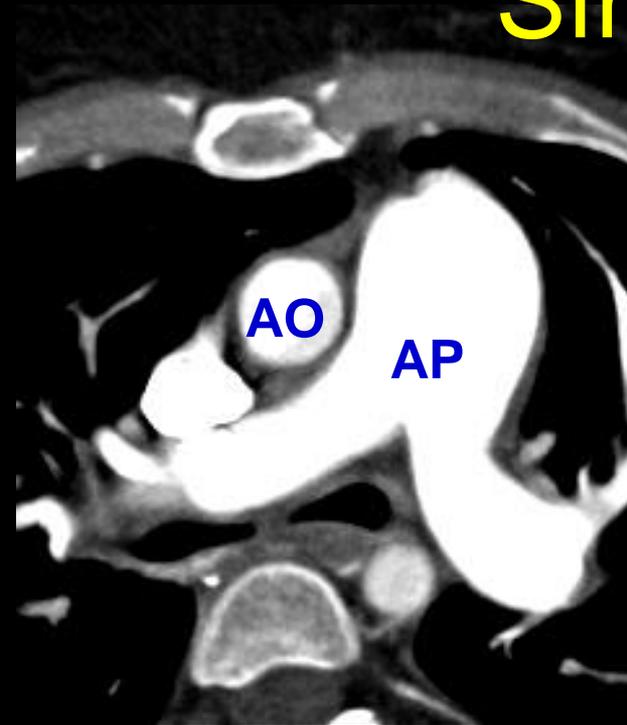
**Axial View**



**Coronal View**

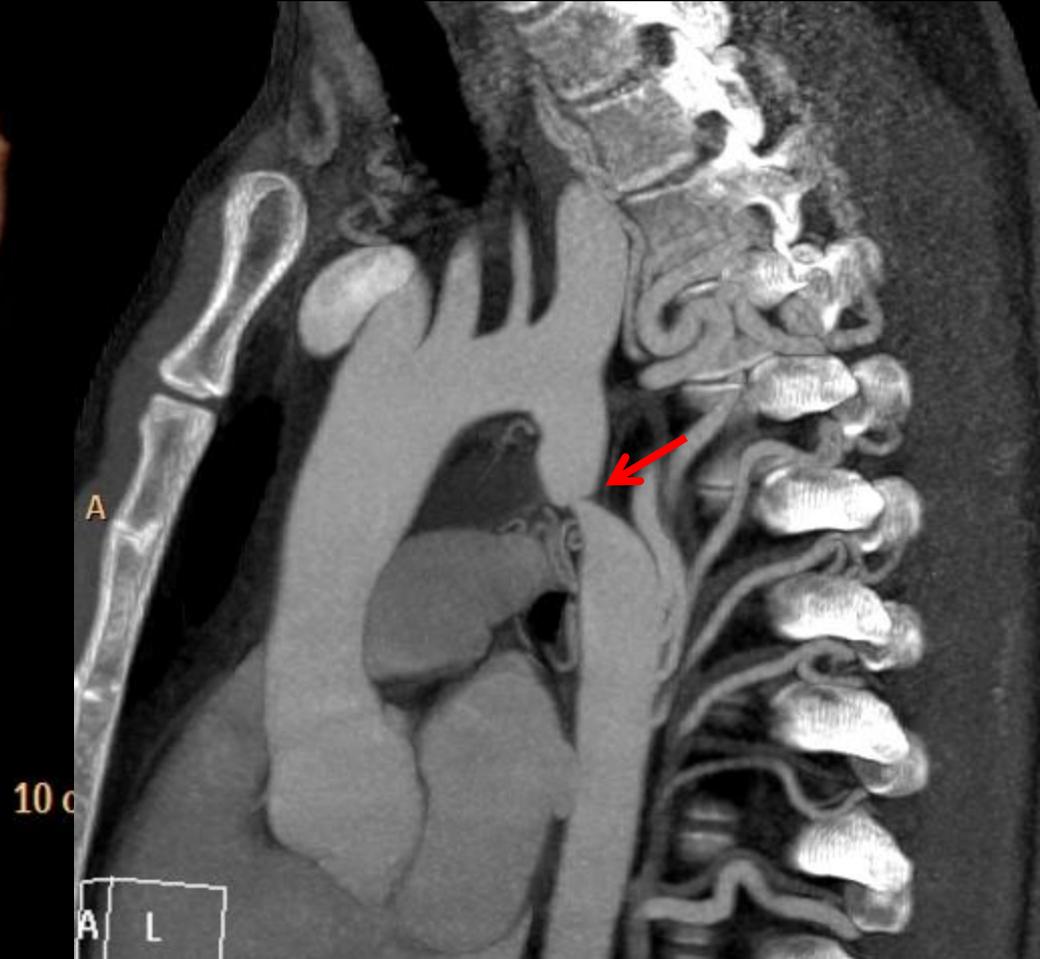


# Síndrome de Down



# Coartación de Aorta

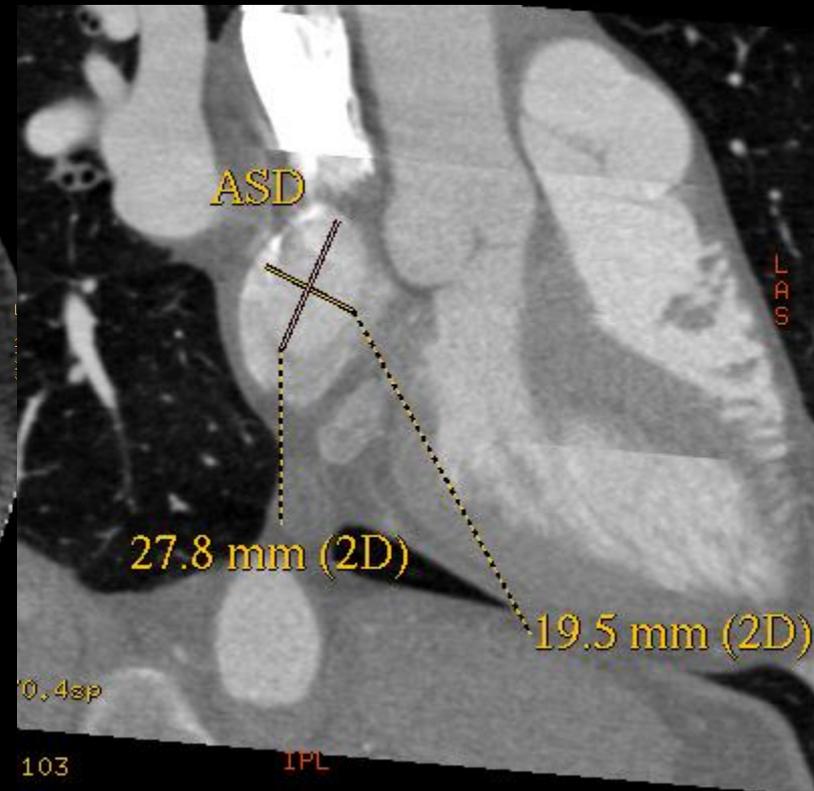
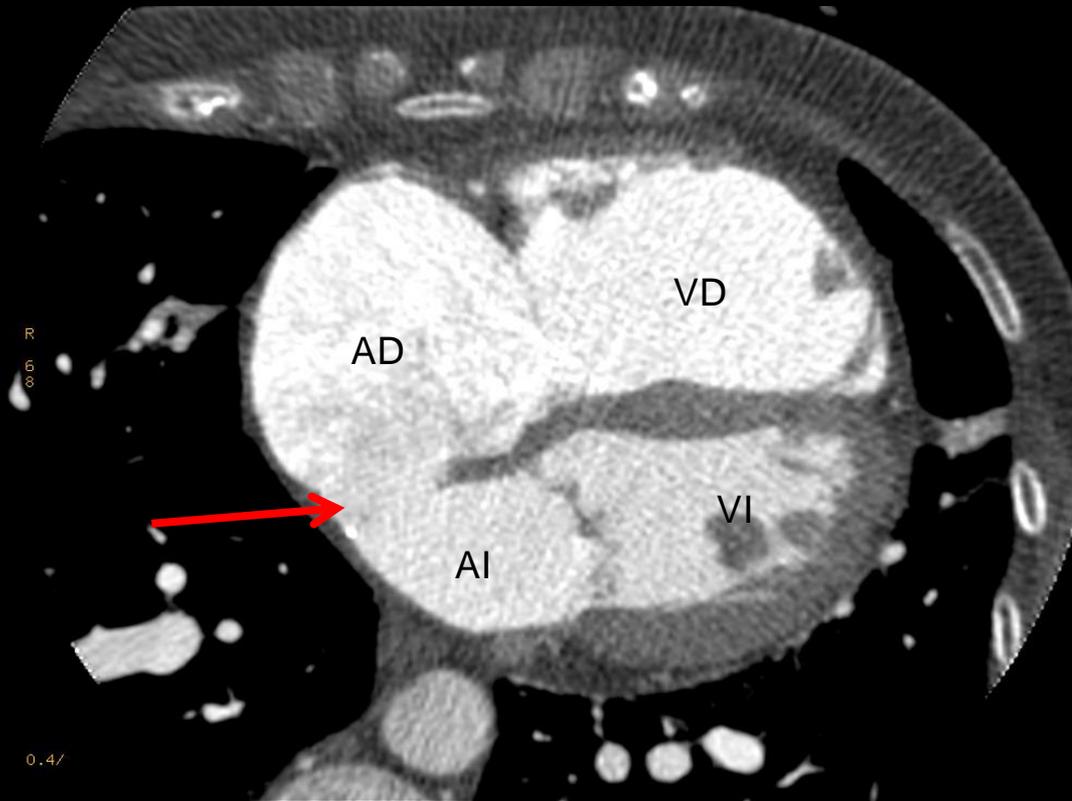
5-8% de todos los defectos congénitos



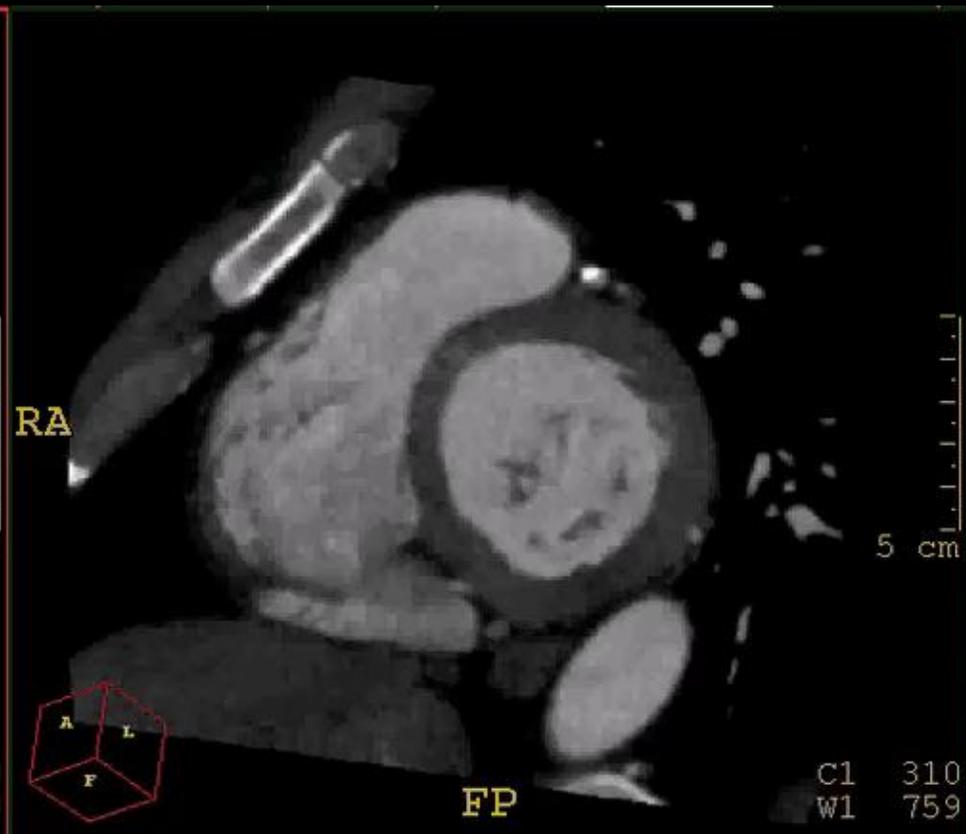
# Comunicación Interauricular

10% de las cardiopatías congénitas

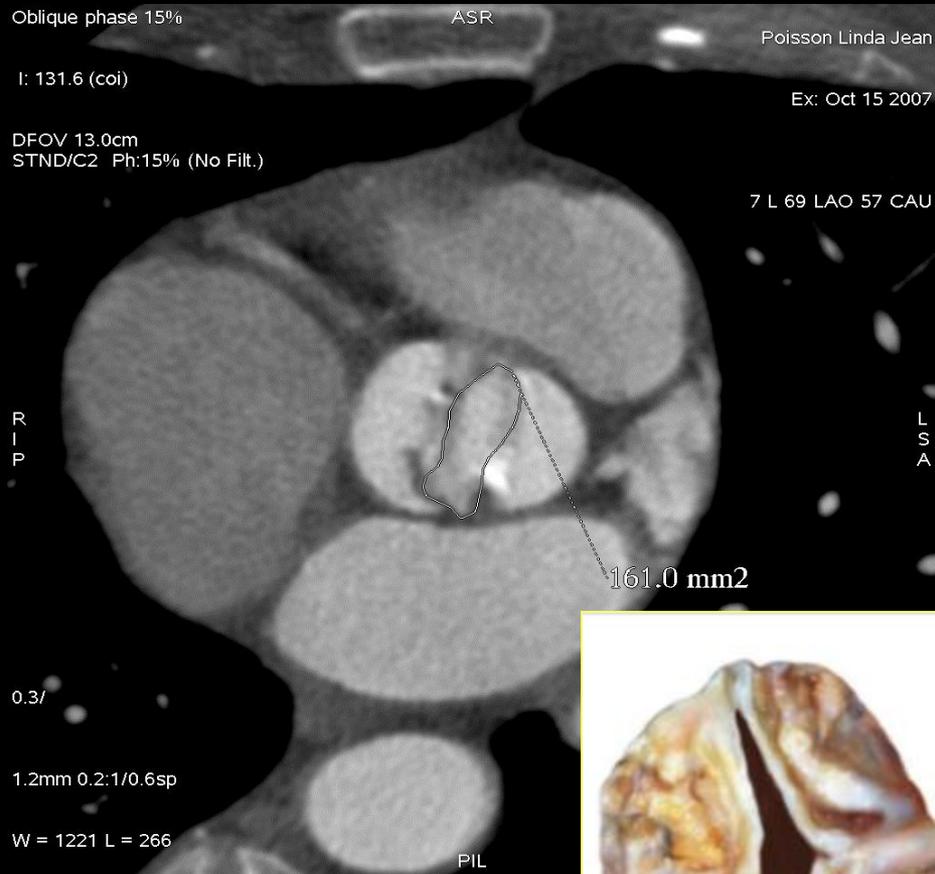
CIA tipo ostium secundum 70%



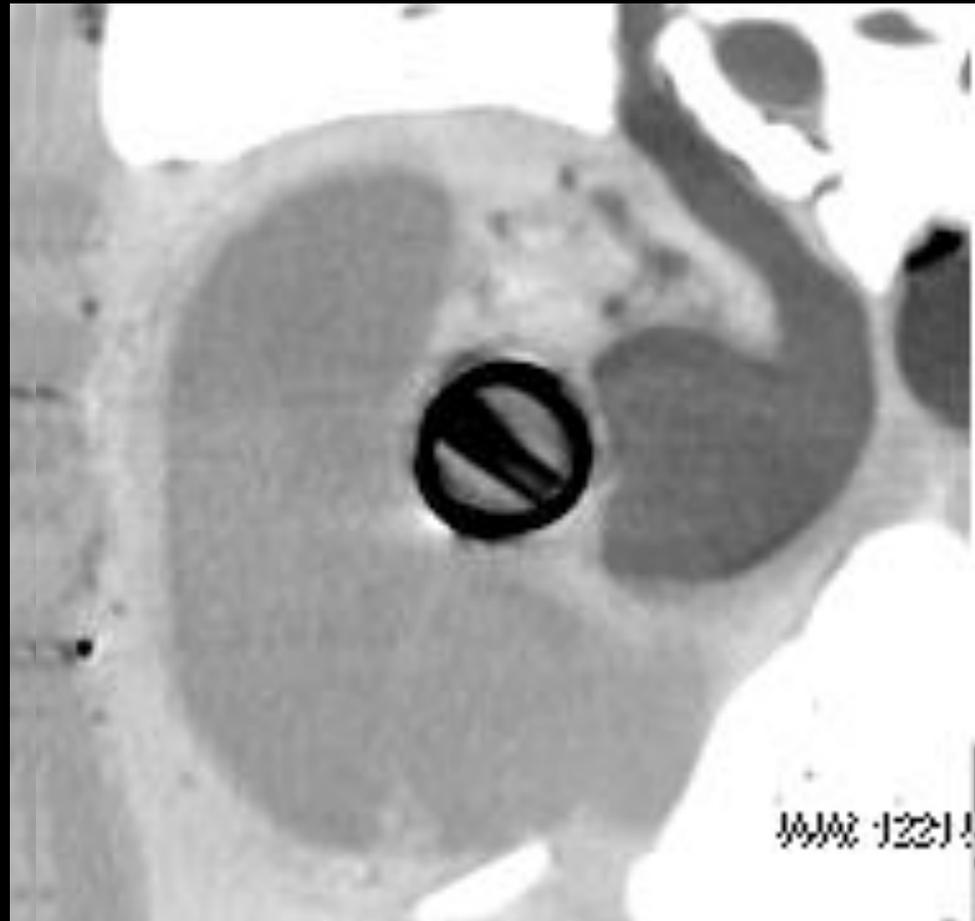
# Función Ventricular



# Válvulas Cardíacas



# Prótesis Valvulares



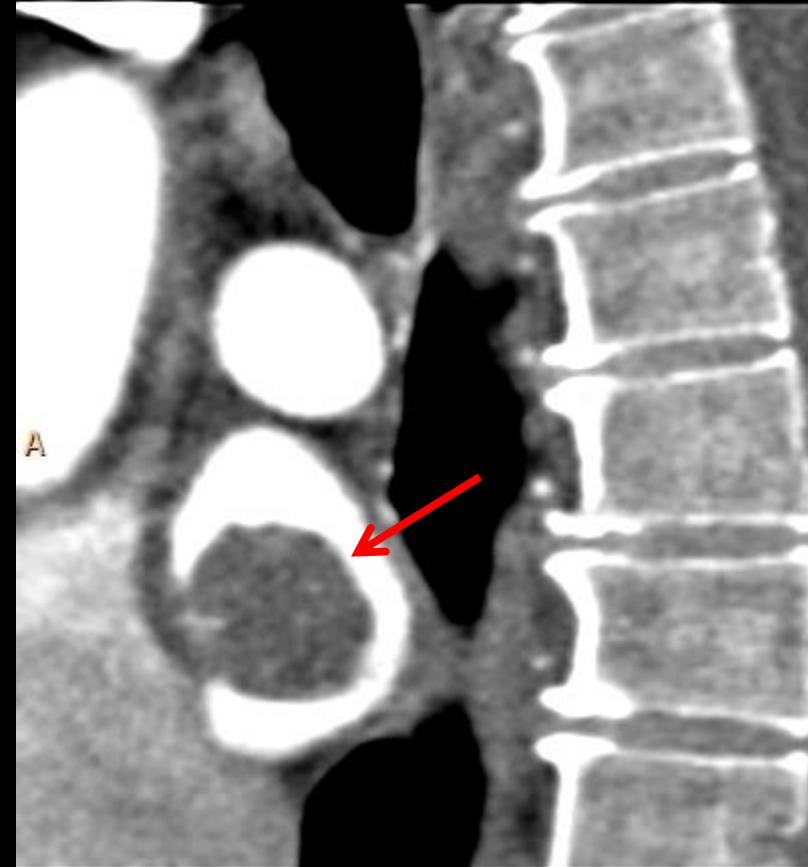
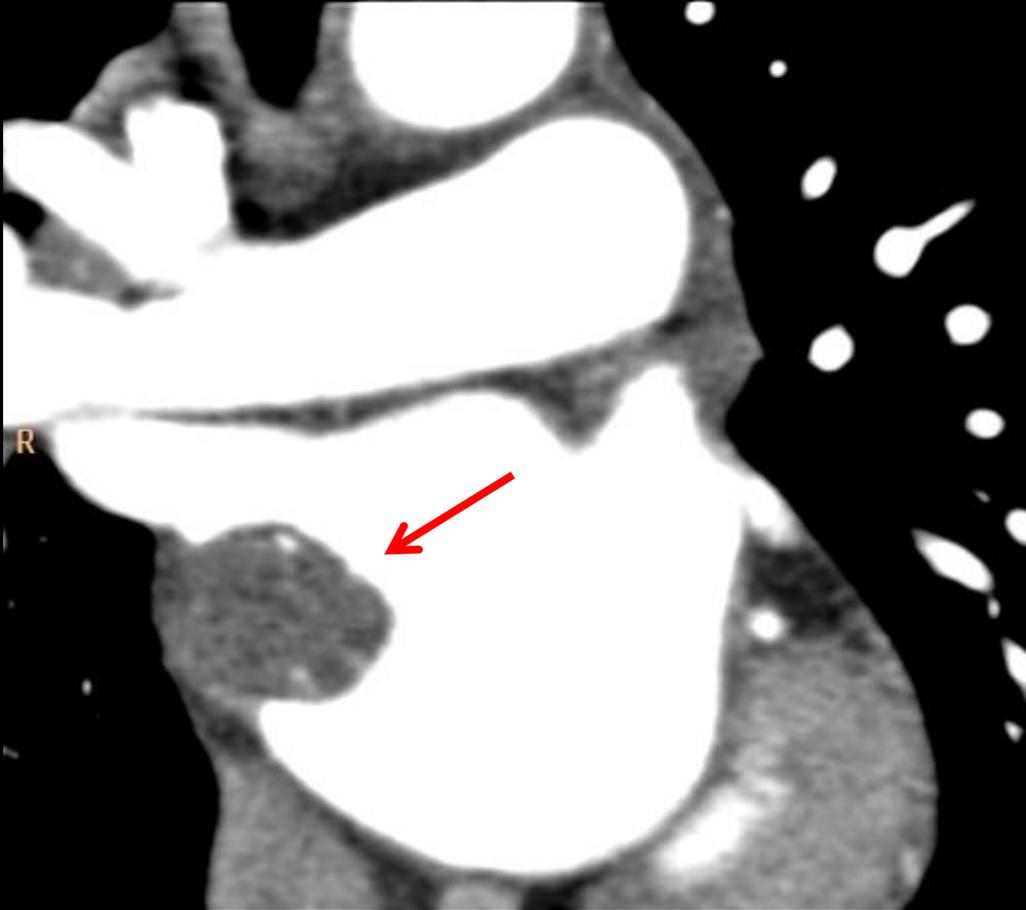
# Endocarditis Infecciosa: Vegetaciones

- Alta morbi-mortalidad
- Factores predisponentes:
  - Válvulas protésicas
  - Enfermedad valvular subyacente
  - Drogas EV

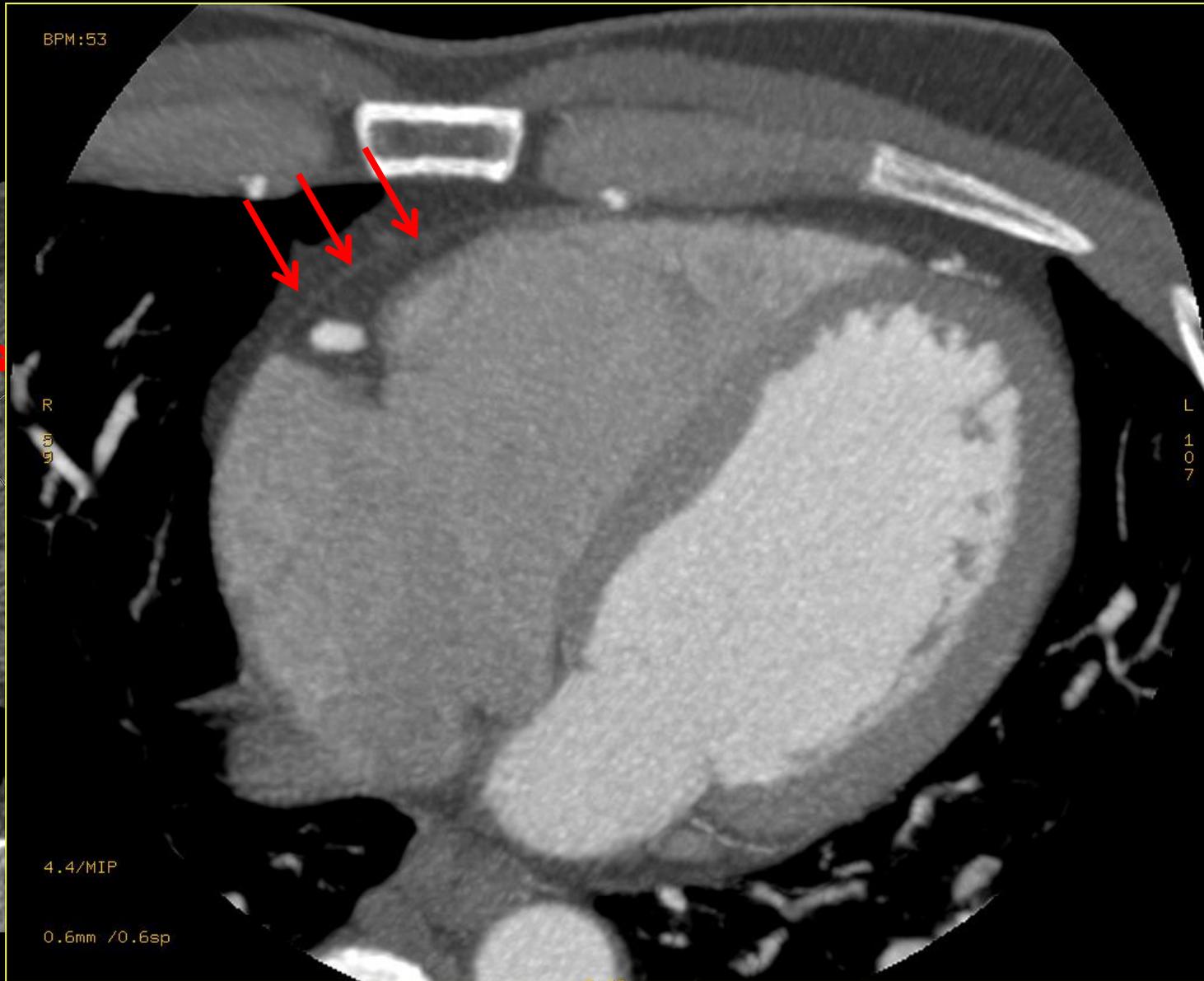


# Tumores Intra-cardíacos: Mixoma Auricular

40-50% Tm Cardíacos primarios/ 75% en AI



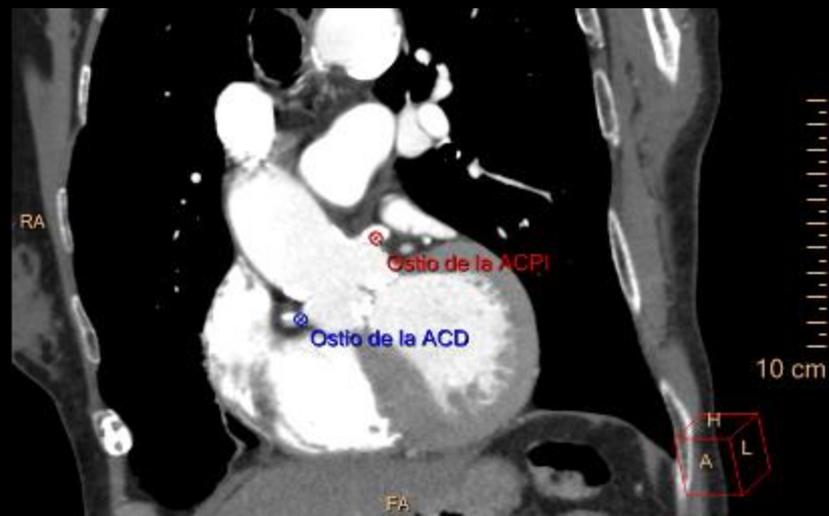
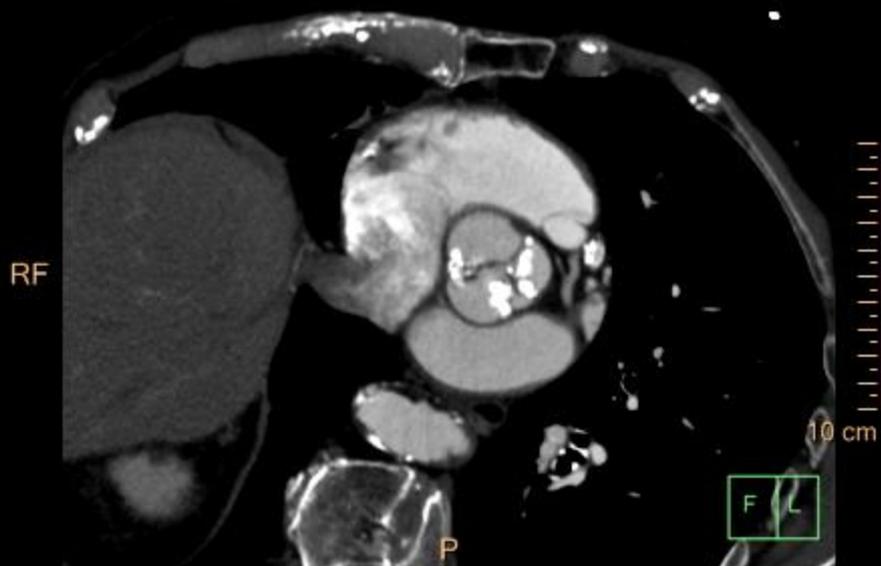
# Pericardio



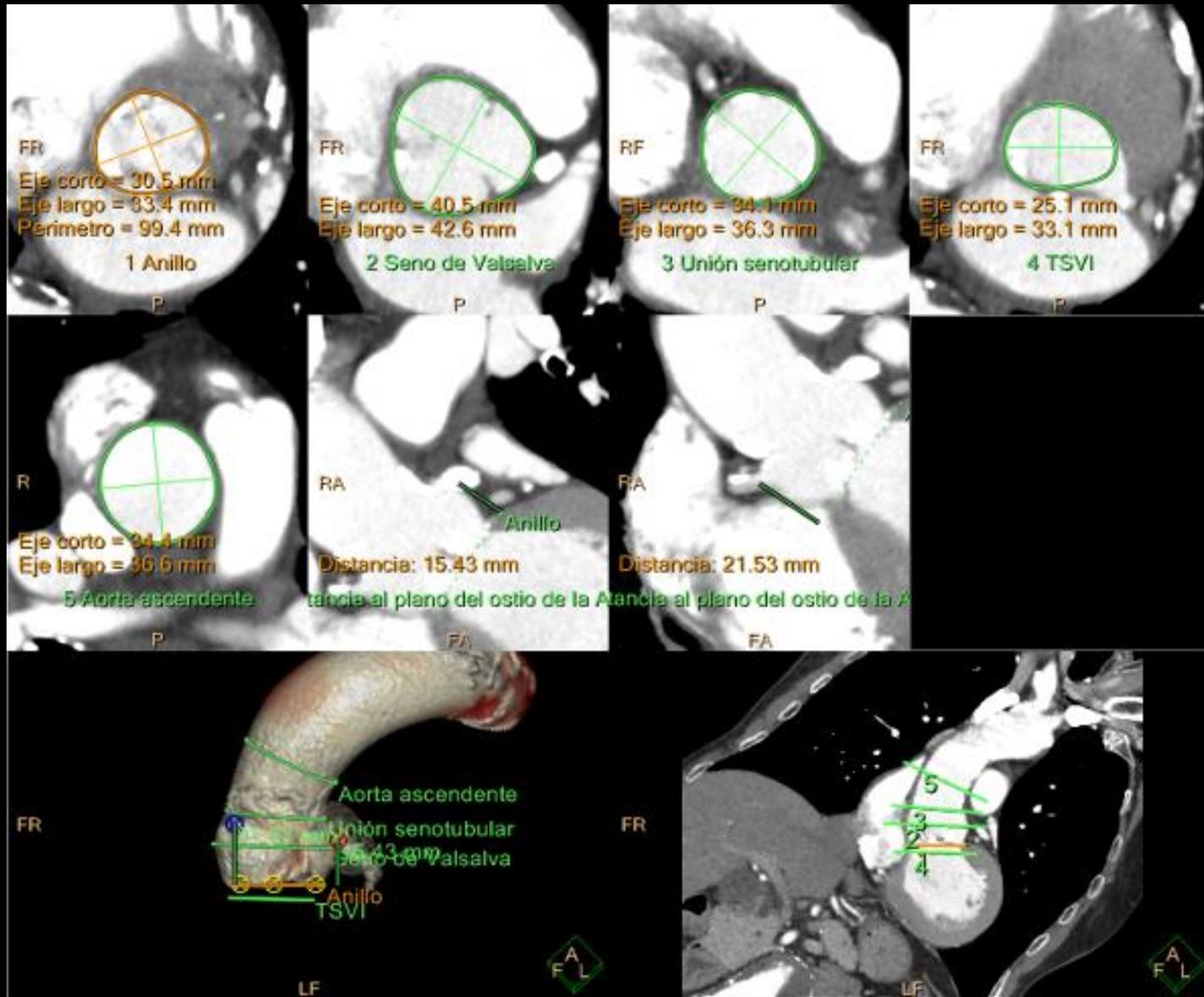
# Patologías de la Aorta



# Evaluación de Aorta previo a TAVI



# Evaluación de Aorta previo a TAVI



# Evaluación de la Circulación Arterial Pulmonar



# Evaluación de las venas pulmonares previo a ablación de FA



# Resonancia Magnética (RMI)

## ¿Ventajas?

- Alta definición de estructuras cardíacas
  - Caracterización de miocardiopatías
  - Viabilidad miocárdica
  - Patologías del Pericardio
  - Masas
- Evaluación Multiplanar-Imágenes en 3D
- Ausencia de radiación
- Pacientes con mala ventana para Ecocardiograma

# Distribución Tisular del Gadolinio

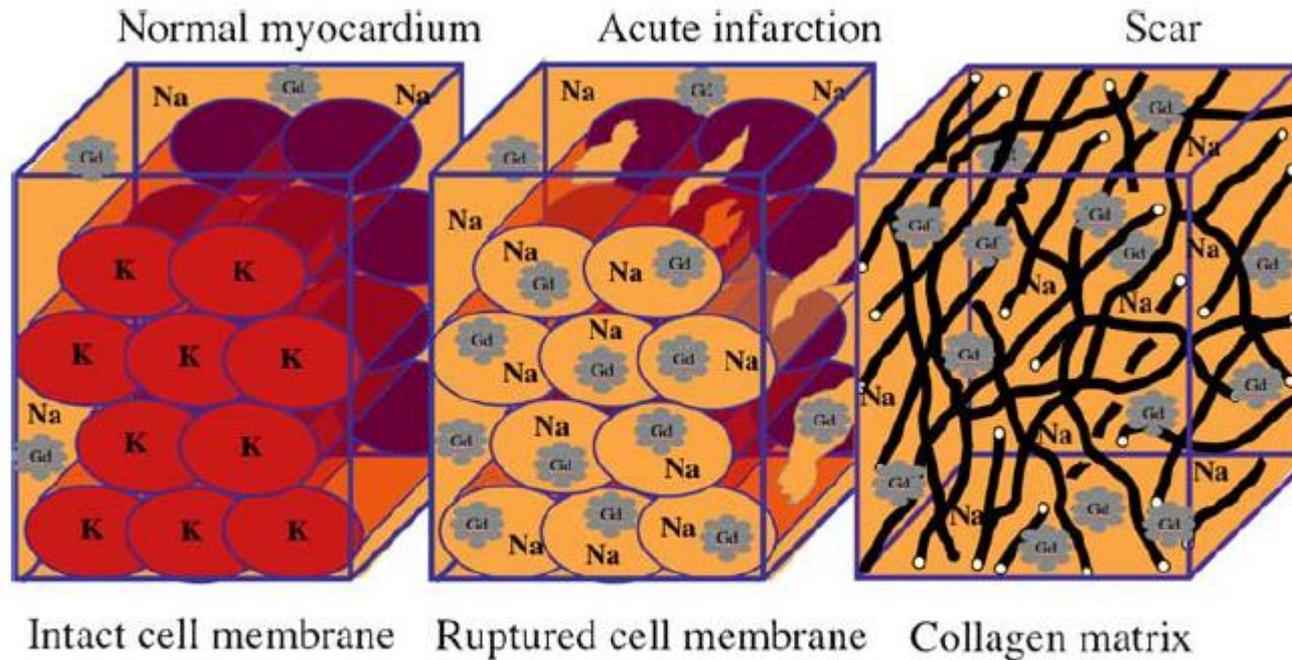
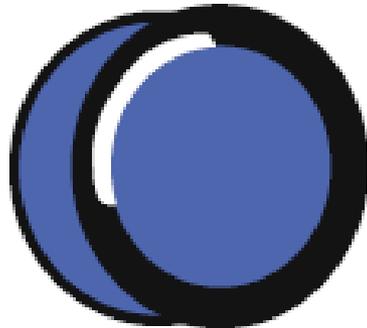


FIGURE 1.5. The volume of distribution for gadolinium is increased in both acute and chronic infarcts. (From Shah et al, Myocardial Viability. In: Edelman et al, eds. *Clinical Magnetic Resonance Imaging (3rd ed.)*. New York, NY: Elsevier; 2006)

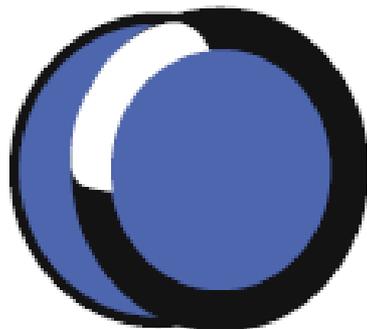
# Patrones de Realce Tardío

## Ischemic

### A. Subendocardial Infarct



### B. Transmural Infarct



## Nonischemic

### A. Mid-wall HE

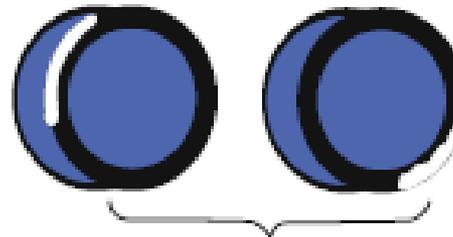


- Idiopathic Dilated Cardiomyopathy
- Myocarditis

- Hypertrophic Cardiomyopathy
- Right ventricular pressure overload (e.g. congenital heart disease, pulmonary HTN)

- Sarcoidosis
- Myocarditis
- Anderson-Fabry
- Chagas Disease

### B. Epicardial HE



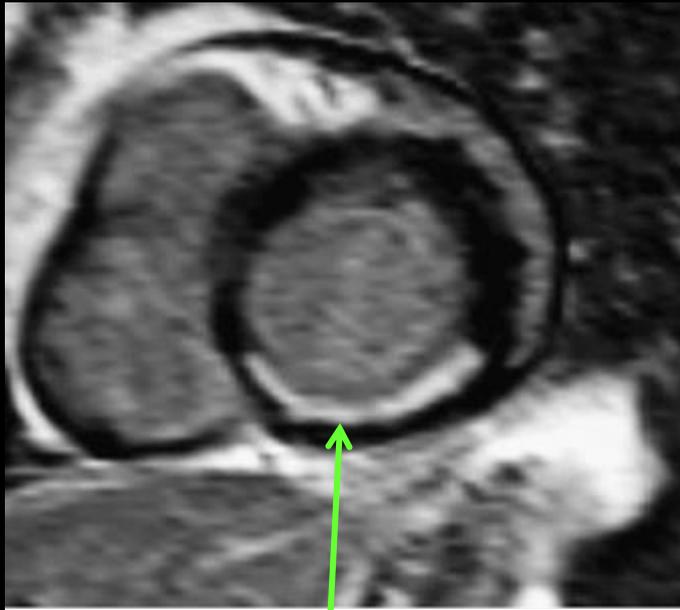
- Sarcoidosis, Myocarditis, Anderson-Fabry, Chagas Disease

### C. Global Endocardial HE

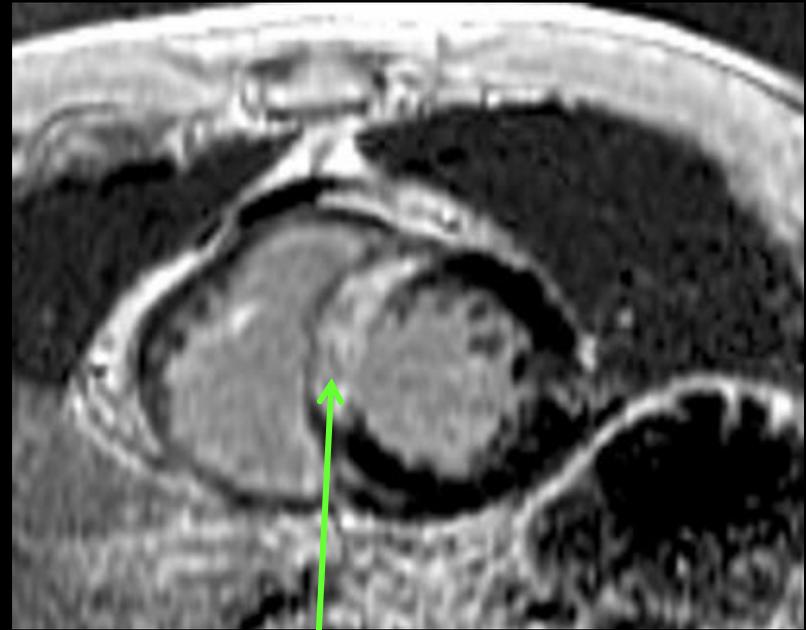


- Amyloidosis, Systemic Sclerosis, Post cardiac transplantation

# Patrones de Fibrosis Miocárdica



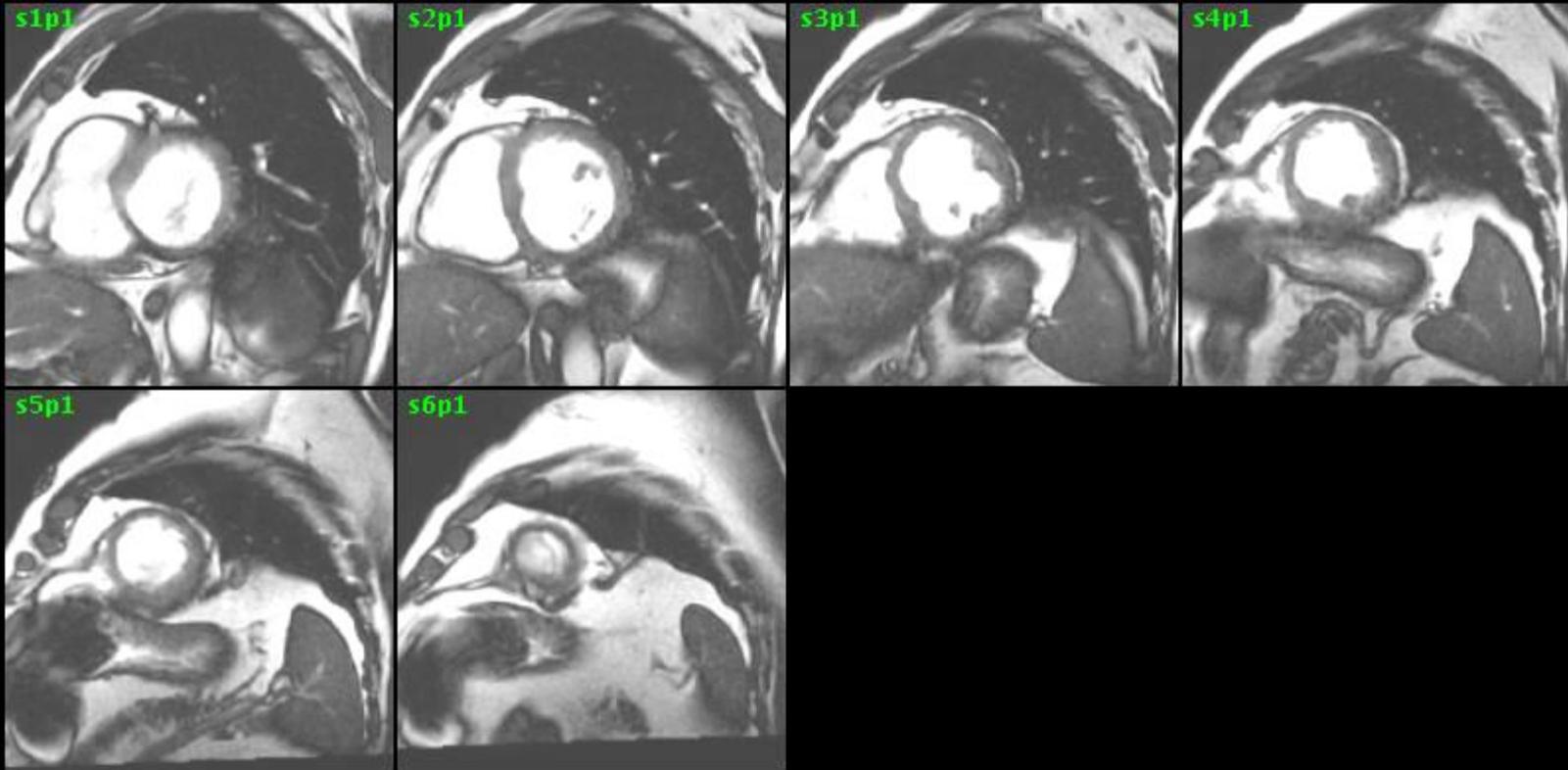
**Fibrosis  
Subendocardica**



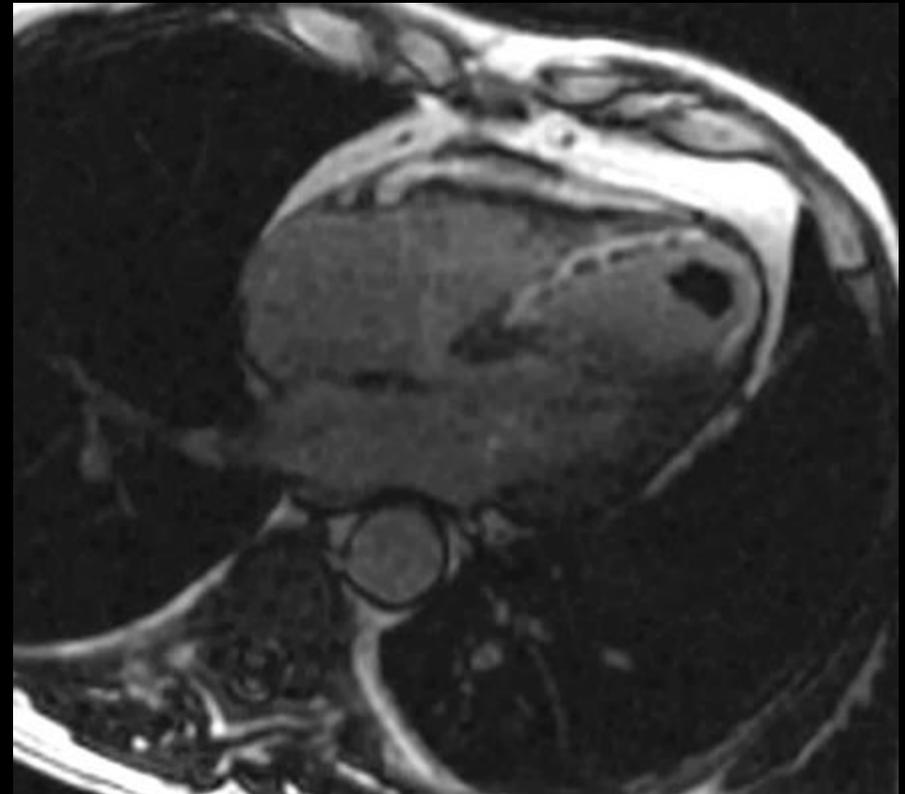
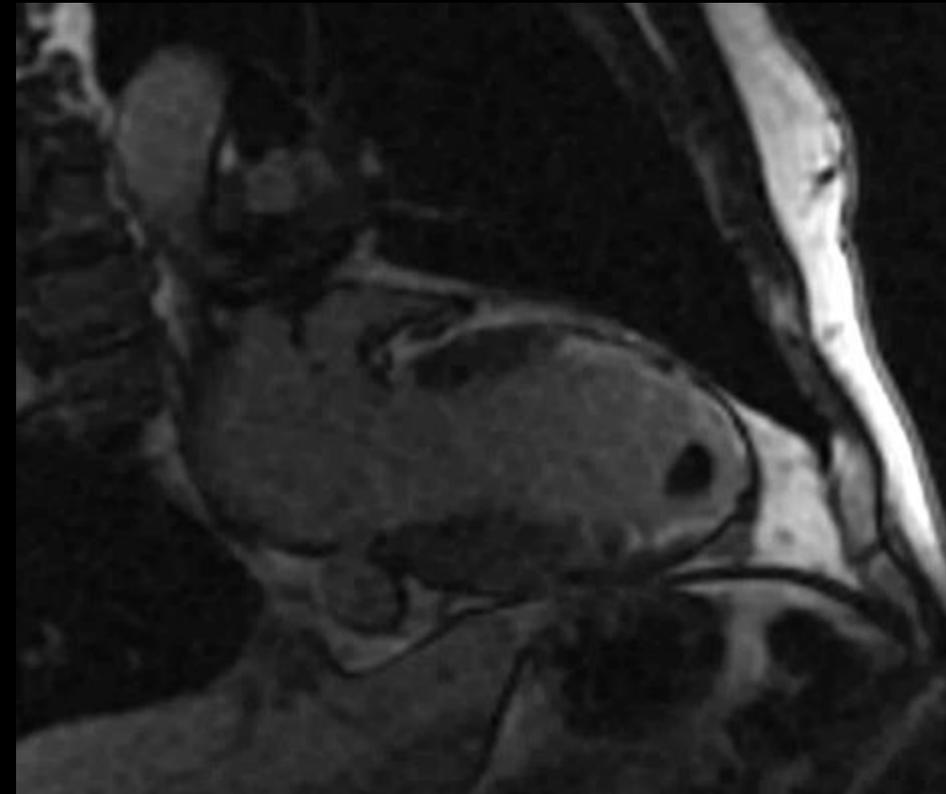
**Fibrosis Transmural**

# RMI Cardíaca

## Función Ventricular

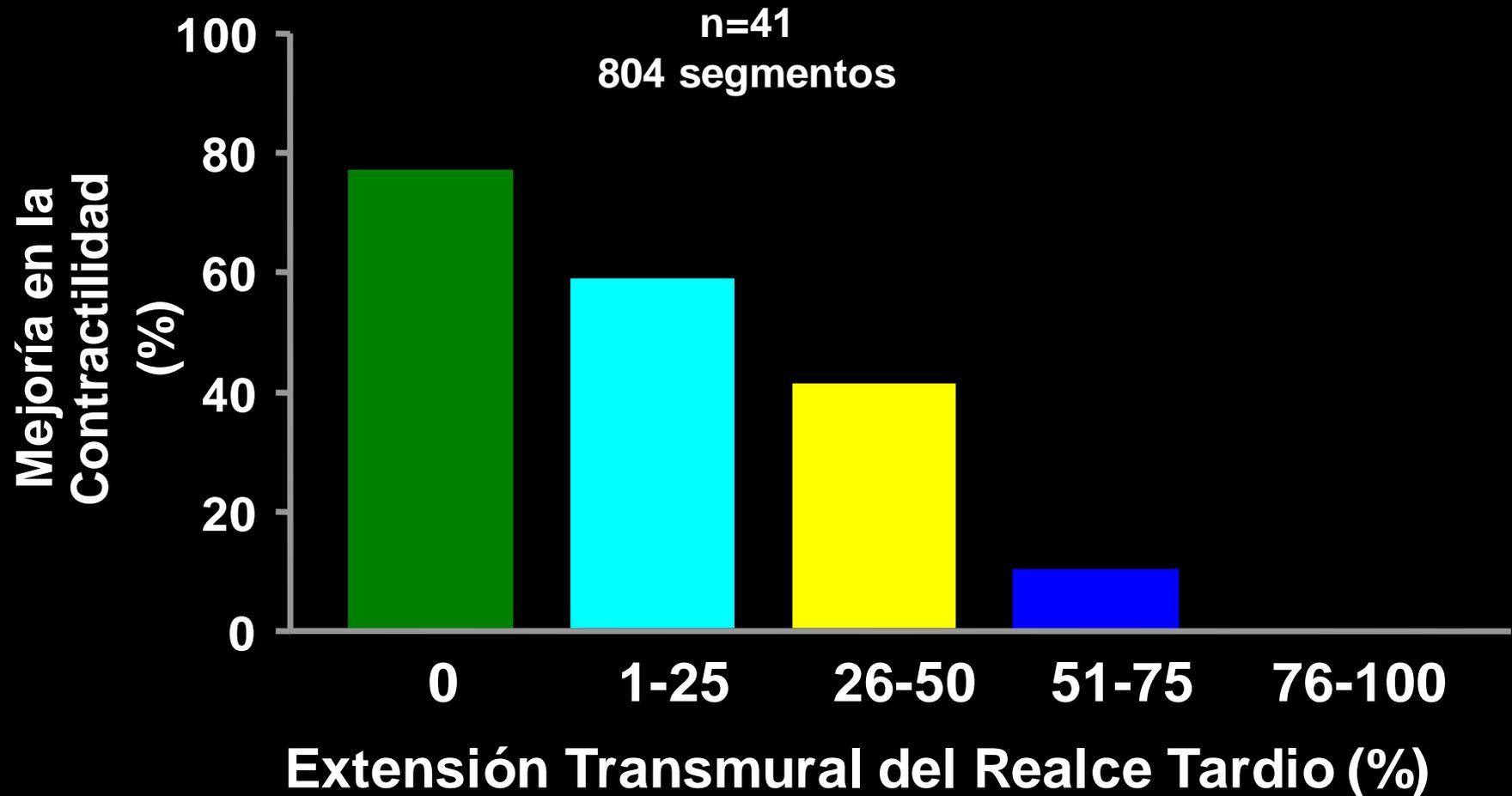


# Fibrosis Anteroseptoapical Trombo apical

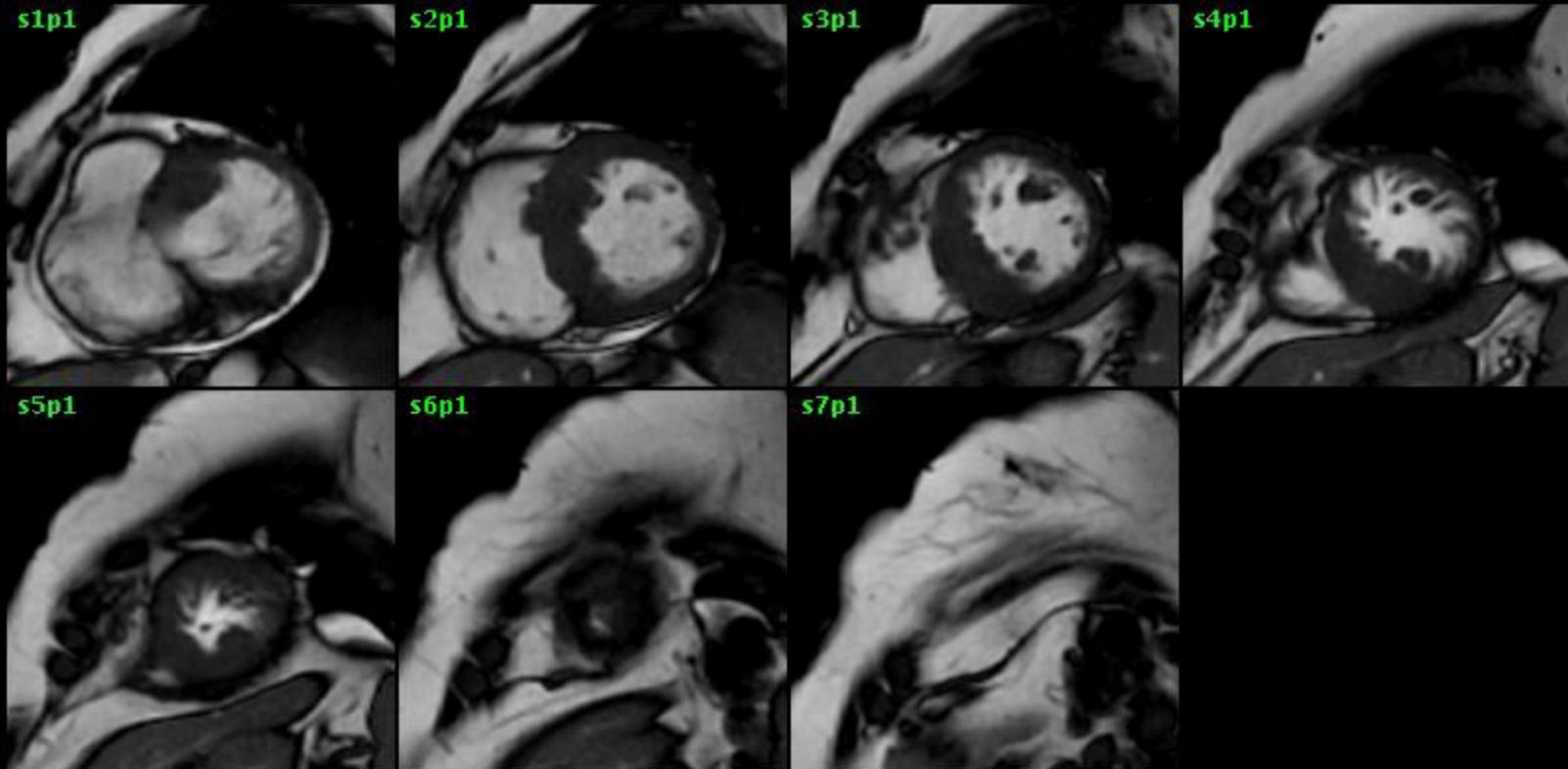


# RMI Cardíaca

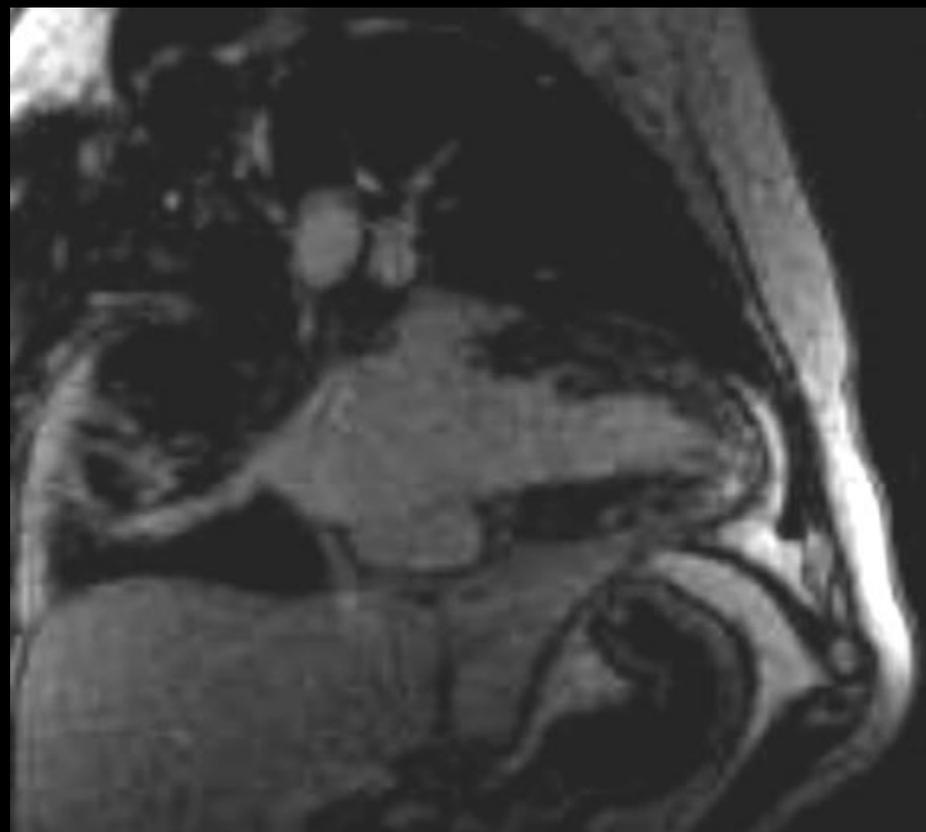
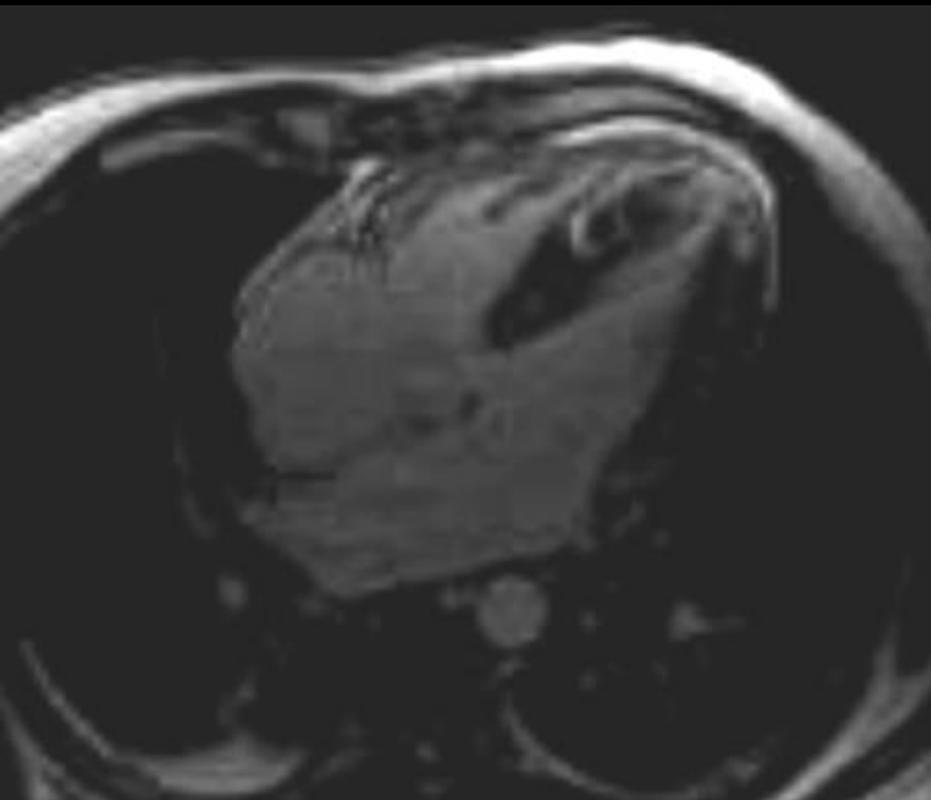
## Recuperación Contráctil



# Miocardiopatía Hipertrófica

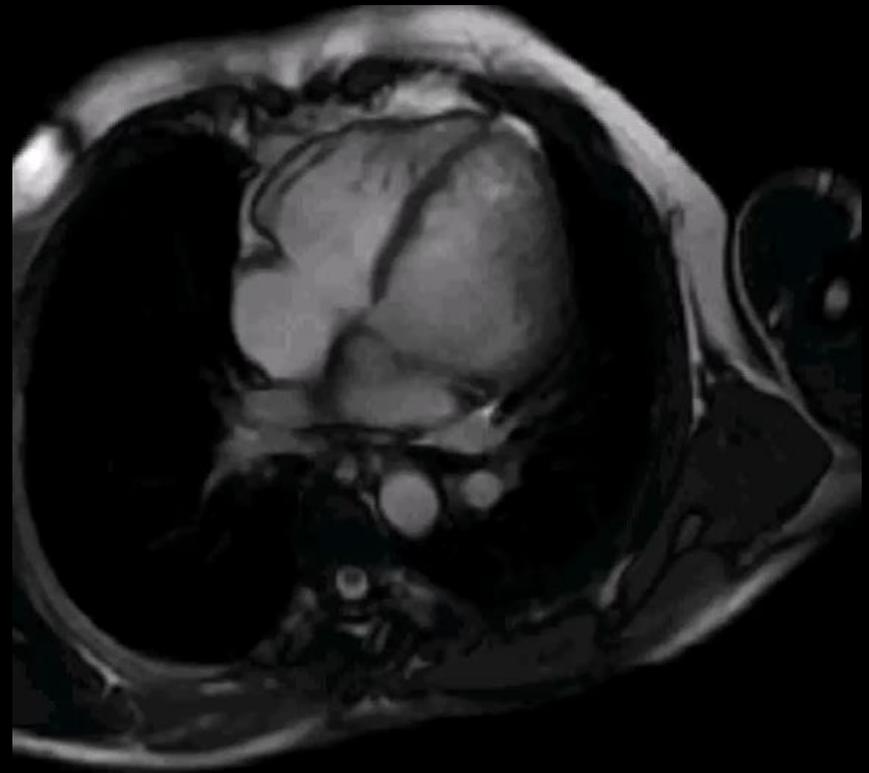


# Enfermedad de Chagas



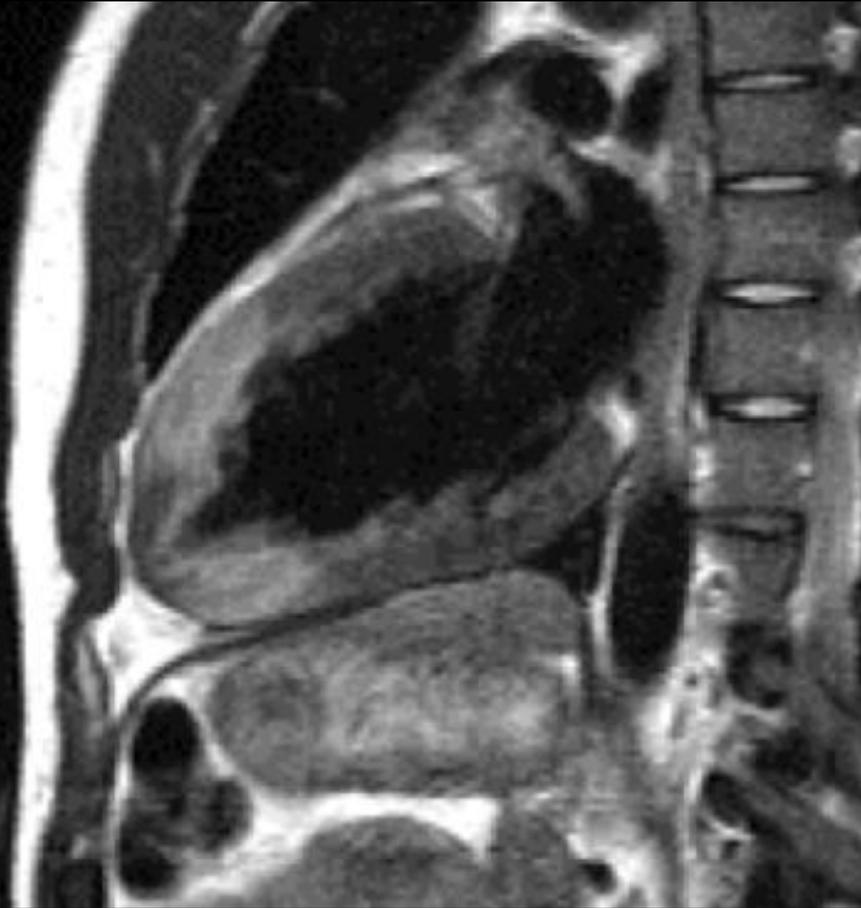
# Ventrículo No compactado

- Detención del proceso normal de compactación de la pared ventricular en la vida fetal
- Presentación clínica:
  - Insuficiencia Cardíaca
  - Embolia Sistémica
  - Arritmias
  - Muerte Súbita

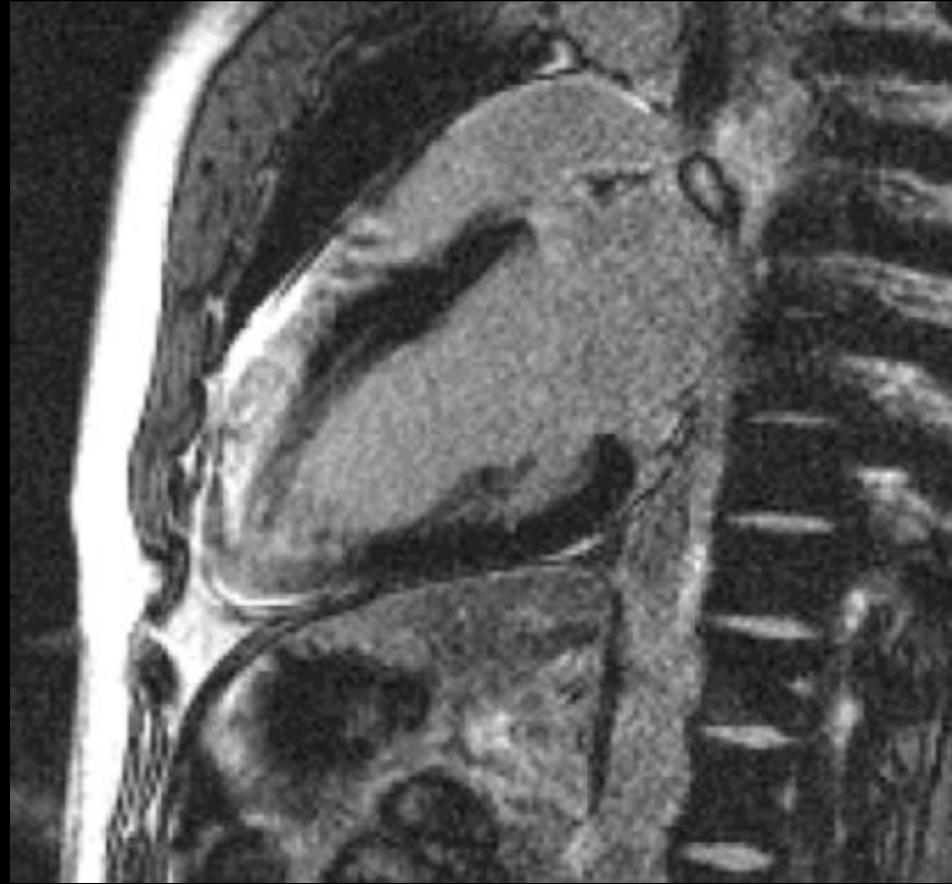


# Miocarditis

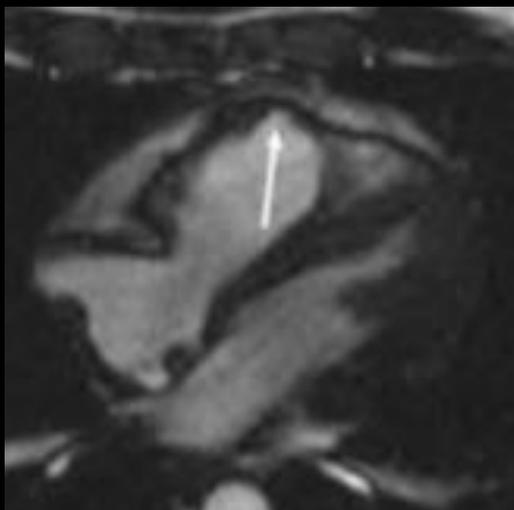
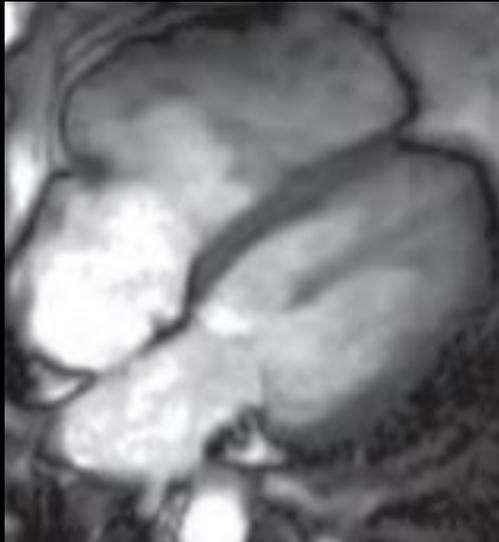
Secuencia Doble IR



Post Gadolinio



# Displasia Arritmogénica del VD



## Criterios Mayores (RNM)

- Aquinesia o disquinesia regional de VD ó disincronía en la contracción del VD y uno de los siguientes:
  1. VFDVD  
 $\geq 110\text{ml/m}^2$  (M)  
 $\geq 100\text{ml/m}^2$  (F)
  2. Fracción de eyección del VD  
 $\leq 40\%$

## Criterios Menores (RNM)

- Aquinesia o disquinesia regional de VD o disincronía en la contracción del VD y uno de los siguientes:
  1. VFDVD  
 $\geq 100$  y  $\leq 110\text{ml/m}^2$  (M)  
 $\geq 90$  y  $\leq 100\text{ml/m}^2$  (F)
  2. Fracción de eyección del VD  
 $\geq 40$  y  $\leq 45\%$

# Conclusiones

- El Score de Calcio posee valor agregado dx. y pronóstico, simple de realizar en pacientes asintomáticos sin EAC
- La TCMS brinda alto valor predictivo negativo para exclusión rápida y eficaz de EAC en pacientes de bajo a intermedio riesgo
- La TCMS posee aplicaciones de uso creciente: TAVI/ Vs Pulmonares, Cardiopatías Congénitas, entre otros
- La RMI brinda alta resolución espacial para caracterización de fibrosis miocárdica, con aplicaciones específicas para patologías del miocardio

Muchas Gracias