

At the intersection of **Academics,**
Neurosciences, & Biodesign
Using 21st Century Tools to Deliver 21st Century Care

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Ochsner BioDesign Lab

May 7th, 2026

Disclosures & Funding

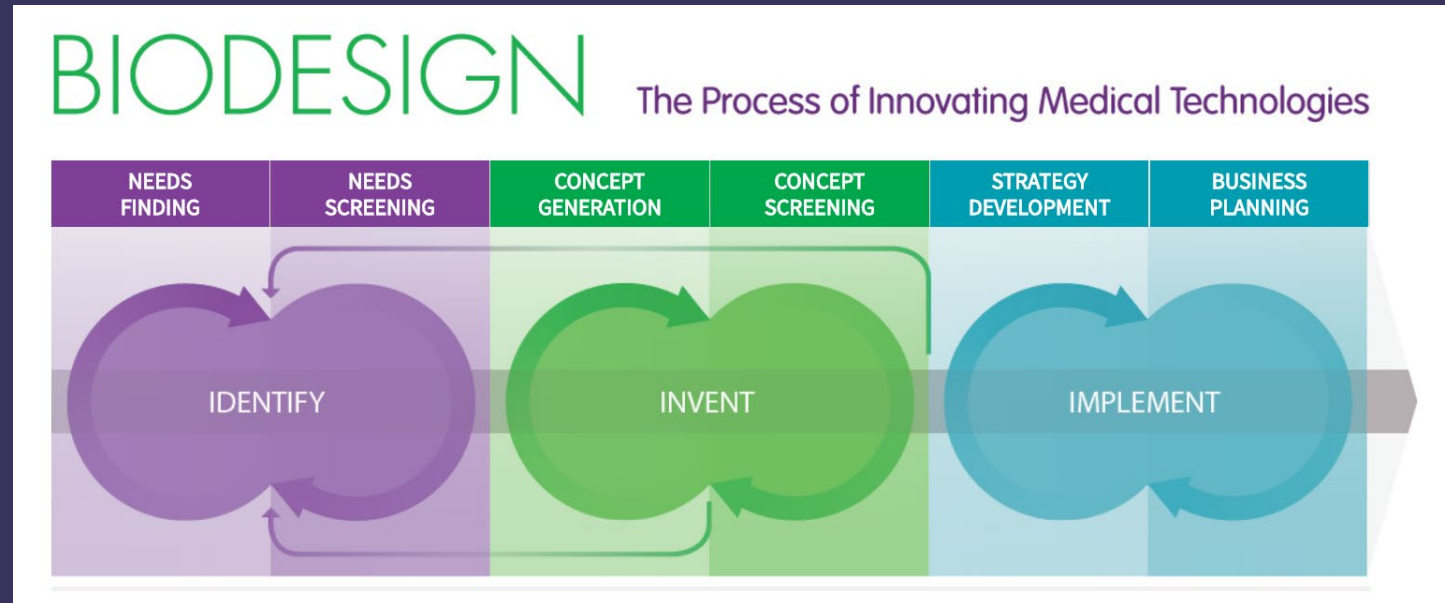
1. Advisory Roles: Doximity, XRHealth
2. Medical Legal
3. Funding:
 1. Ochsner LSU-Shreveport Collaborative Intramural Research Program
 2. Terence C. D'Souza, MD, Fellowship in Neuroscience
 3. Ochsner Philanthropy, Academics, & Neurosciences

Outline

1. BioDesign
2. Past to Present: Advanced Visualization
3. Future Directions: Ochsner Neuroscience Institute
4. Discussion

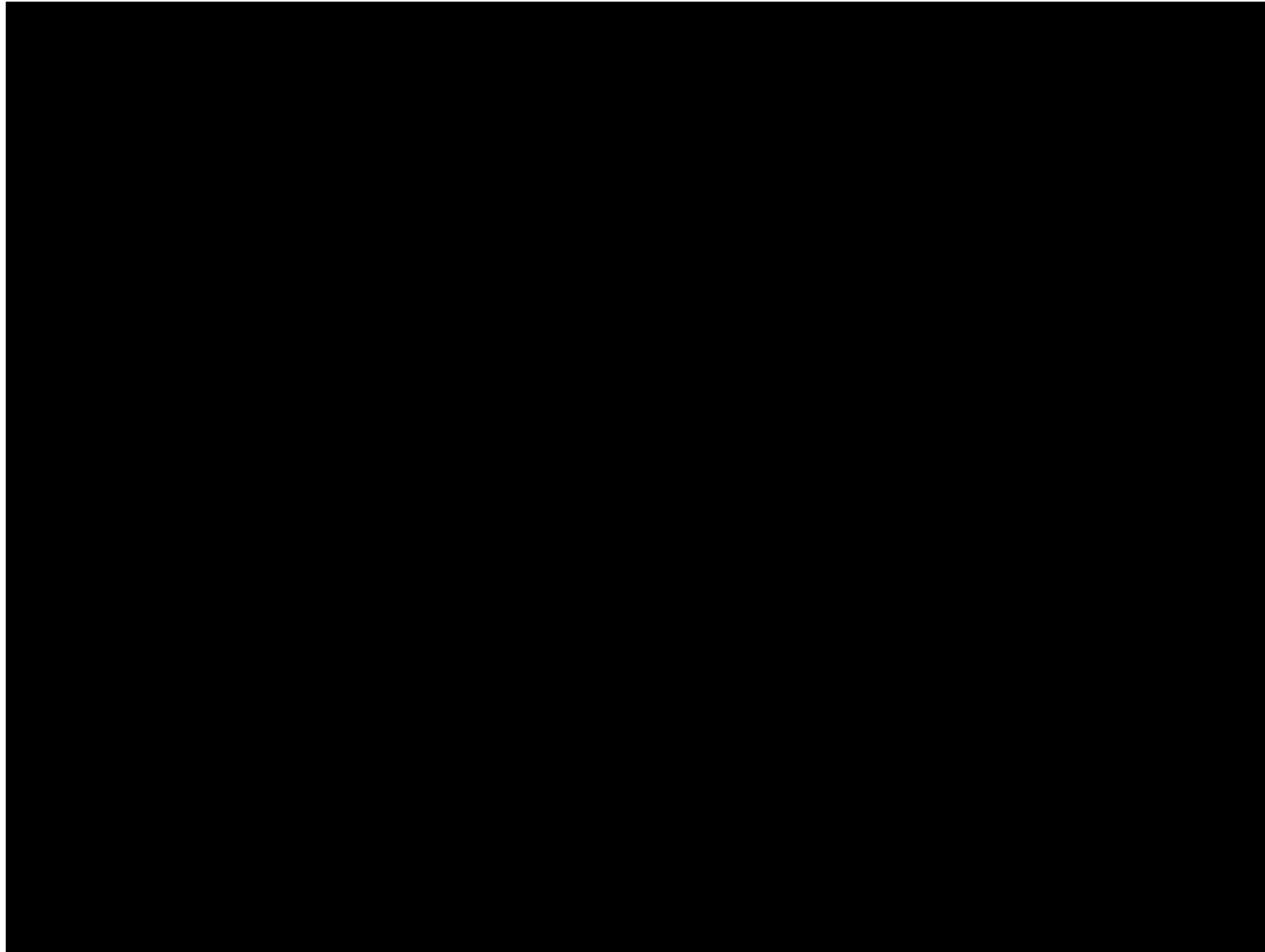
BioDesign

- Needs Finding & Selection
- Prototyping/Brain Storming
- Compliance/Regulatory
- Sustainability
- Defensibility/**Validation**
- **Clinical Integration**

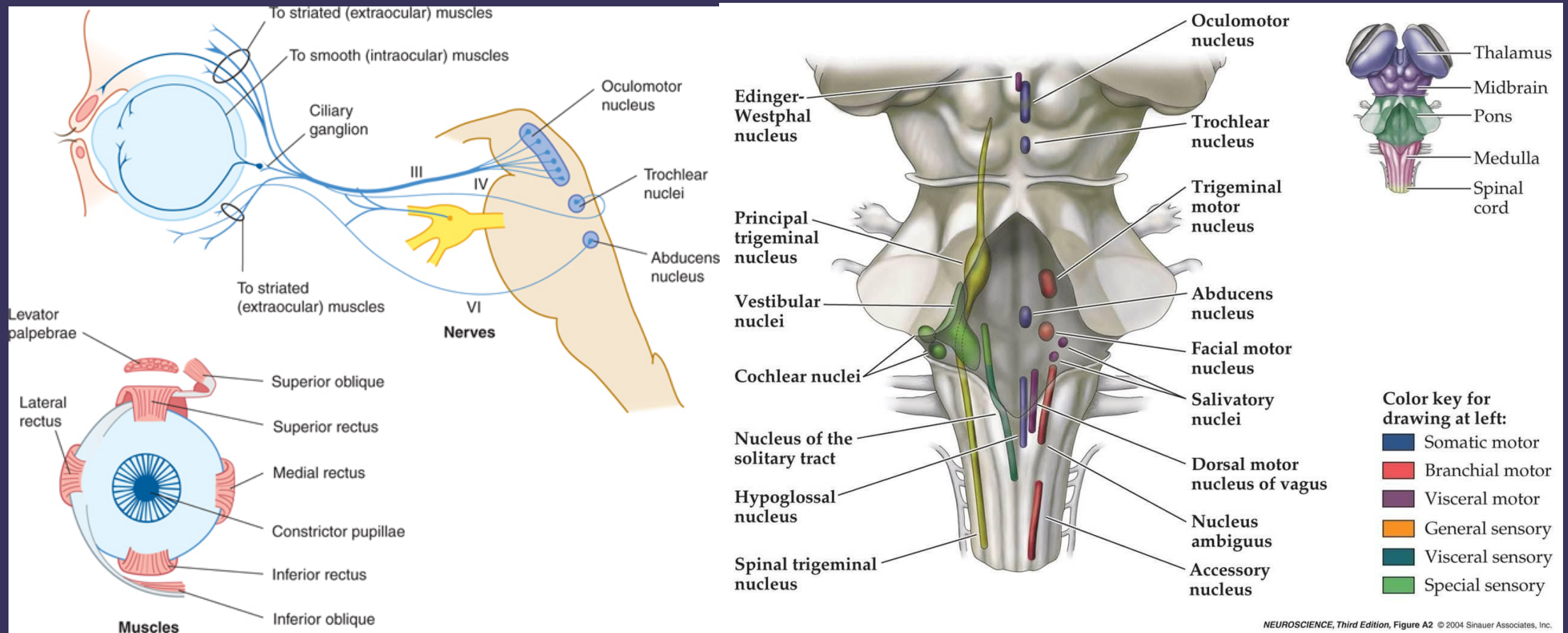


Denend, Lyn. *Biodesign*. Cambridge University Press, 2015.

Need: Visualization

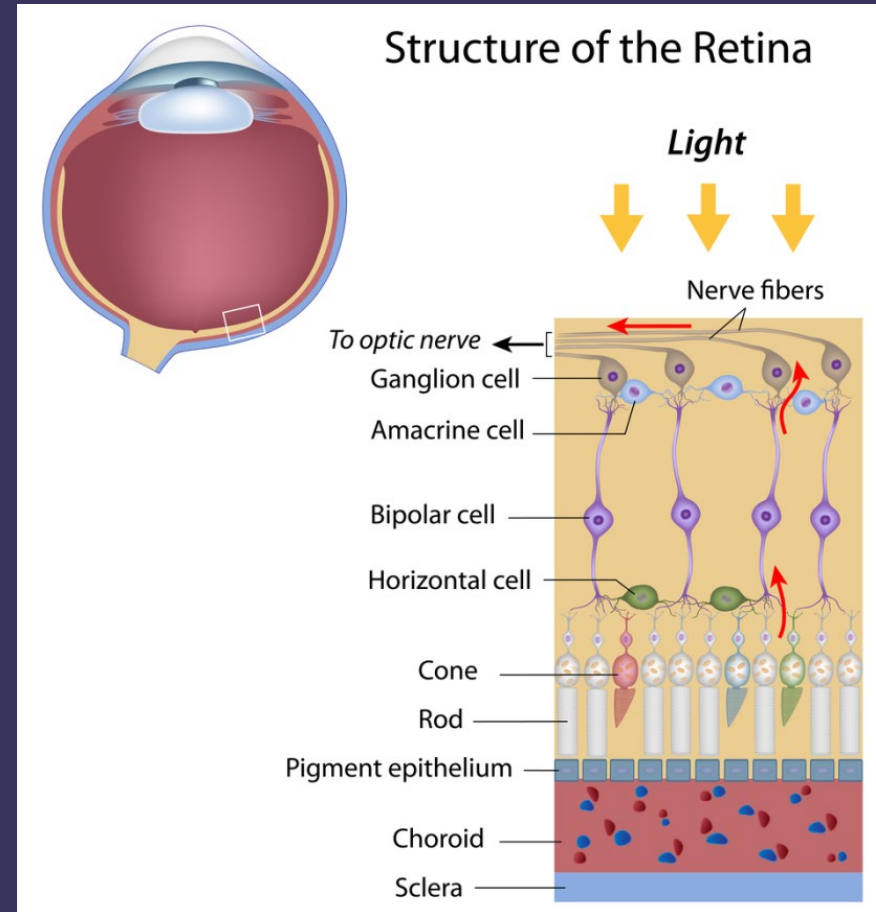


Sensor Control: Oculomotor

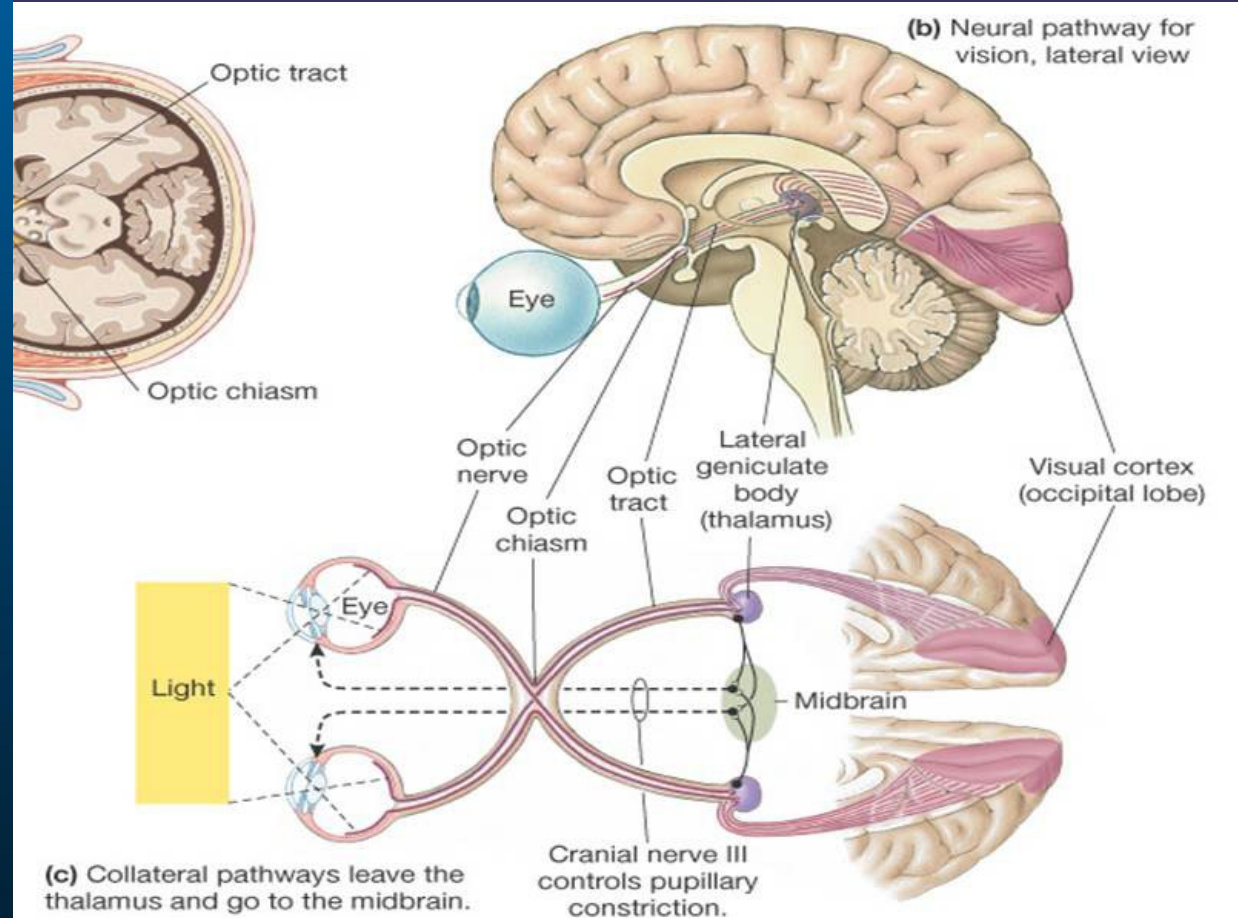
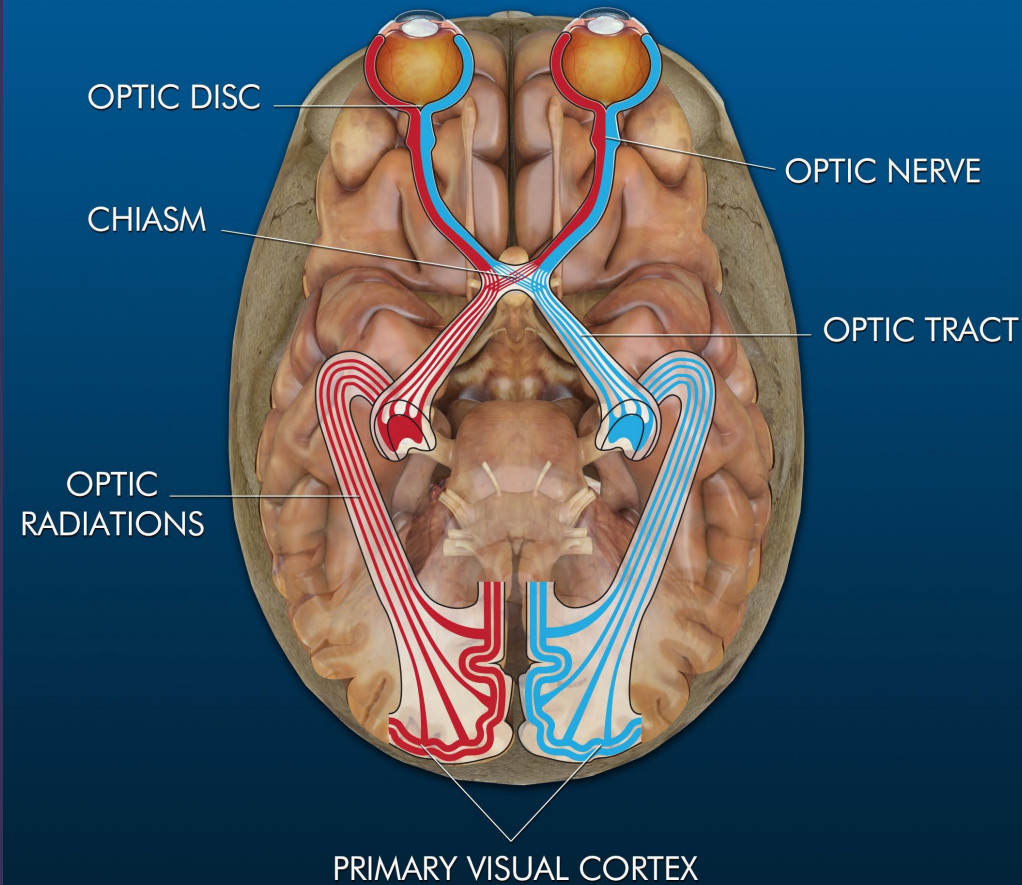


NEUROSCIENCE, Third Edition, Figure A2 © 2004 Sinauer Associates, Inc.

Sensor: Retina



Transmission: Optic Nerve to Thalamus



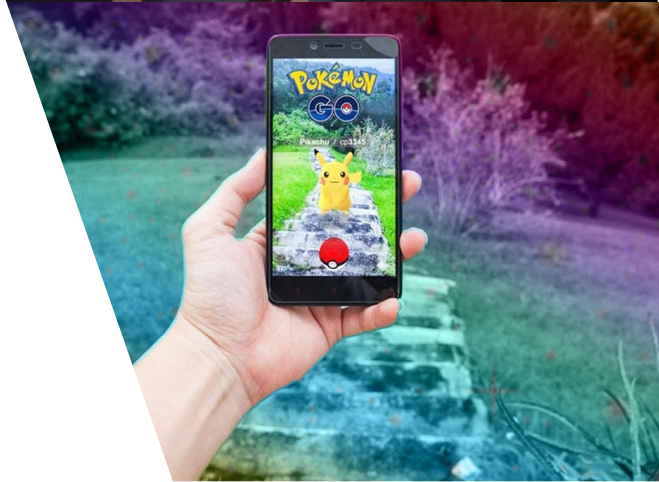
3DPrinting



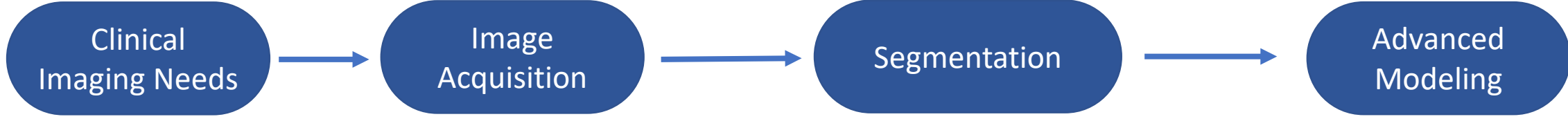
 Ochsner

Mixed Reality: VR and AR

- **Virtual Reality** is an artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment
- **Augmented Reality** is a form of technology that superimposes a virtual image onto the user's view of the real world, offering a life-like and often interactive virtual overlay onto a real world environment



Learnings & WorkFlow:



Radiology

3D Rendering Process

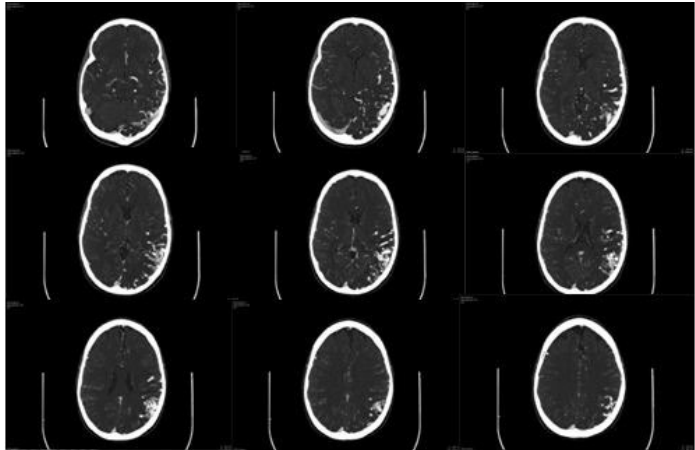
Neuroscience

Transplant

Cardiac

Orthopedics

Image Ordering



EMR Order: Model Request

3DV

3DP

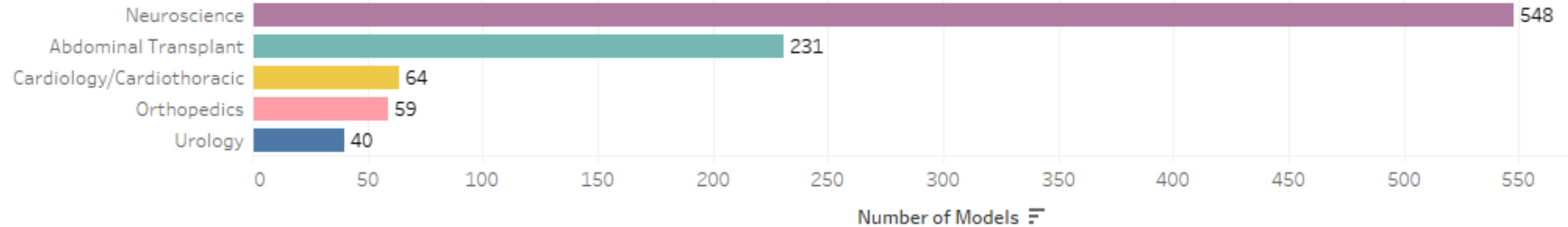
VR

AR/Holo

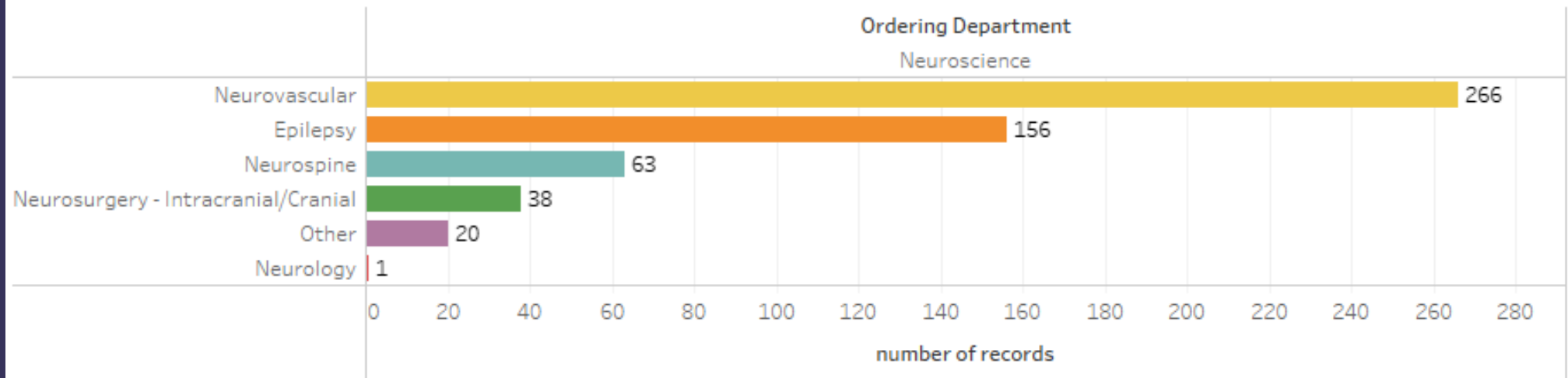


AV through the Enterprise

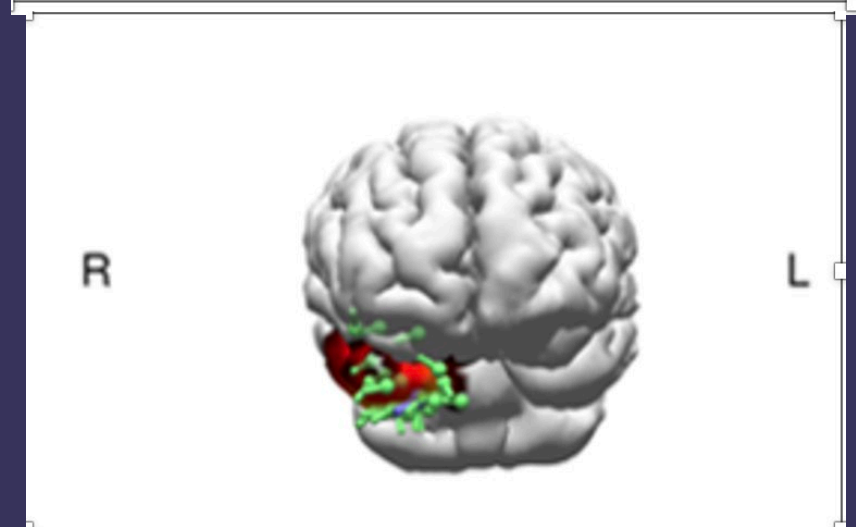
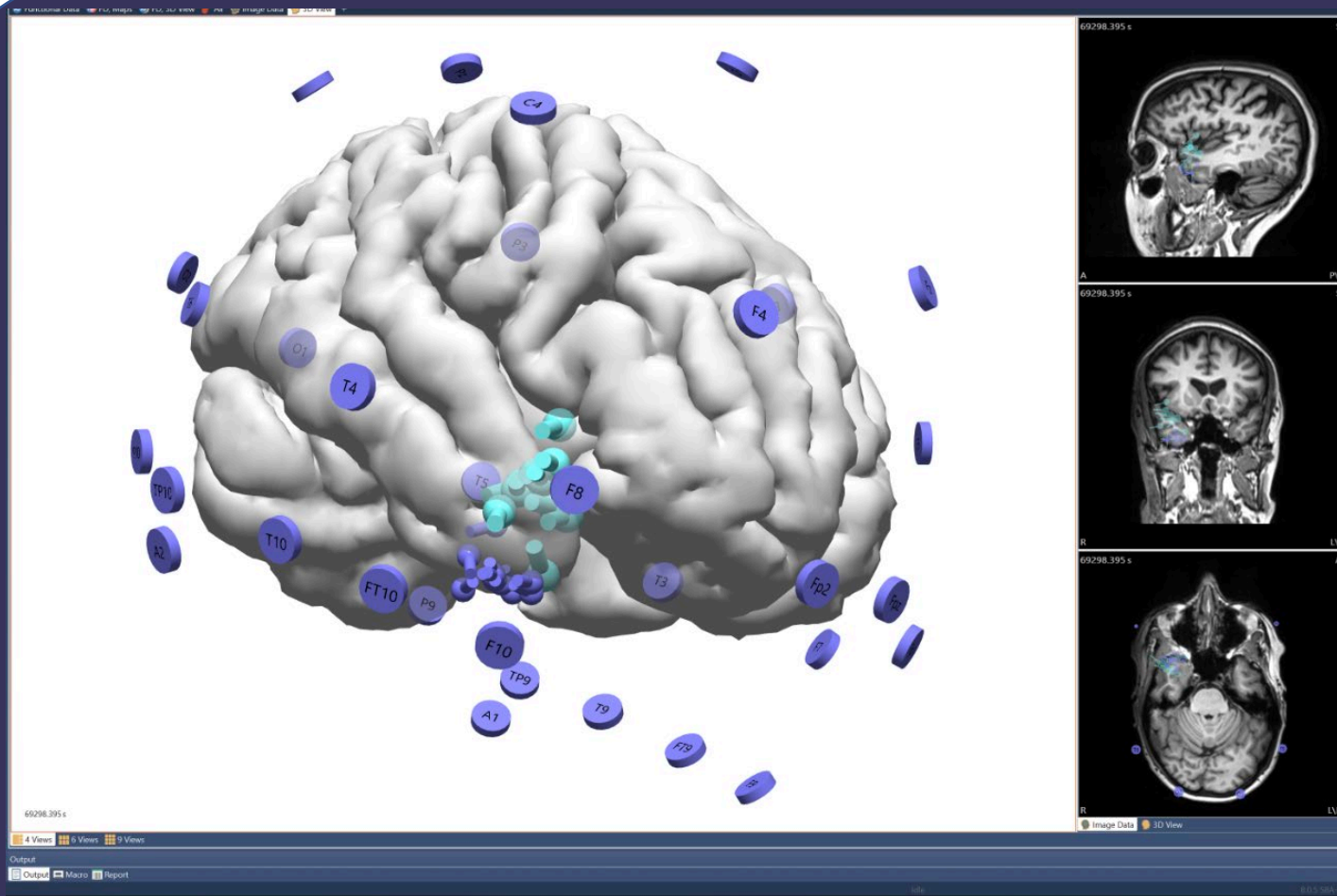
OBL Top Utilizers from 2019-2025



Neuroscience Subspecialty Cases from 2019-2025



Visualization in Epilepsy Management



Impact on Therapeutic Approach & Utilization

Bar Chart: Change in Therapeutic Procedures

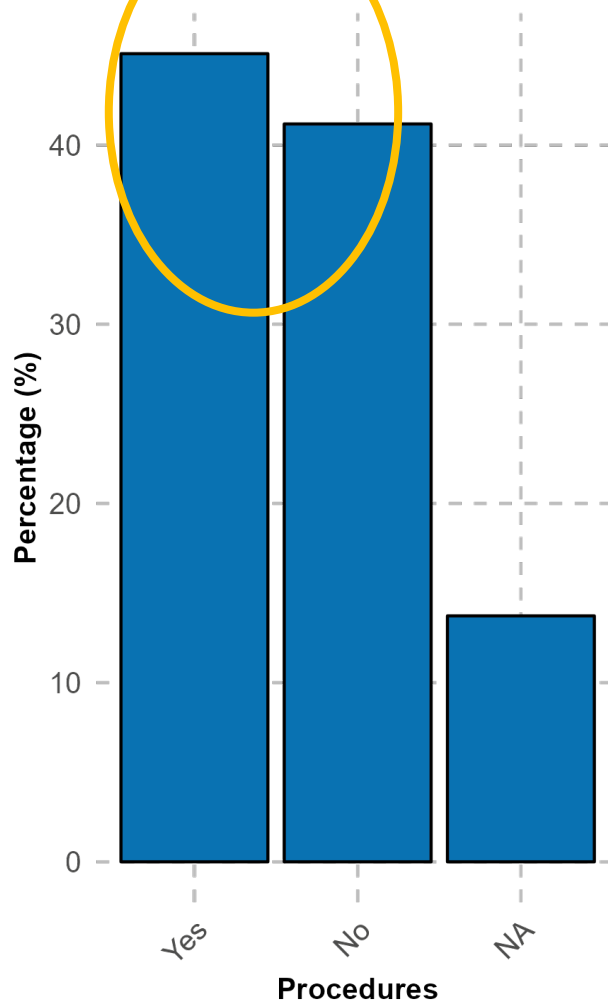
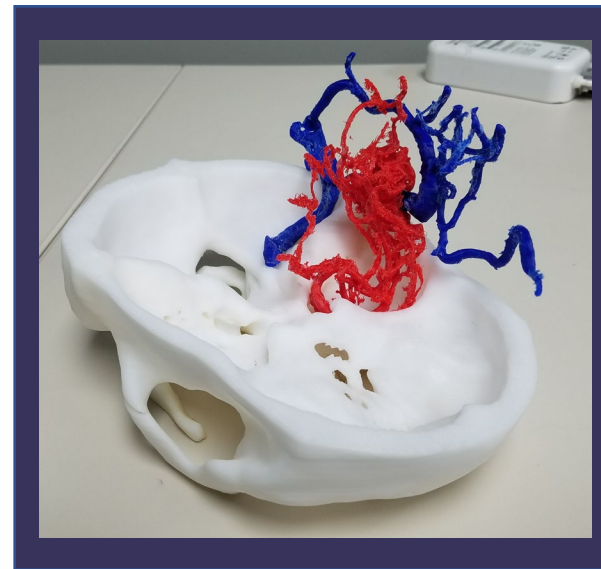


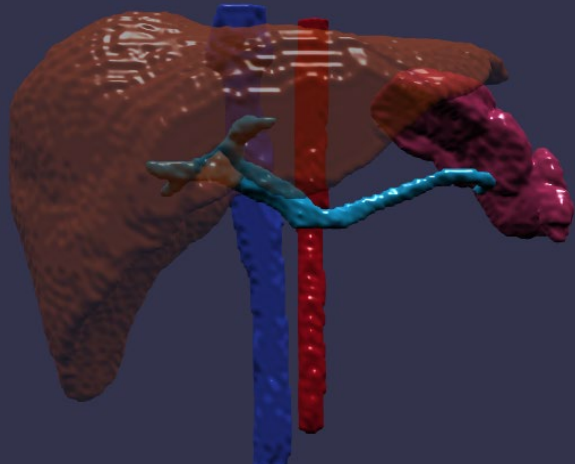
Table 2. Surgical Time Metrics

	Treatment (n=174)	Control (n=522)	Difference (treatment minus control)	p-value
Mean Anesthesia time (in minutes)	204.59	231.4	26.81	0.044

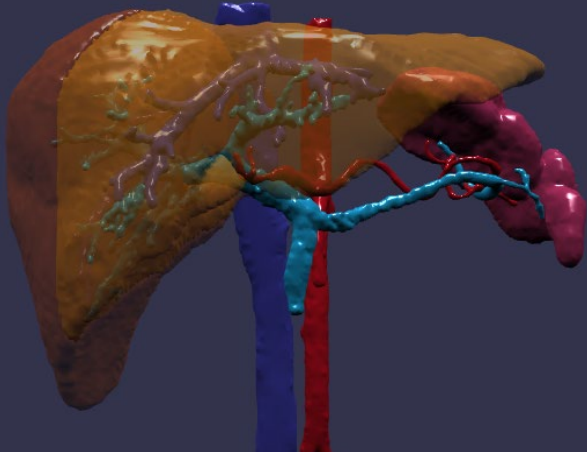


Preoperative planning using 3D anatomical models was associated with improved surgical efficiency. The 3D group (n = 174) demonstrated significantly shorter anesthesia (p = 0.044). When combining all cases in each group, the 3D group had a net savings of \$1574.64 per case.

Artificial Intelligence: ML-Assisted Segmentation

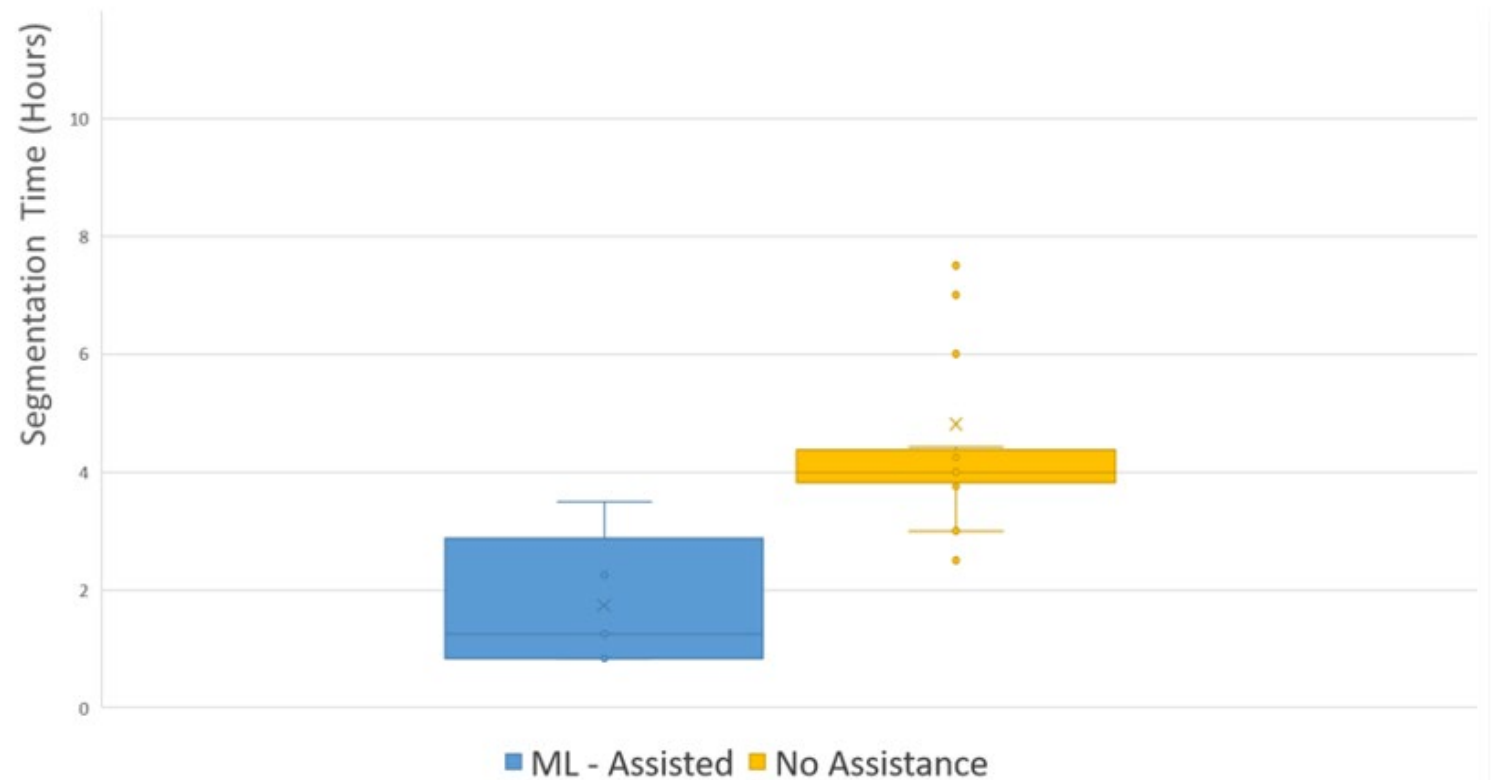


MACHINE LEARNING MODEL (ML)



MANUAL

ML - Assisted Segmentation vs. No Assistance in Liver Donor Transplant



Advanced Visualization: **Artificial Intelligence**

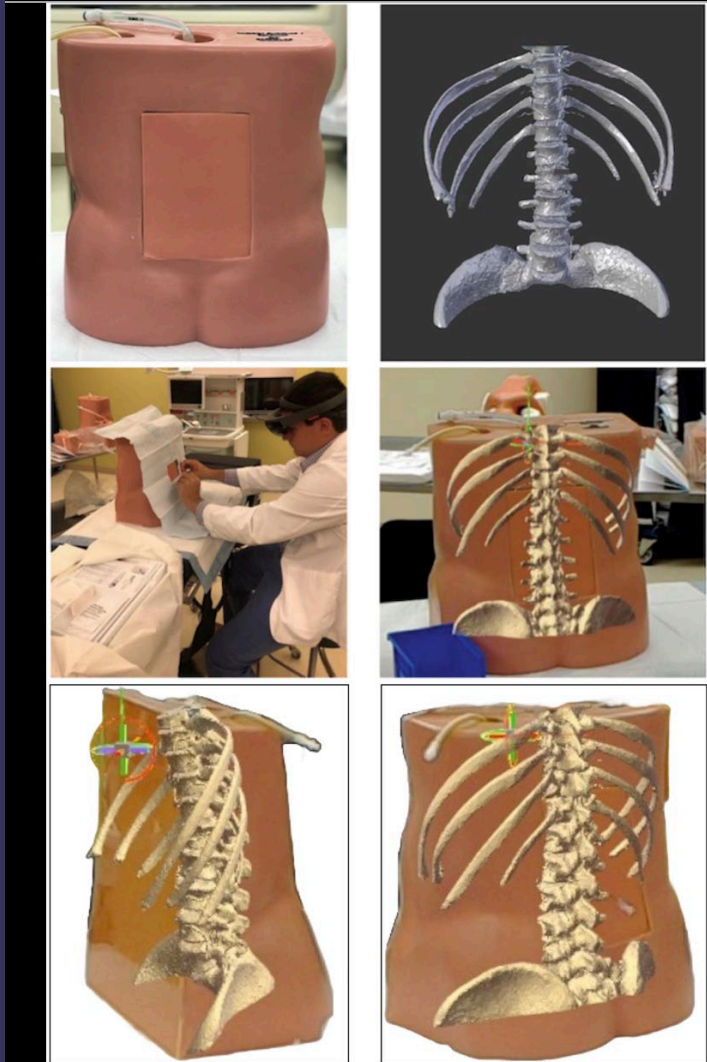
**Lean Down & Scale Up: Scripting and
AI Automation for 3D Planning—
Spotlighting **Ochsner Health**
BioDesign Lab**



Medical Extended Reality

Medical extended reality (**MXR**) has emerged as a dynamic field at the intersection of health care and immersive technology, encompassing virtual, augmented, and mixed reality applications across a wide range of medical disciplines.

Medical Simulation & Training



- Pilot the use of **AR in the Lumbar Puncture** simulation with Medical Students
- Confirm Feasibility
- Scaled trial with next generation head-mounted displays (HMD)
- Different Procedures: Kidney Transplant, TAH, neuro-interventional
- **Beyond Simulation?**
- **Sarkar, K.,** J. Coote, R. Abdul, and A. Slayden, *Feasibility, Adoption, and Utility of Augmented Reality in Lumbar Puncture Simulation by Medical Students: A Pilot Study.* *Journal of Medical*

XR in Neuro-Rehabilitation



Sarkar K, Delpy K, Skelton S, Slayden A and Villemarette-Pittman NR. Design and preliminary evaluation of a VR-based optokinetic stimuli system for vestibular rehabilitation: insights from clinical end users. Front. Med. 13:1766706. doi: 10.3389/fmed.2026.1766706

Connecting Ochsner to External Partners

Ricoh Partnership: Neurovascular Phantoms



MakeGoodNOLA: Custom Walker for Ataxia

#makegood #pt #ot #neuro #ataxia #disability #accessibility #design
#3Dprinting #health #collaboration



Assistive Technologies: Augmentative & Alternative Communication (AAC)

TEAM  GLEASON



Emerging neurotechnology: Brain Computer Interface Interface (BCI)



[Brain Initiative event 2016](#)



Figure 1: **Paradromics** Connexus Direct Data Interface (DDI) conceptual illustration

How it Started



How's it Going



- Core Services Include 3D Printing, Virtual Reality and Augmented Reality
- Allow for Anatomical Modeling, Medical Education/Pre-Operative Planning and Procedural Training
- Current Applications in Transplant, Neurosurgery, Neurology and Orthopedics
- Planned Future Growth to Include True Medical Additive Manufacturing, Design and Peri-Procedural Guidance



How's it going to **Be?** Ochsner Neuroscience Institute (**ONI**)



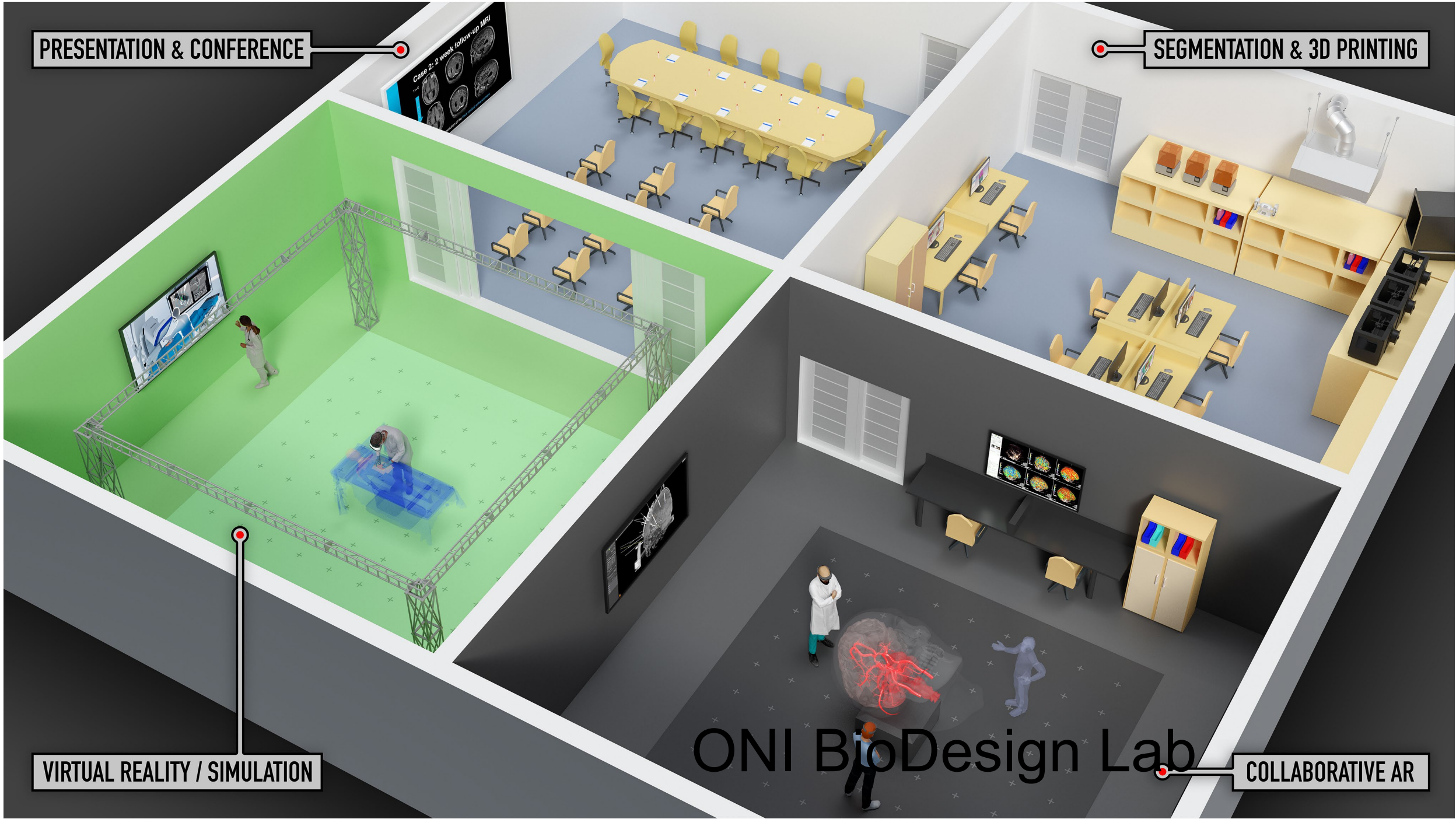
PRESENTATION & CONFERENCE

SEGMENTATION & 3D PRINTING

VIRTUAL REALITY / SIMULATION

COLLABORATIVE AR

ONI BioDesign Lab



The BioDesign Team

- Anatomical Modeling
- AI & Machine Learning
- Software Development
- Research & Development
- Data Modeling & Analytics
- Virtual and Augmented Reality
- Biomedical Engineering
- Innovation Partner



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CLINICAL DIRECTOR



Dr. Nicole Villemarette-Pittman
RESEARCH DIRECTOR



Kimberly Hughes
SR. PROJECT COORDINATOR



Colin Curtis
BIOENGINEER



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Informaticist



Alec Slayden
IMMERSIVE TECH DEVELOPER



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Research Associate



Leo Seoane
AI Engineer



Rahim Abdul
Biostatistician

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