

The Use Ultrasound in Anatomy and Embryology Education

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Talk Outline

- I) Overview of integrating Ultrasound into the Medical Embryology and Gross Anatomy (MEGA) class at USC
- II) Specific example of the use of ultrasound to teach embryology



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Vevo770 Small animal ultrasound

Day 3 chick embryonic heart



Scope: MEGA has incorporated five US labs into the curriculum. The labs plus the OSCE make up 20% of their final grade.

Timing: MEGA is a regionally-based course that is divided into 4 sections

- 1) Back and Thorax – Cardiac US lab**
- 2) Head, Neck and Upper Limbs-
Carotid US lab**
- 3) Abdomen, Pelvis, Lower Limbs –
Kidney US lab and Knee US lab**
- 4) Comprehensive final –US OSCE**

Part I Conclusions:

- Combining Anatomy dissections with US labs allows students to integrate the 3D anatomy that they are learning in the Anatomy lab with the 2D images that they will be interpreting the rest of their careers.
- Anatomy Shelf test scores went up for the last year.

Using US to teach embryology

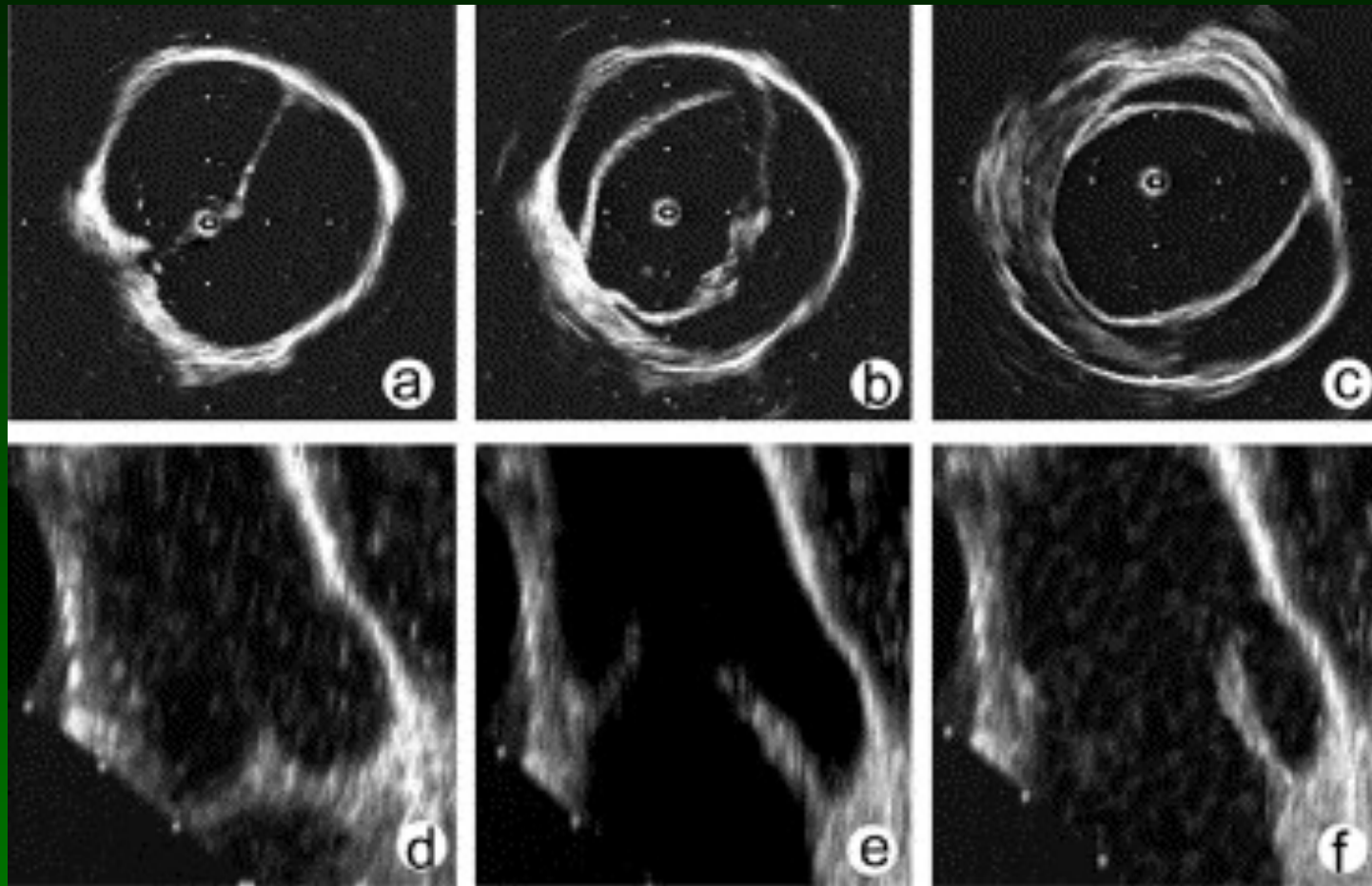
- One of the most common use of US is to determine status of fetal development and diagnose fetal disorders. Thus, future neonatologists and OBs need the exposure.
- Traditionally embryology is a difficult subject area for M1's.
- Becoming clear that a number of adult disorders are the result of congenital defects.

Go to Web video

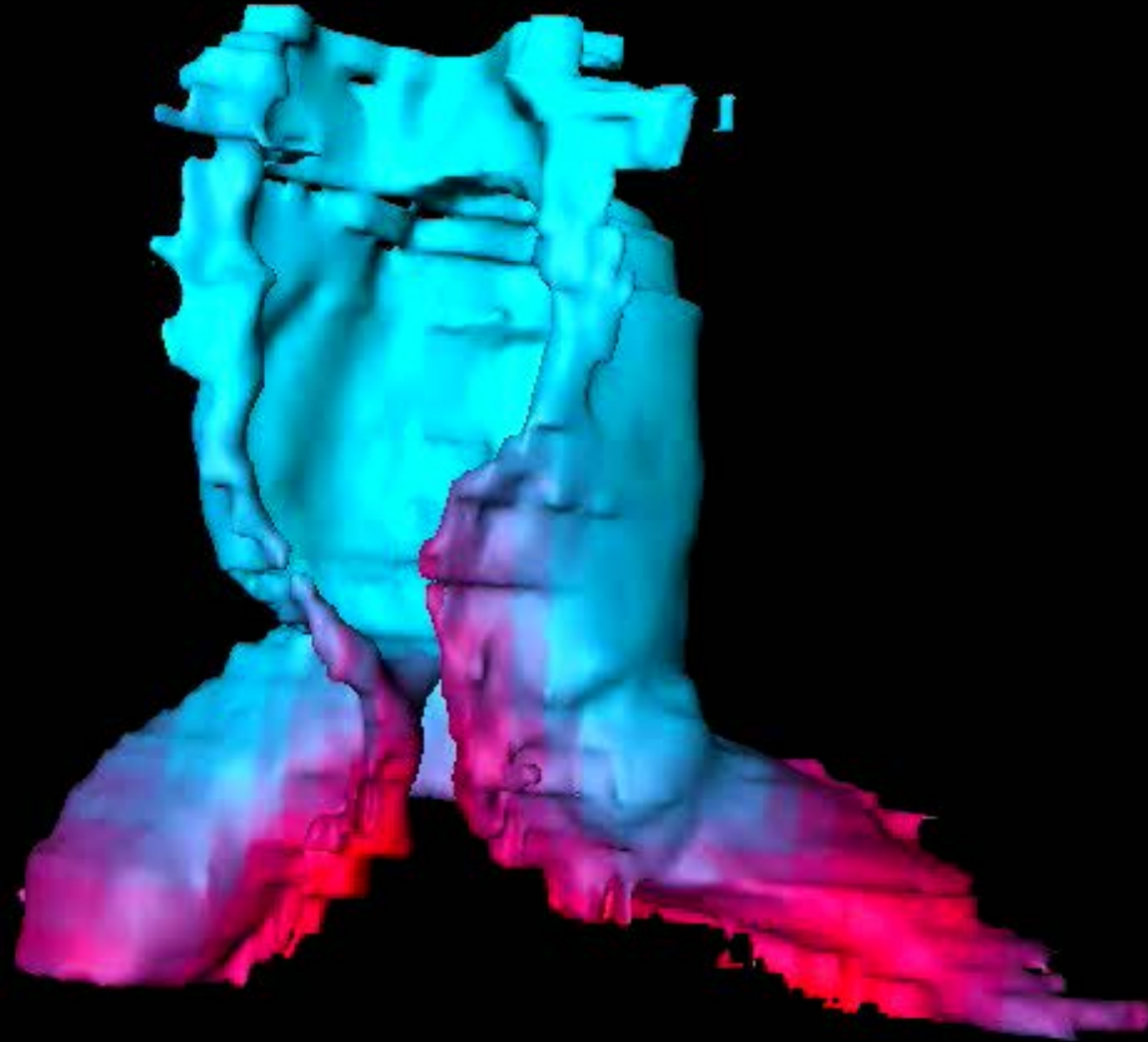
- https://www.youtube.com/watch?v=vZgbGT_Uv1g
- Bicusid Aortic Valve Ultrasound

- **Bicuspid aortic and pulmonary valves**
Only two valve leaflets form

“Fish Mouth”

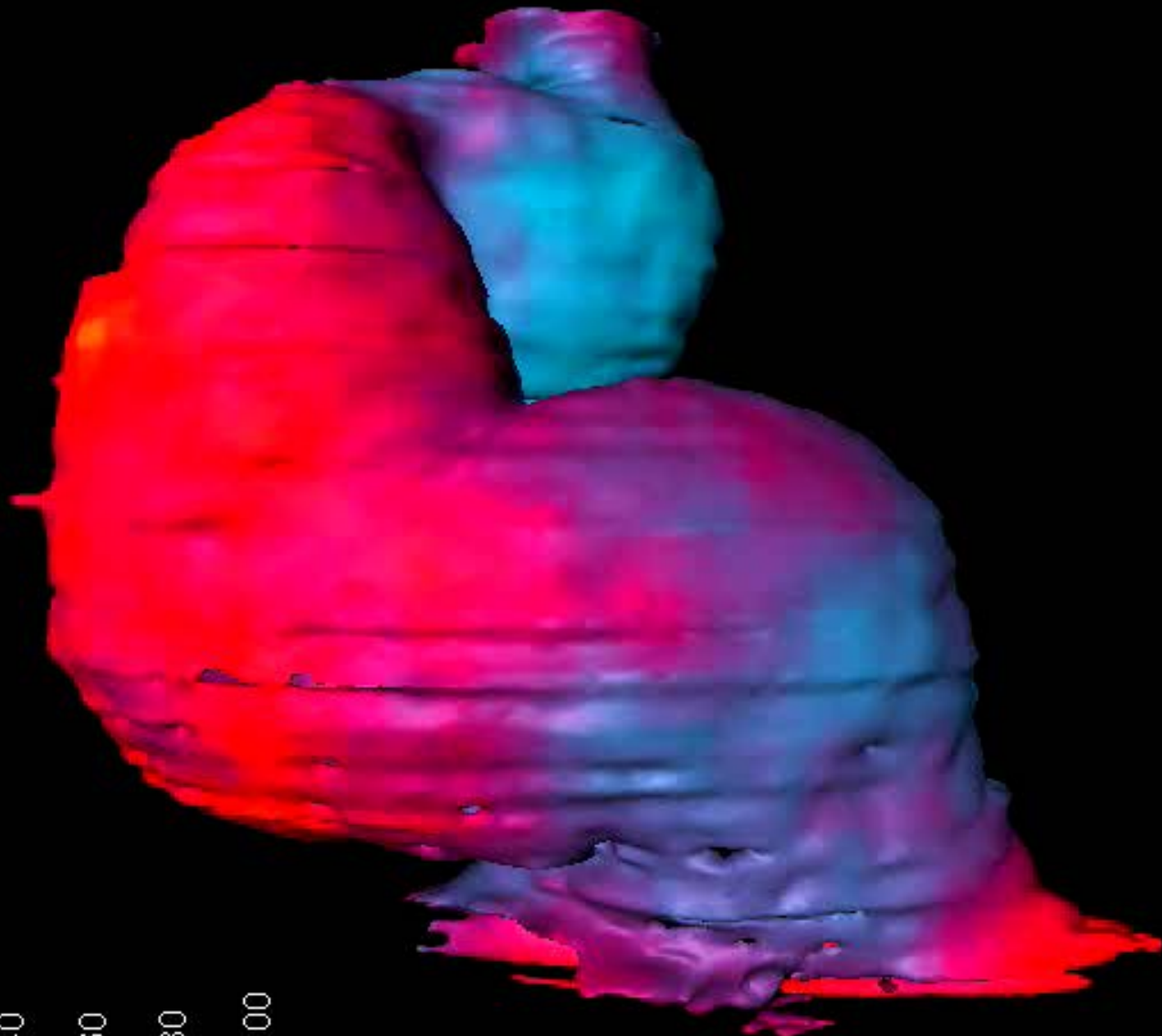


Hamburger / Hamilton stage 10

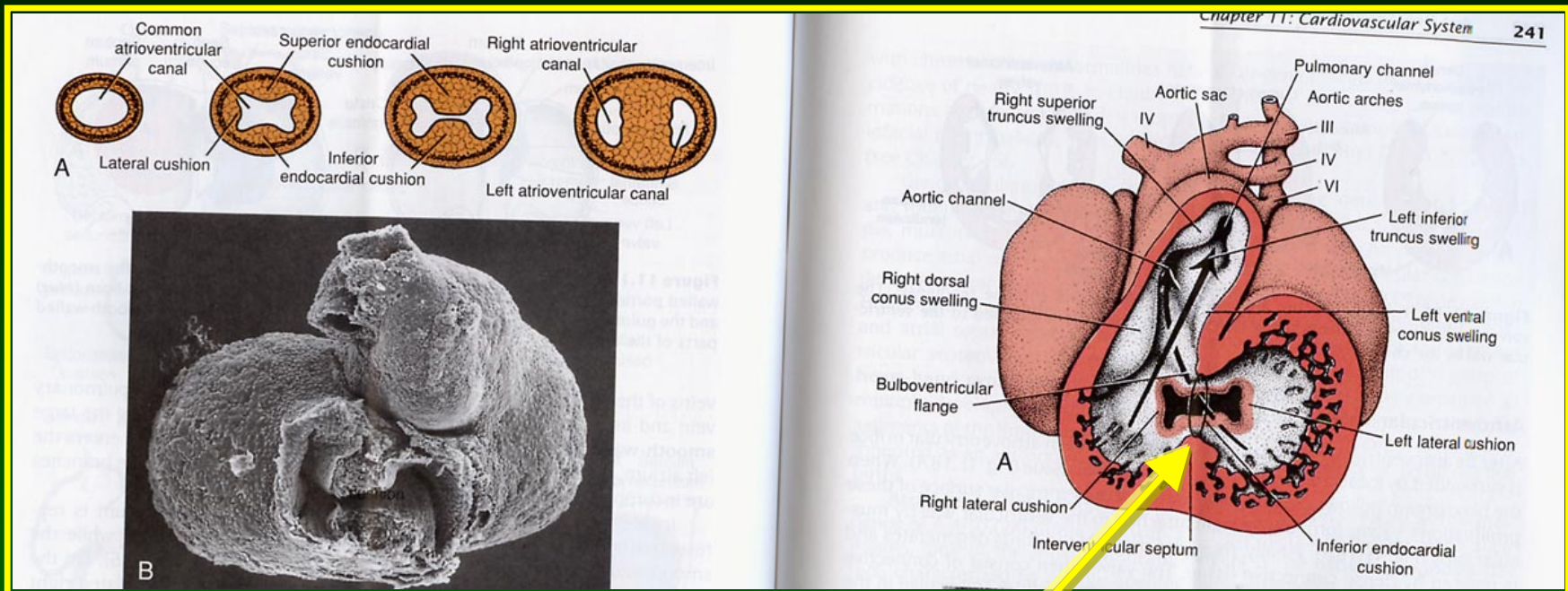


200 [um]

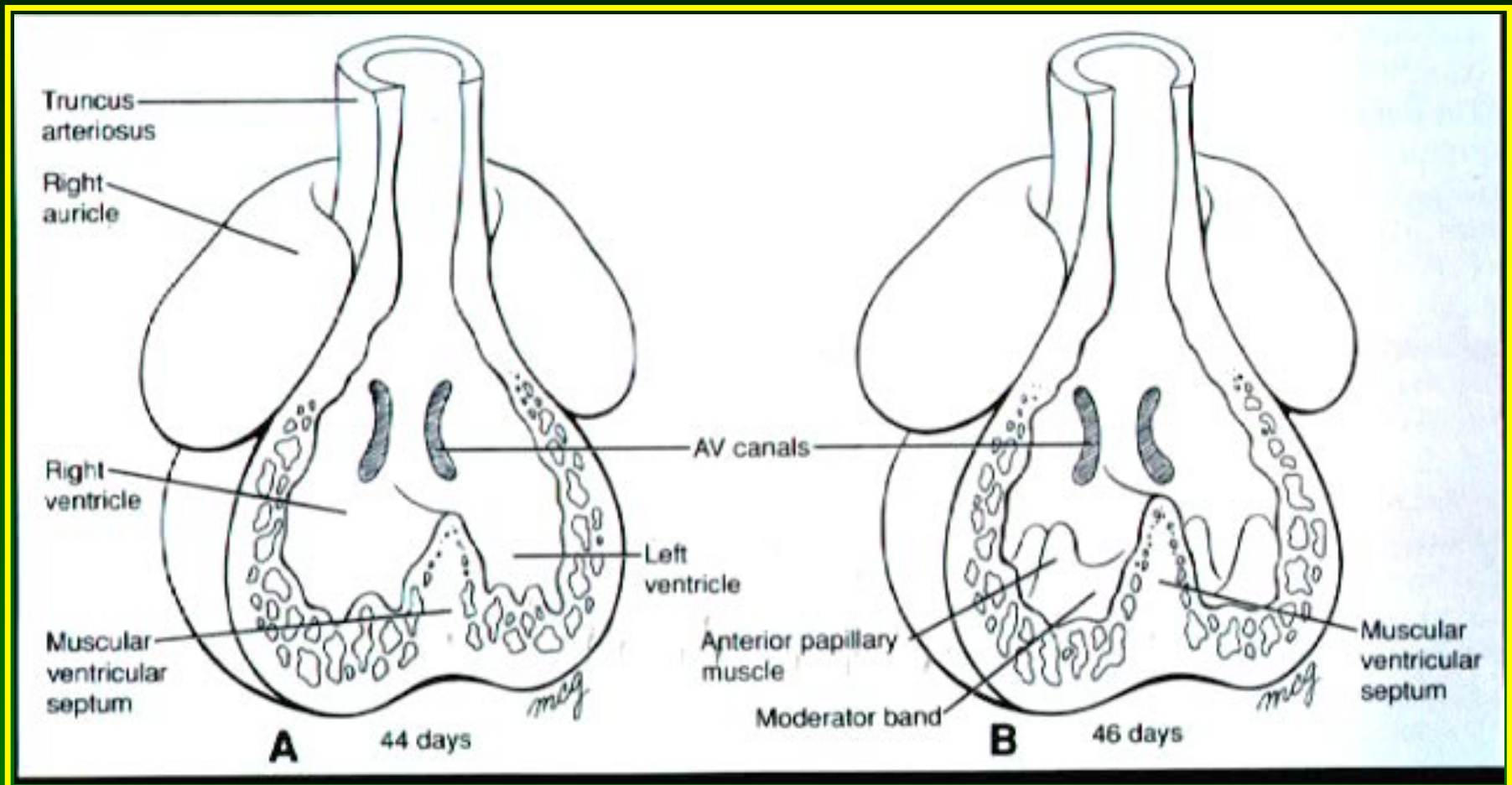
Hamburger / Hamilton stage 12



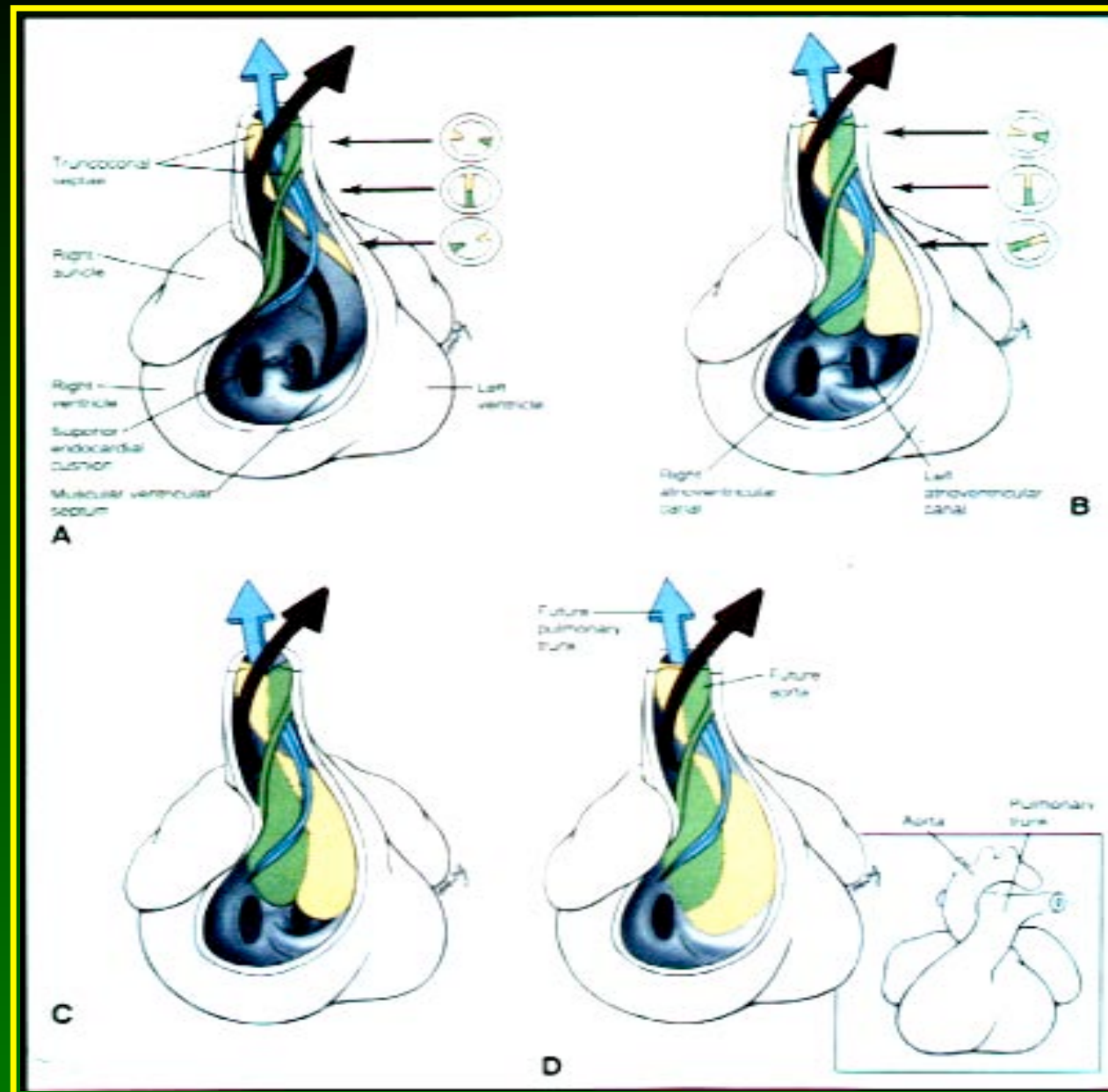
Atrioventricular Septation



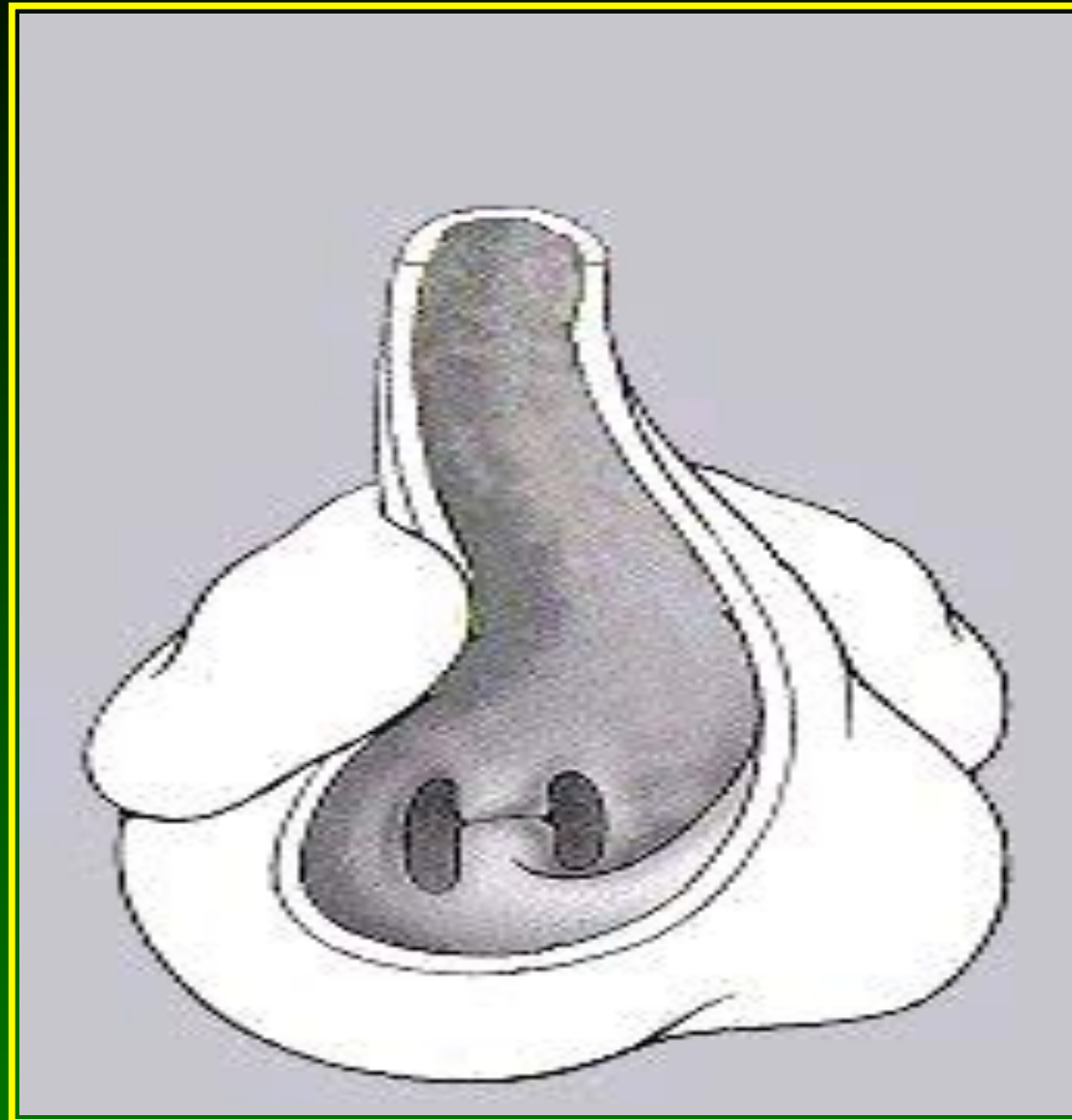
Muscular septum originates inferiorly

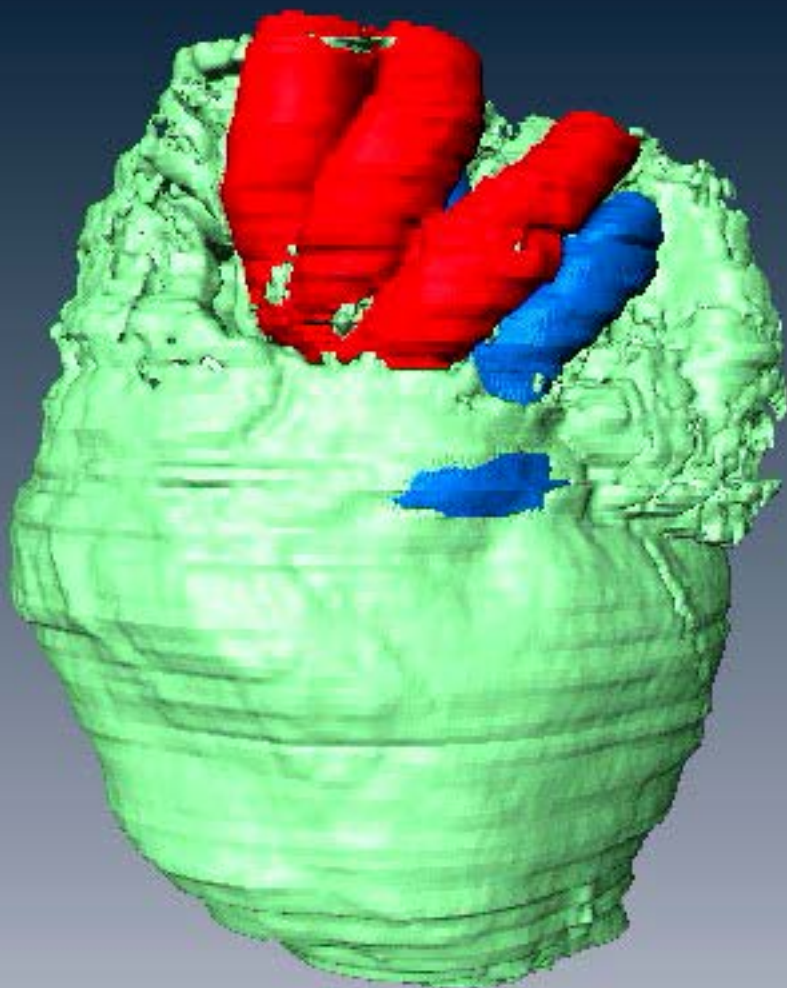


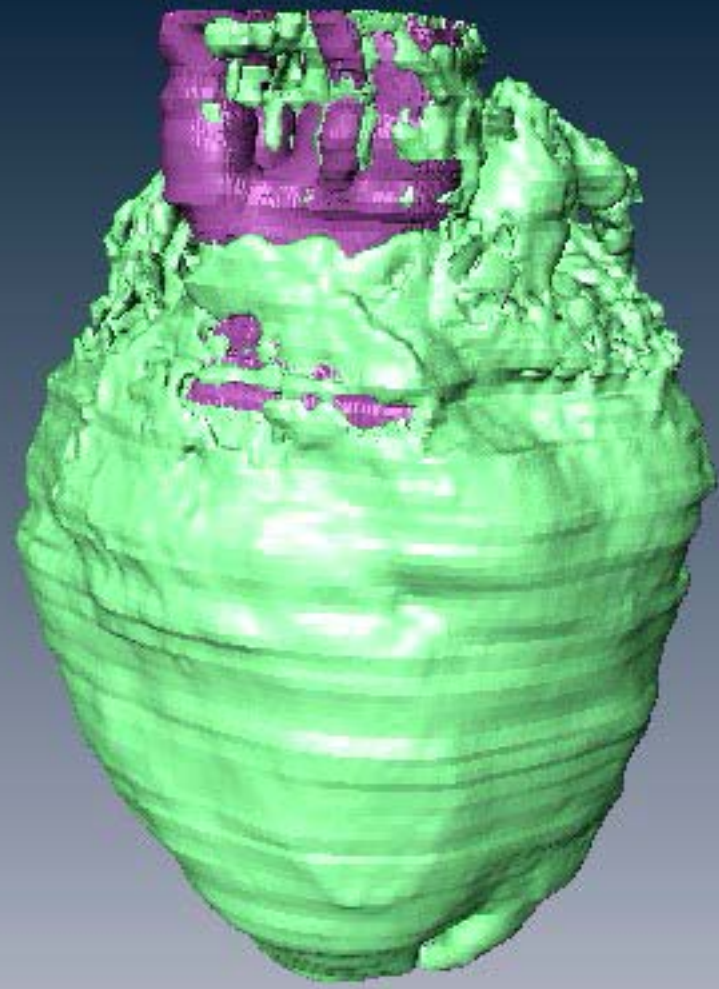
Spiral septation of the outflow tract form the aorta and Pulmonary artery



Ventricular Septation

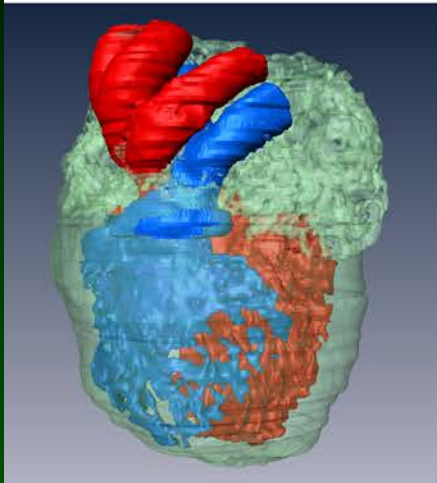




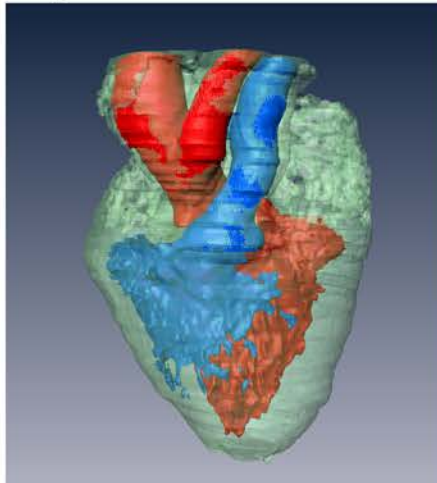


Animal models of cardiac defects

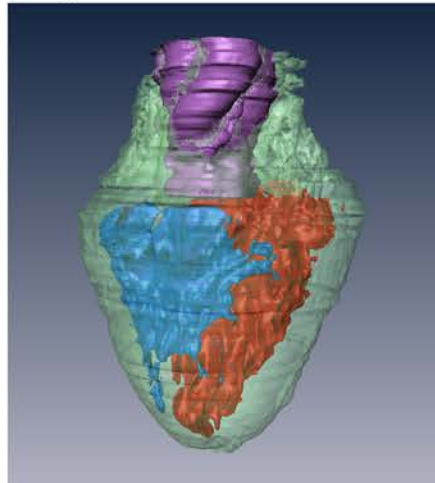
Control



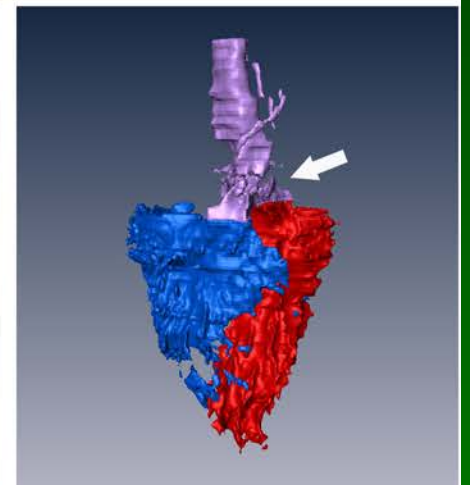
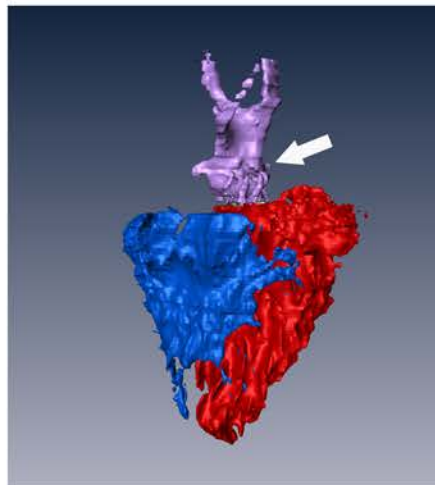
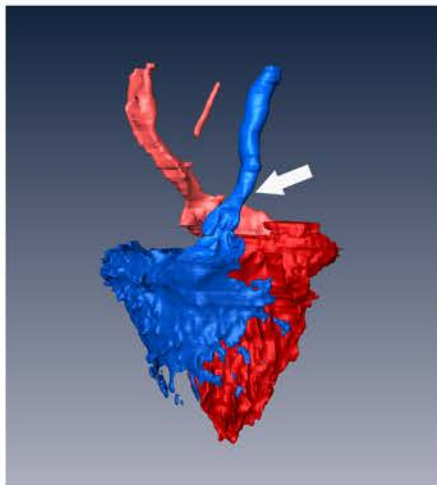
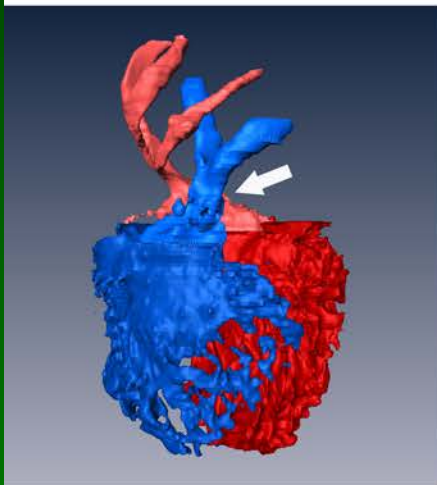
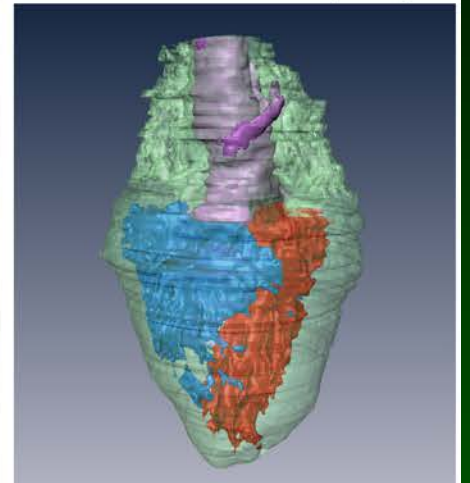
Cyc-treated (stenosis)



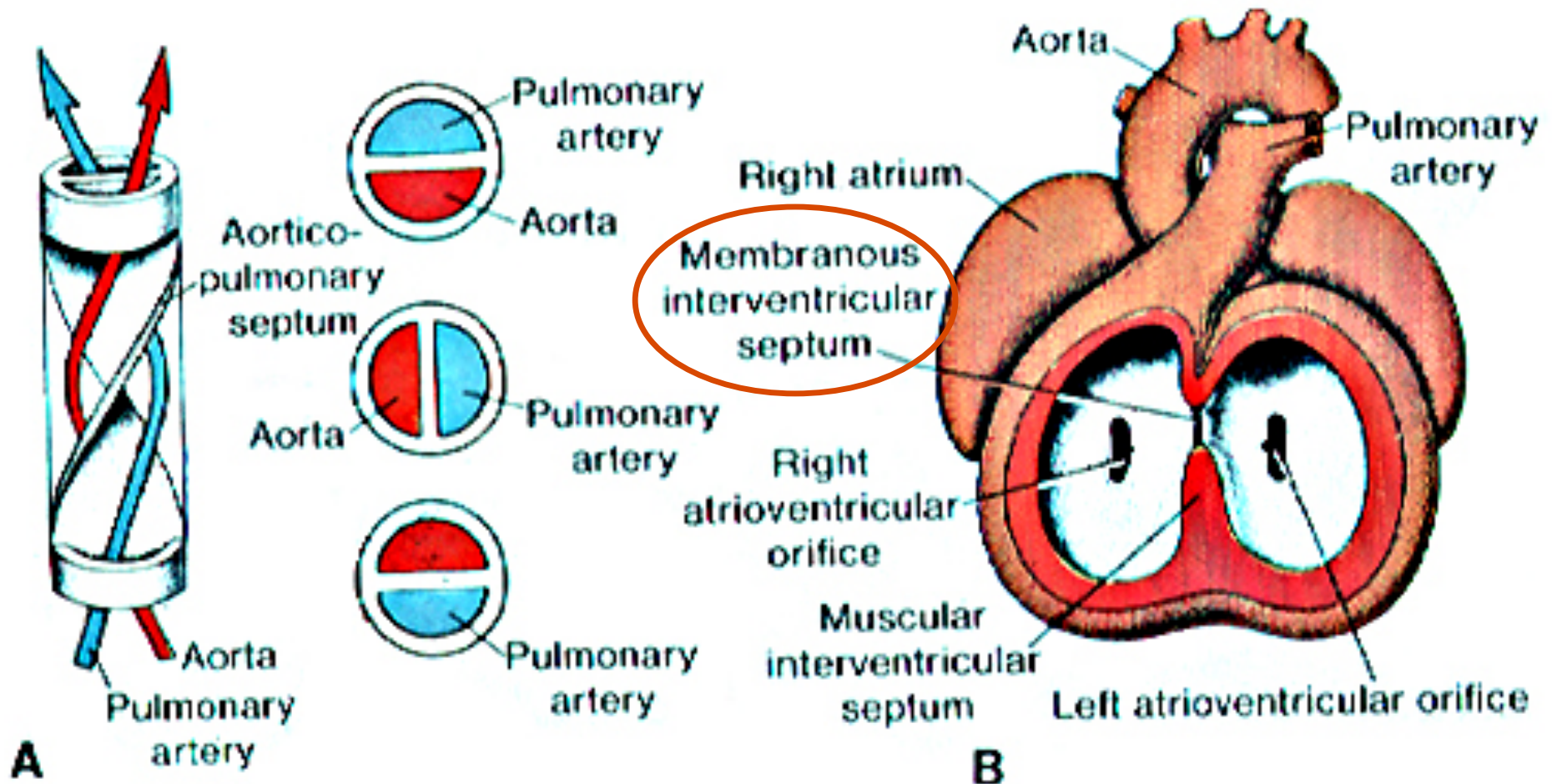
Cyc-treated (atresia)



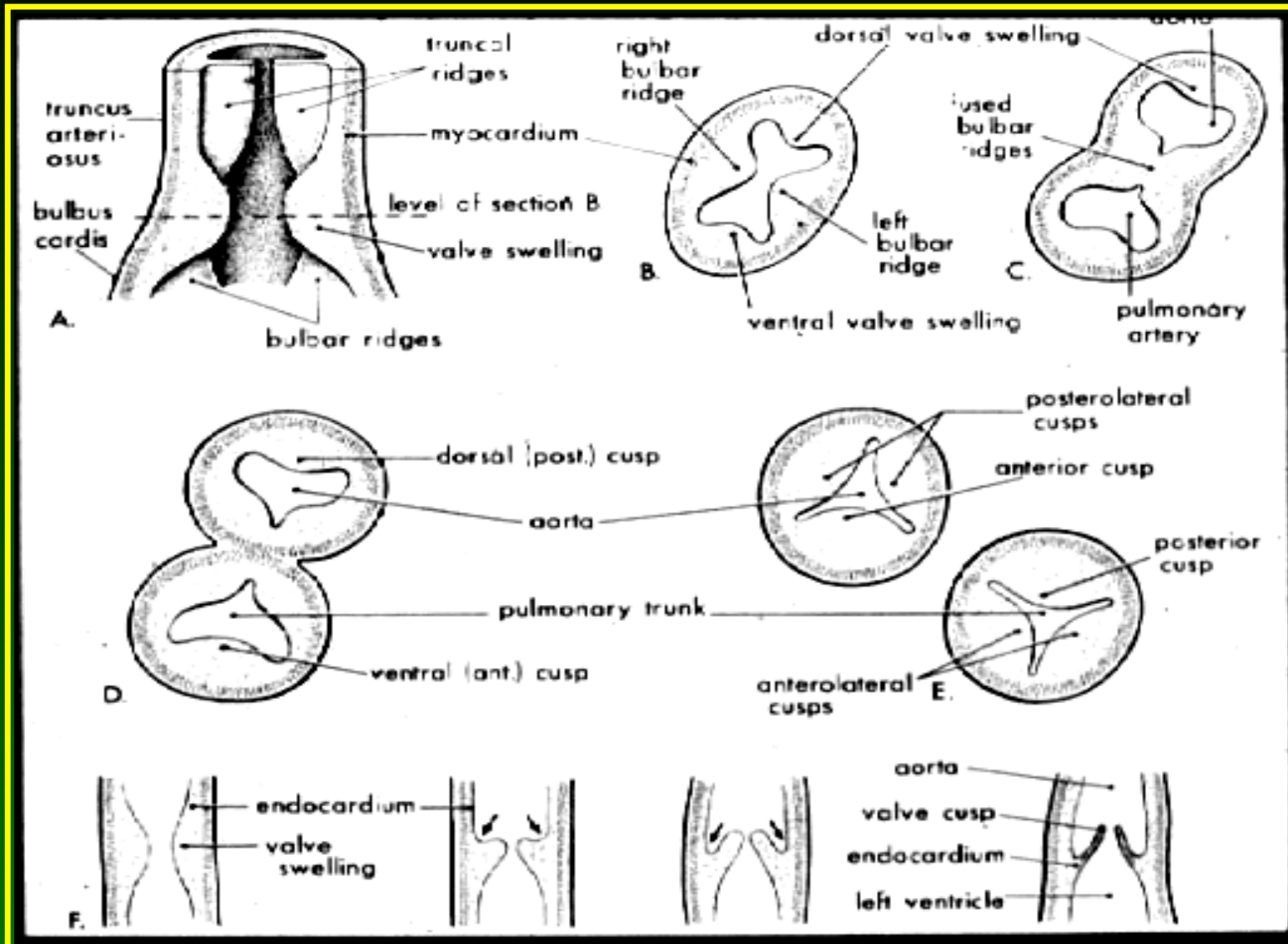
NC Ablated (PTA)



Spiral Septation of the Outflow Tract

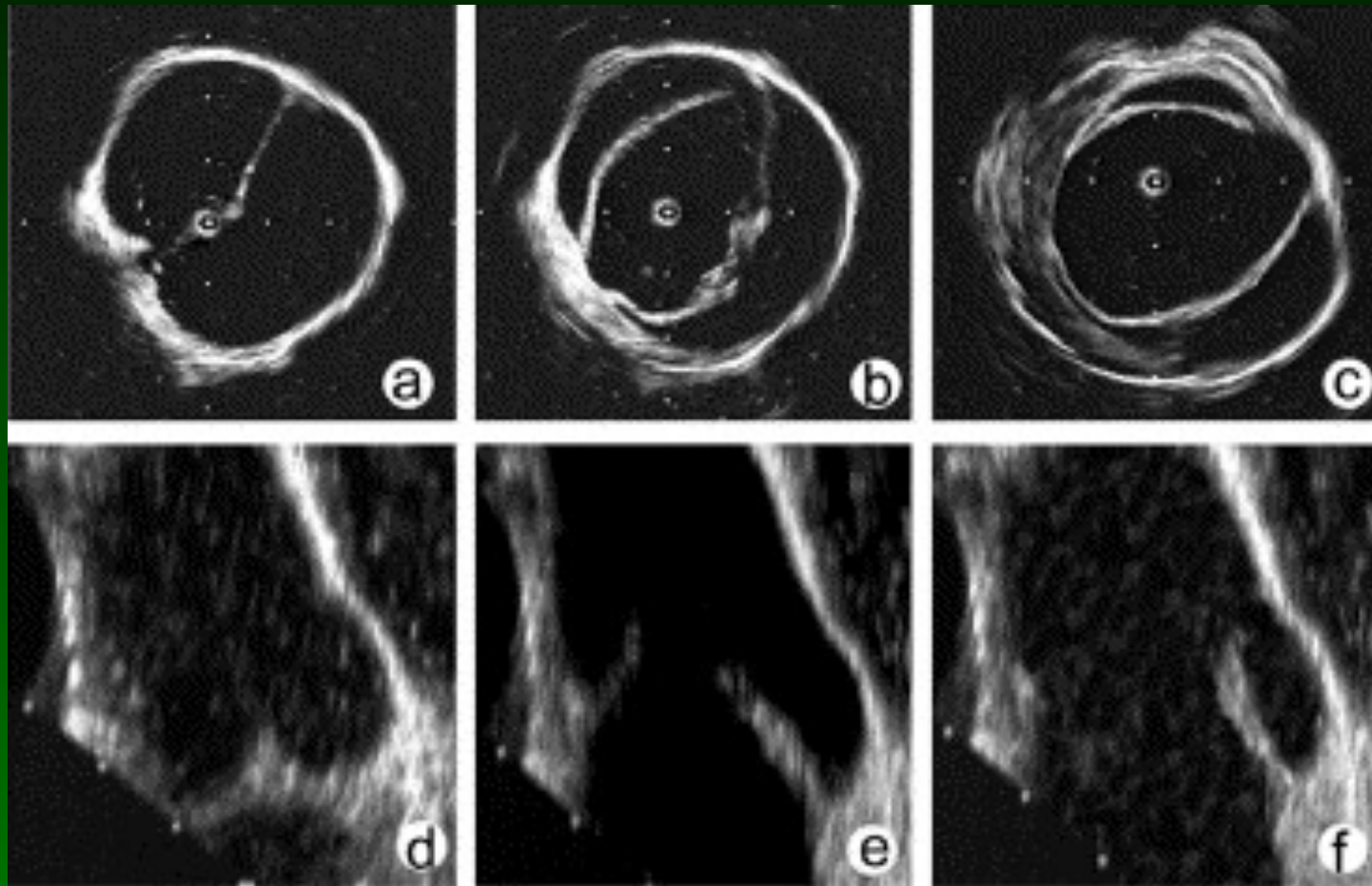


Formation of the semilunar valves



- **Bicuspid aortic and pulmonary valves**
Only two valve leaflets form

“Fish Mouth”



The causes of Bicuspid Aortic valve are unknown.

Recently Dr. Christie Kern's lab has described a transgenic mouse which implicates ADAMSTS 5 in BAV.

Versican cleavage is necessary for proper aortic valve formation.

What are the mechanisms of valve calcification?

Early diagnosis may allow for effective treatment.

Part 2 Conclusions:

- **US is an effective tool in engaging medical students.**
- **Can be used to drive home important concepts in embryological development.**
- **Perhaps spur new innovations in the treatment of adult disorders.**
- **Need to find ways to incorporate OB in MEGA.**
- **This is a work in progress!**

Thanks to:

Dr. Erika Blanck

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Dr. Jim Wells

Dr. Jay Potts

Dr. Bob Price

Lorain Junor



A. Tsiaras In Life Aug. 26th, 2005