

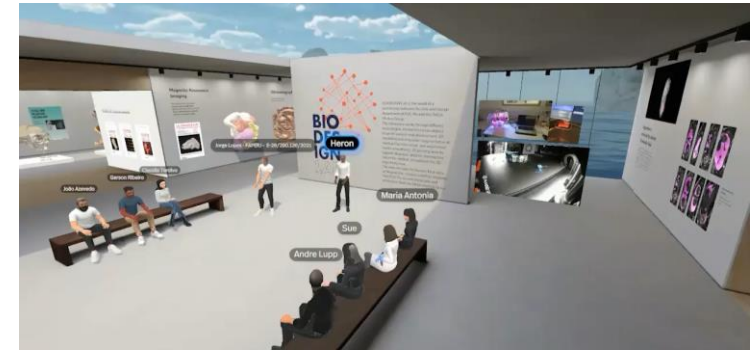
Tecnologias 3D: novas ferramentas de auxílio ao diagnóstico e tratamento

Dr. Vitor Sardenberg

Dr. Heron Werner

➤ BIODESIGN

- **Metodologia que integra:**
 - Design
 - Medicina
 - Engenharia



- Desenvolver soluções inovadoras na área da saúde com base em necessidades clínicas reais

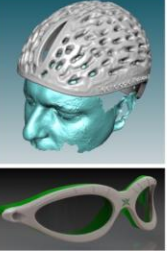
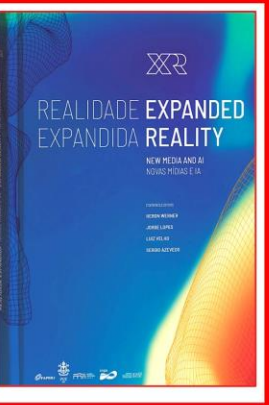
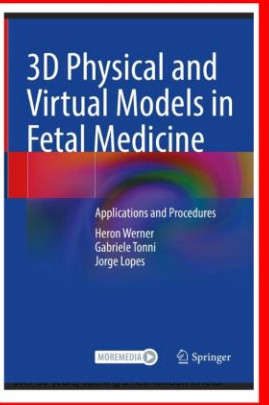
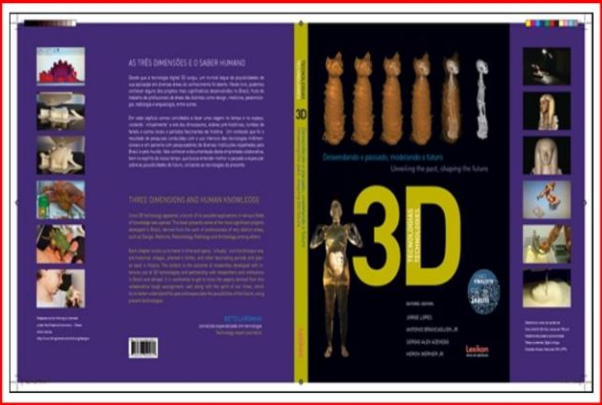
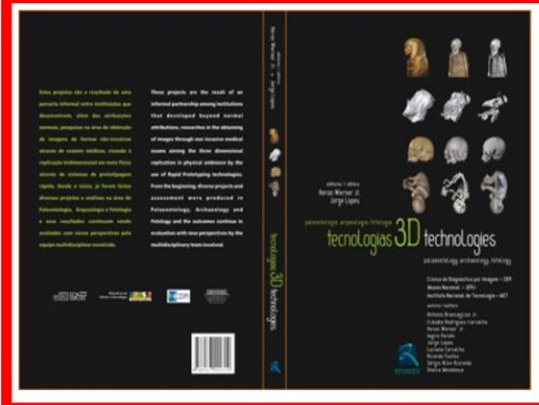
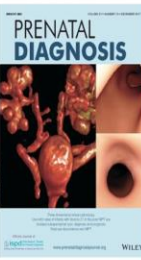
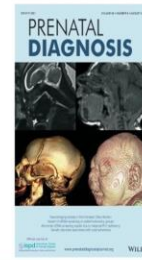
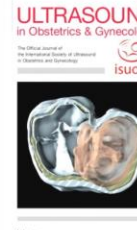
➤ **Objetivo**

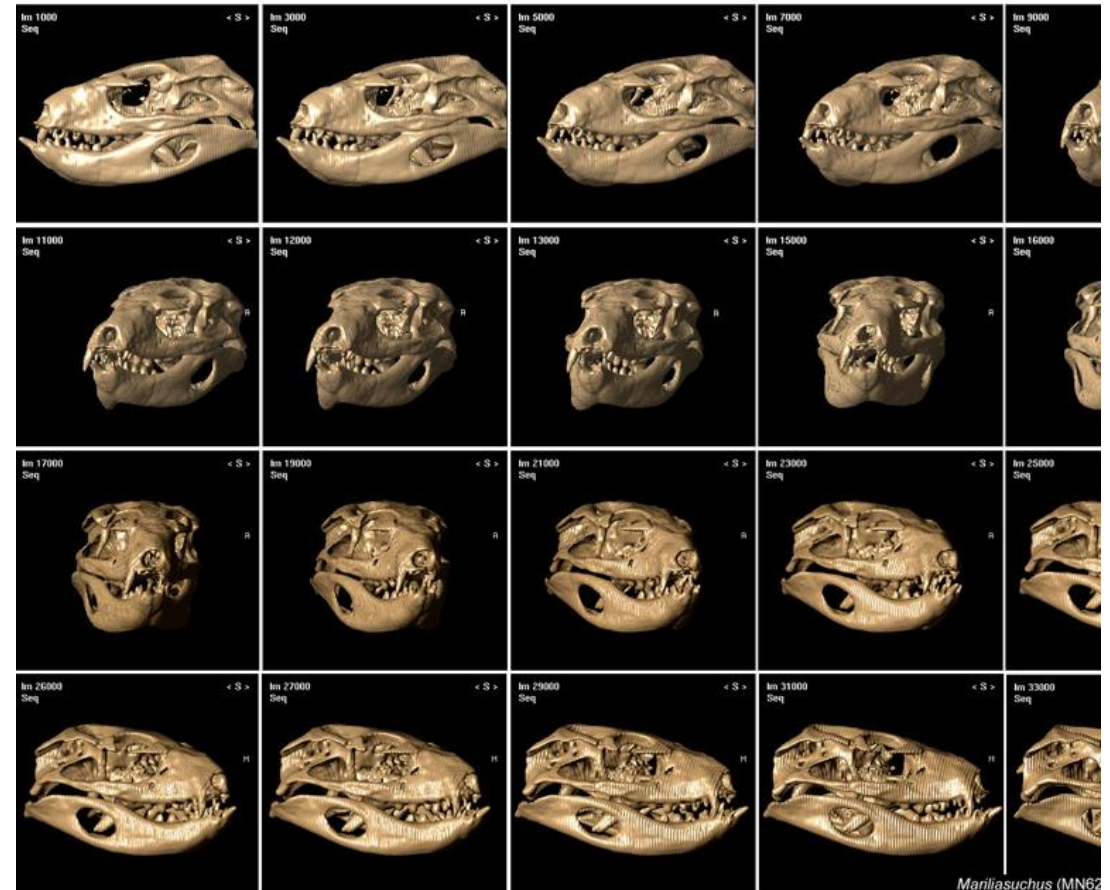
Transformar os desafios da prática médica em inovações seguras, eficientes e centradas no paciente

BIODESIGN LAB DASA / PUC-RIO

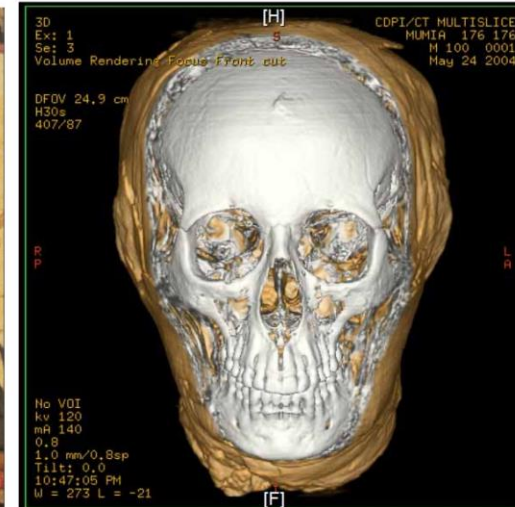
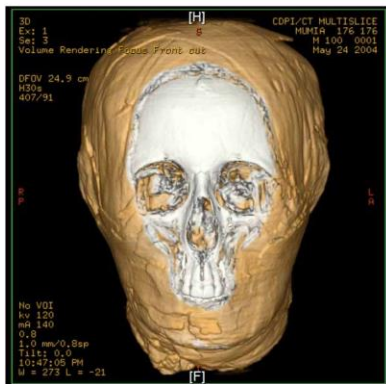
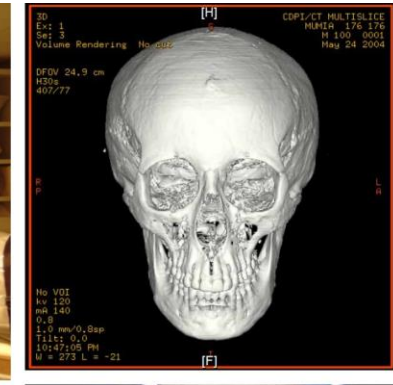
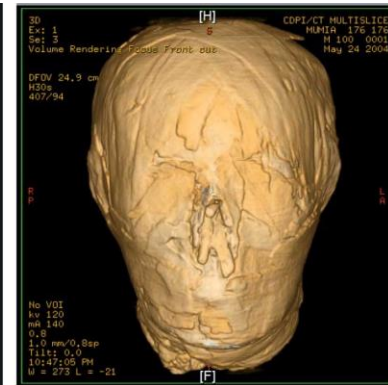
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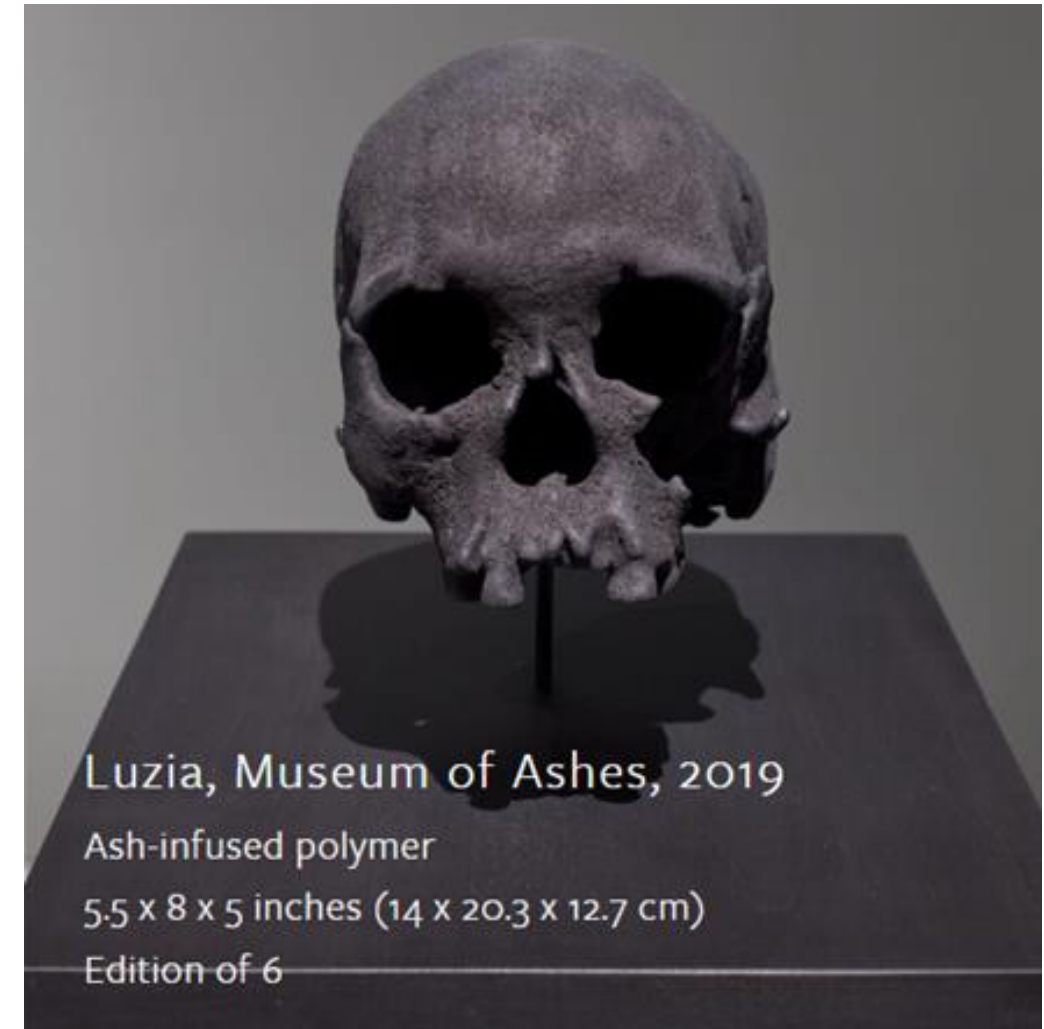


- Modelo virtual após TC do fóssil da cabeça de jacaré encontrado em Marília, Brasil
 - (+ / - 40 milhões de anos)



➤ Caixão de Sha-Amun-en-su entrando no tomógrafo

➤ Cabeça da Senhora de Tebas – Remoção Virtual das Bandagens



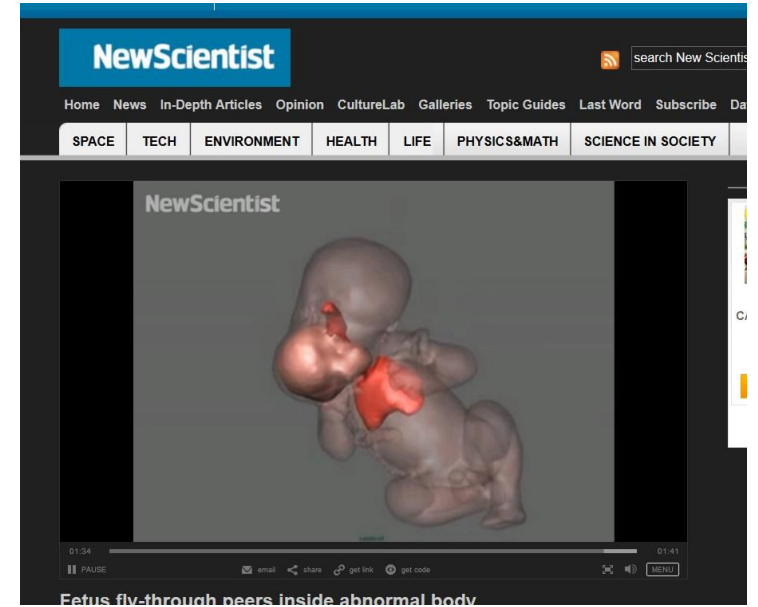


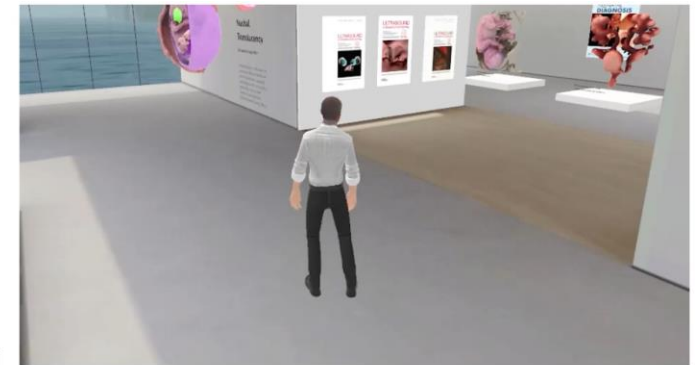
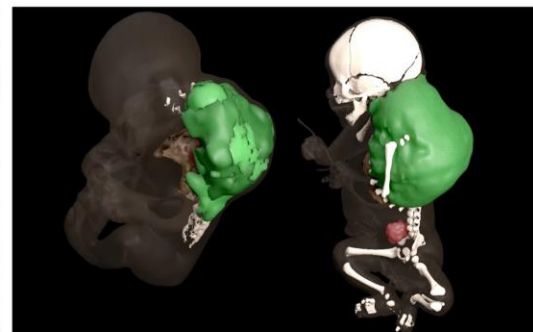
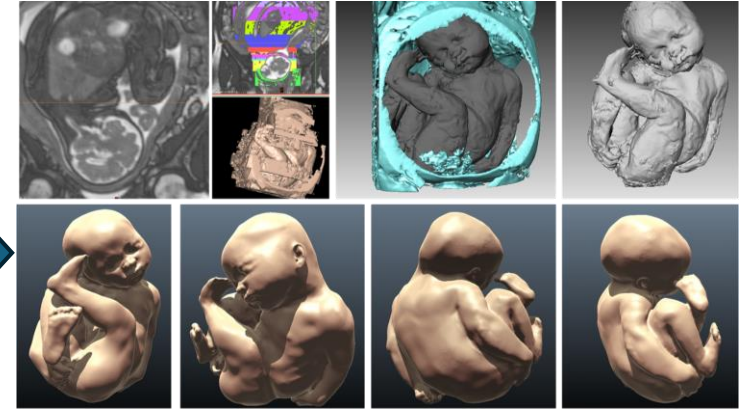


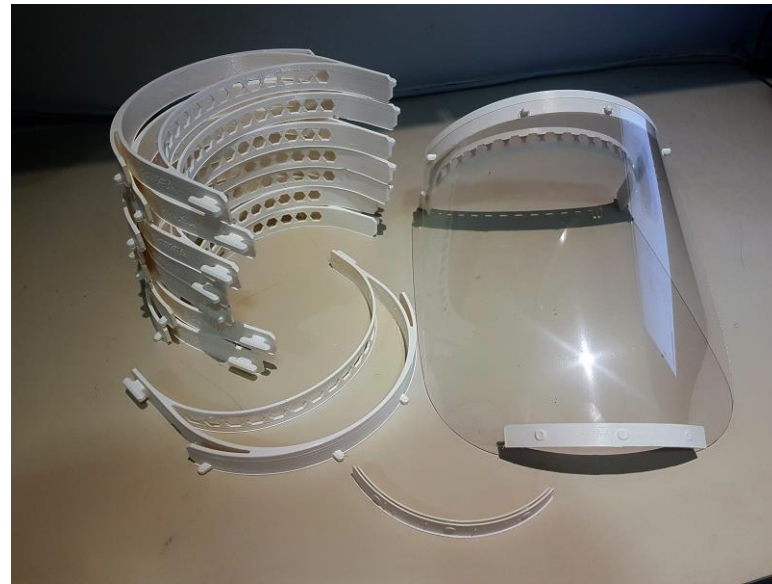
METAVERSO



MUSEU NACIONAL – RIO DE JANEIRO





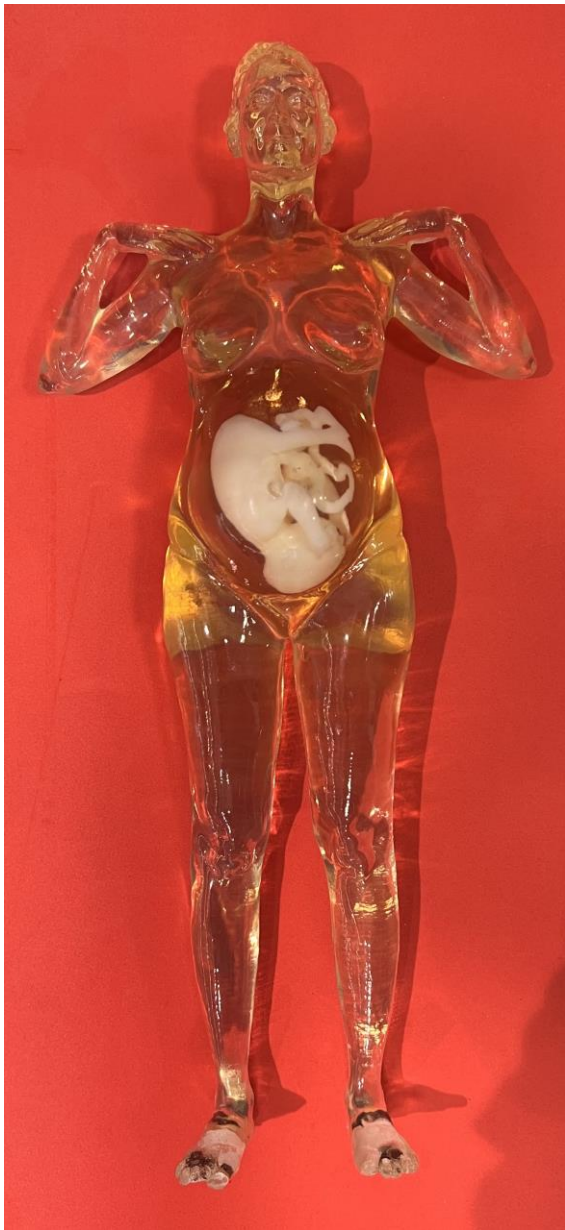


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DIAGNÓSTICOS

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LAB



DCSD
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Blind, expectant parents cry with joy 'seeing' baby in utero



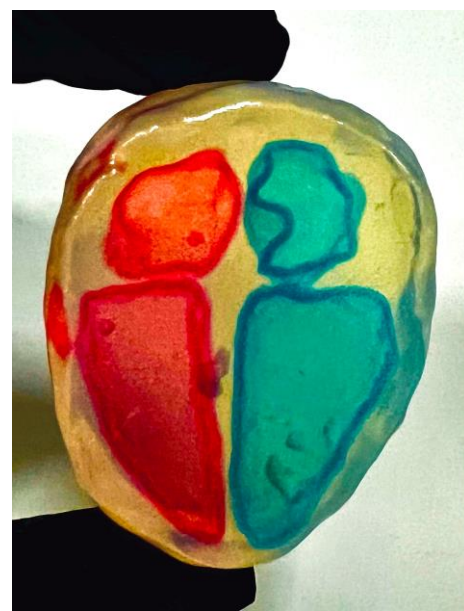
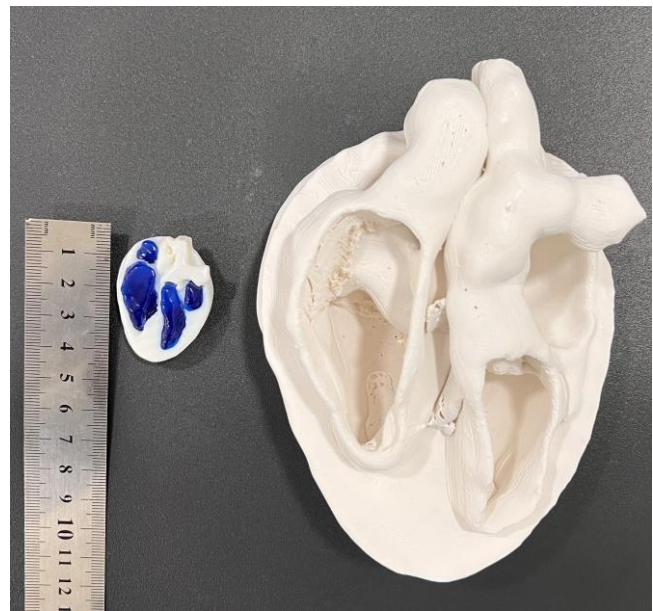
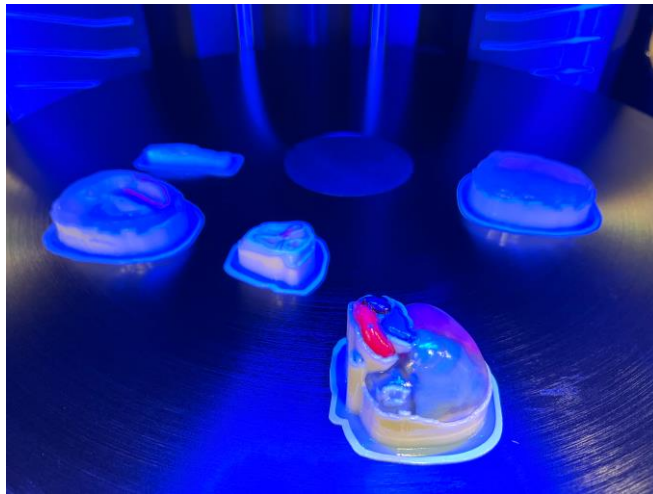
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SHARE 2.4K TWEET 48 EMAIL

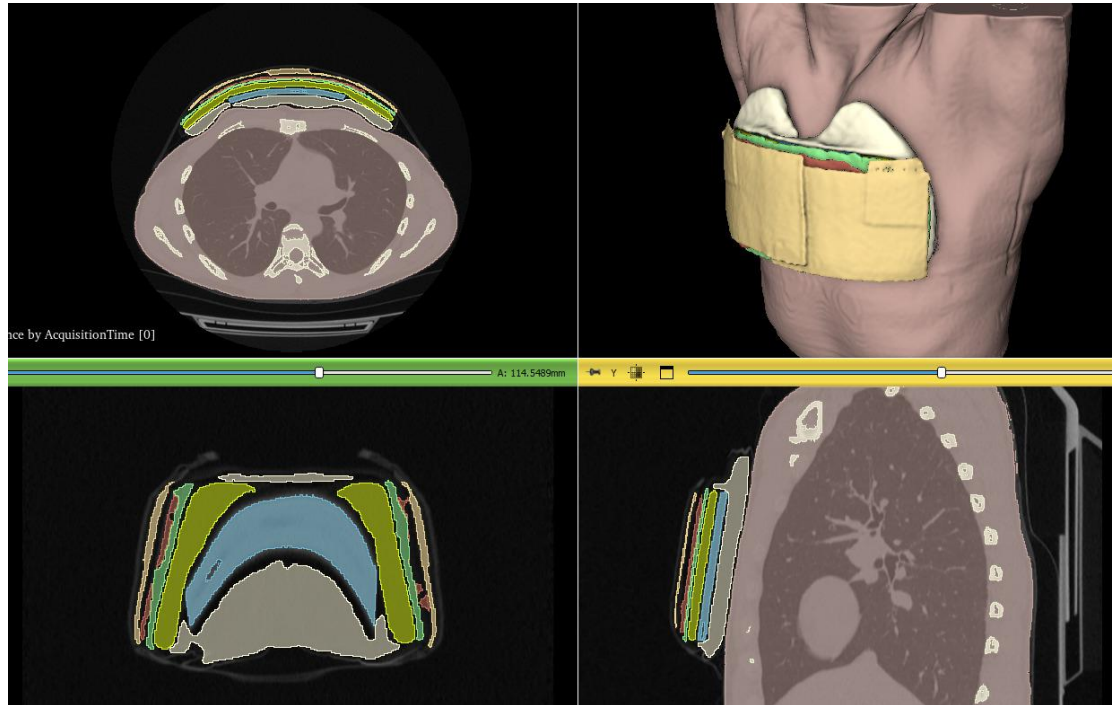
Because of advances in 3-D printing technology, visually impaired expectant parents are for the first time able to "see" their babies in utero via printable plastic models of their sonogram photos.

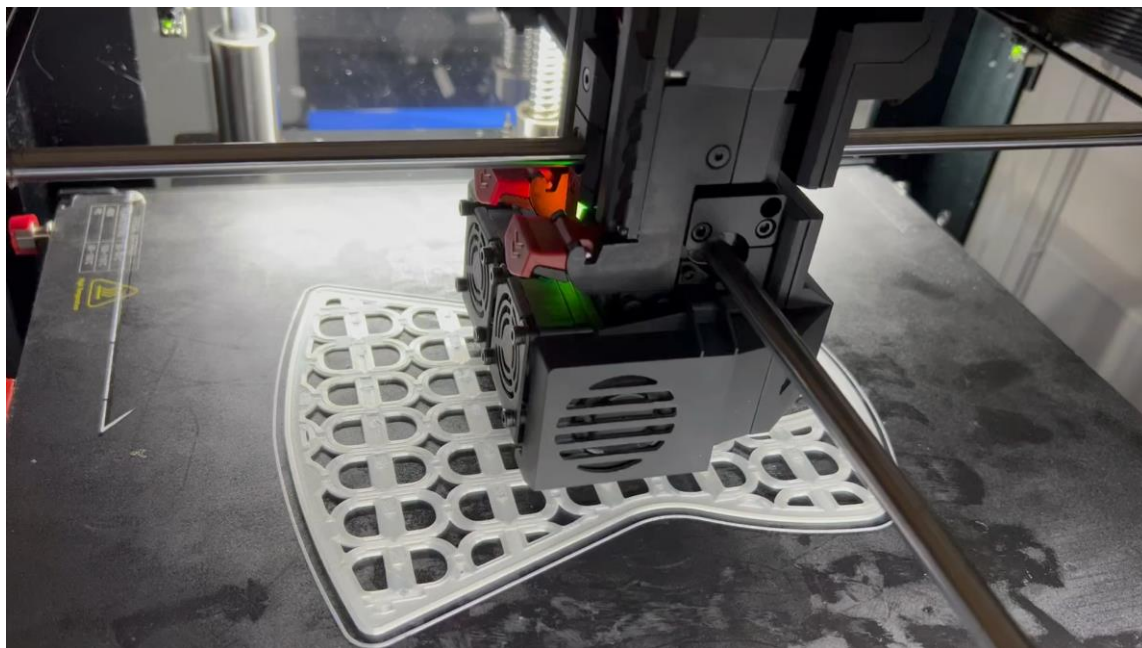
Blind parents-to-be now have a way to experience the joys of a sonogram (the image produced from an ultrasound scan), thanks to 3-D printing technology that can produce life-sized models of their babies in utero.

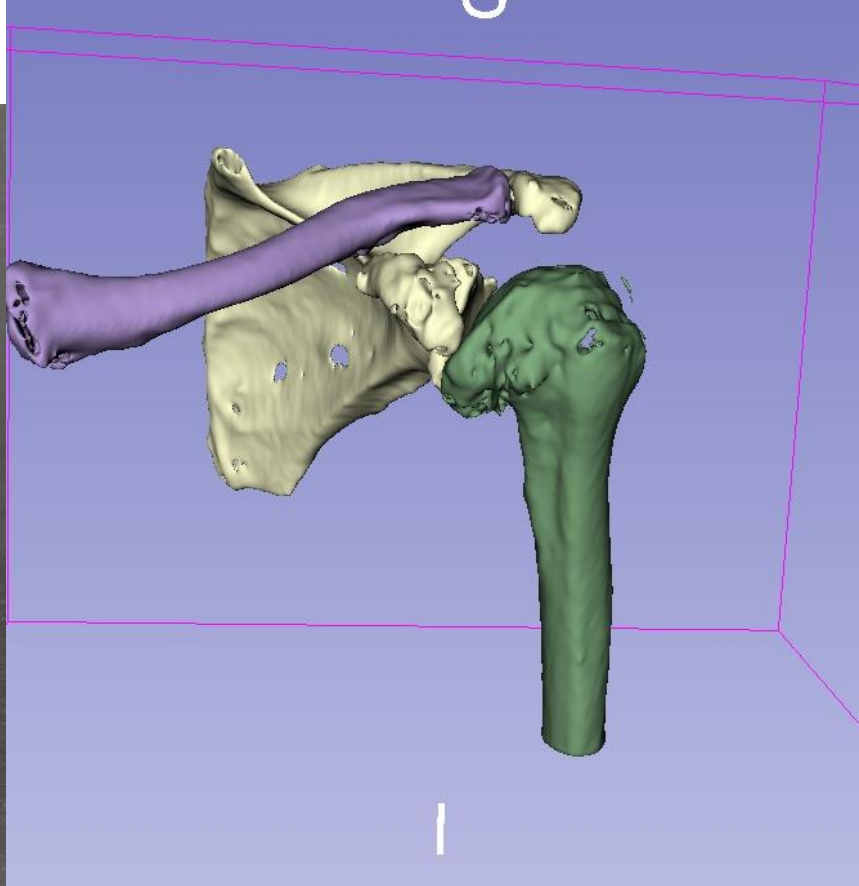
While researching ways to improve prenatal diagnostic tools, Brazilian industrial designer Jorge Roberto Lopes dos Santos realized that emerging 3-D printers could give expectant moms and dads with visual impairments a way to cherish the kinds of prenatal keepsakes that other parents-to-be have long enjoyed from traditional sonogram photos.







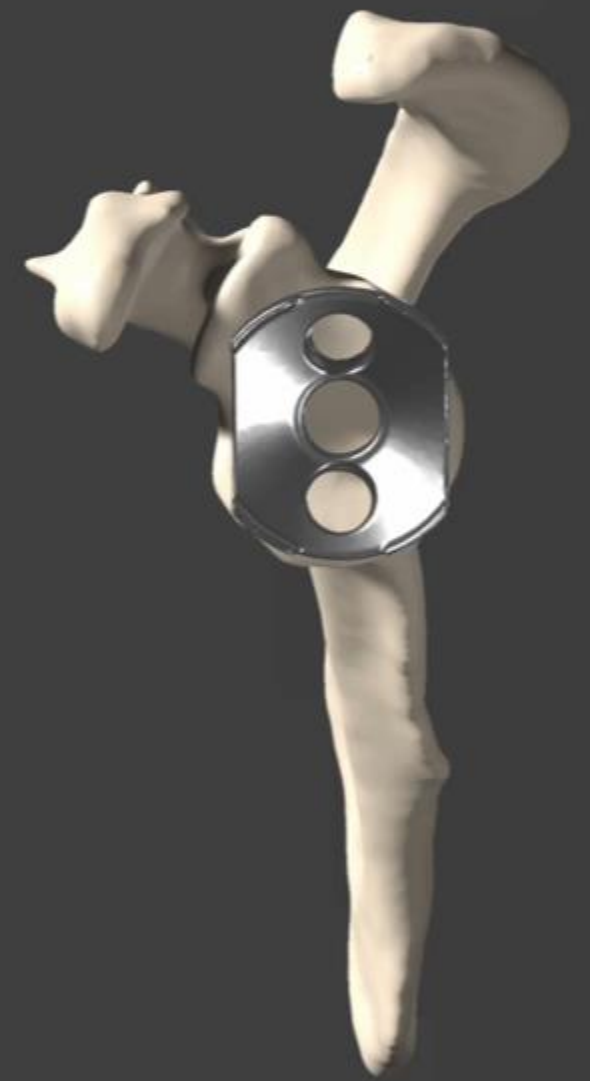




Artroplastia do Ombro

Visão das estruturas

Visão dos exames



Inclinação

0°

Versão

0°

Rotação

0°

Profundidade

0

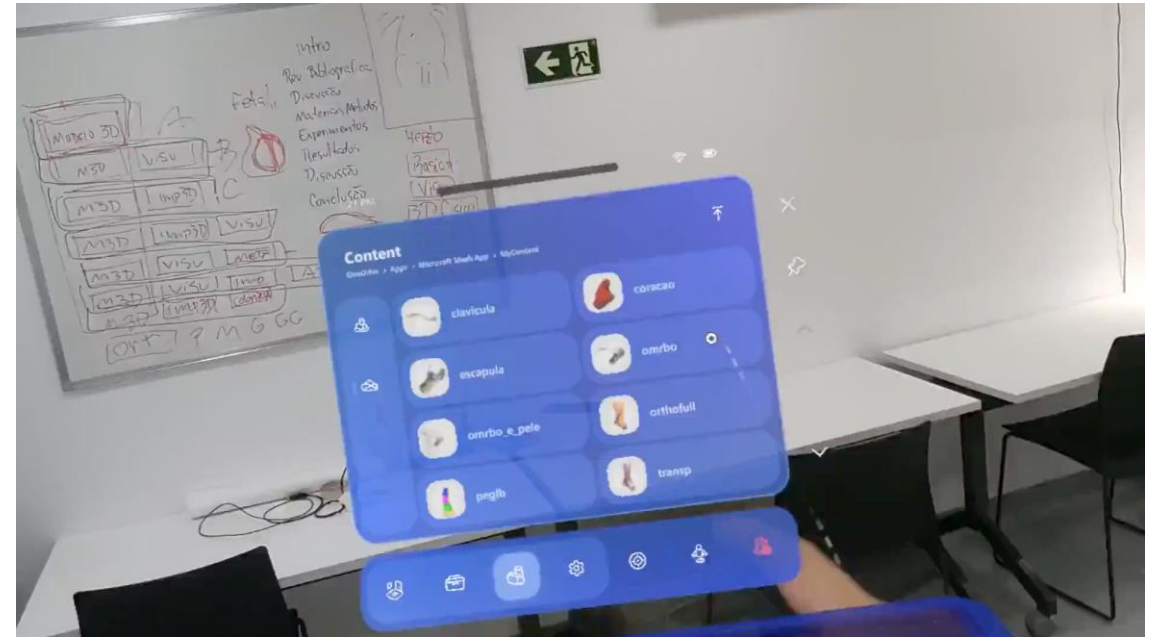
Horizontal

0

Vertical

0

A control panel with seven rows of navigation controls. Each row has a label, a central '0' value, and two arrow icons. The labels are: Inclinação, Versão, Rotação, Profundidade, Horizontal, and Vertical. The 'Profundidade' row includes a mouse cursor icon pointing to the '0' value.

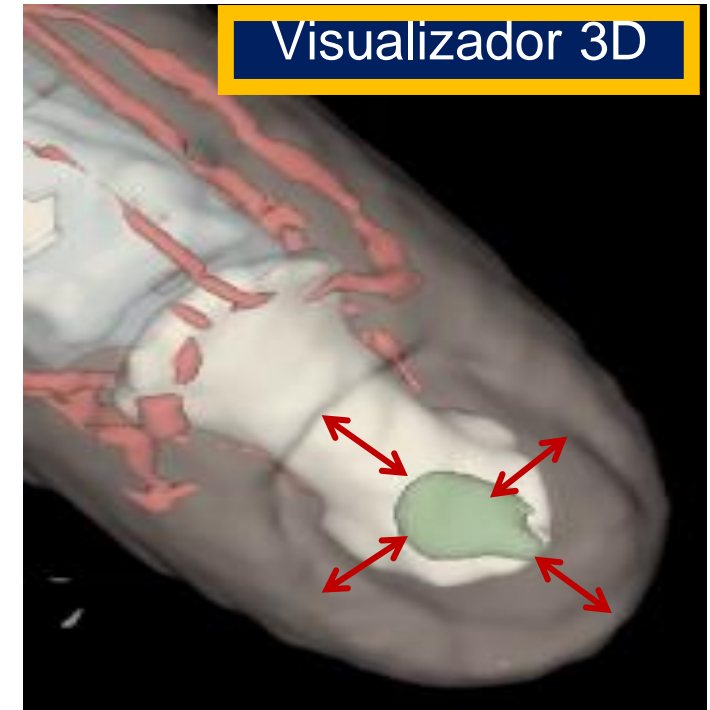




Realidade Aumentada



Impressão 3D



Visualizador 3D

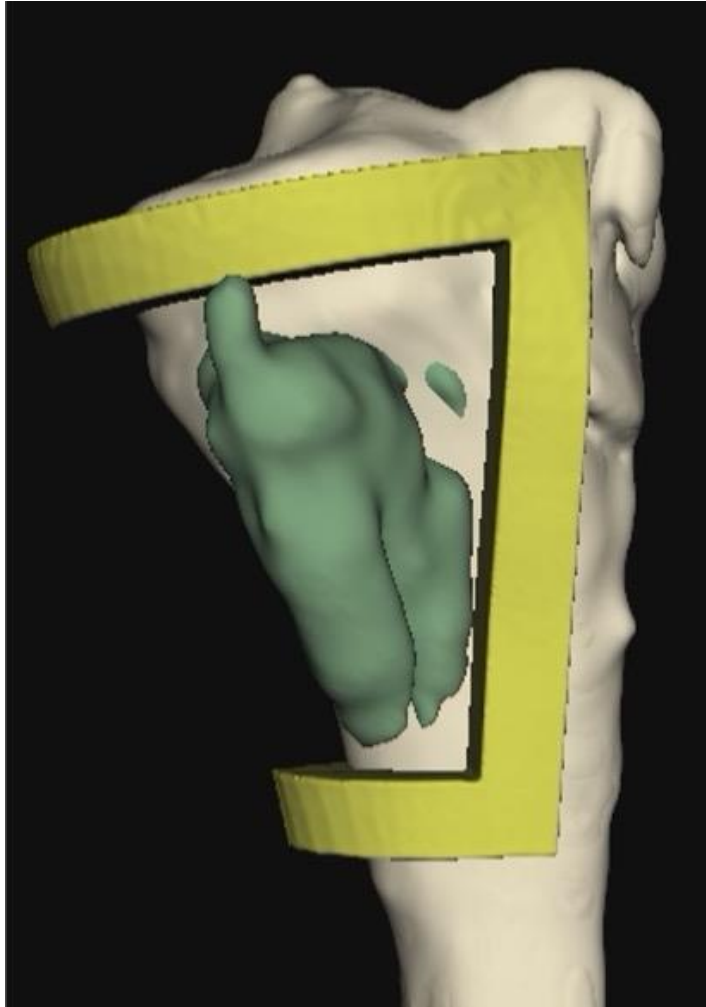


Metaverso

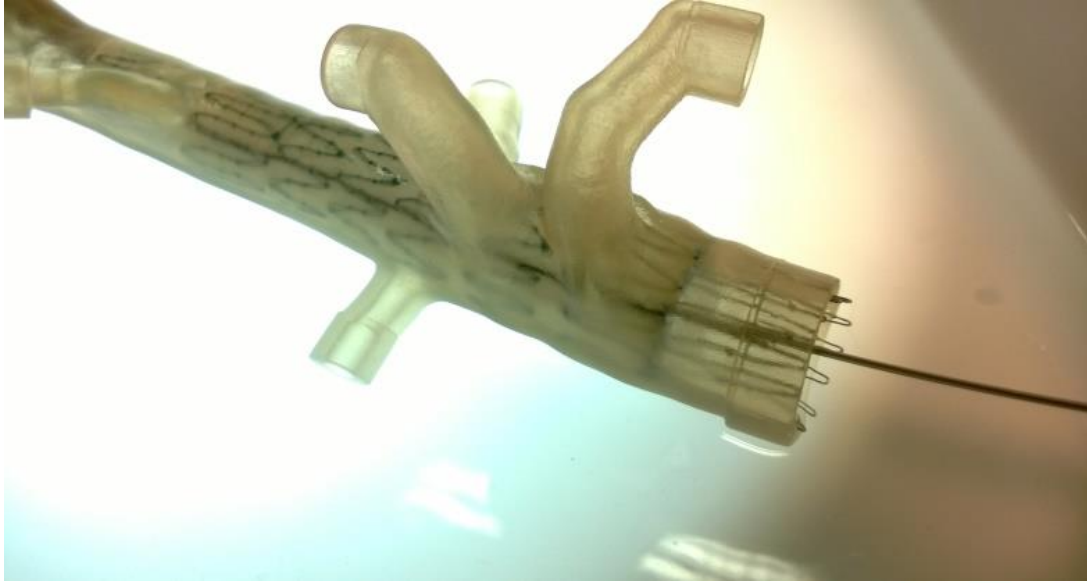
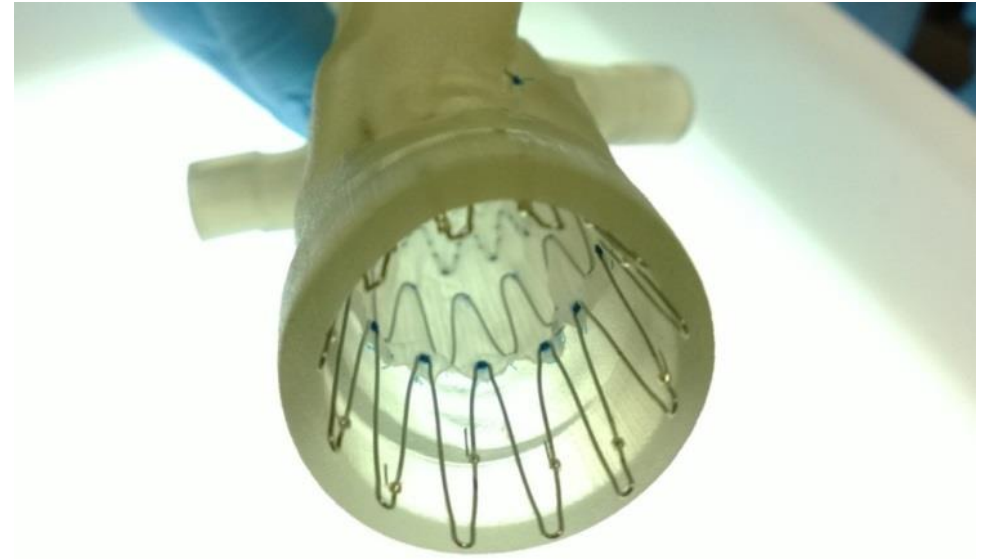


Cortesia: Drs Miguel Ceccarelli, Robertha Nakamura, Andréia leverone, Clarissa Canela









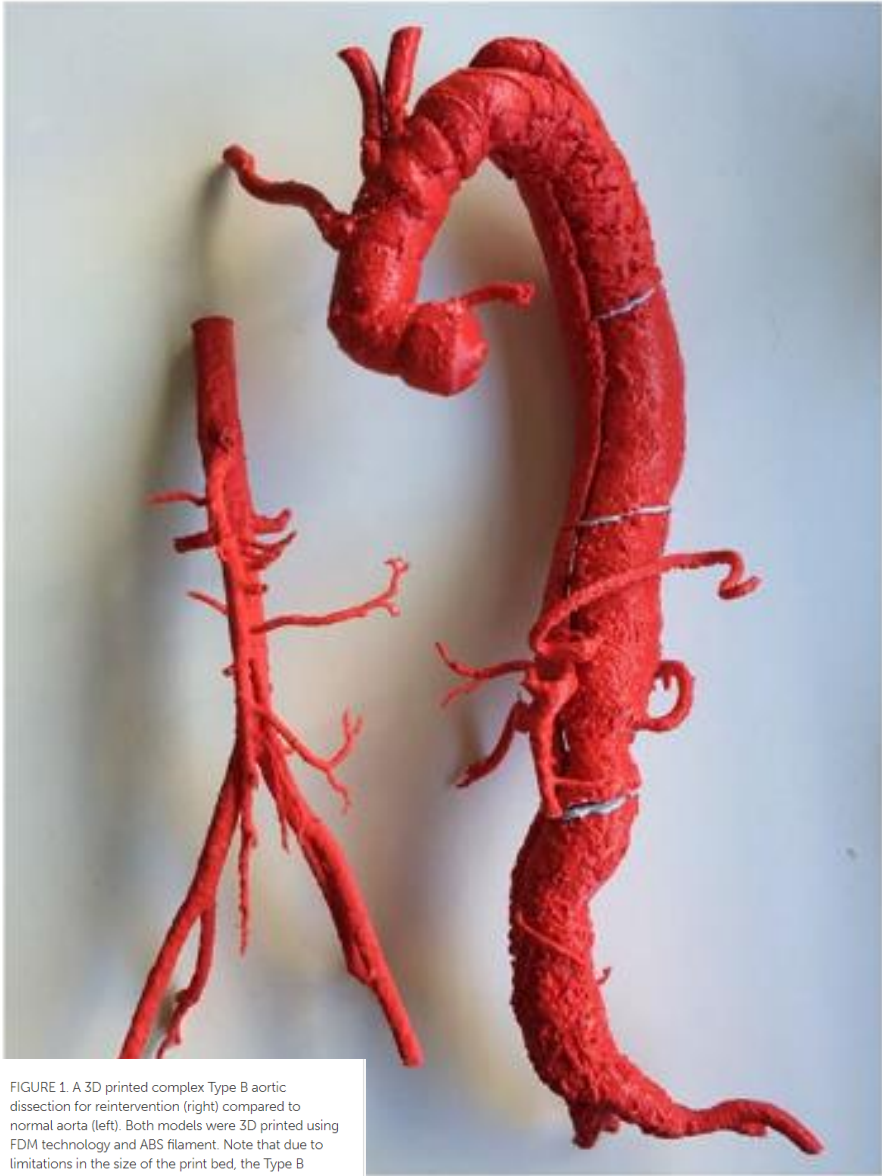


FIGURE 1. A 3D printed complex Type B aortic dissection for reintervention (right) compared to normal aorta (left). Both models were 3D printed using FDM technology and ABS filament. Note that due to limitations in the size of the print bed, the Type B aortic dissection was printed in four pieces.

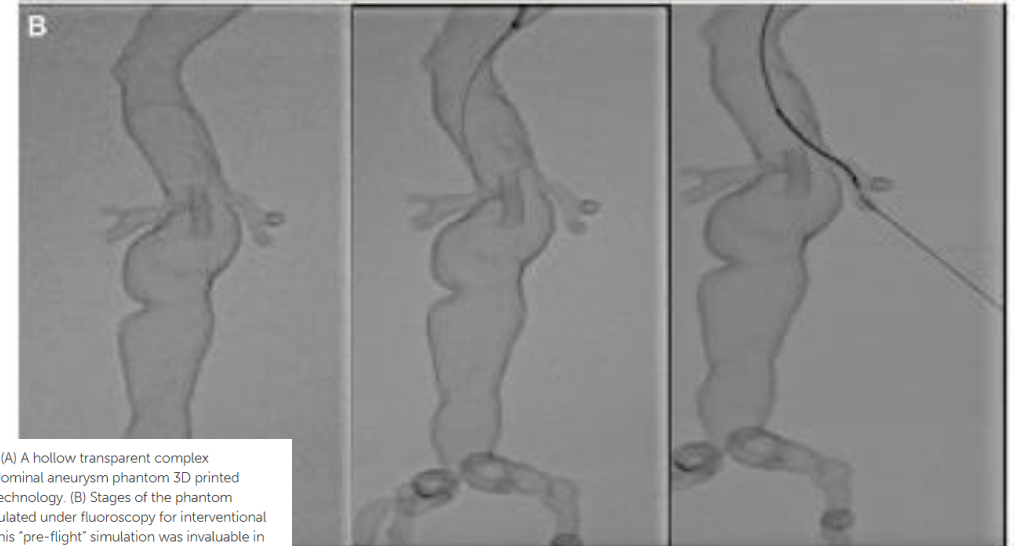
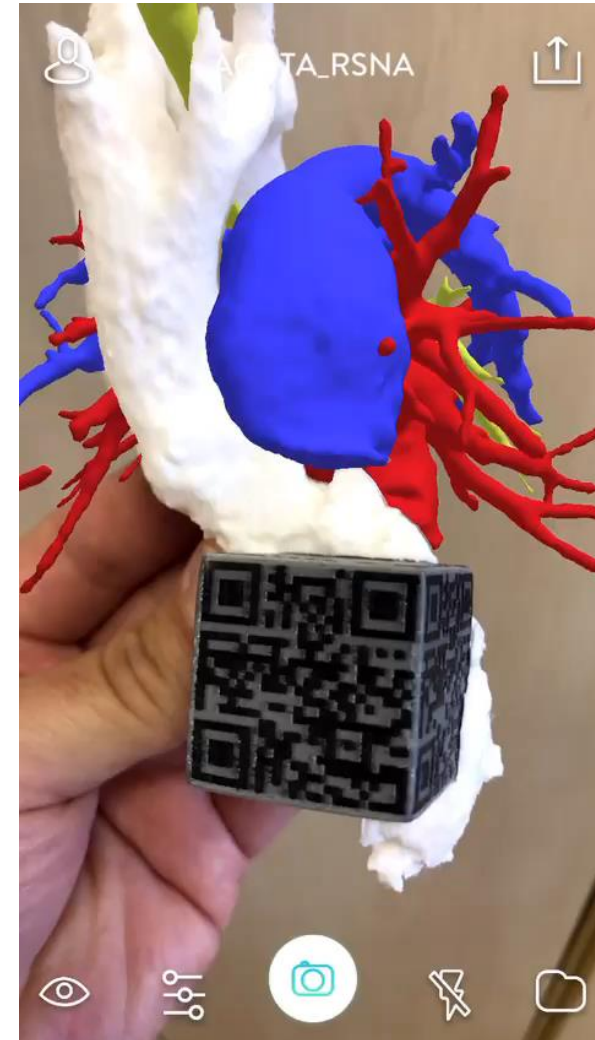
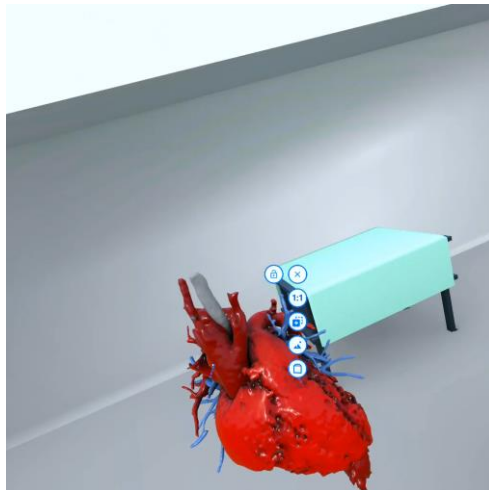
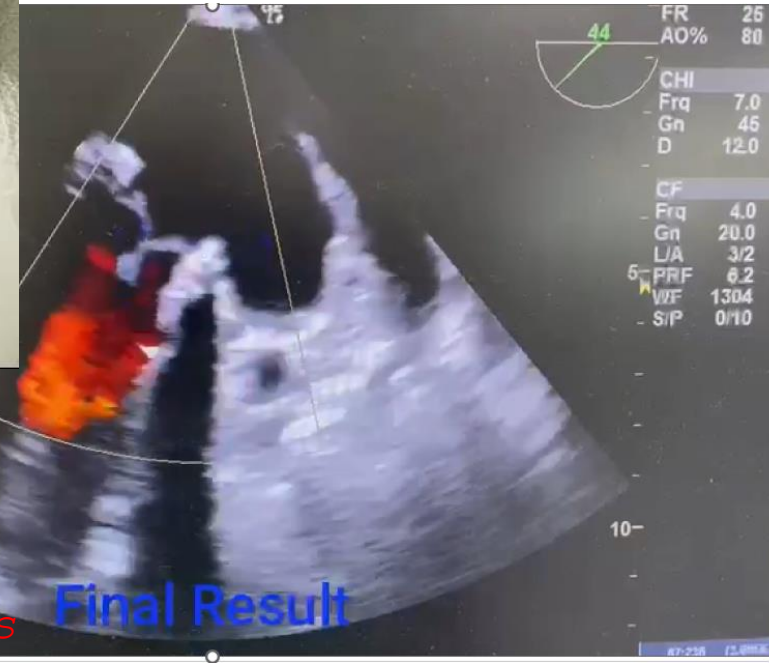
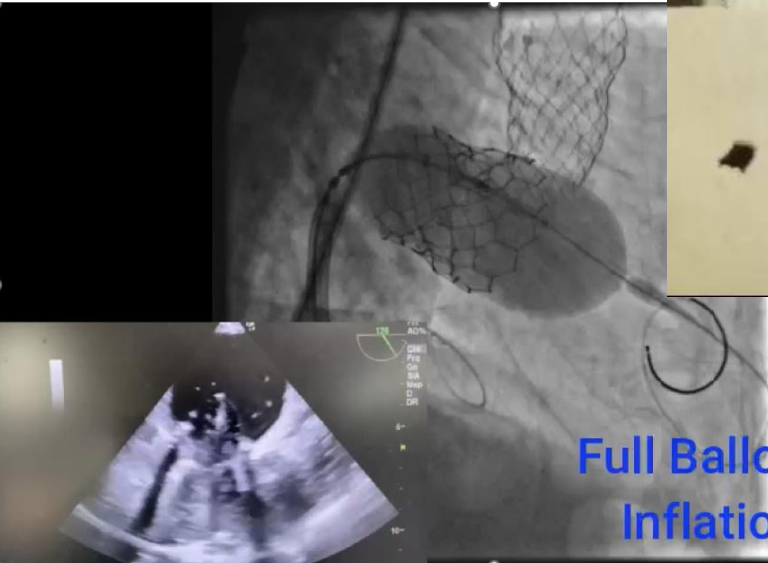
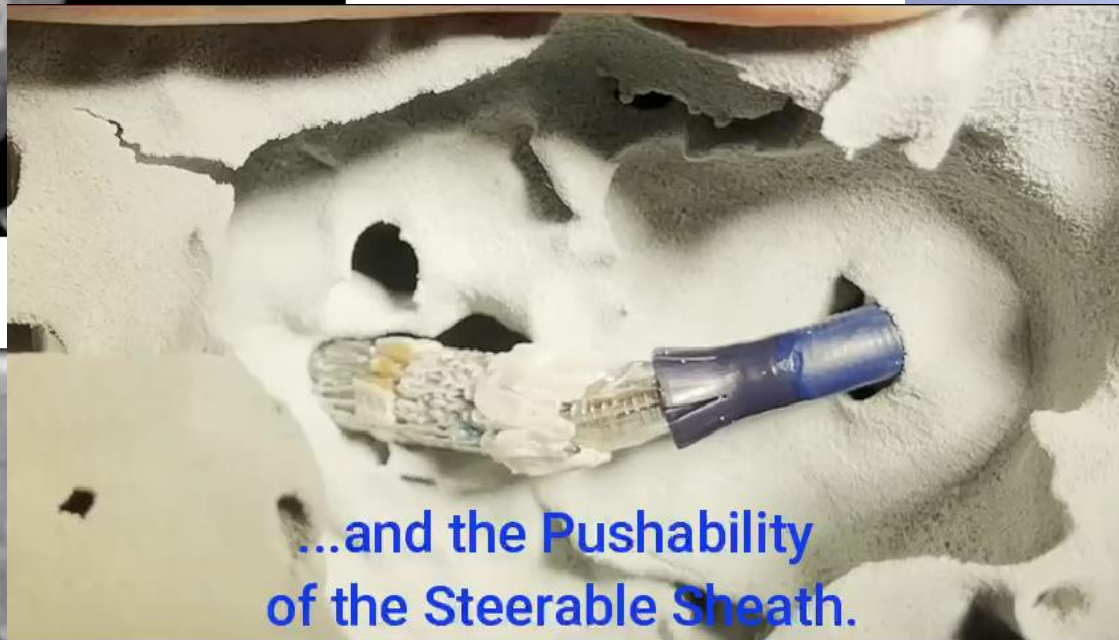
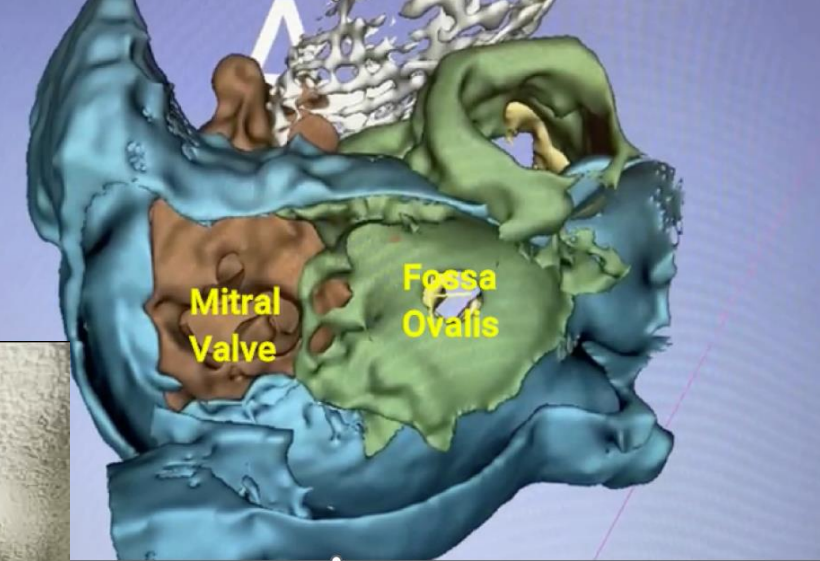
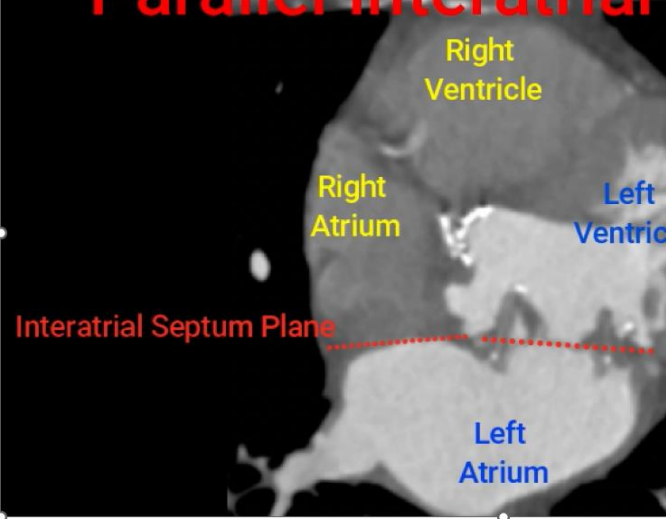


FIGURE 12. (A) A hollow transparent complex thoracoabdominal aneurysm phantom 3D printed using SLA technology. (B) Stages of the phantom being cannulated under fluoroscopy for interventional planning. This "pre-flight" simulation was invaluable in predicting navigational difficulties, with the trajectory of guidewires and devices matching what was encountered during live surgery.

Endoprótese de Arco Aórtico

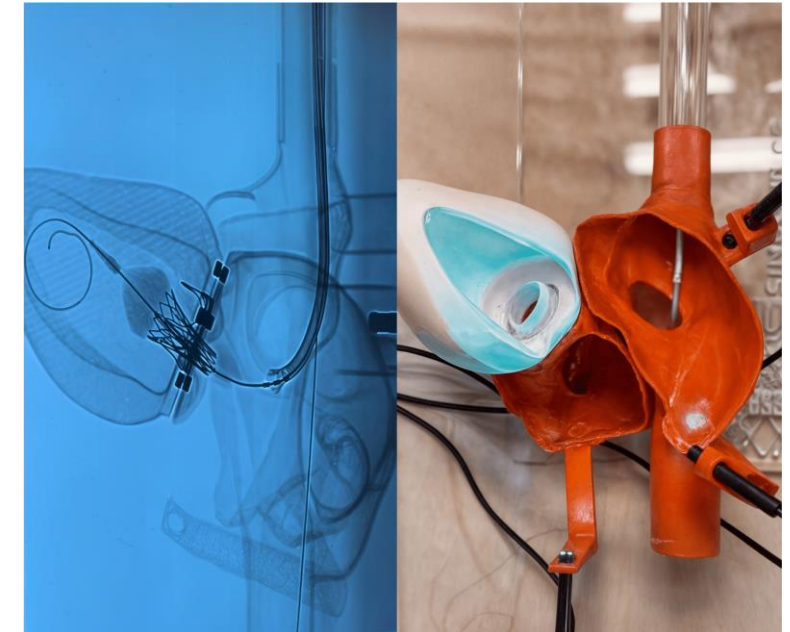


"Parallel Interatrial Septum"



Cortesia do Dr. Estevão Martins

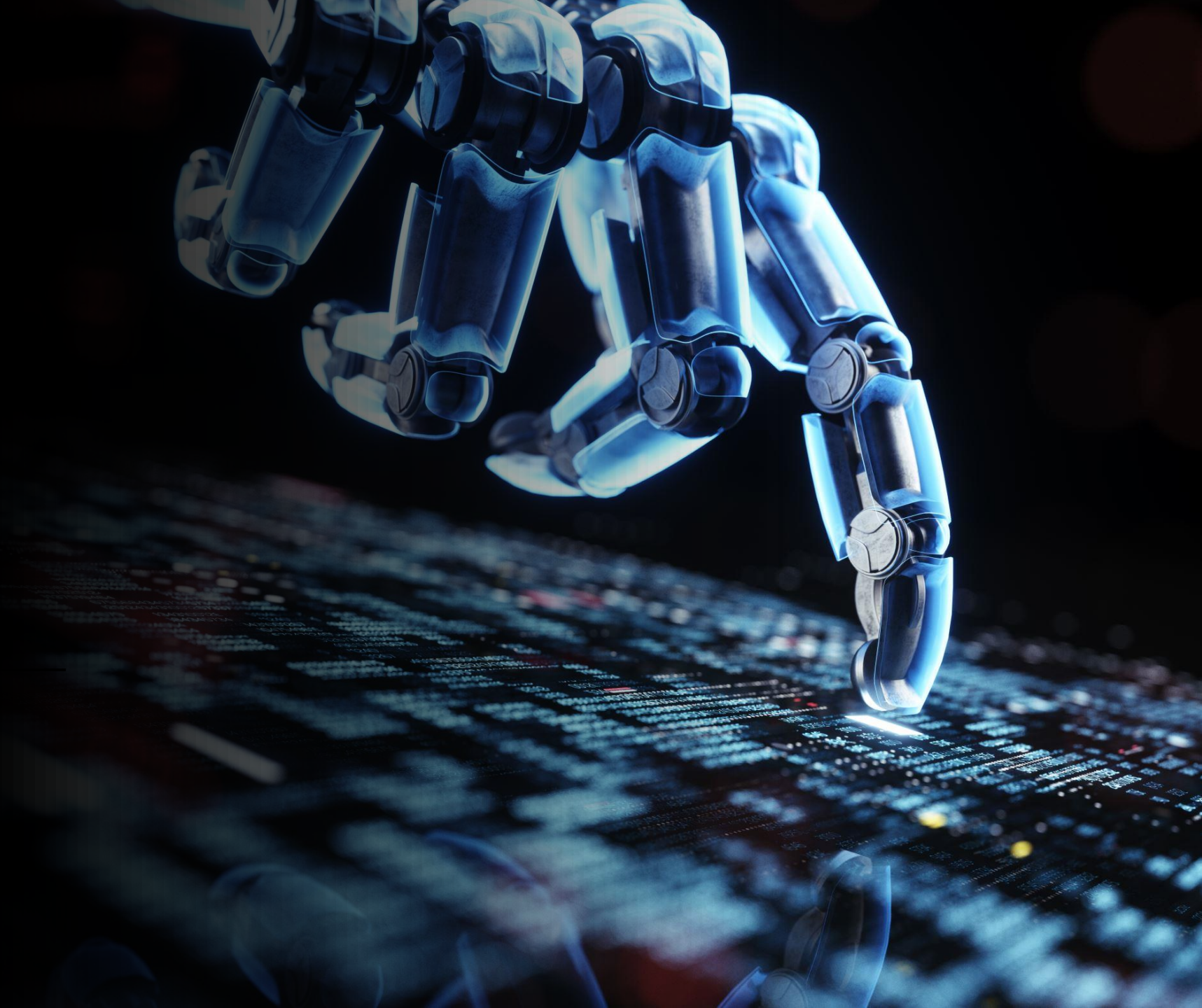


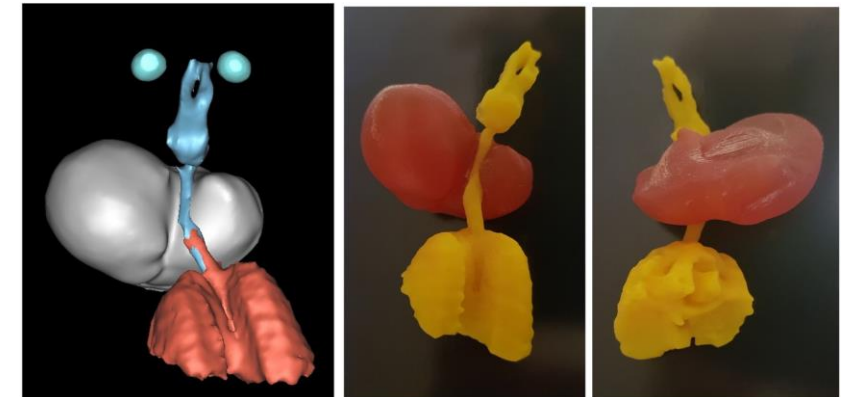
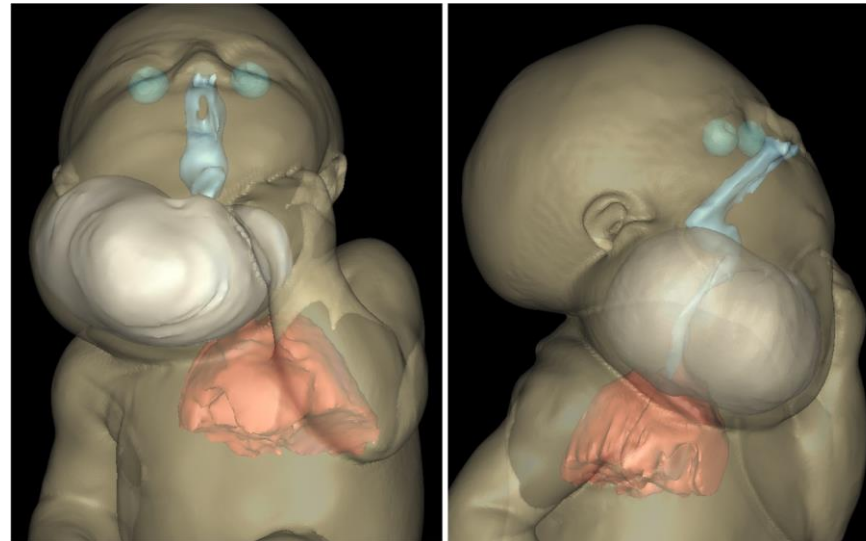
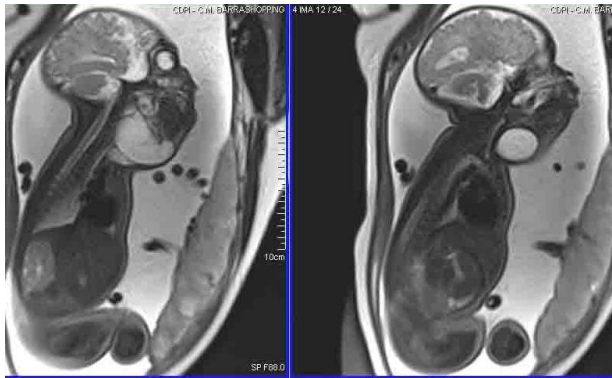
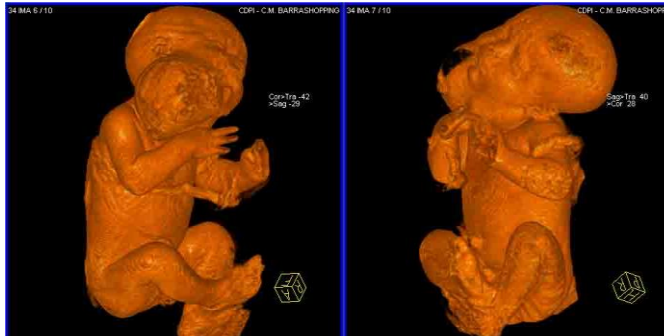


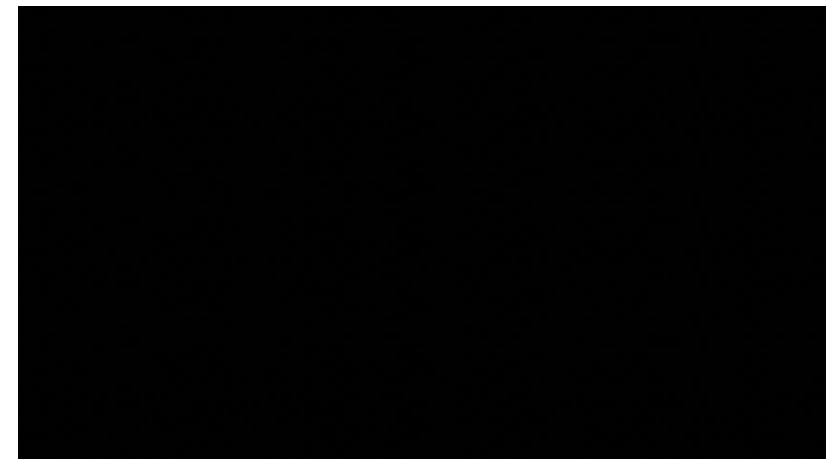
Estêvão C. de Campos Martins, Vinícius Pontes Arcoverde, João Victor Azevedo, Jorge Lopes



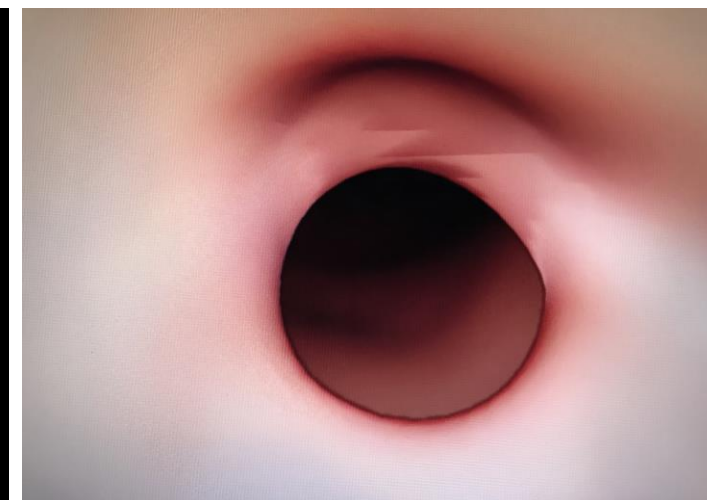
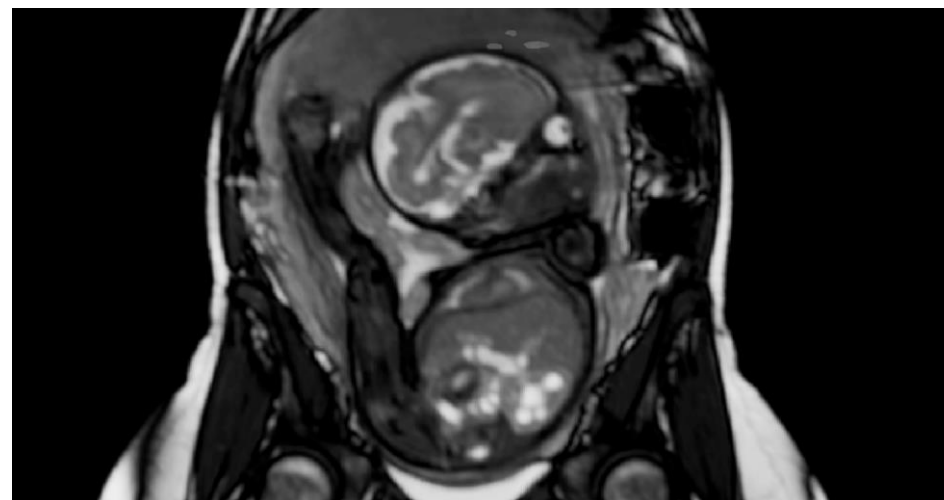
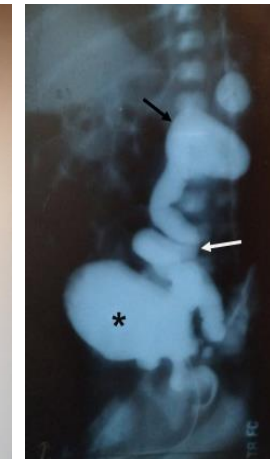
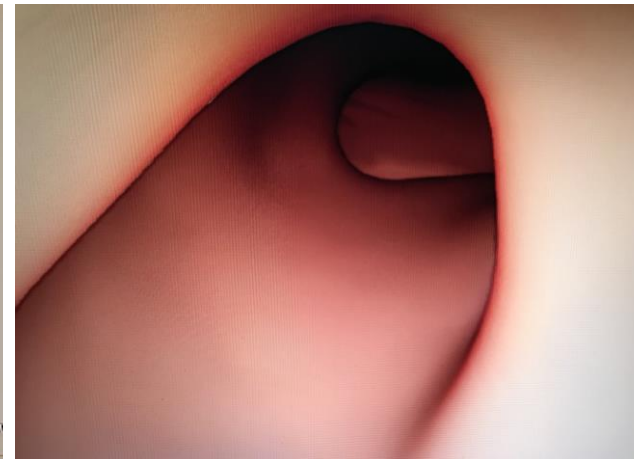
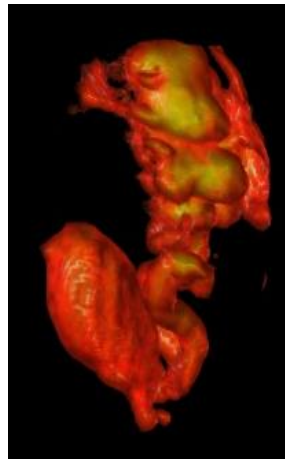
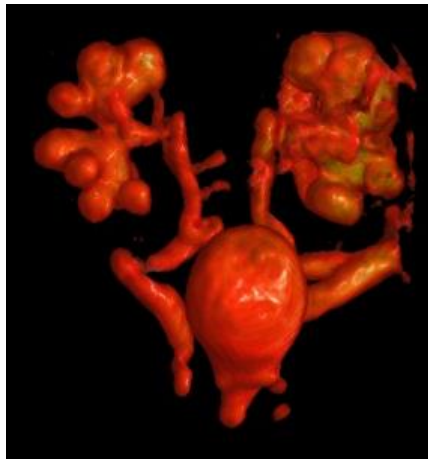
Realidade Virtual

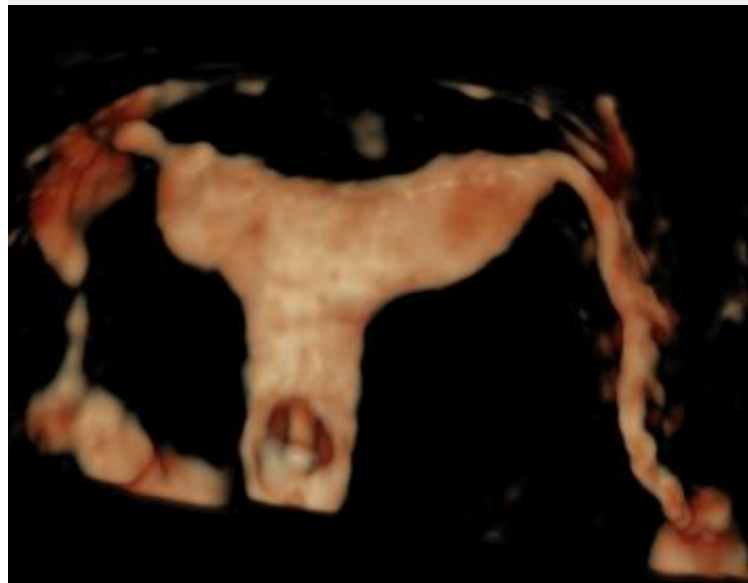
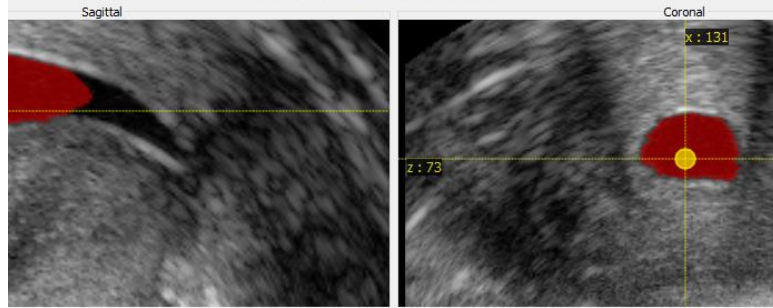
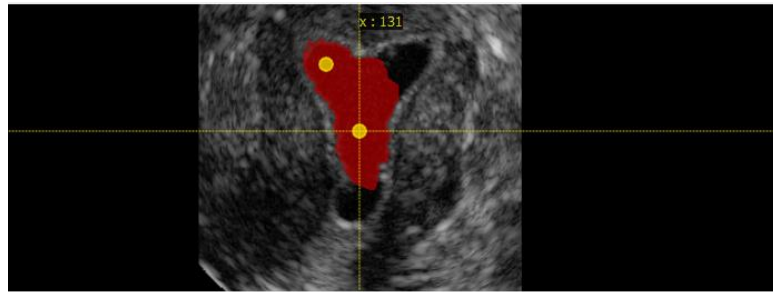






VÁLVULA DE URETRA POSTERIOR





Virtual hysteroscopy: a new non invasive approach for the assessment of uterine cavity

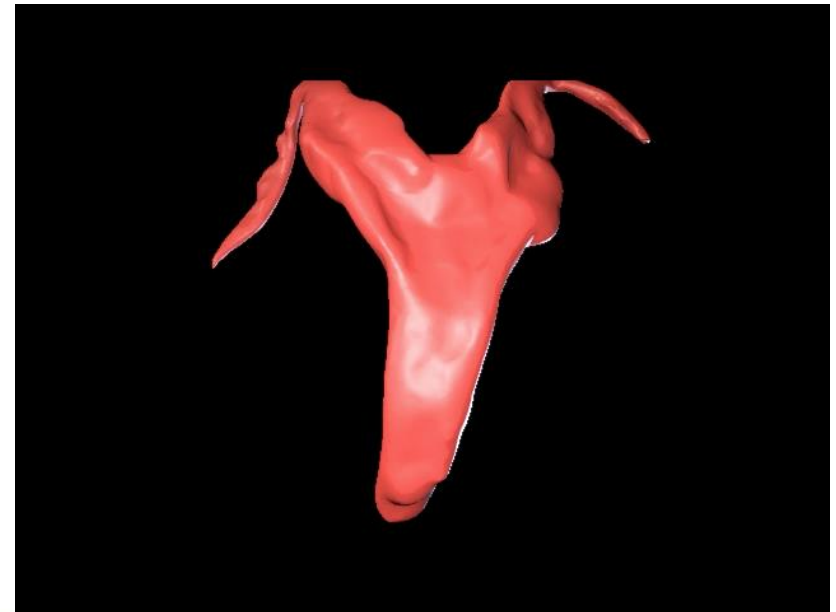
Paulo Sérgio Cossi¹, Heron Werner², Wellington P. Martins³, Alberto Borges Peixoto^{1,4}, Edward Araujo Júnior¹

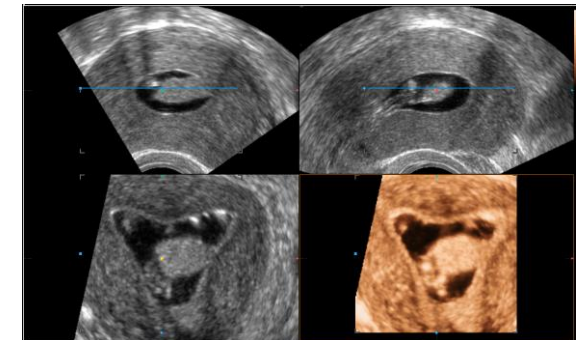
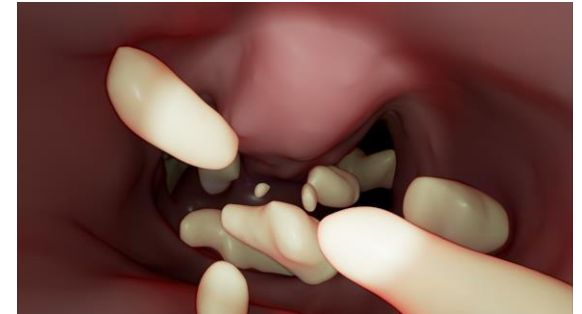
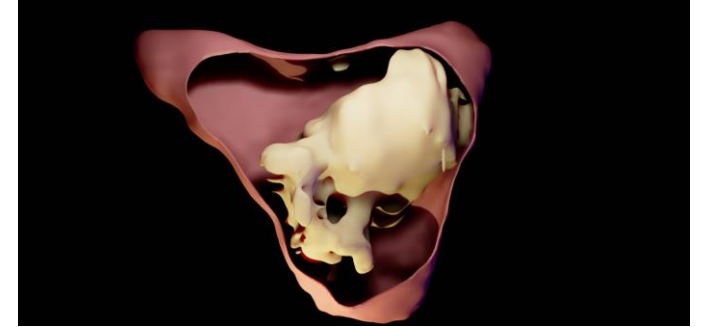
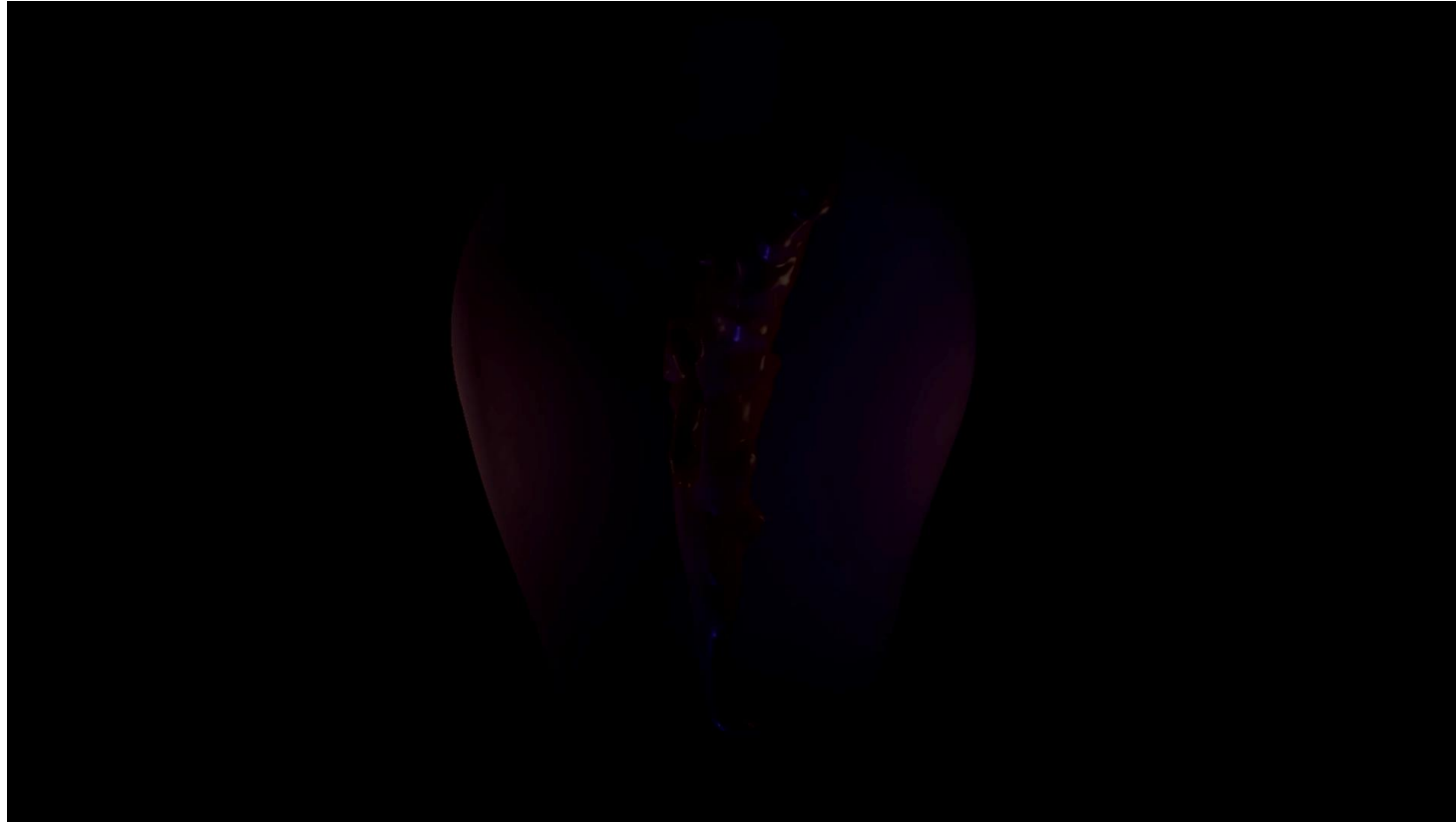
¹Department of Obstetrics, Paulista School of Medicine, Federal University of São Paulo, São Paulo-SP, ²Clínica de Diagnóstico por Imagem, Rio de Janeiro-RJ, ³Department of Obstetrics and Gynecology, Ribeirão Preto Medical School, University of São Paulo (FMRP-USP), Ribeirão Preto-SP, ⁴Mario Palmério University Hospital – University of Uberaba, Uberaba-MG, Brazil.

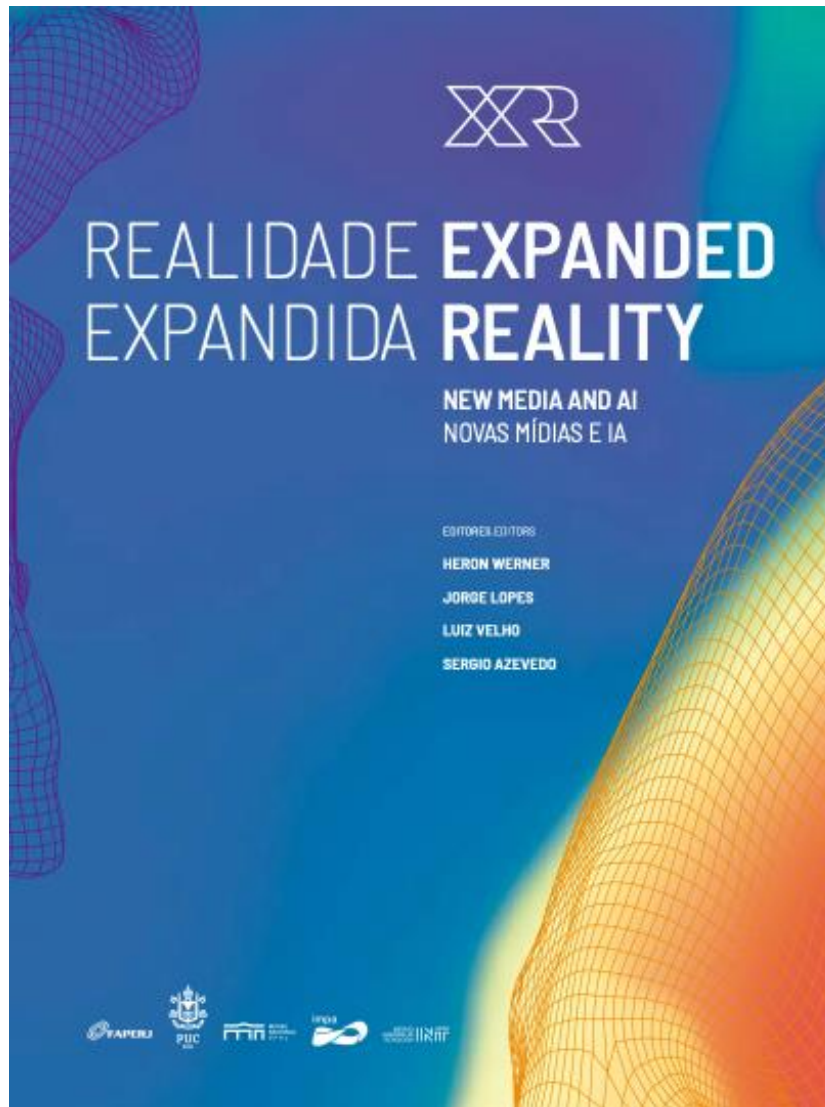
Abstract

Endometrial pathology is frequent in premenopausal women and the diagnostic hysteroscopy is considered the gold standard for assessing endometrial cavity and congenital uterine anomalies. However it is an invasive and uncomfortable procedure. Saline contrast hysterosalpingography and hysterosalpingo-contrast sonography allow detailed assessment of the uterine cavity. We propose a virtual hysteroscopy from three-dimensional saline and three-dimensional hysterosalpingo-contrast sonography scan data to generate a virtual reality as a new noninvasive procedure for assessing the uterine cavity in uterine congenital anomaly and endometrial pathology cases as well

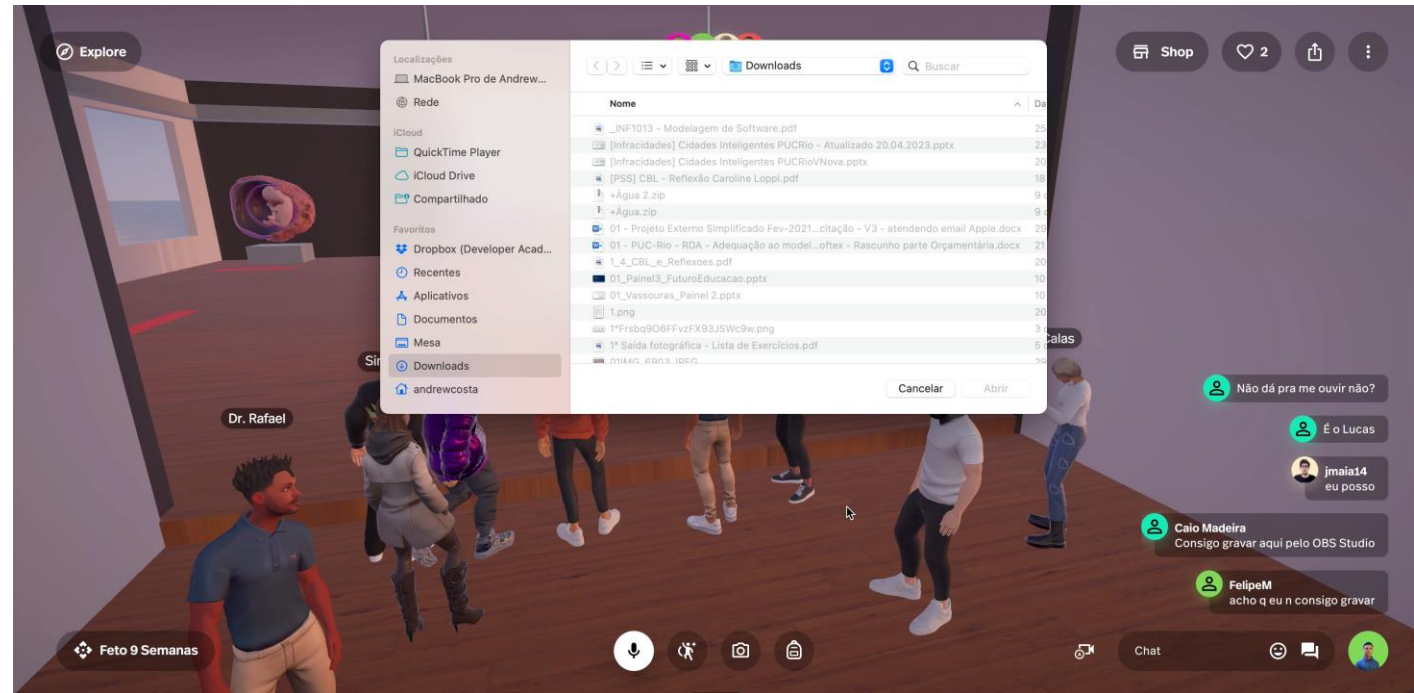
Keywords: virtual hysteroscopy; three-dimensional hysterosalpingo-contrast sonography; three-dimensional saline hysterosalpingography; septate uterus; endometrial polypus.

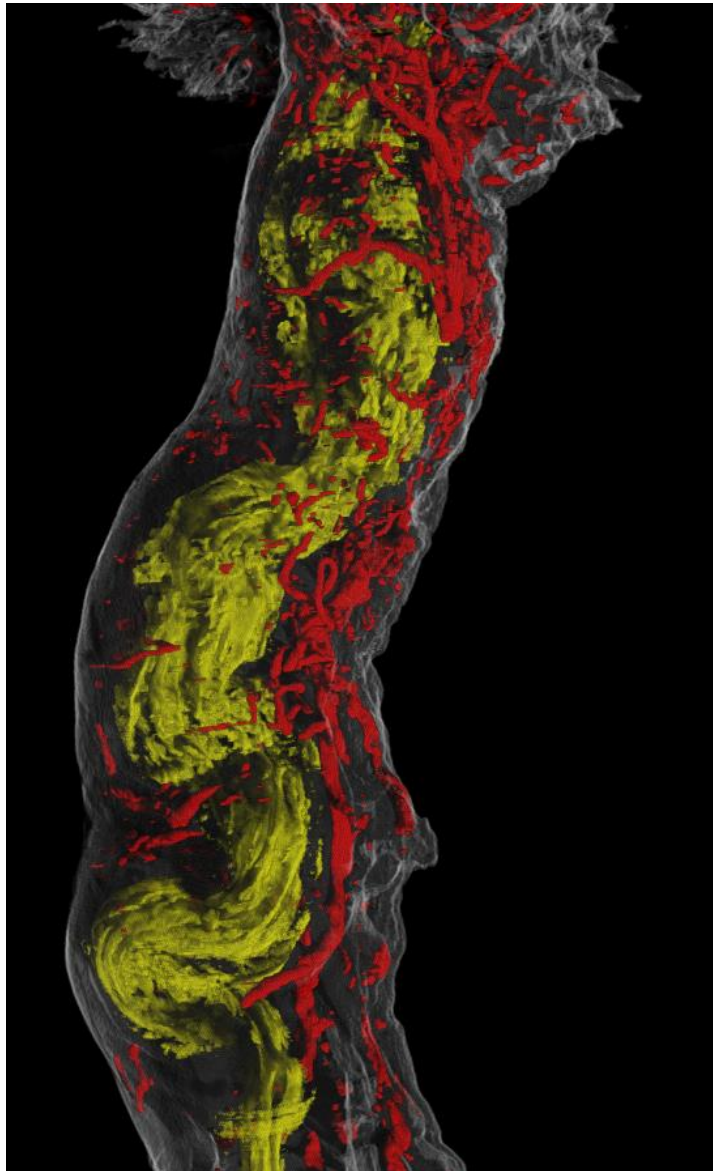


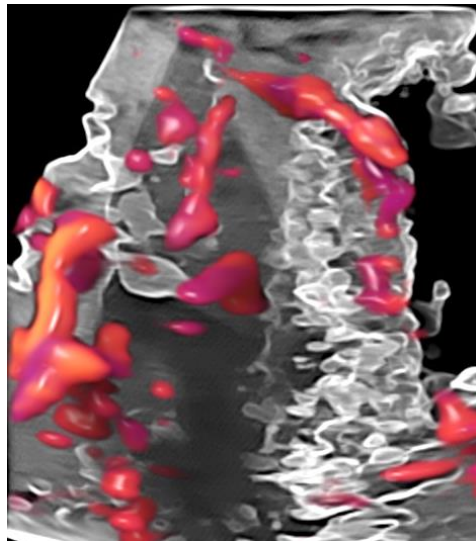
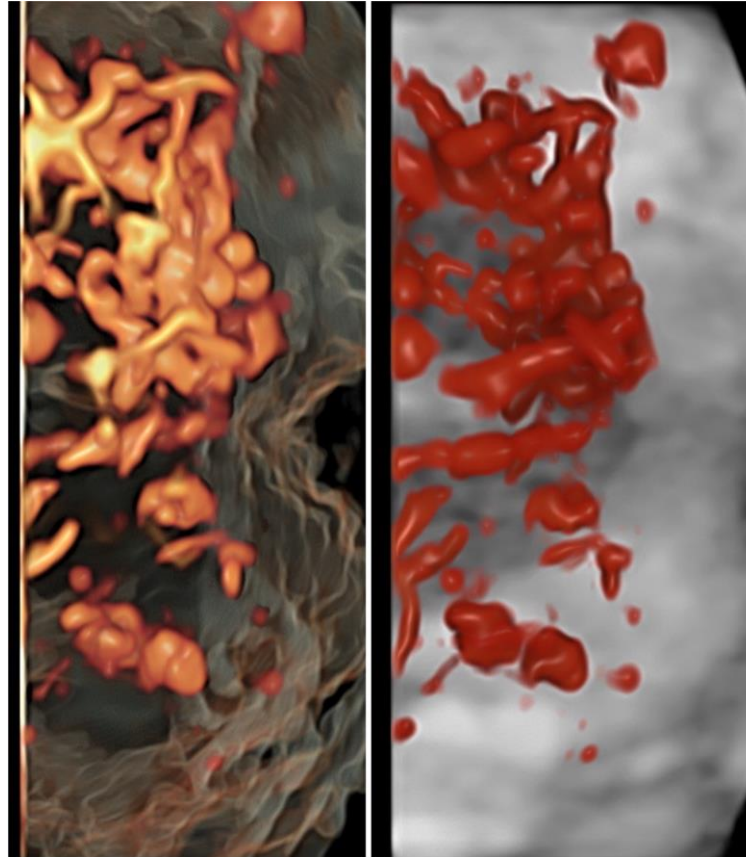
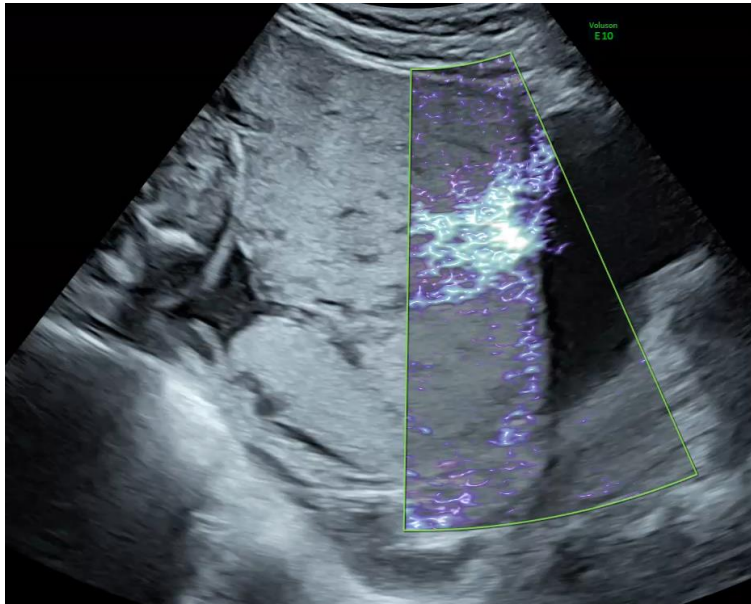




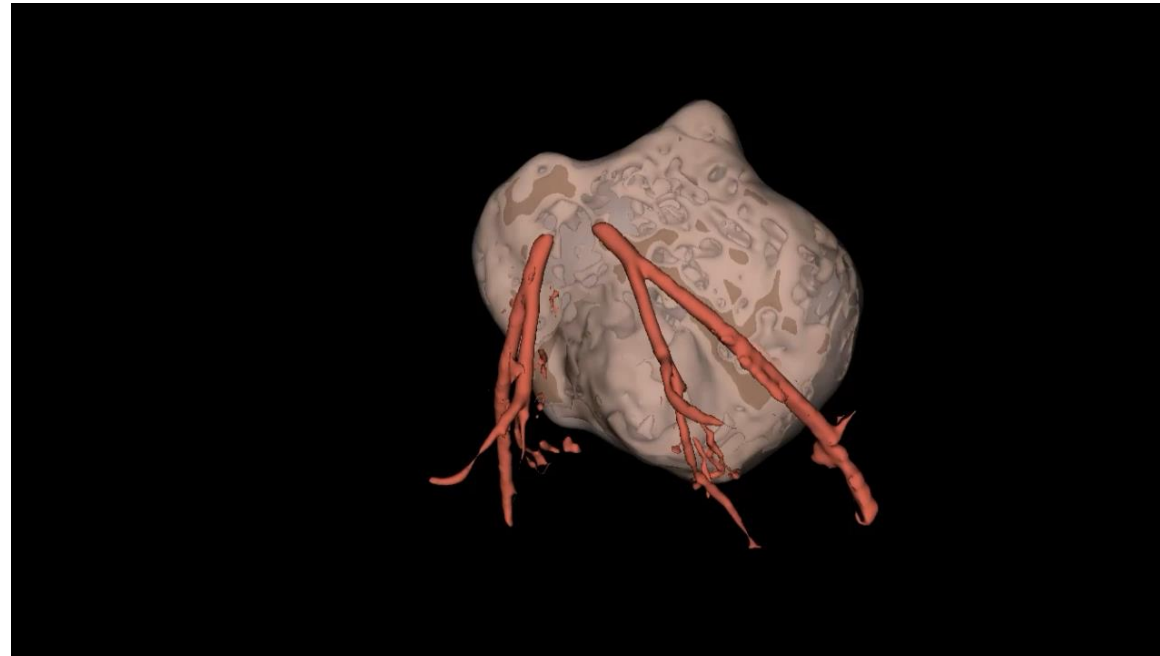
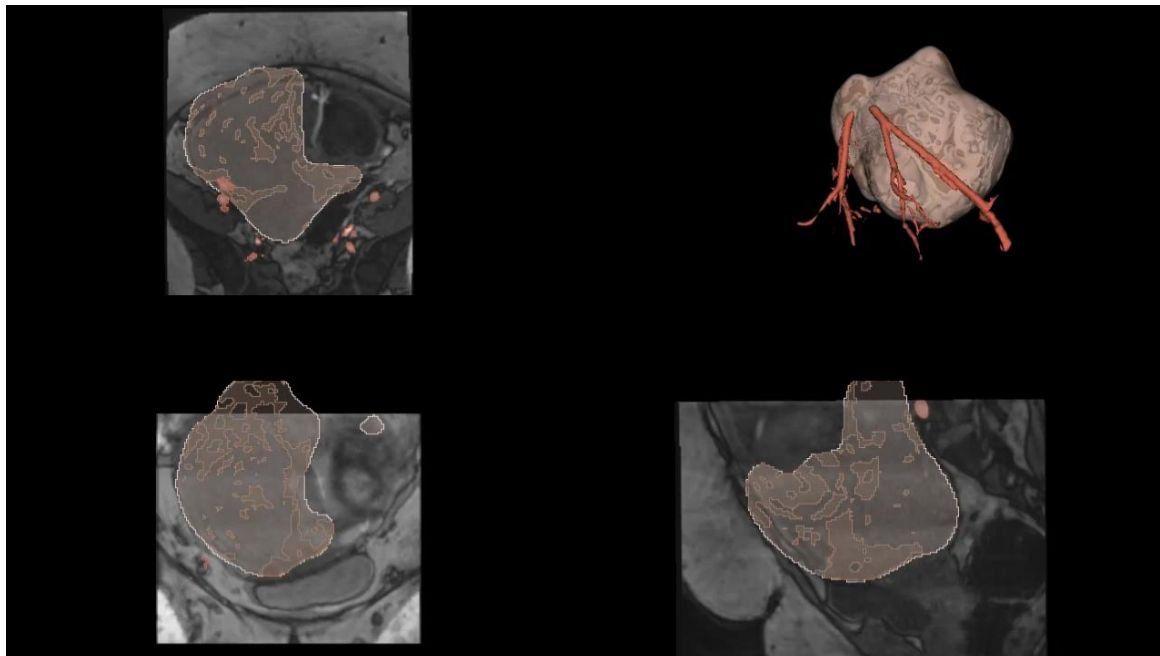
- **Realidade Estendida**
- **Inteligência Artificial**

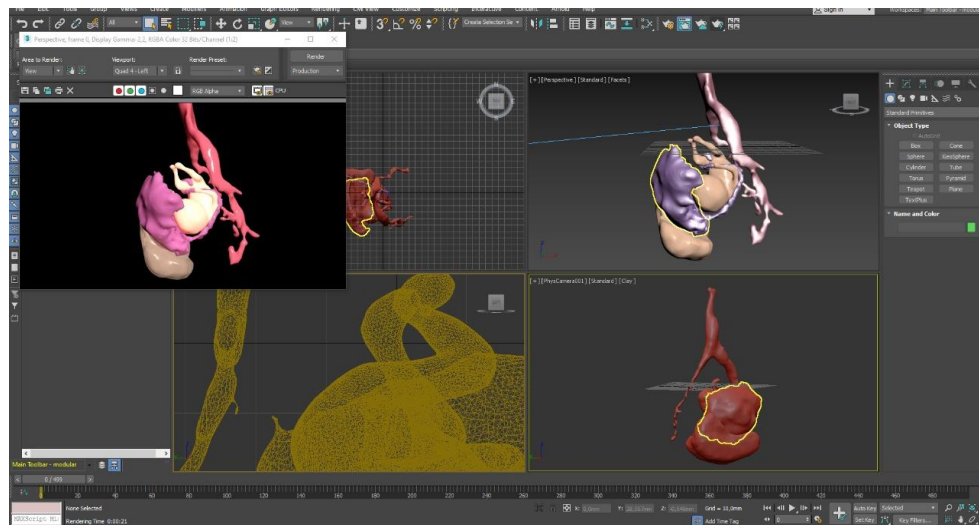
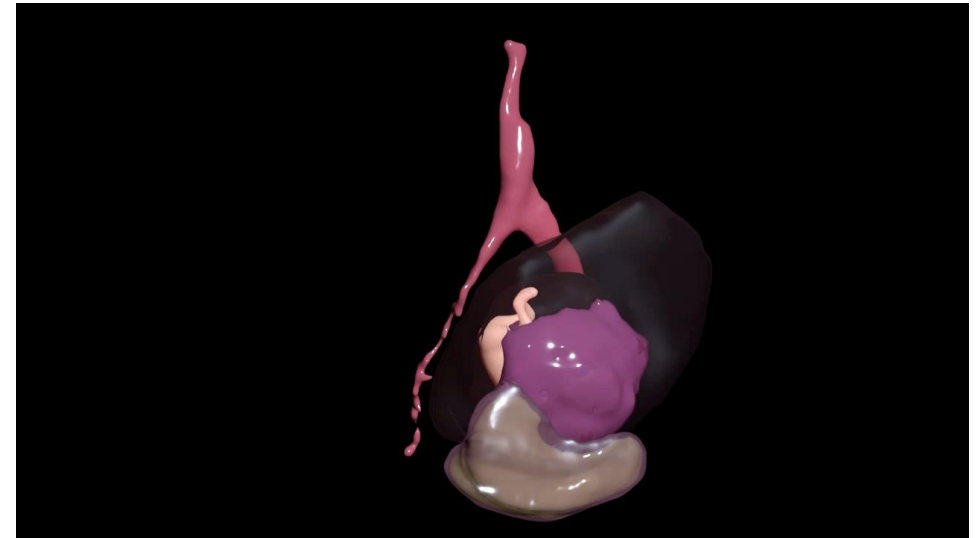
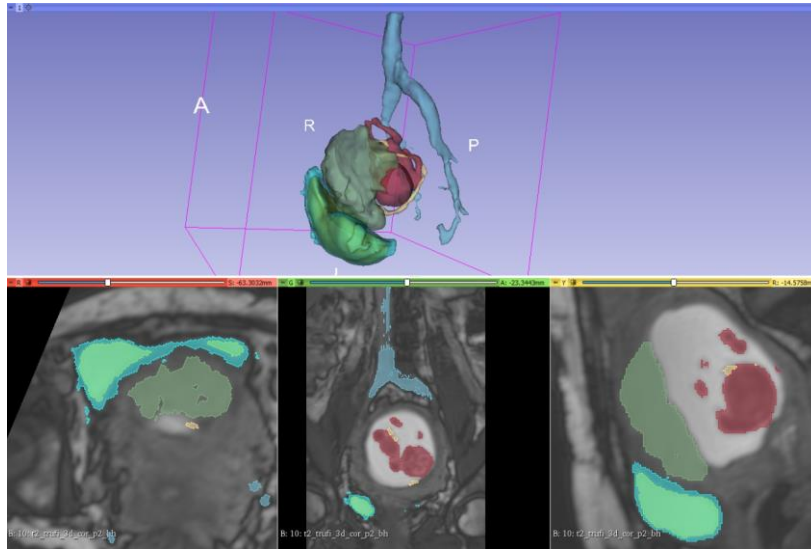


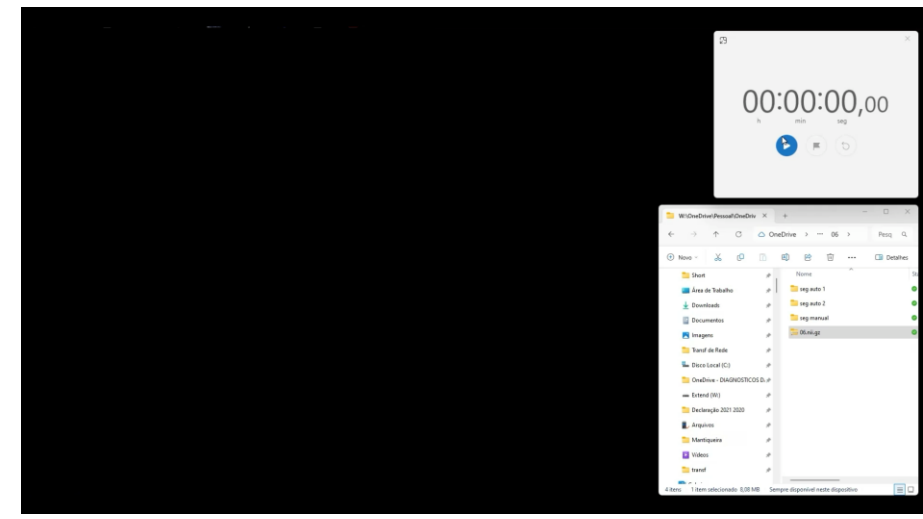
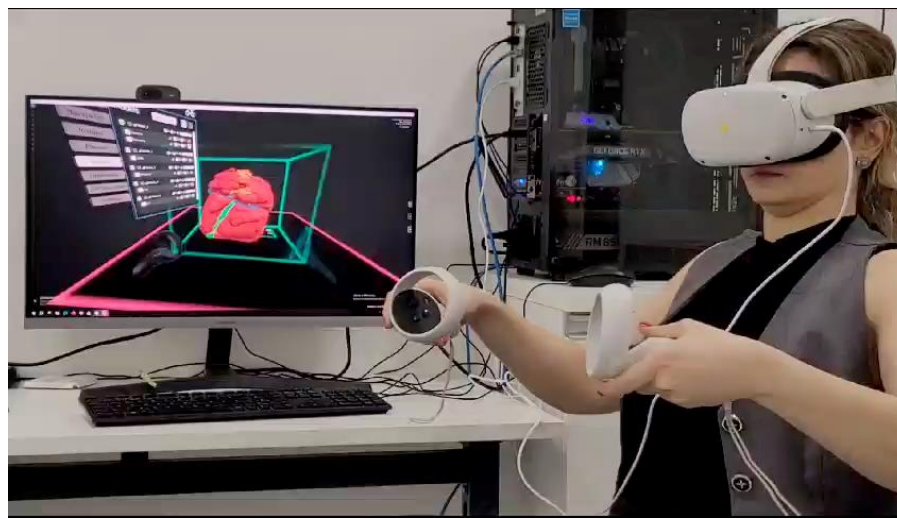
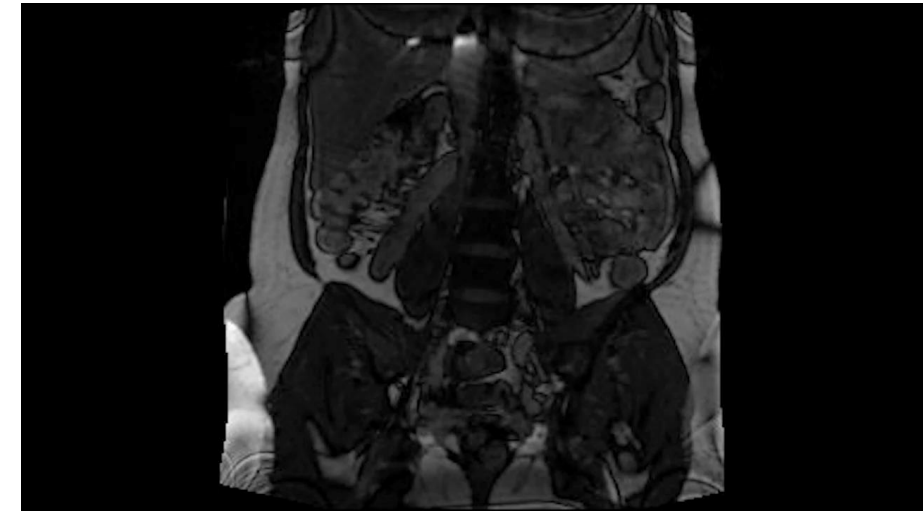
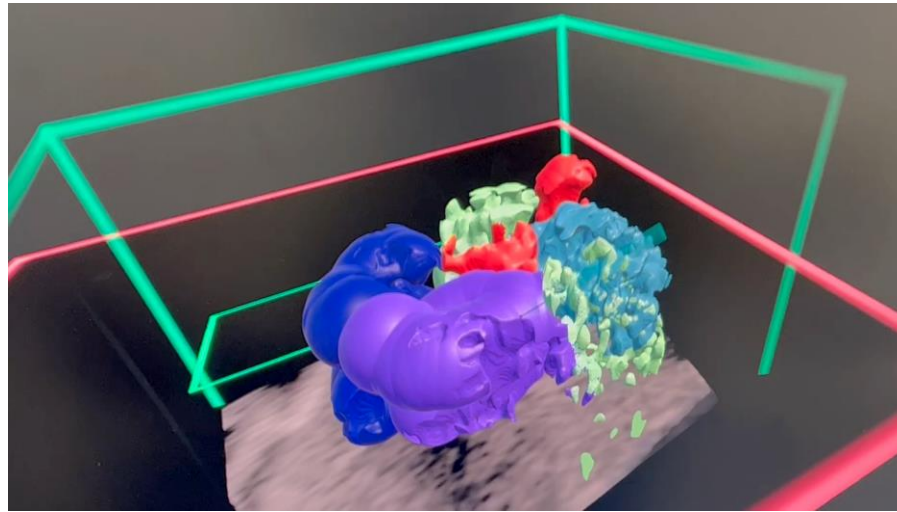


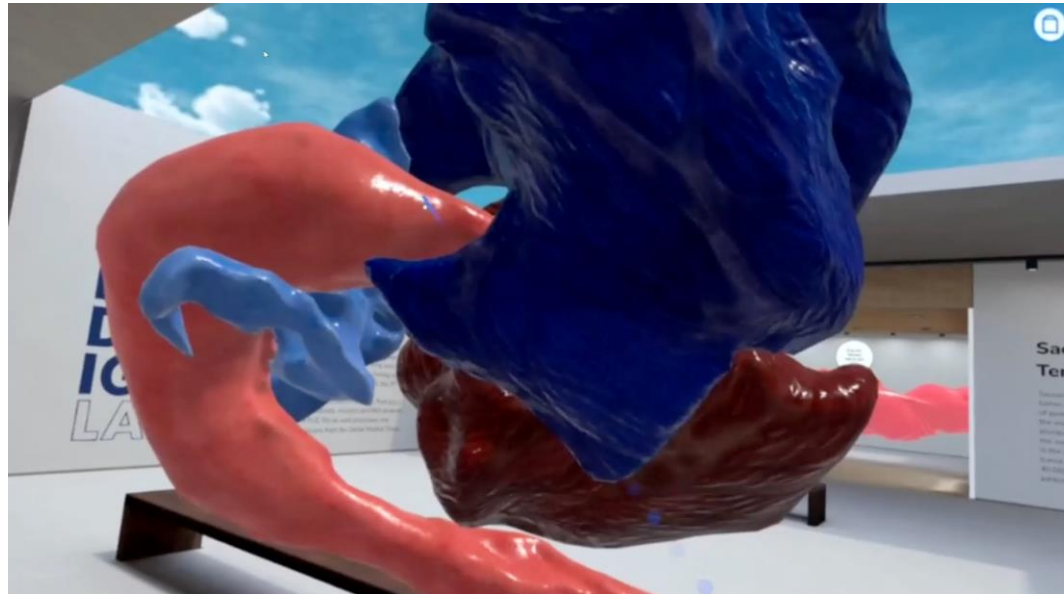
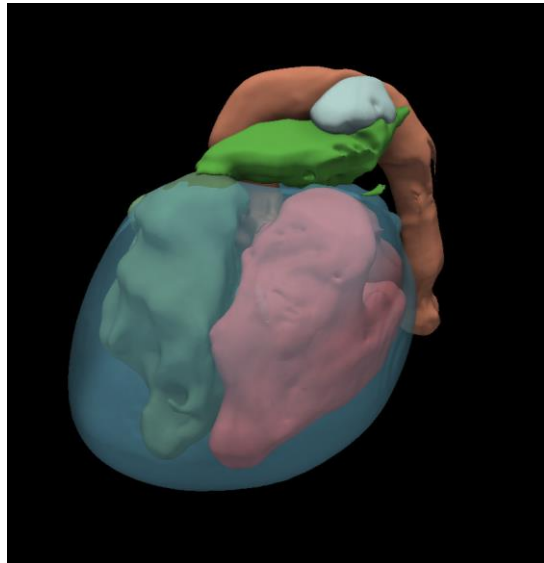
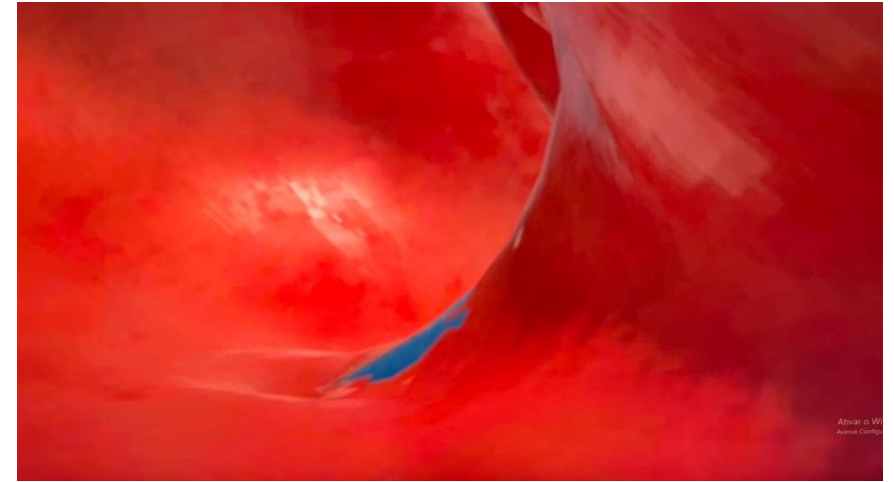
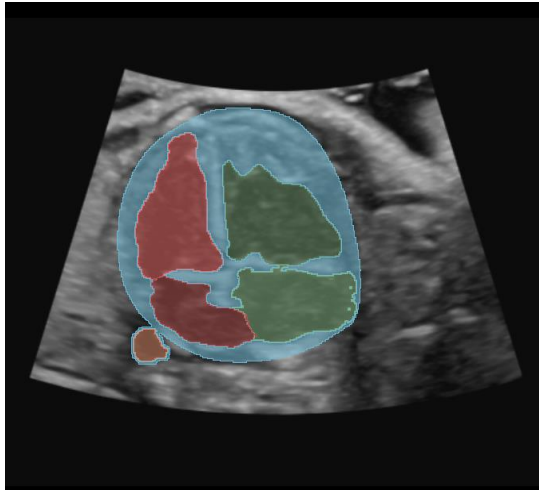


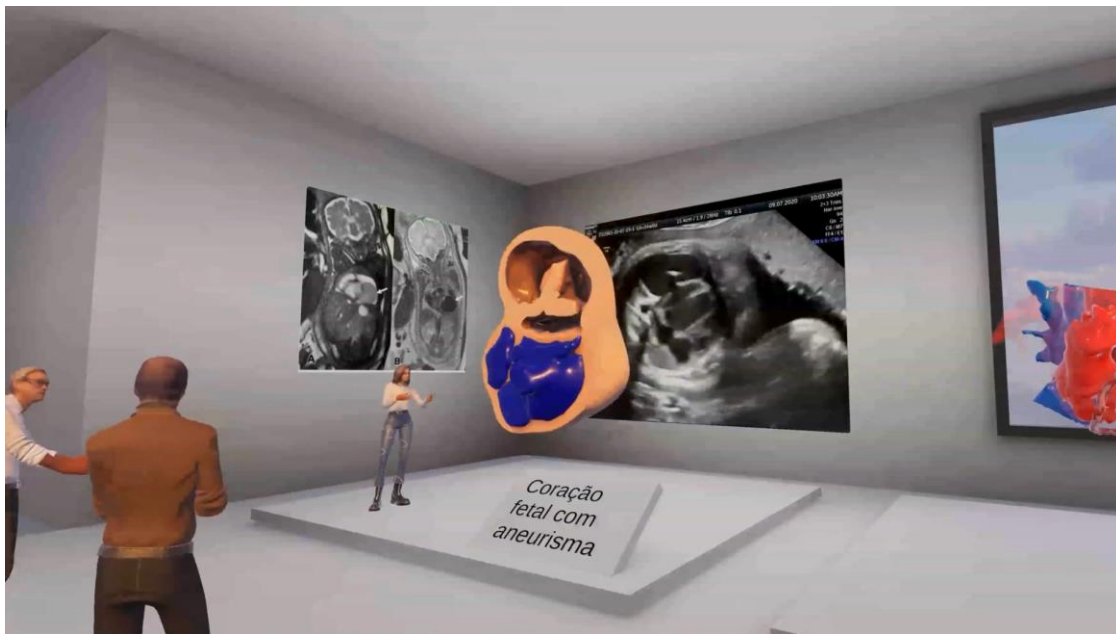
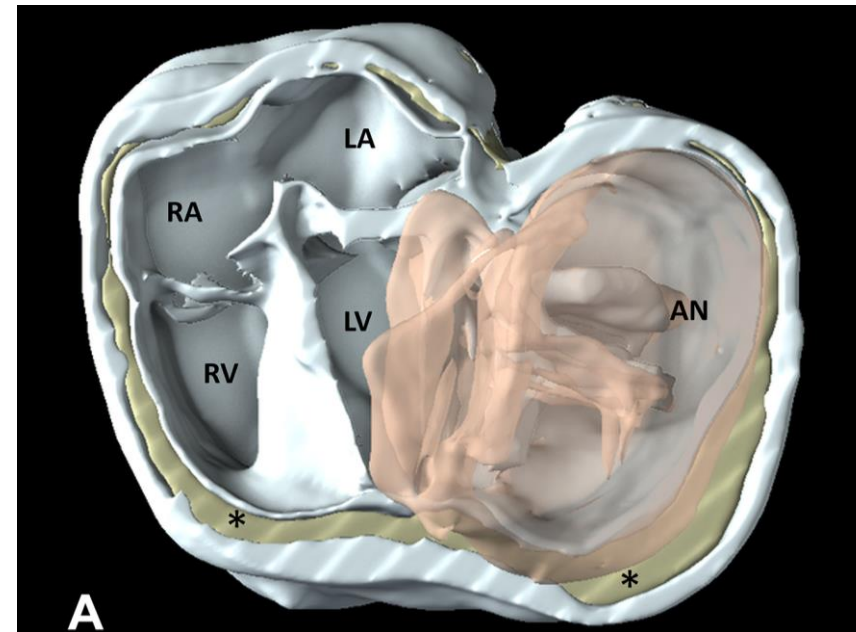
COLOR DOPPLER ABNORMALITIES – PLACENTA ACCRETA

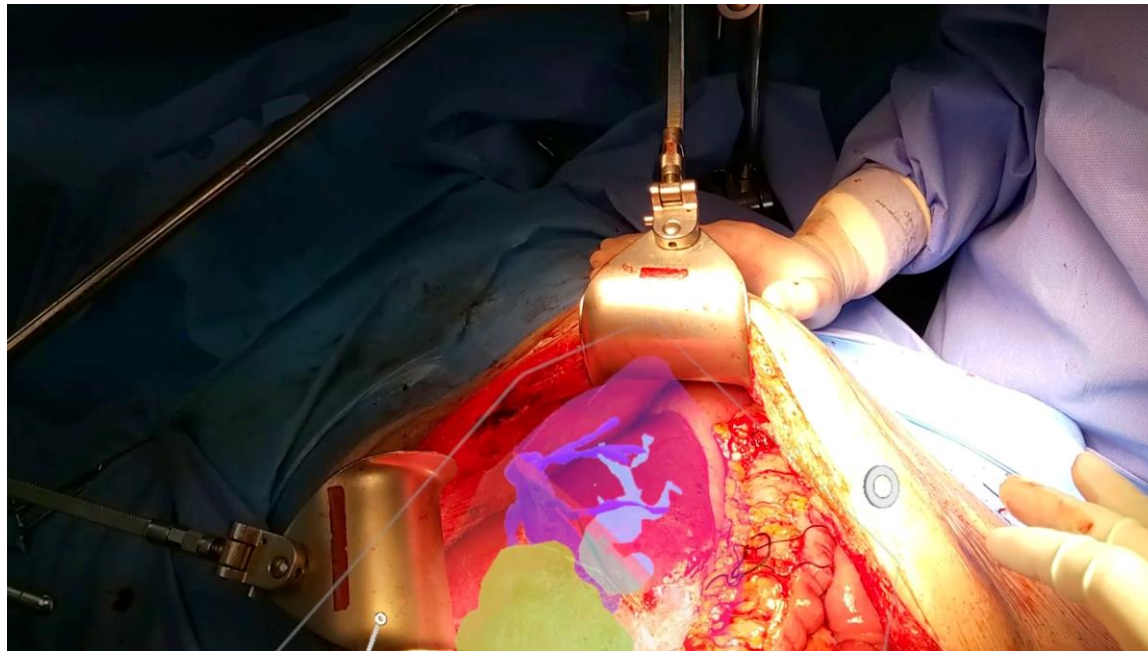


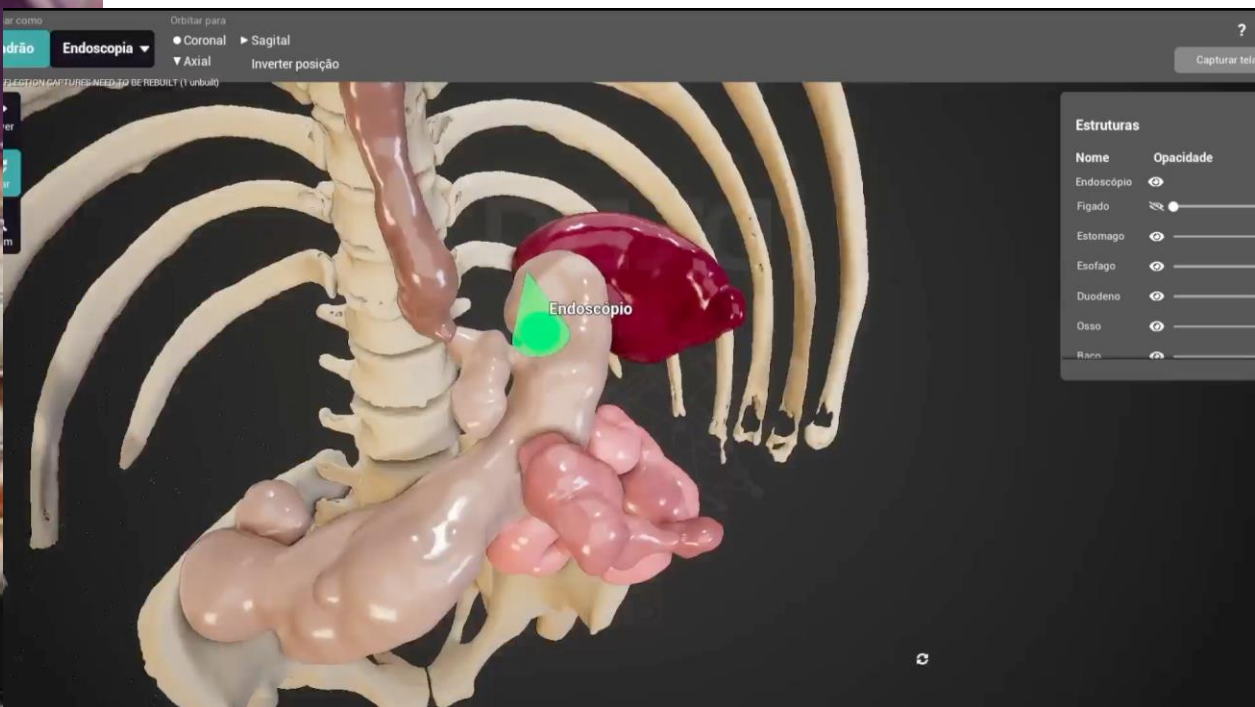
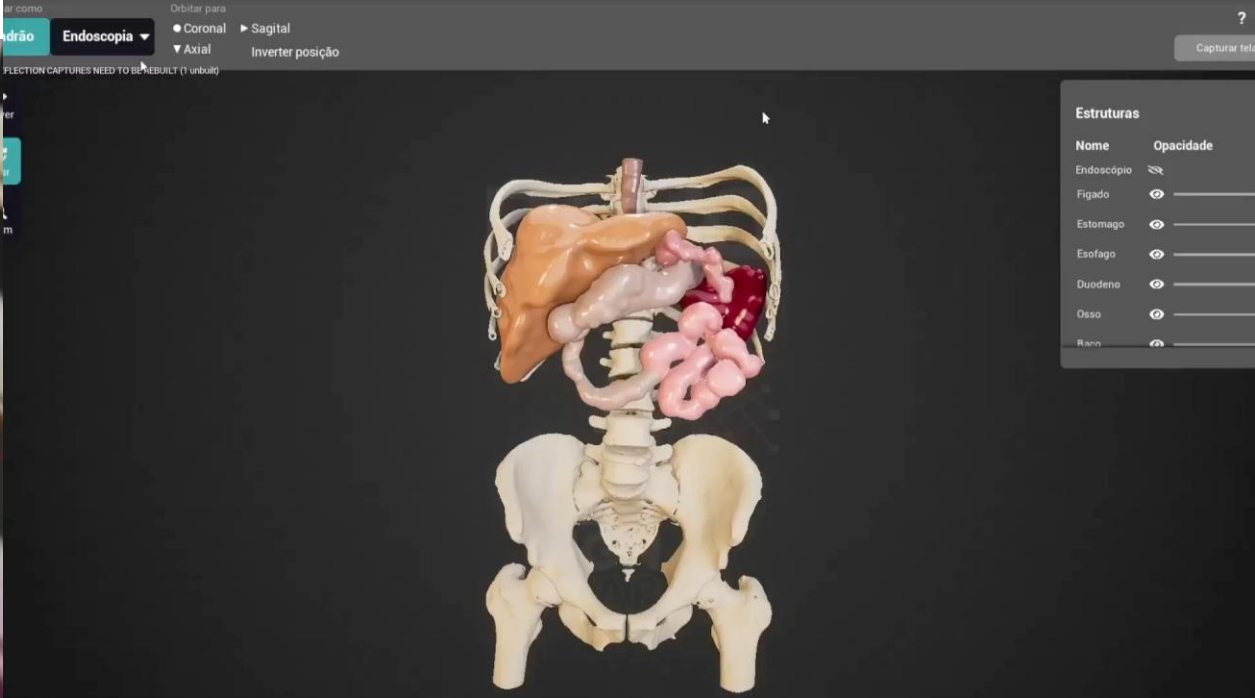


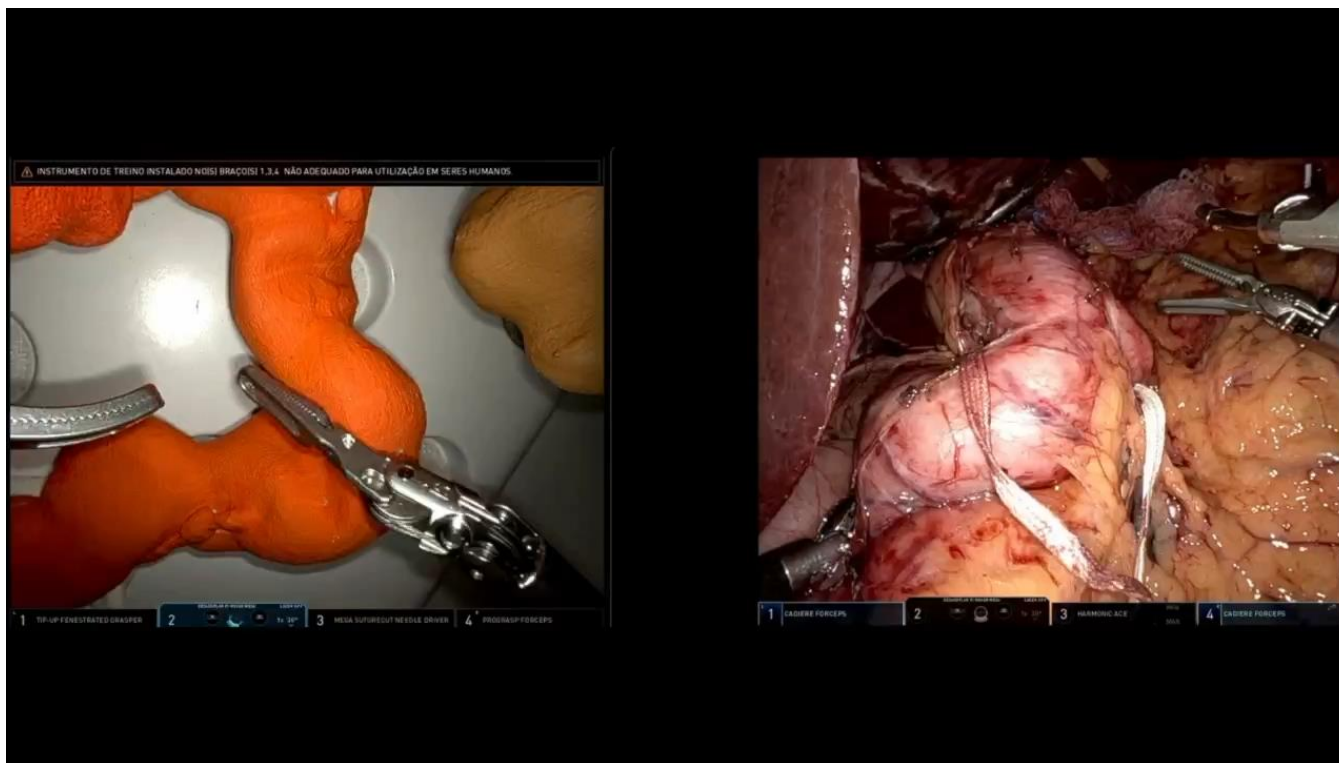












Dr Fernando de Barros



Fernando TAC Chile



Heron



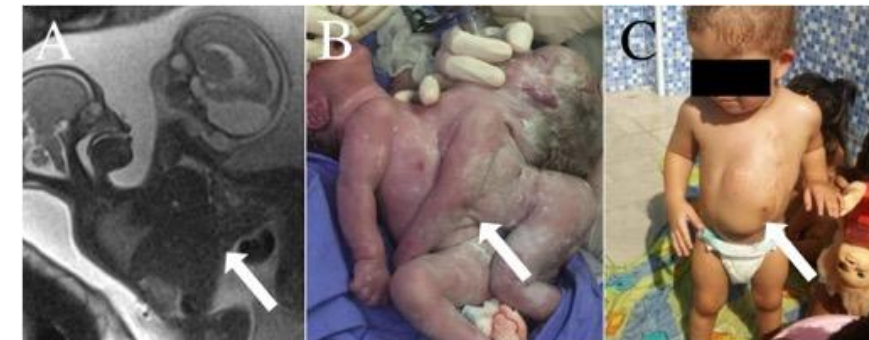
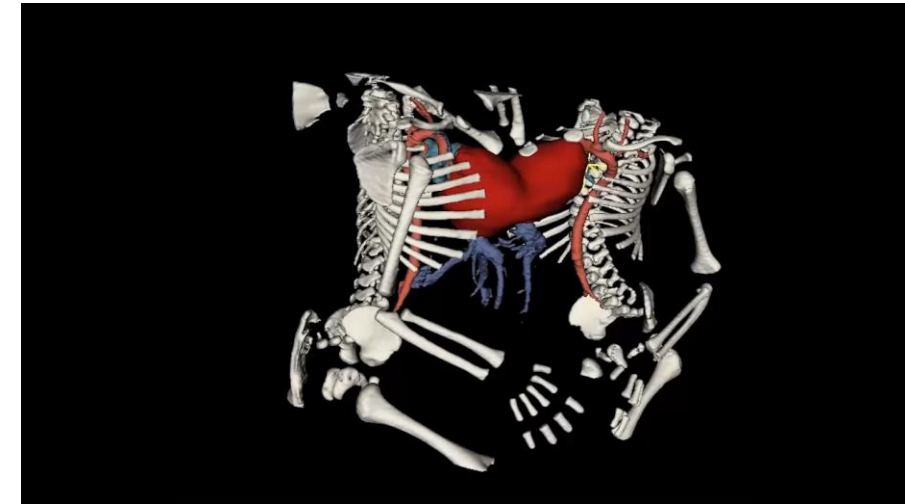
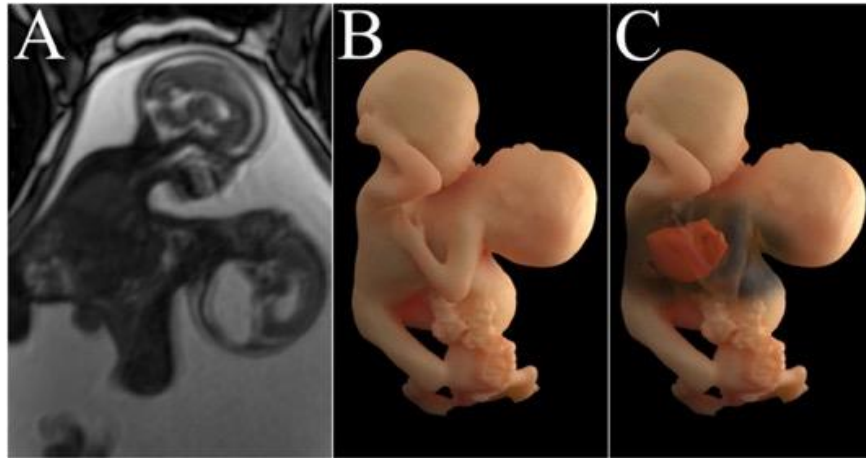
Javi Kuri

Vitor Sardenberg

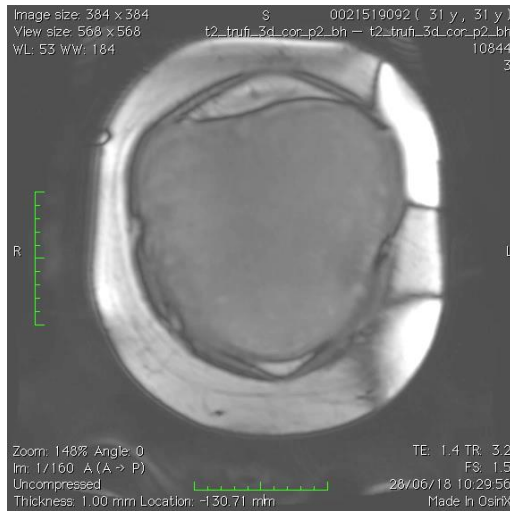
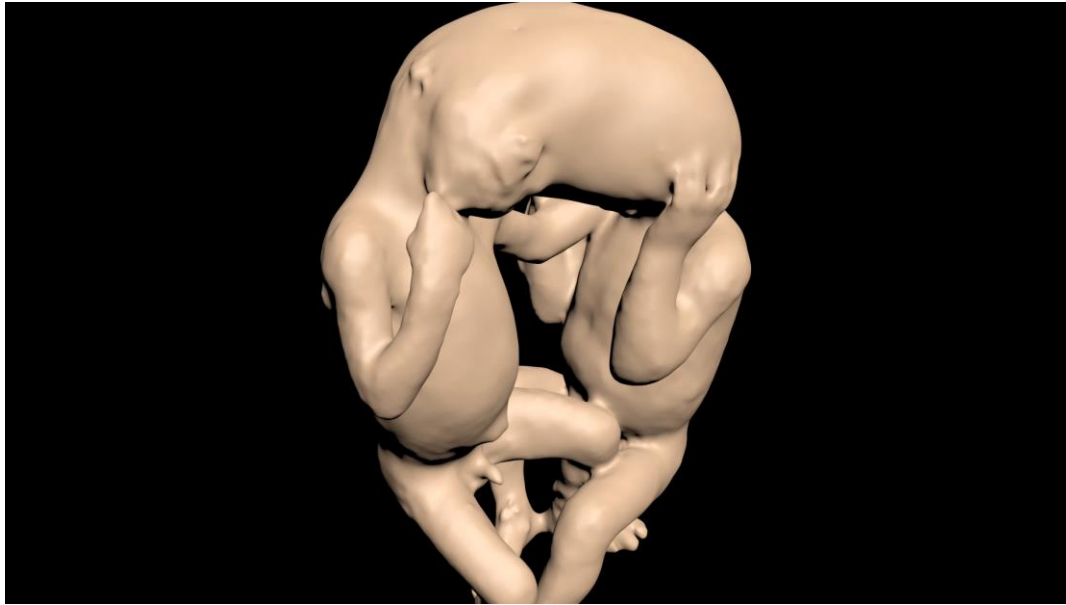
Vitor Sardenberg

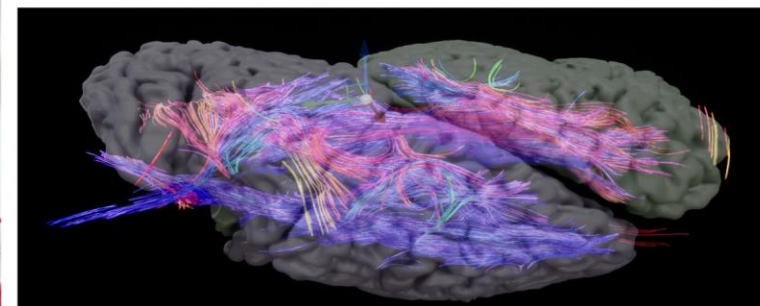
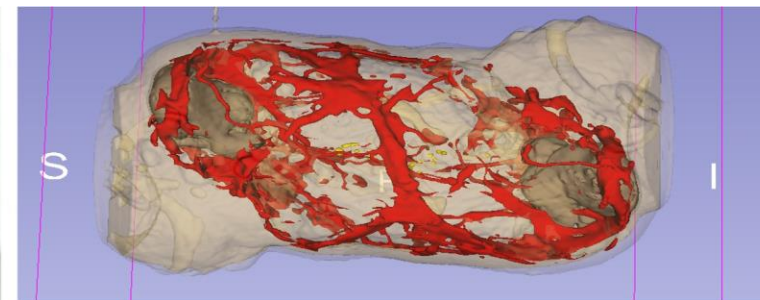
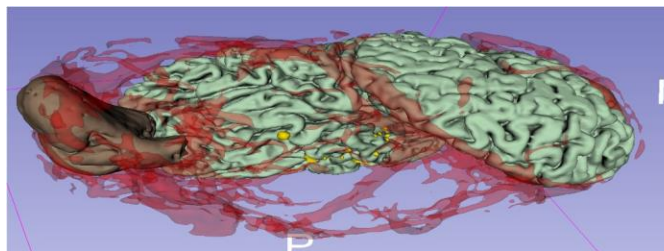


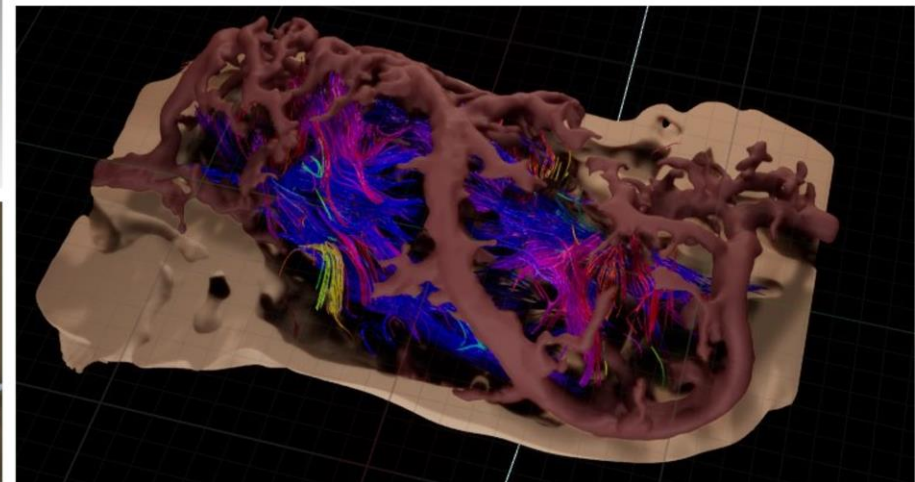
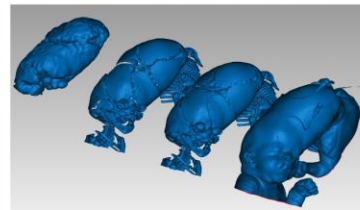
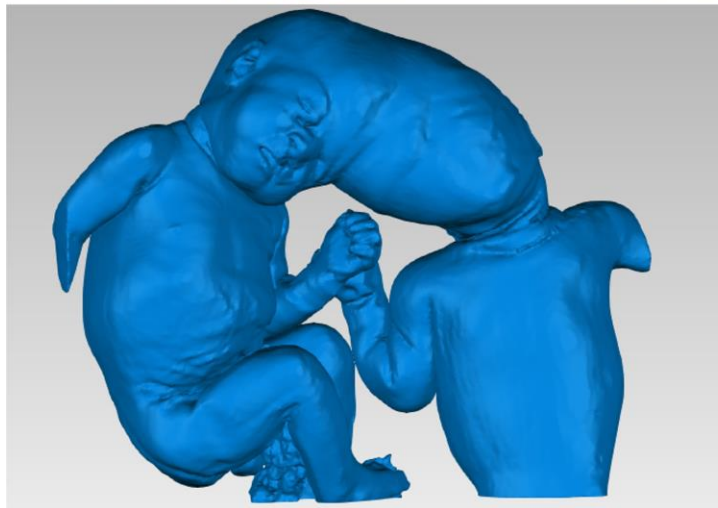
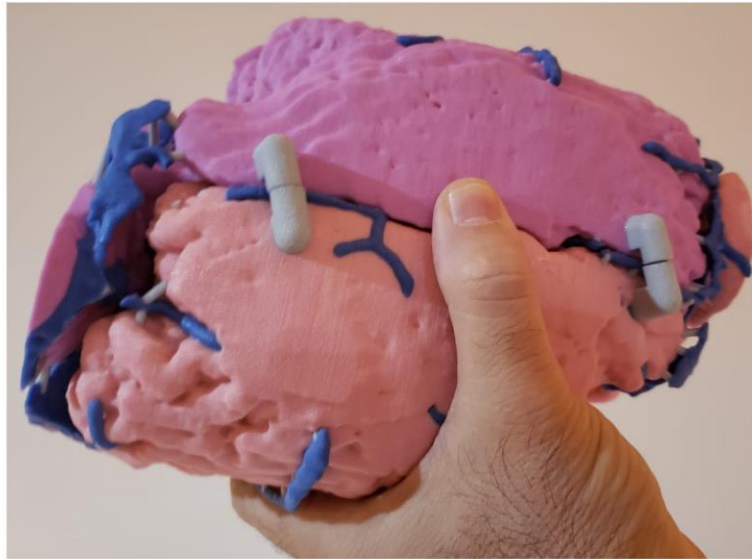
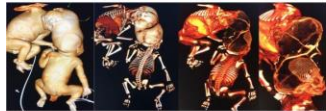
Dr. Fernando de Ba
Press '/' to type

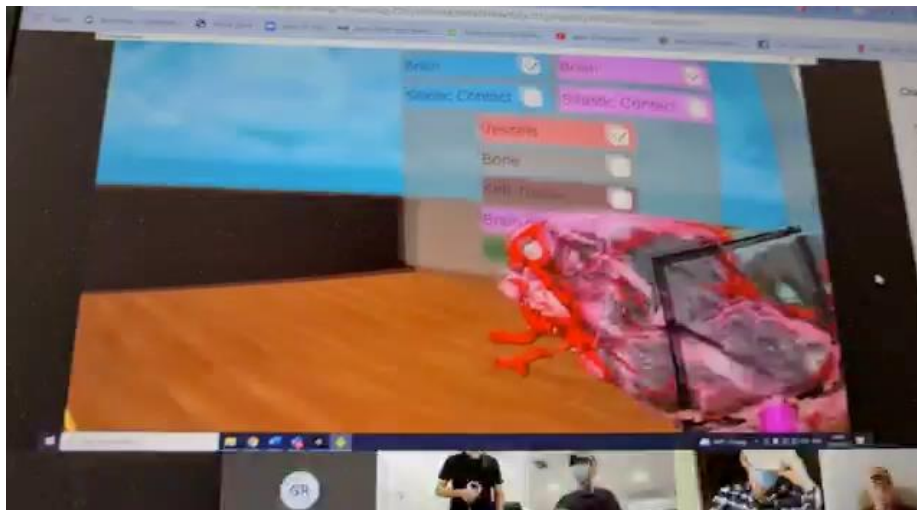
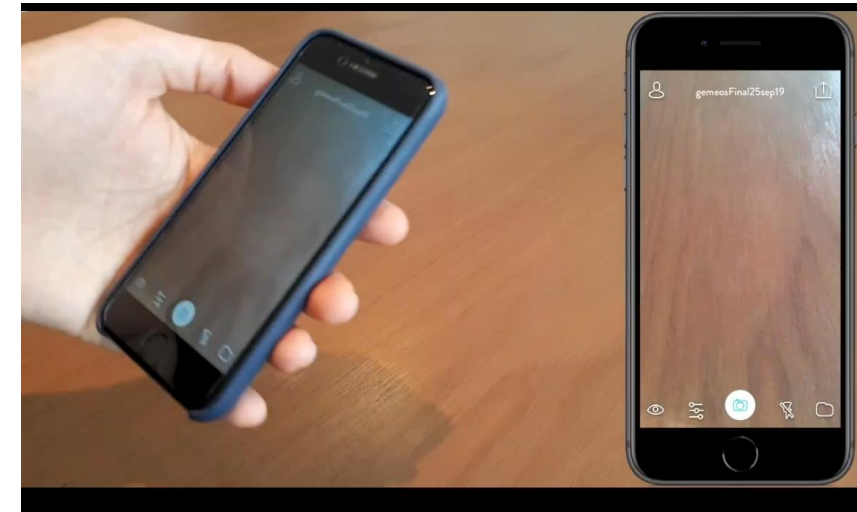
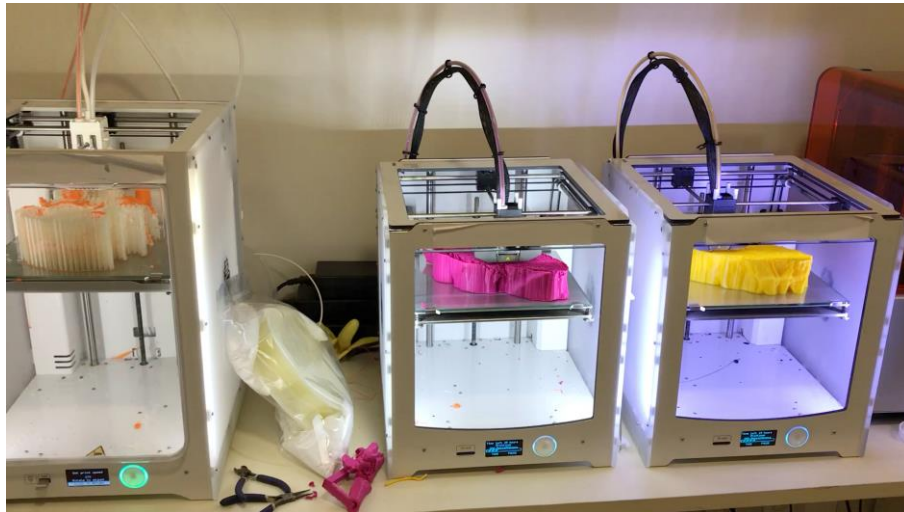


➤ Craniopagus











Fantástico >

Cirurgia do SUS separa gêmeos unidos pelo cérebro no Rio de Janeiro

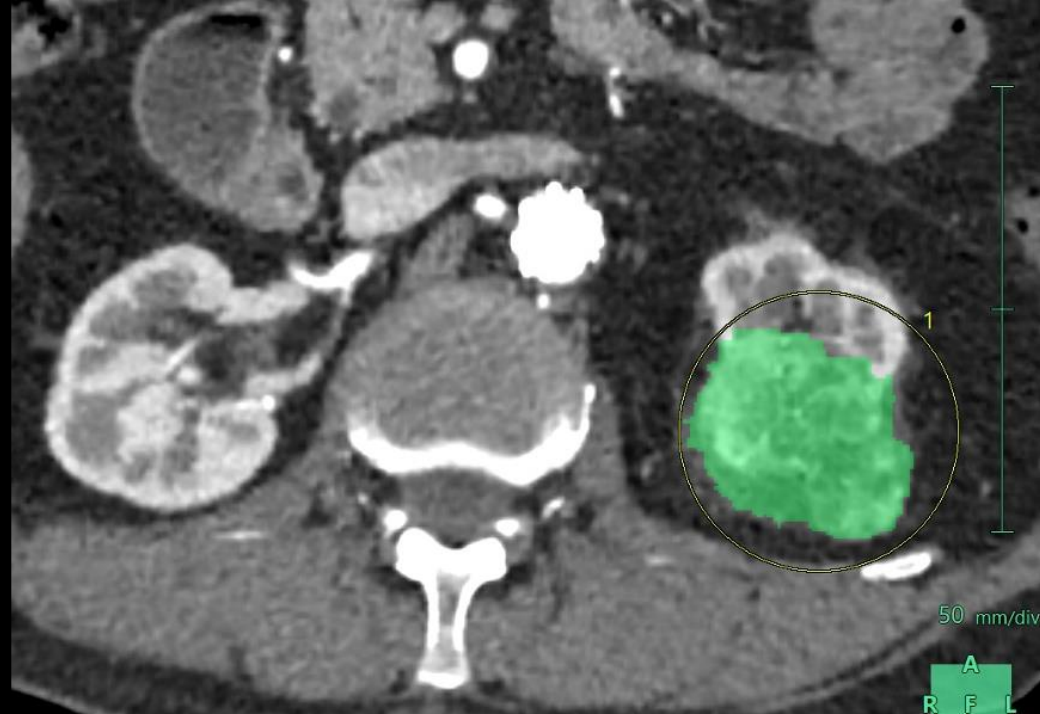
13 min Exibição em 31 jul 2022



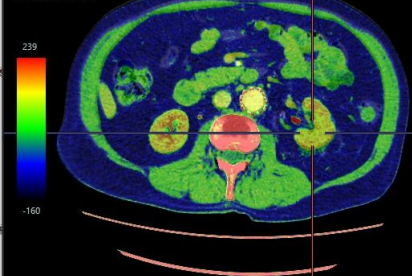
Fantástico >

Cirurgia do SUS separa gêmeos unidos pelo cérebro no Rio de Janeiro

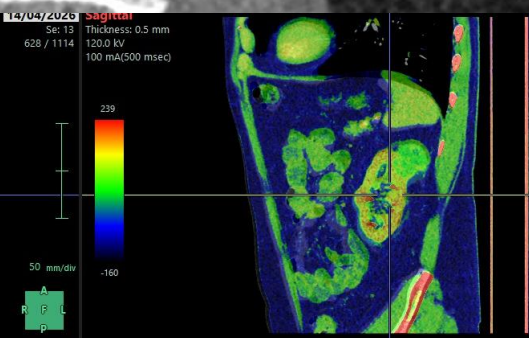
13 min Exibição em 31 jul 2022



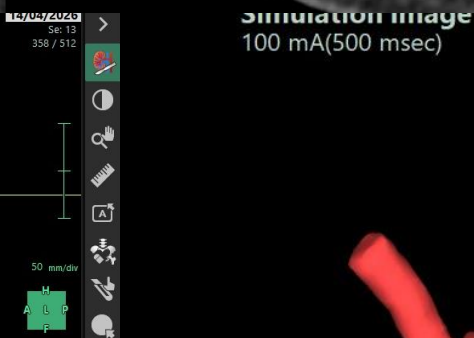
AX101
Thickness: 0.5 mm
120.0 kV
150 mA(500 msec)



14/04/2026
Sagittal
Thickness: 0.5 mm
120.0 kV
100 mA(500 msec)



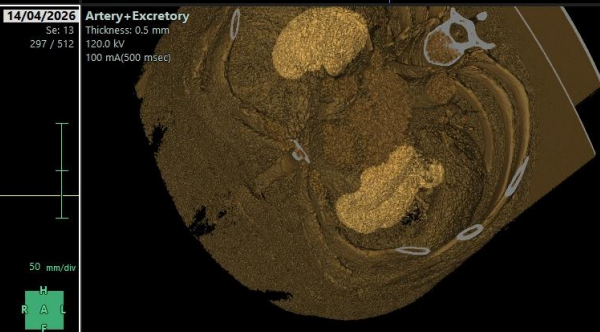
14/04/2026
Axial
Thickness: 0.5 mm
120.0 kV
100 mA(500 msec)



Coronal
Thickness: 0.5 mm
120.0 kV
100 mA(500 msec)



14/04/2026
Artery+Excretory
Thickness: 0.5 mm
120.0 kV
100 mA(500 msec)

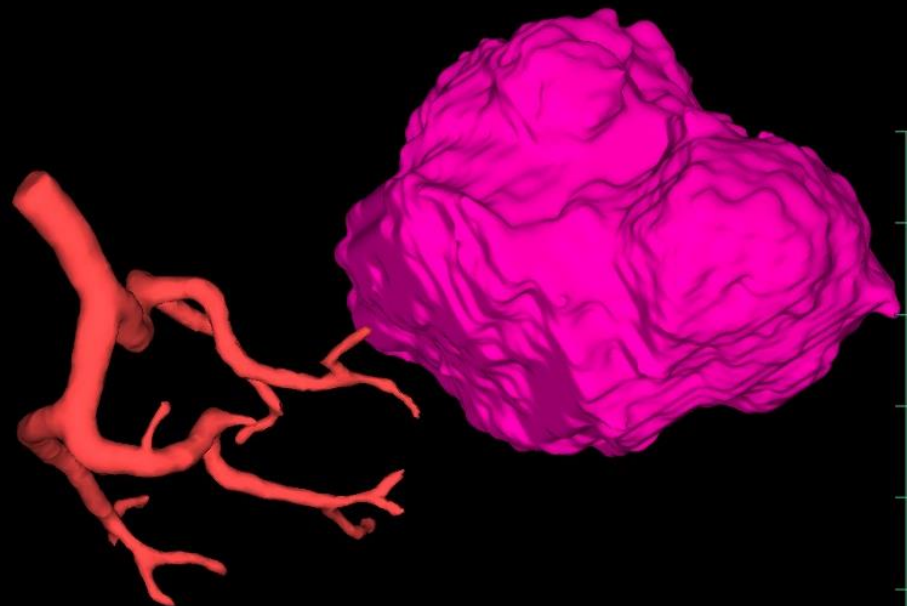


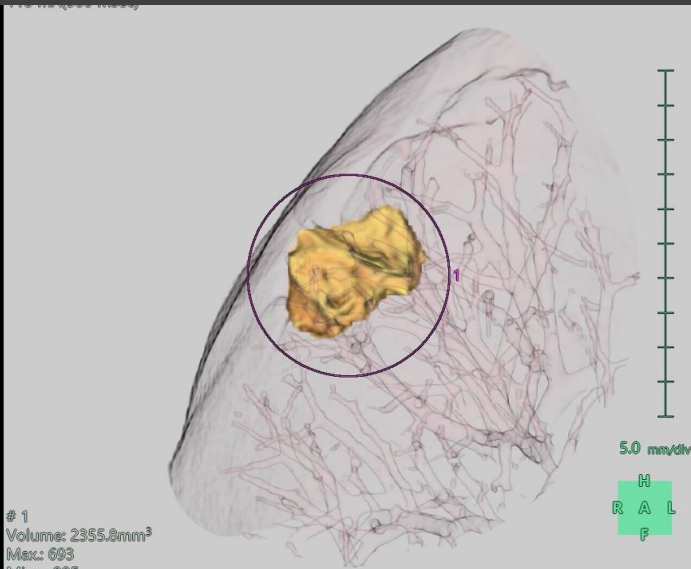
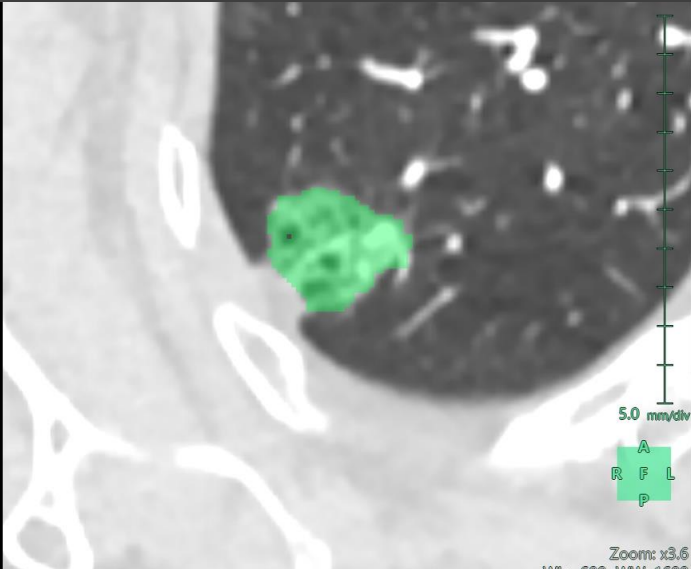
14/04/2026
Axial
Thickness: 0.5 mm
120.0 kV
100 mA(500 msec)



Simulation image
100 mA(500 msec)

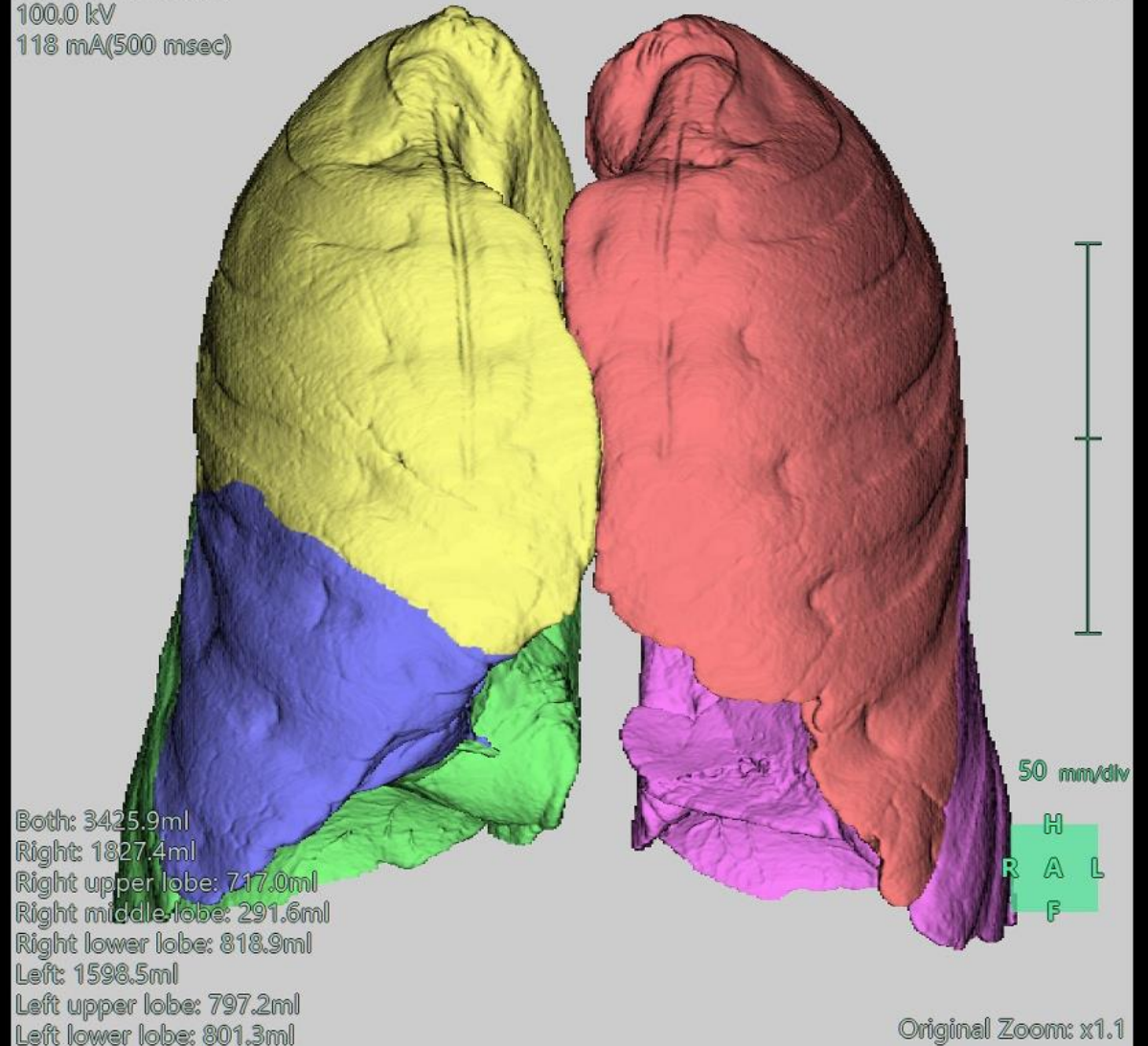
Deformed image included





3D view
Thickness: 0.5 mm
100.0 kV
118 mA(500 msec)

02/05/2026
Ser: 9



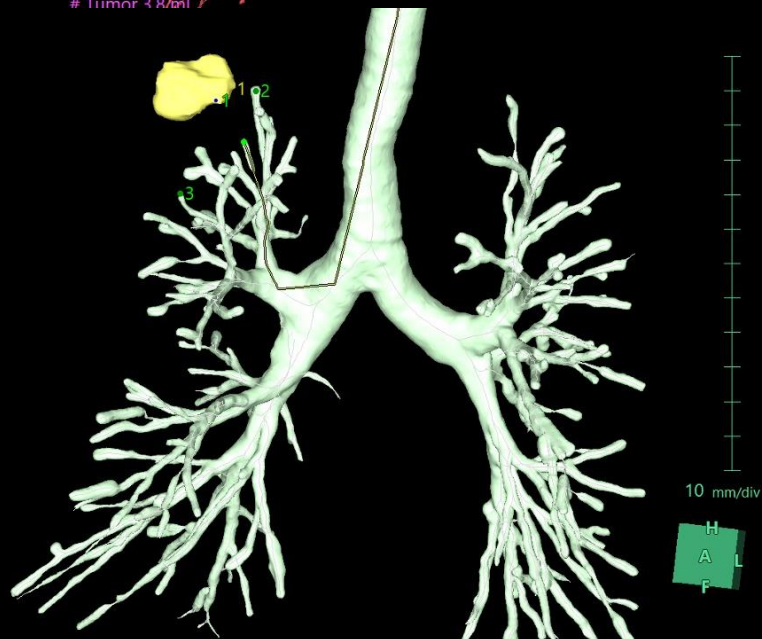
3D view

Thickness: 0.5 mm
100.0 kV
118 mA(500 msec)

02/05/20
Se



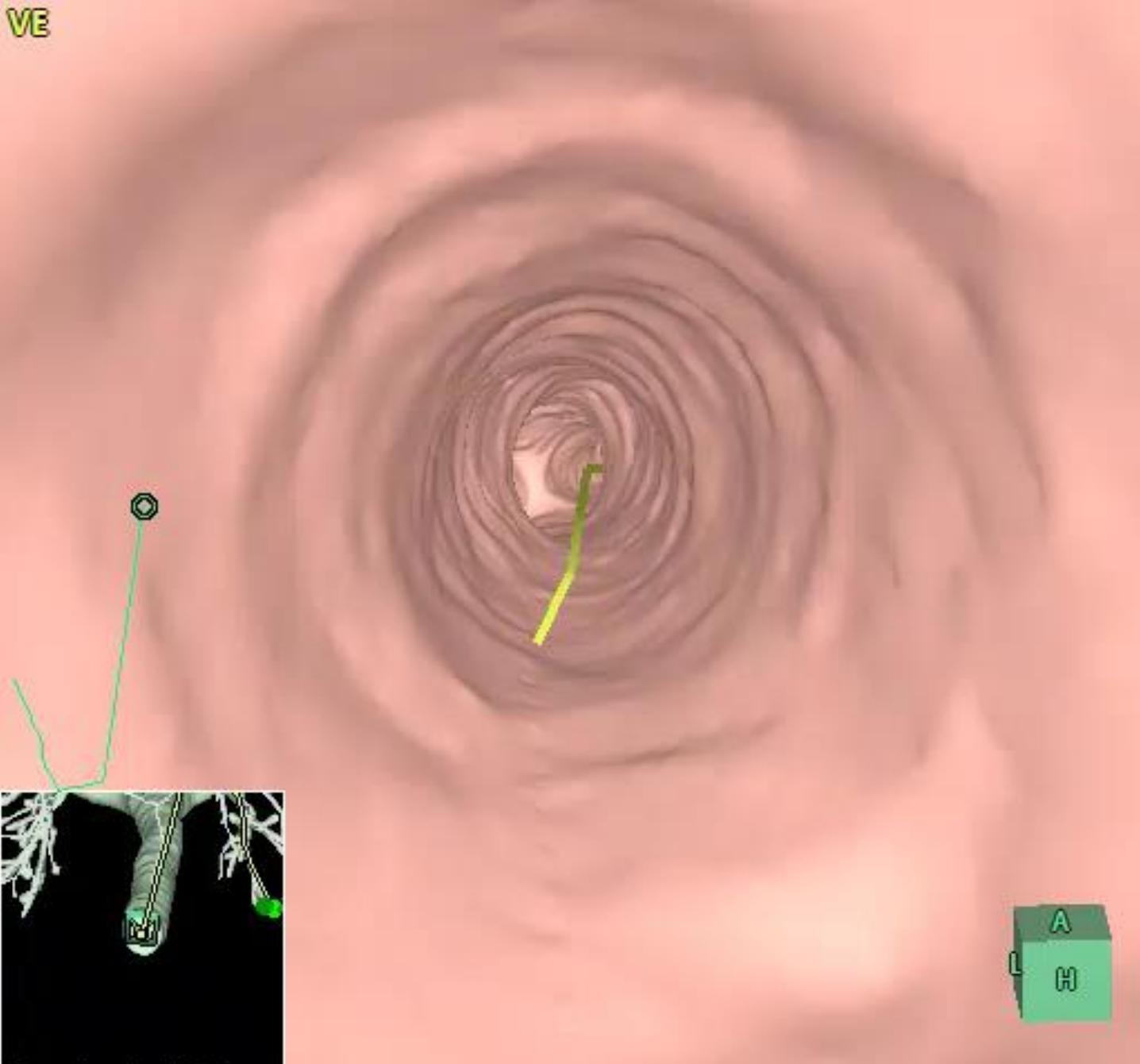
Cut Plane Area 125.2 cm²
(# Region Volume (% Volume))
Artery
Tumor 3 R/01



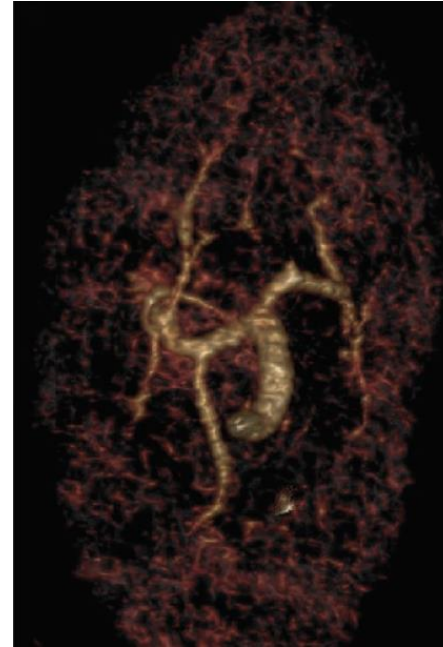
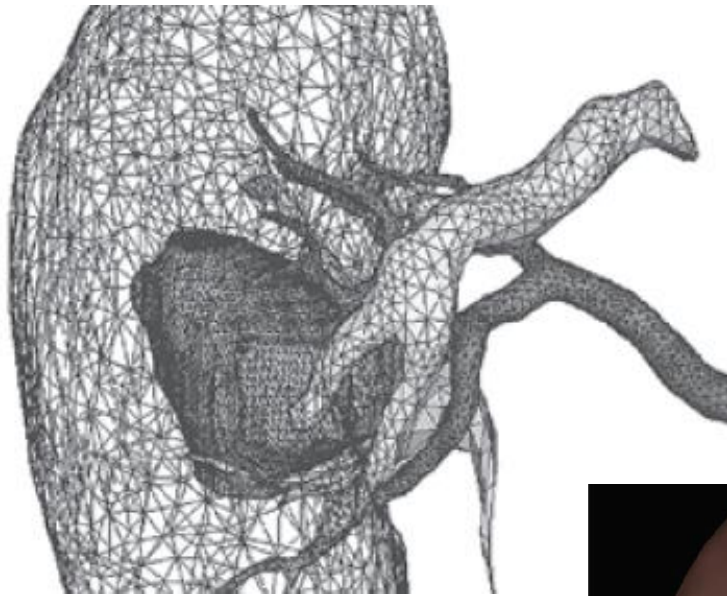
Bronchus

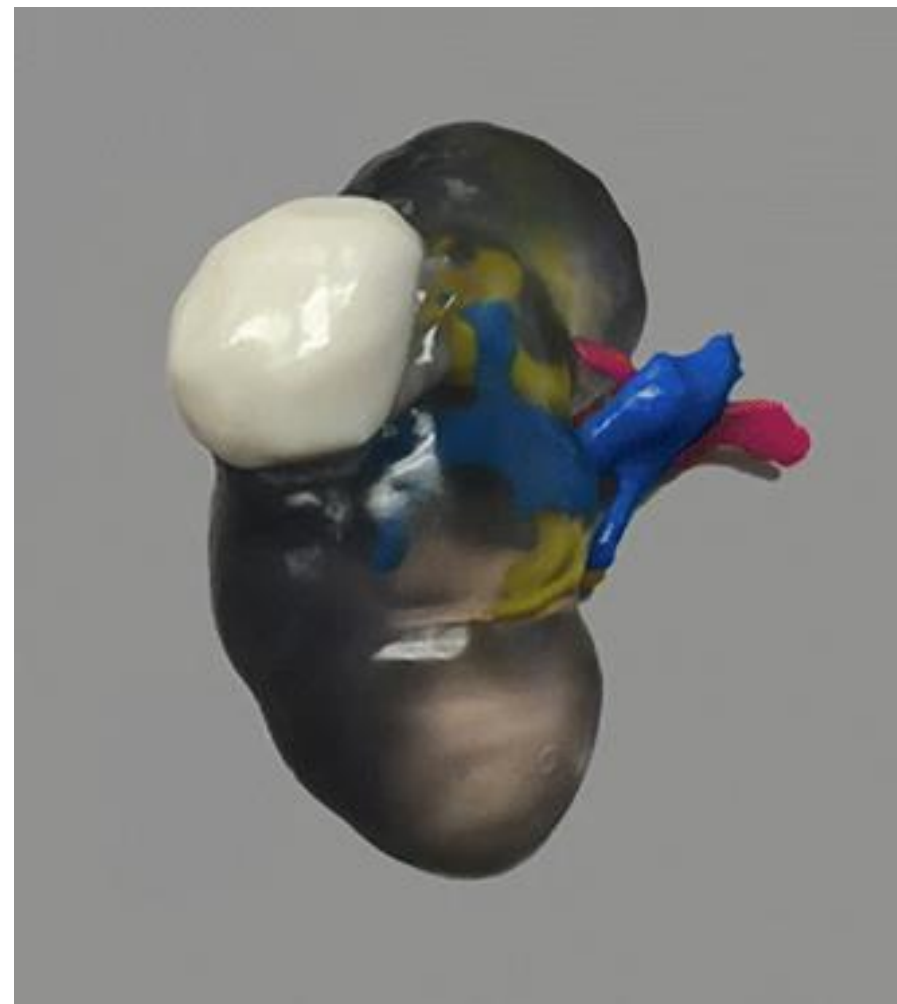
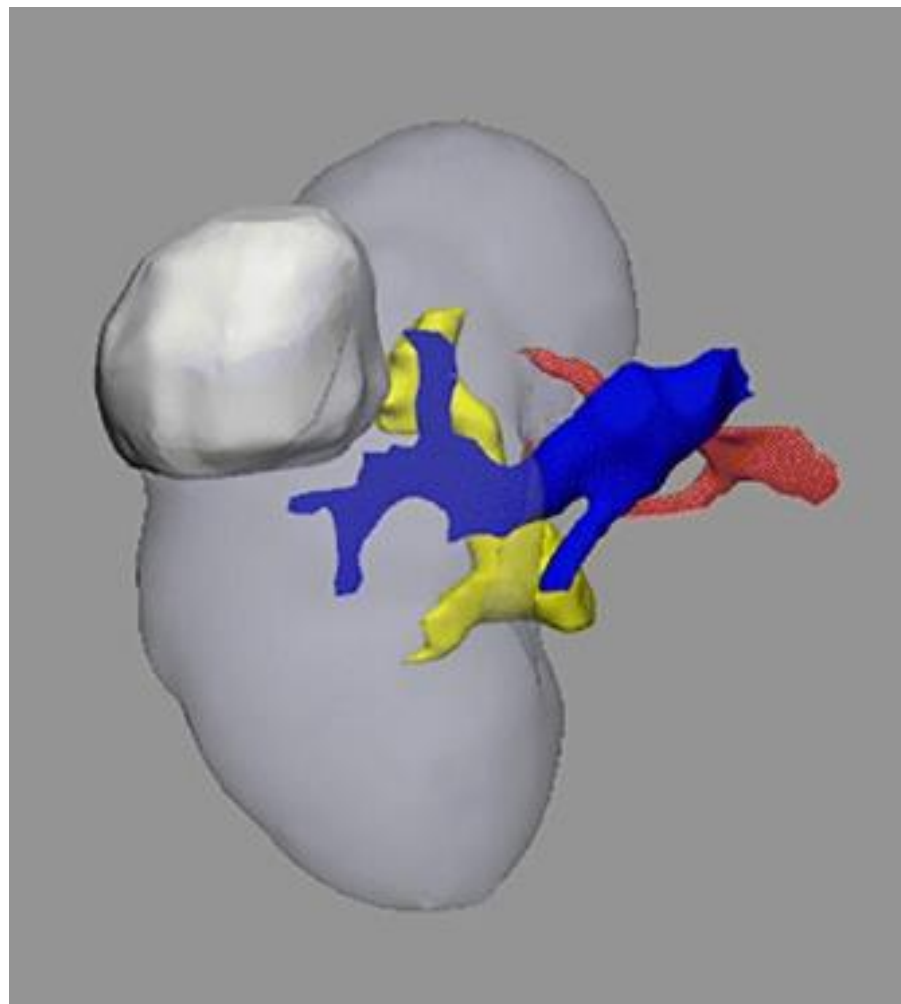
LAO:6.9 CAU:0.8
Original Zoom: x1.4

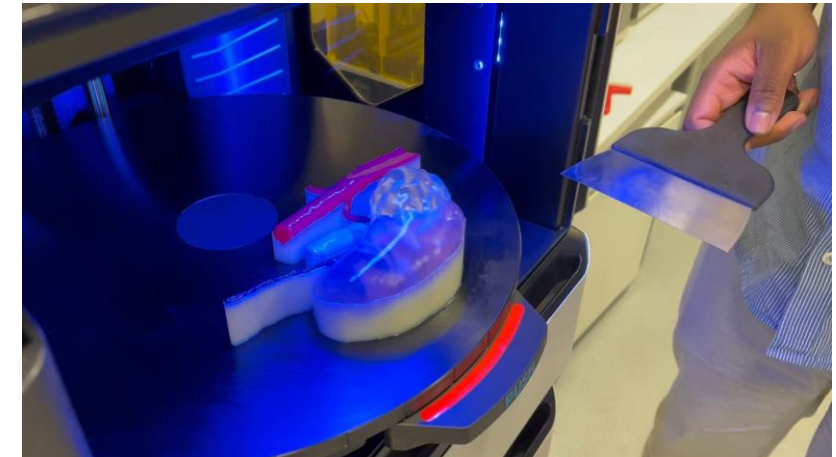
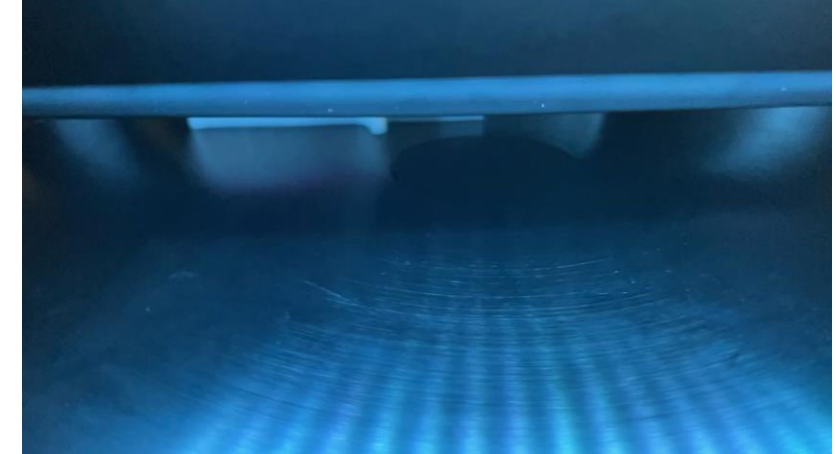
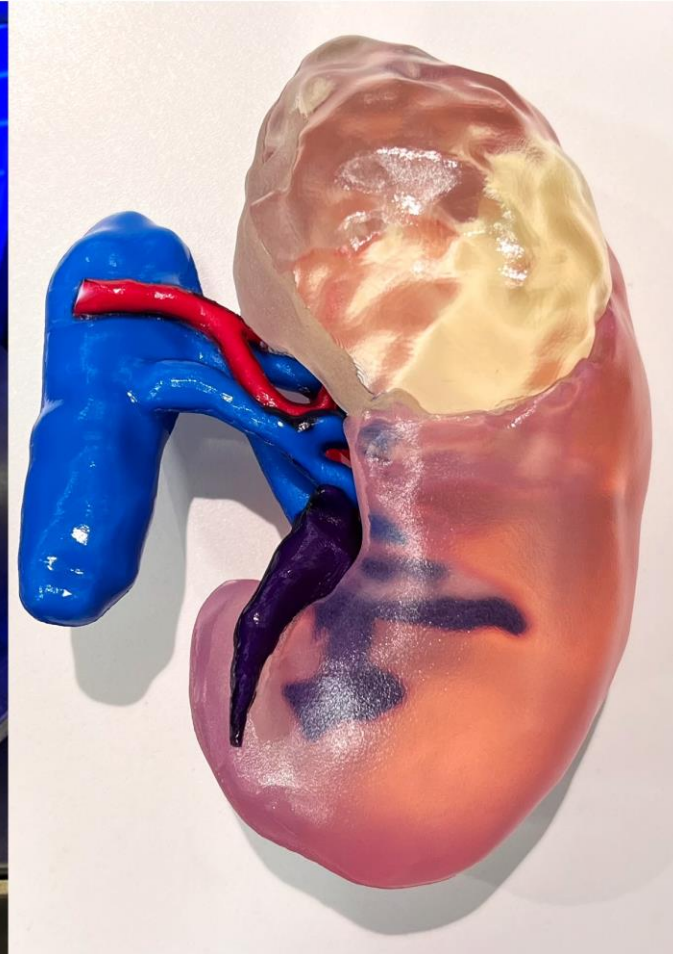
VE

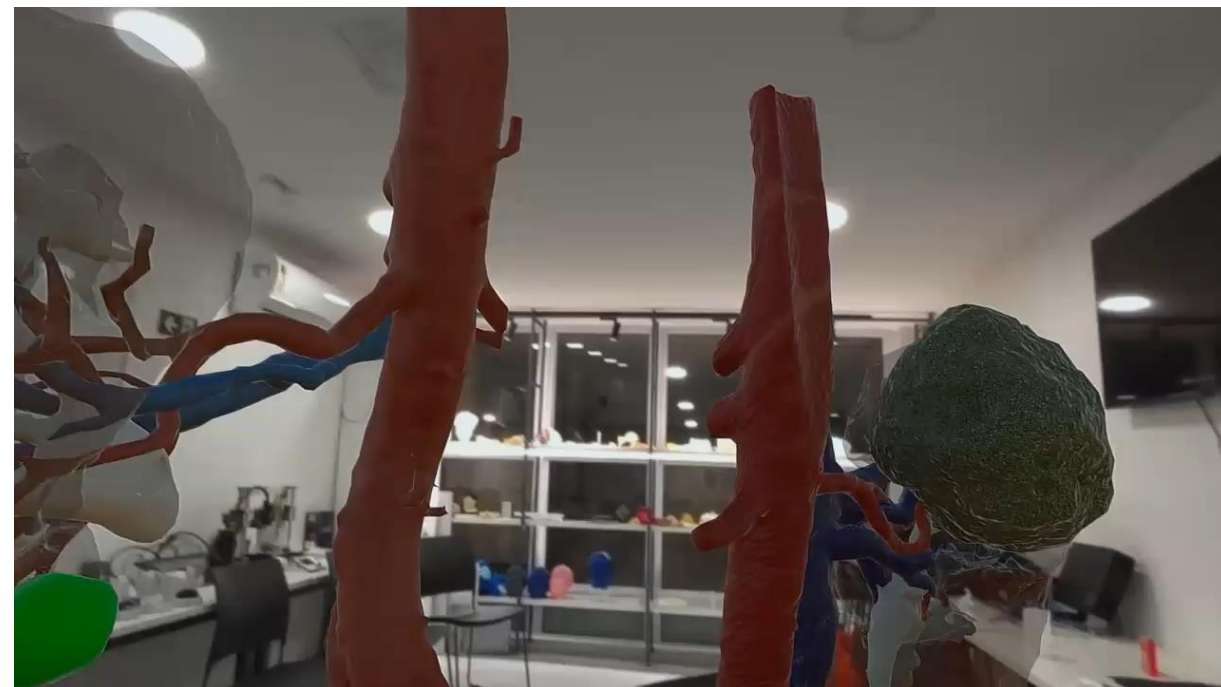
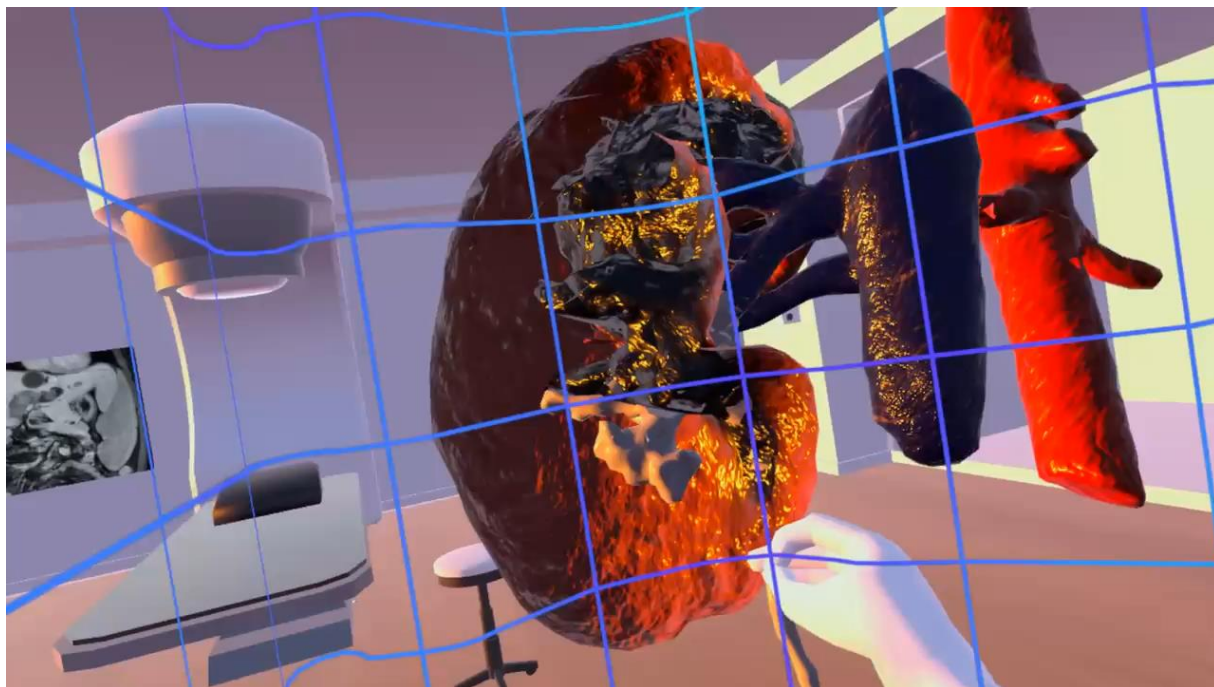


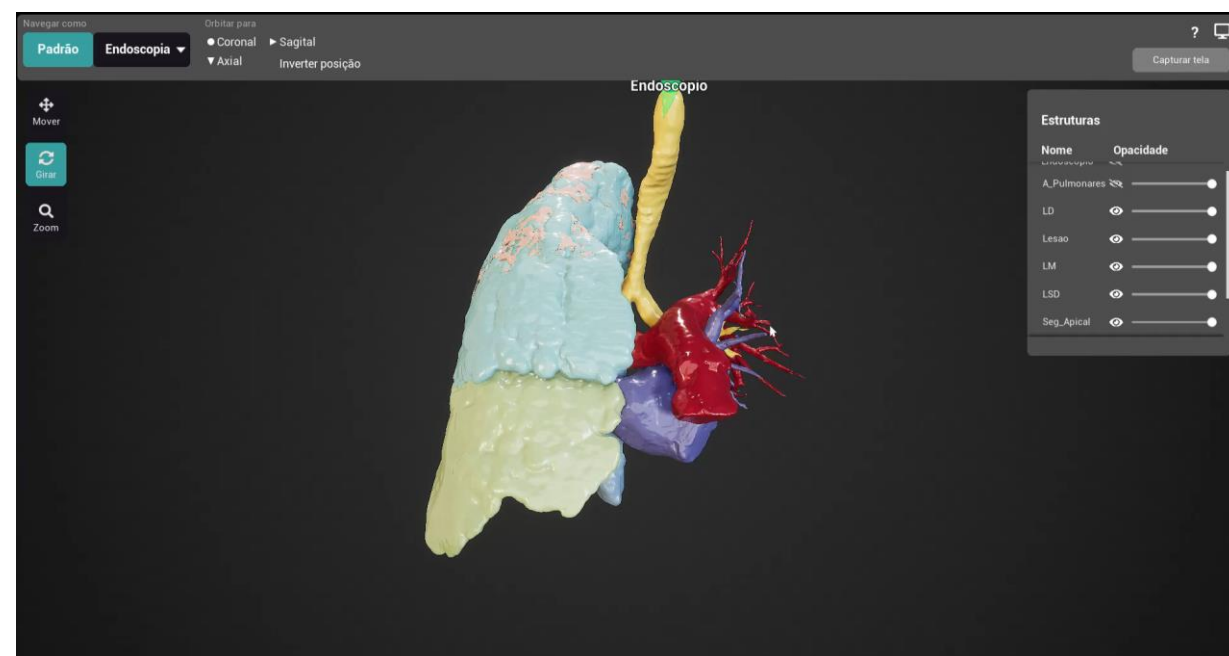
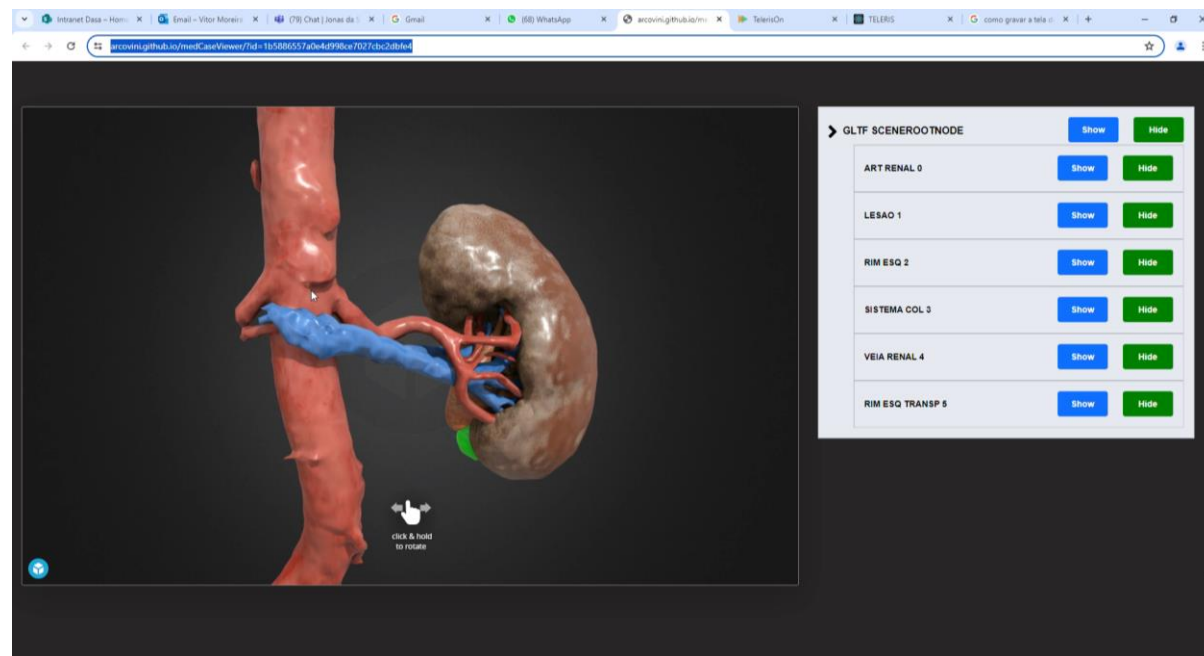
To end point 180.3 mm
From insertion positions 0.0 mm







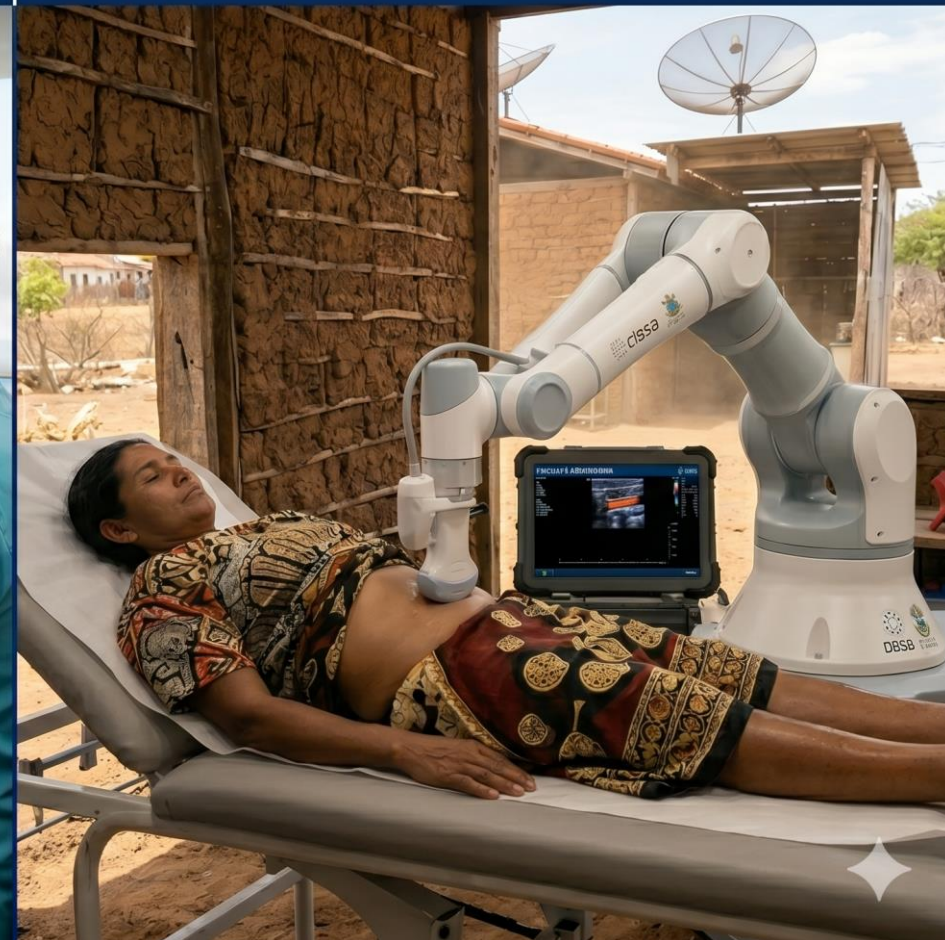




MÉDICO ESPECIALISTA - RIO DE JANEIRO (REMOTELY CONTROLLED)

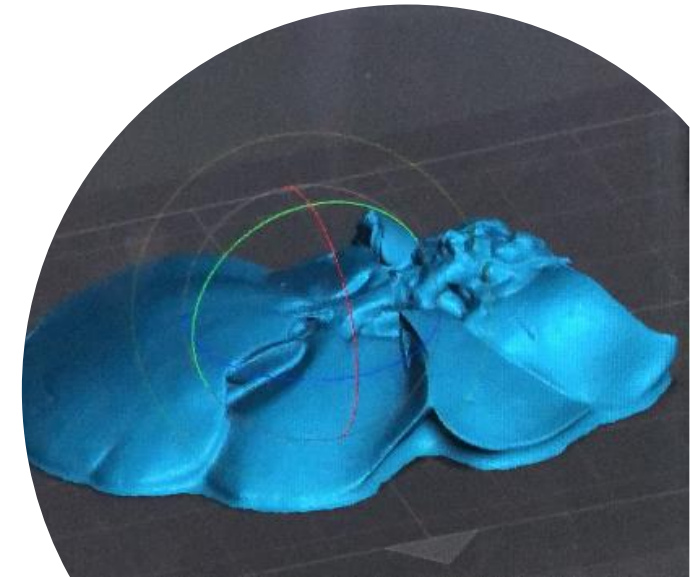
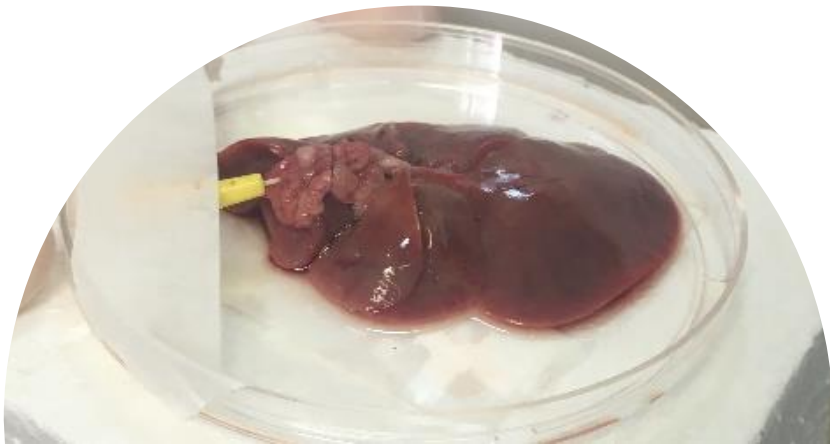
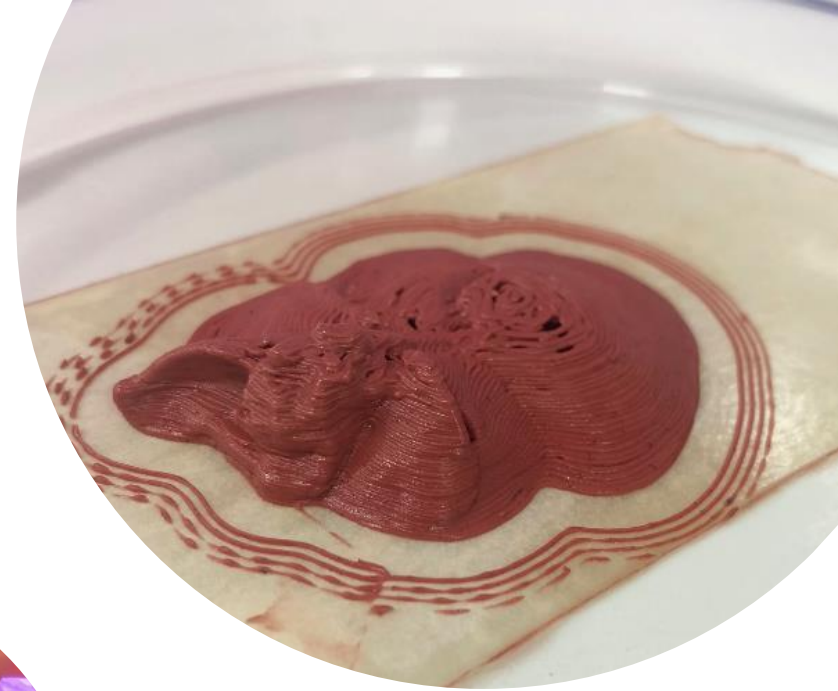


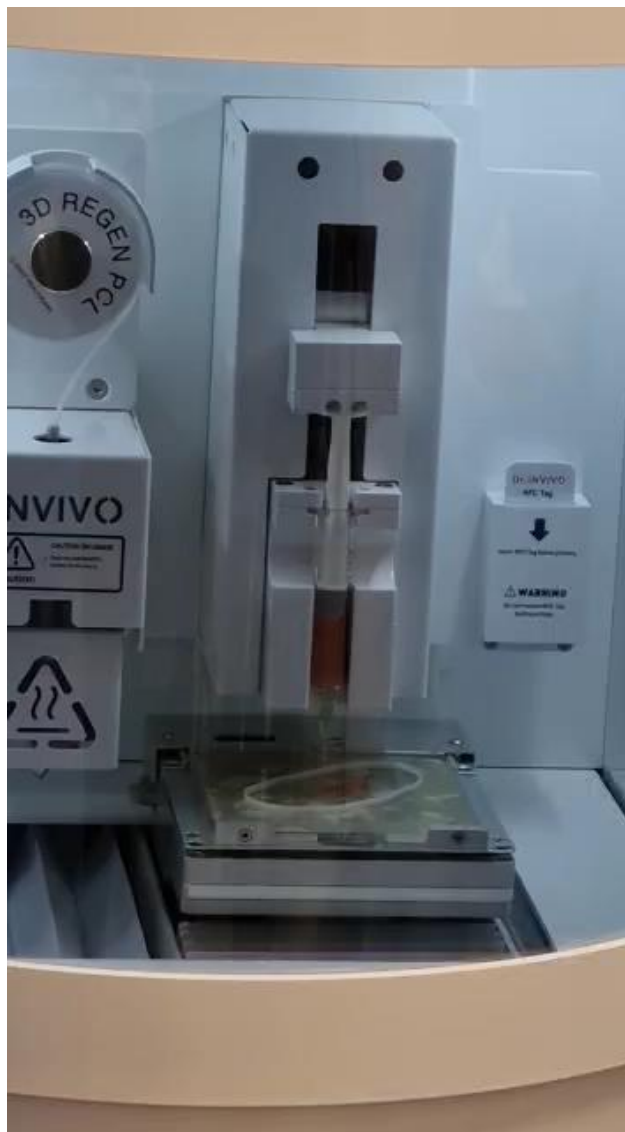
PACIENTE - INTERIOR DO BRASIL



BIOIMPRESSÃO

- Com elas é possível gerar, a partir de imagens, constructos com fidelidade geométrica (tecidos, vasos, cartilagens, etc)
- Com o uso de biotintas (substrato contendo células) é possível cultivar tais constructos celulares para diversas finalidades





Medicina 4.0: O Futuro é Agora



Impressão 3D

Modelos anatômicos personalizados para planejamento cirúrgico

Realidade Virtual

Simulações imersivas para treinamento e educação médica

Realidade Aumentada

Visualização em tempo real durante procedimentos

Metaverso

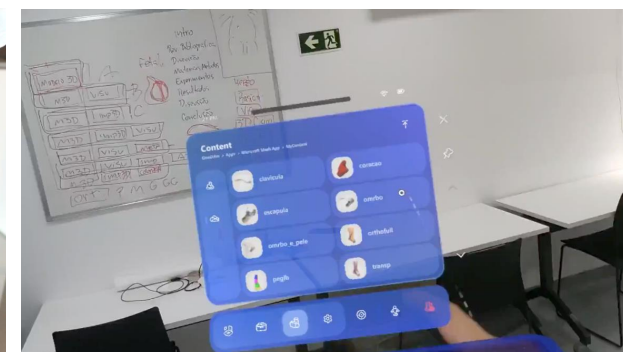
Colaboração global entre especialistas em ambiente virtual

MEDICINA 4.0



especialistas criam modelos e imagens cada vez mais realistas, que auxiliam médicos em estudos e diagnósticos precisos

Médicos discutem casos clínicos, realizam simulações e planejam cirurgias personalizadas utilizando Impressão 3D, Realidade Virtual, Realidade Aumentada e Metaverso



- Pacientes - melhor compreensão
- Estes desenvolvimentos provavelmente contribuirão igualmente para a Pesquisa, Prática e Educação em Medicina



The Arctic World Archive Foundation

Invitation to deposit your most valuable data

Svalbard, Thursday, February 26th 2026







Fernando TAC Chile



Heron

Javi Kuri

Vitor Sardenberg

Vitor Sardenberg

OBRIGADO!



DASA

PUC RIO



Dr. Fernando de Ba
Press '/' to type