

Artificial Intelligence in My Clinical Practice

Nassir Marrouche, MD

Director of Tulane Heart and Vascular Institute

Tulane Research Innovation for Arrhythmia Discovery (TRIAD)

Tulane University School of Medicine

@nmarrouche

Clinical Case

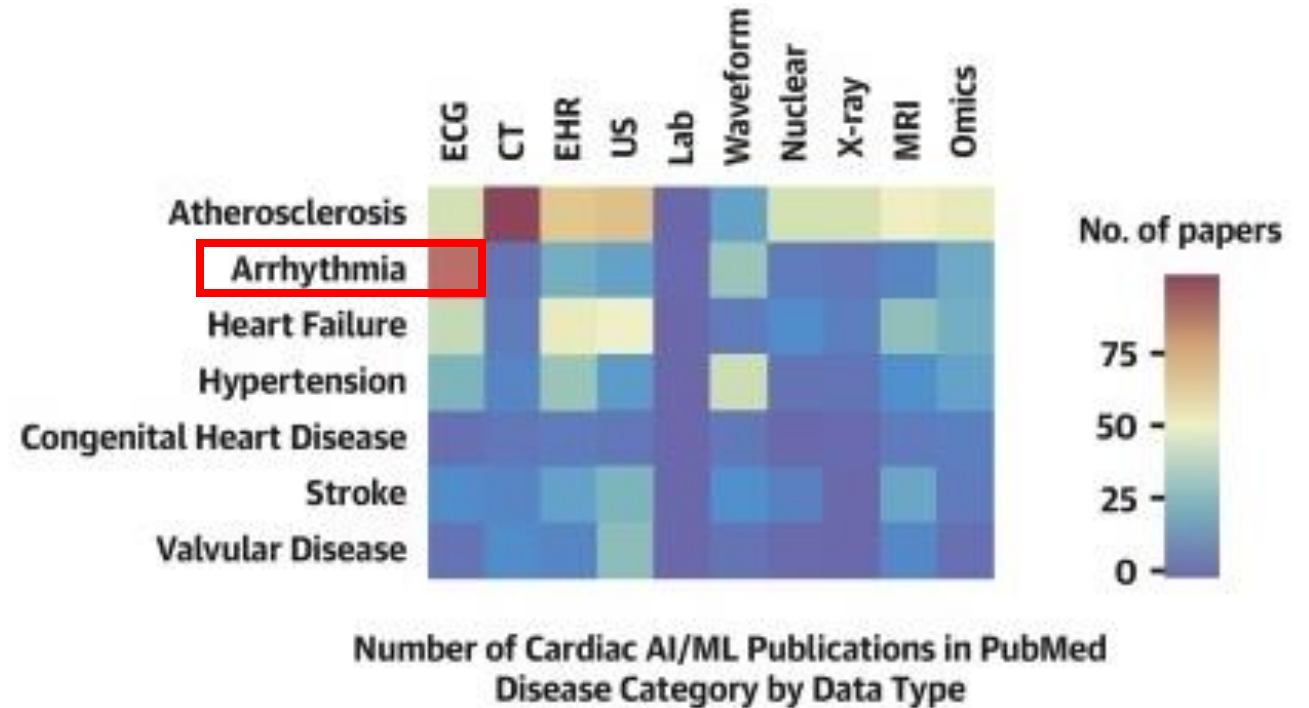
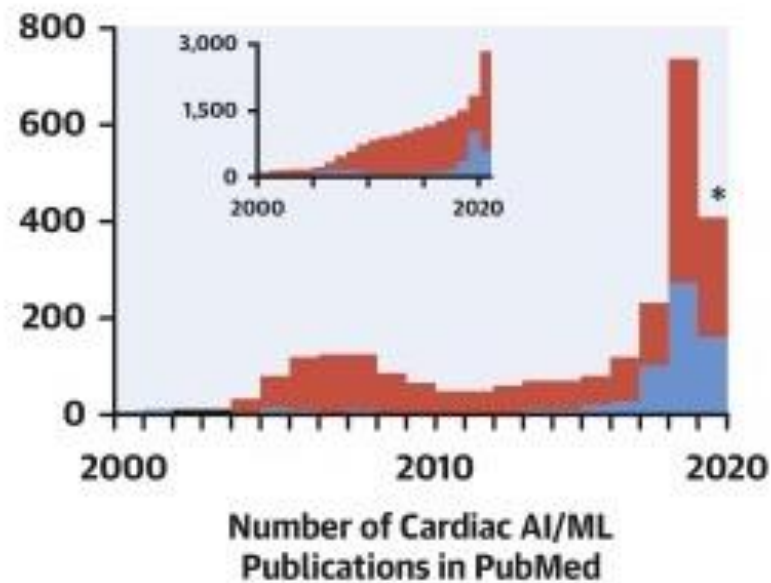
John, 70-Year-Old

Year 2006

Could We Have
Prevented This?

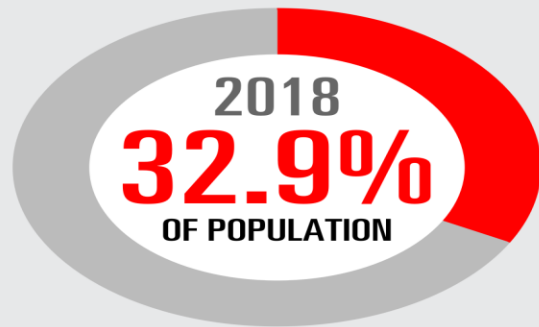


Growth in Cardiac AI/ML



Growth in Digital Health Means Big Data!

How Many Millennials Are Using Wearables in the US?



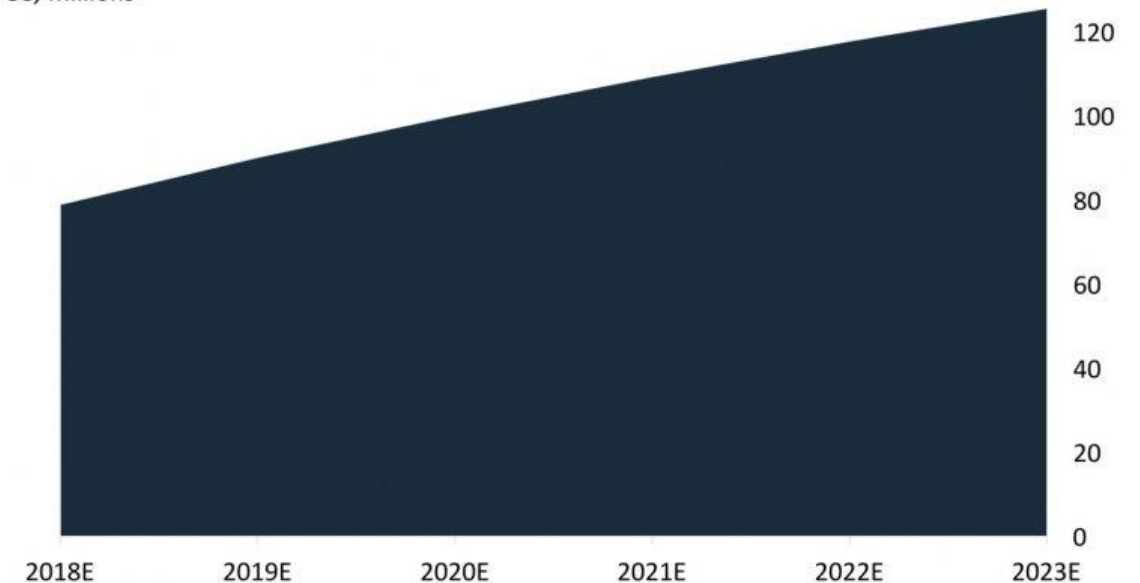
Note: at least once per month; individuals born between 1981 and 1996 who wear accessories or clothing embedded with electronics, software or sensors that have the ability to connect to the internet (via built-in connectivity or tethering), which in turn collects and exchanges data with a manufacturer, operator or other connected devices. Wearables include items such as activity trackers, smart bands, smart clothing, smart glasses, smart headphones, smartwatches and virtual reality headsets. The device must have features that can be used without being tethered to a smartphone, PC or other internet-connected device.

Source: eMarketer, October 2018



FORECAST: Fitness Tracker And Health-Based Wearable Installed Base

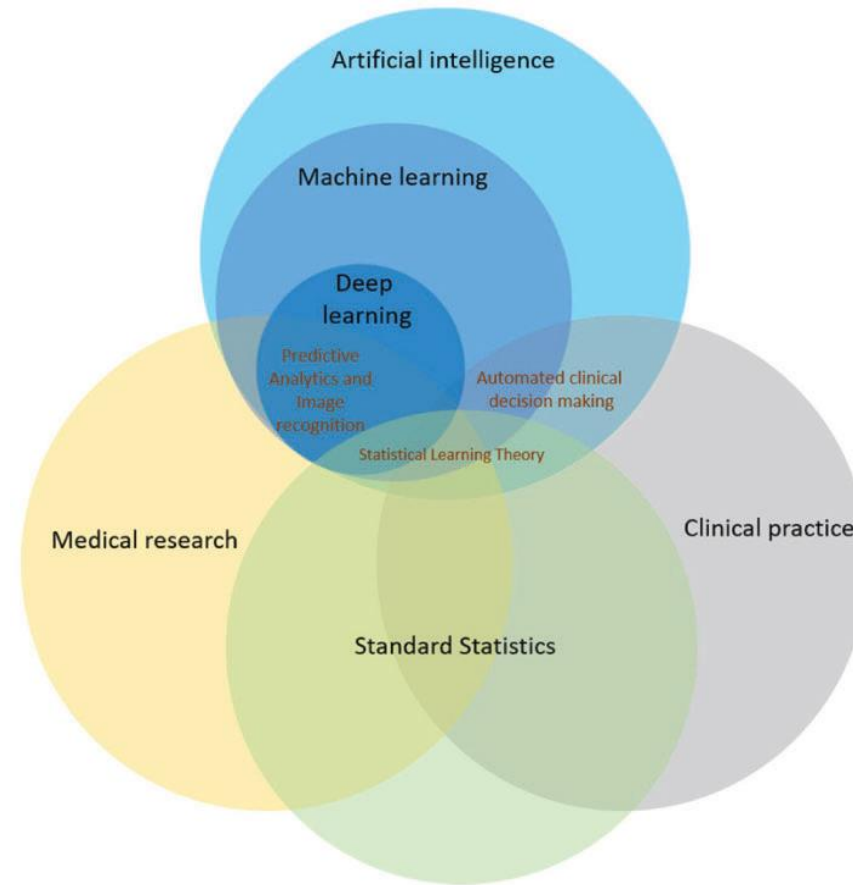
US, millions



Source: Business Insider Intelligence estimates, 2018; Mozilla, 2017

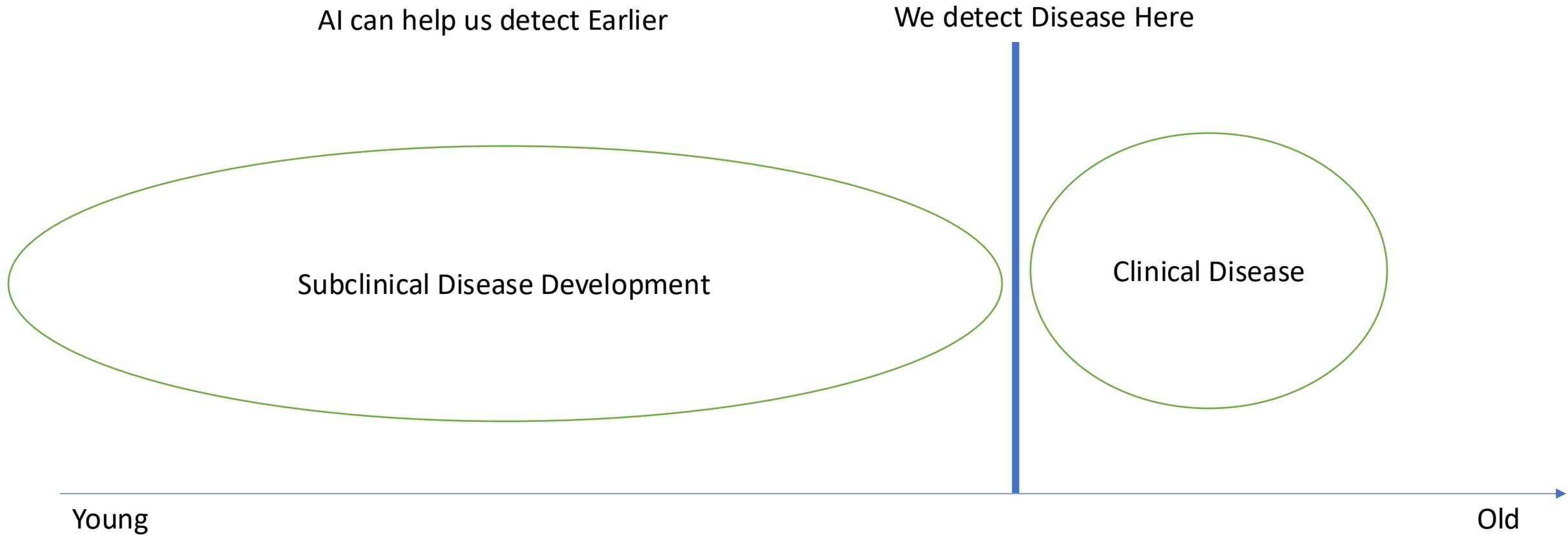
BUSINESS
INSIDER
INTELLIGENCE

Integration of AI, ML and DL in clinical medicine



Wehbe RM et al. Predicting High-Risk Patients and High-Risk Outcomes in Heart Failure. *Heart Fail Clin.* 2020

Disease Develops Years Before We Detect It



Episodic
(traditional)



Continuous
(real-time)



1 week

Consumers/Patients Are Already Evaluating Themselves

Wearable Device Use at Tulane Clinics Today

75%



Physicians Welcome Wearables In Their Practice

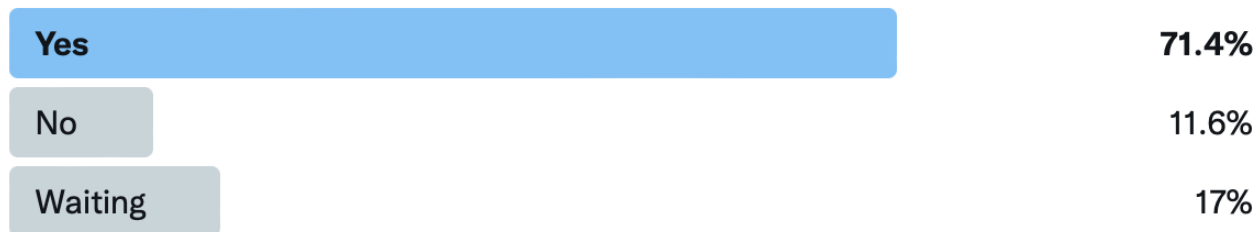


Nassir Marrouche

@nmarrouche

...

Do you welcome wearables ([#AppleWatch](#), [#googleWatch](#), [#SamsungActive](#), [#alivecor](#), [#ECGCheck](#) etc.) into your daily practice to acquire your patient's [#ECGs](#)? [@drsuneet](#) [@CMichaelGibson](#) [@PassmanRod](#) [@khalountarakji](#) [@Dr_Santangeli](#) [@SergioPinski](#) [@Phiso_de](#) [@EricTop](#)

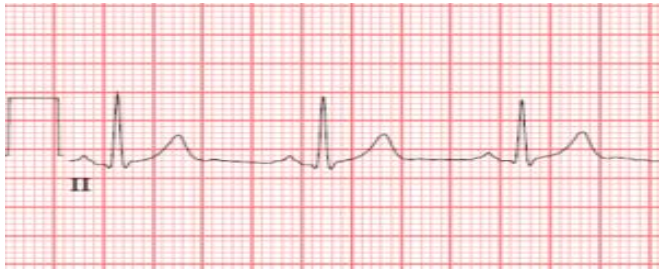


147 votes · Final results

9:19 AM · Mar 30, 2019 · Twitter for iPhone

Back to John Year 2024

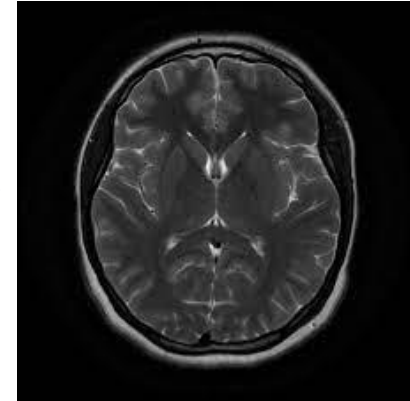
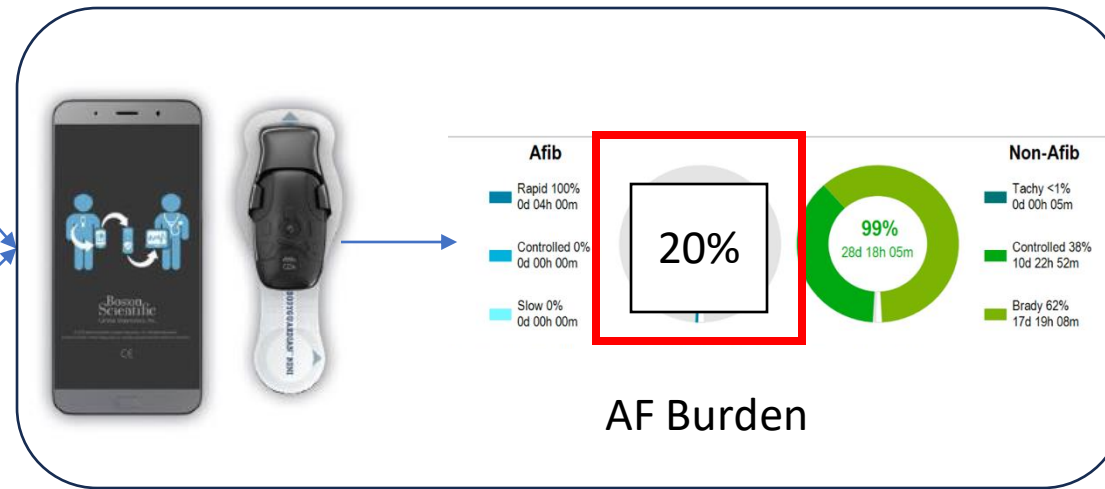
Normal ECG



Normal Echo



Continuous Telemetry



Today, We Prevent The Stroke

16 Years of Practice

DECAAF-I

DECAAF-II

Database Protocols

**200,000+ Hours of
monitoring
500 000 + ECG Strips**

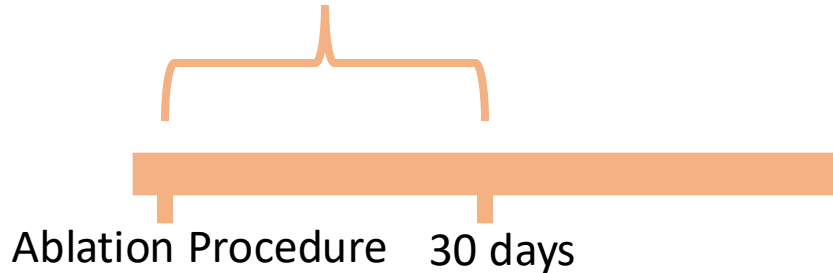
**4022 patients
7000+ Heart Scans**

Risk Stratification Based on ECG For Treatment Success



High Risk

Low Risk



AI Identifies Early Aging Based on ECG



2-Lead ECG

Chronological Age: 53

**AI Finds Your Real
Heart Age**

AI-Based Age: 57

AI in Clinical Trials: Defining Treatment Responders

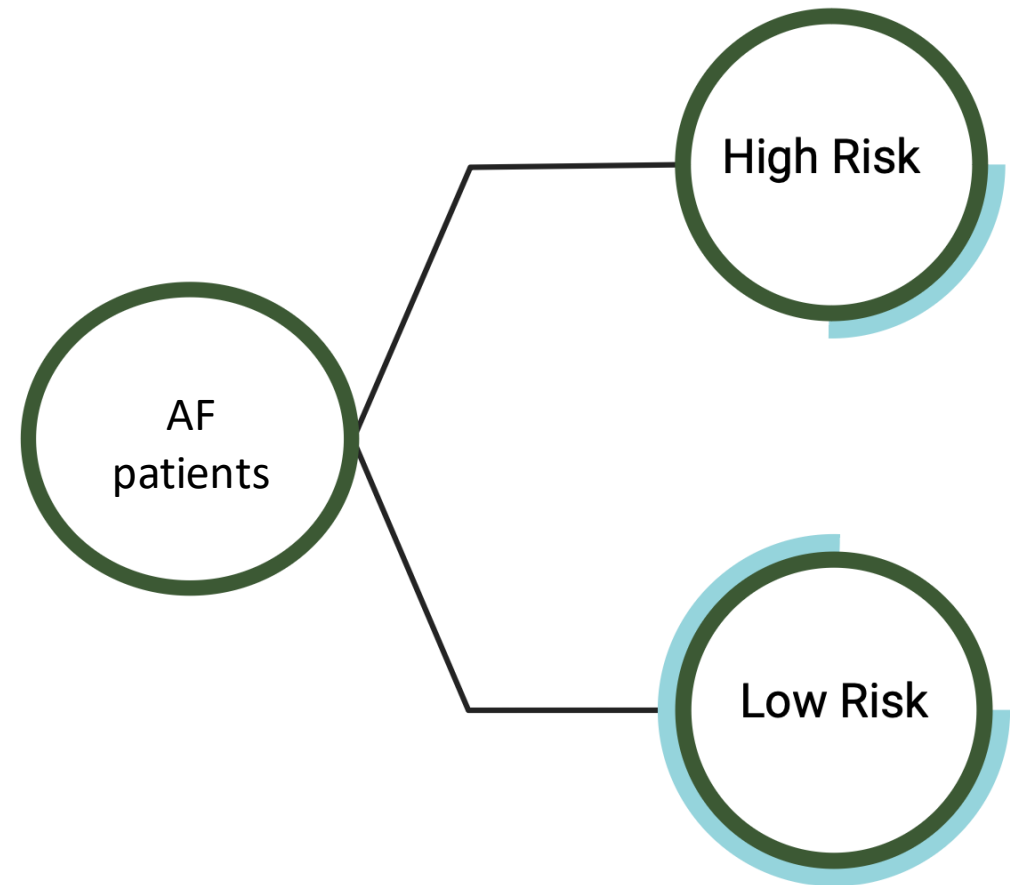
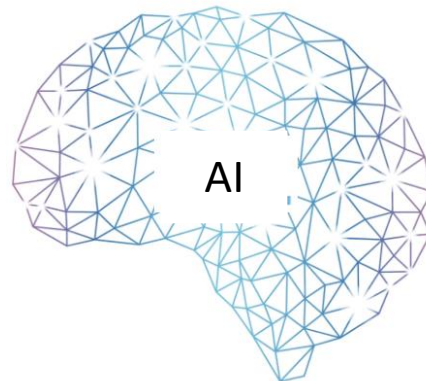
Input Characteristics:

Demographics
Comorbidities

Medications



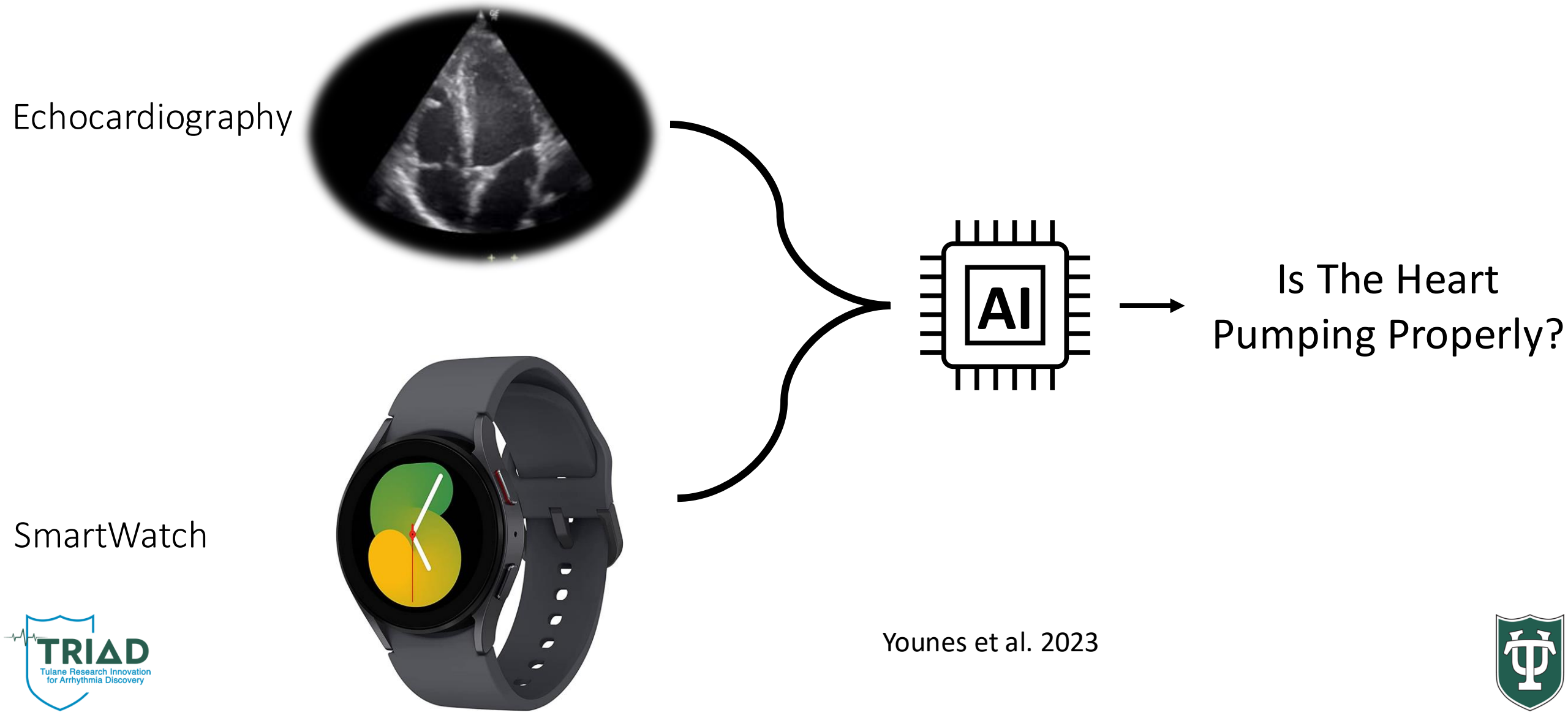
Imaging Parameters



Younes et al. 2023

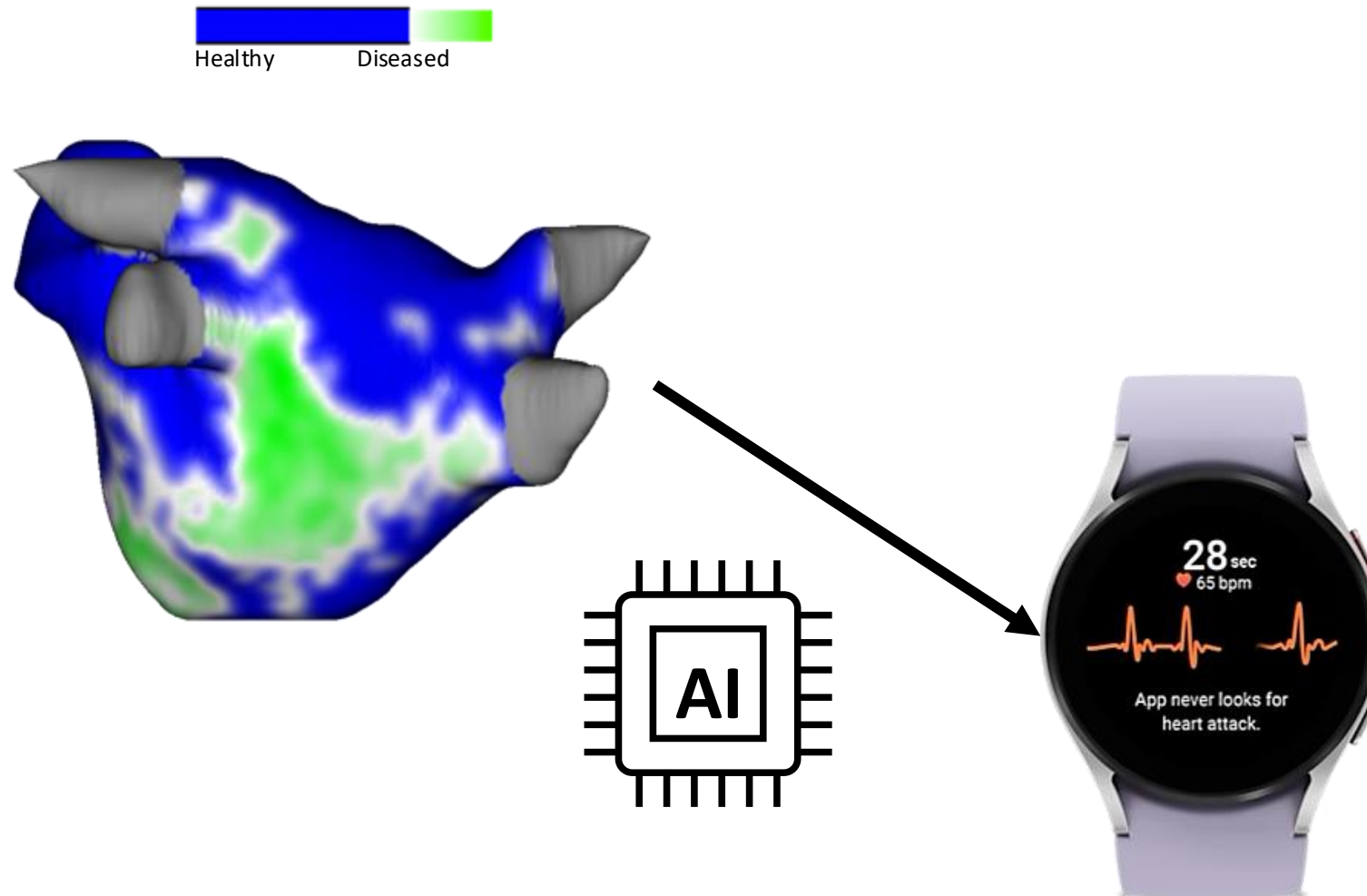
Heart Function Assessment Using Wearables

Alternative to Echo Imaging

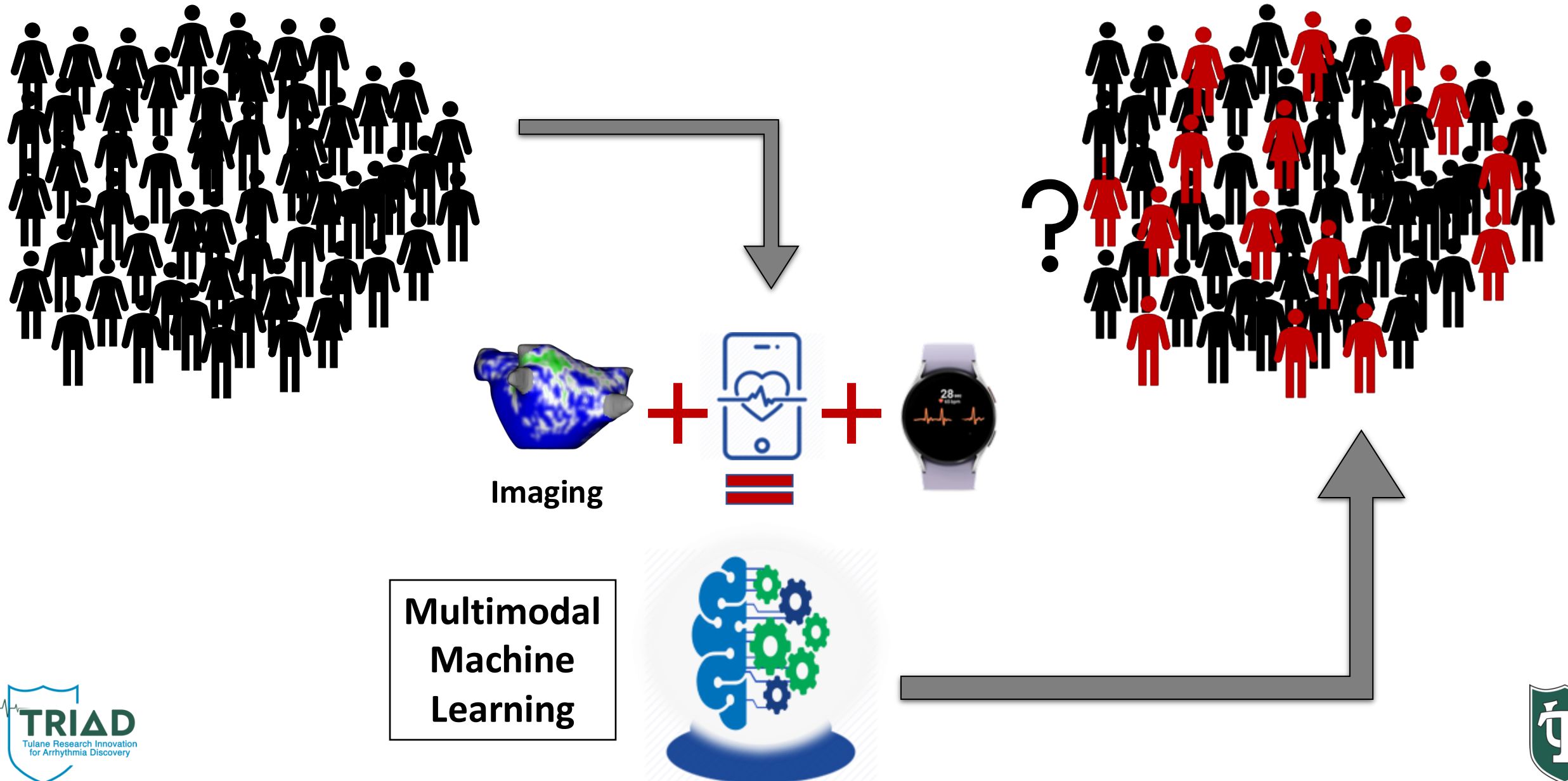


Younes et al. 2023

Connect The Watch to The Image



Tulane iPredict, Prevent Study (TiPP)

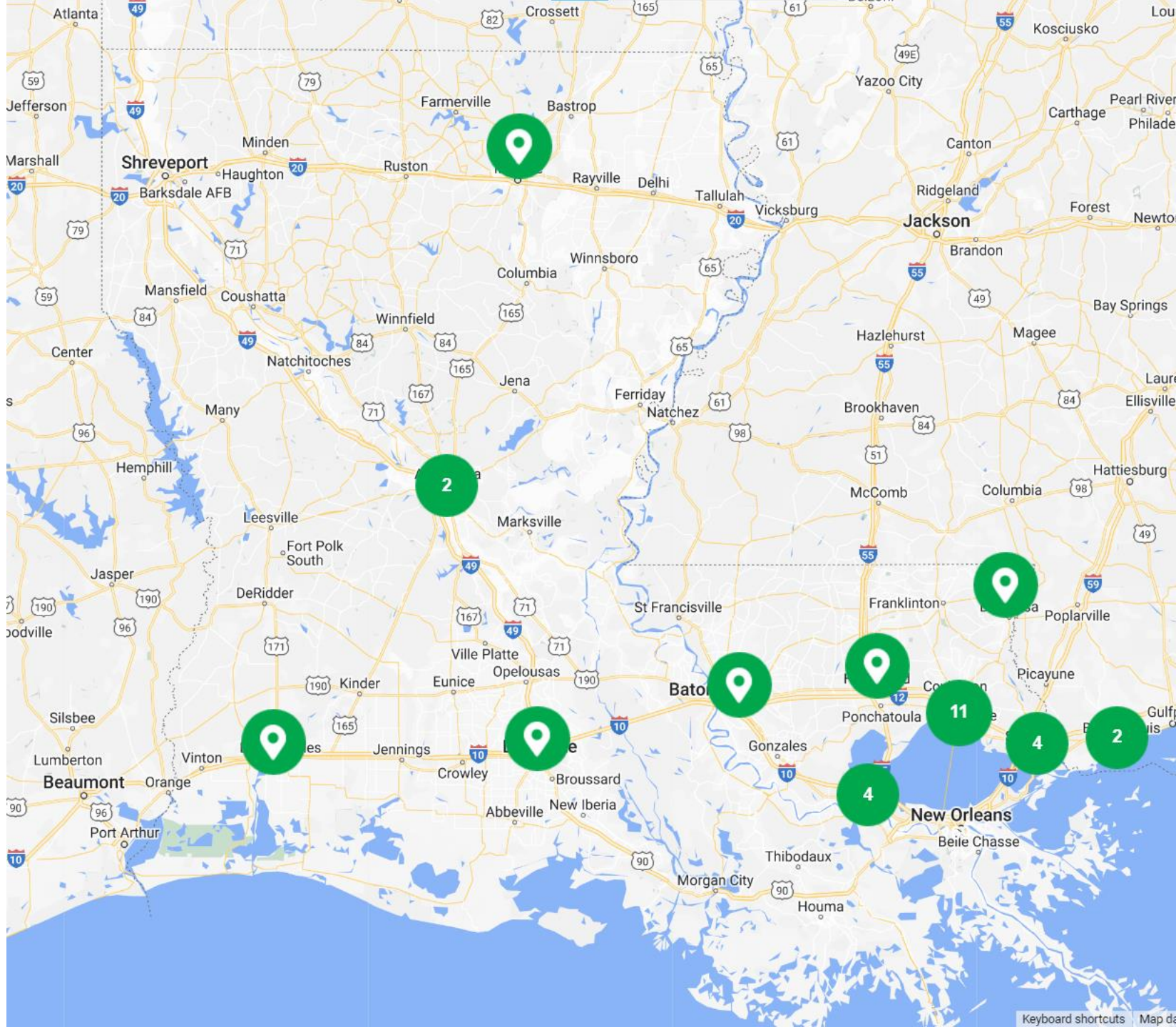


HEARTBEAT

In Partnership with
Samsung



10K
Participants



The HEARTBEAT Project



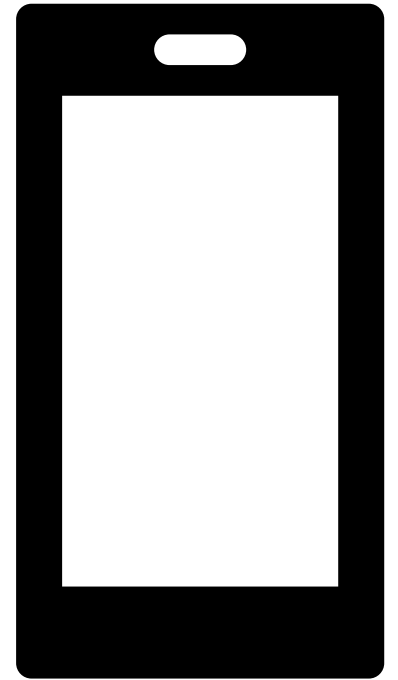
Smartwatch Data

Raw sensor data +
derived features



EMR Integration

Medical history + labs + imaging results



Smartphone App

Surveys +
Patient reported outcomes

The HEARTBEAT Project Aims

Disease
Interaction and
Vascular Aging

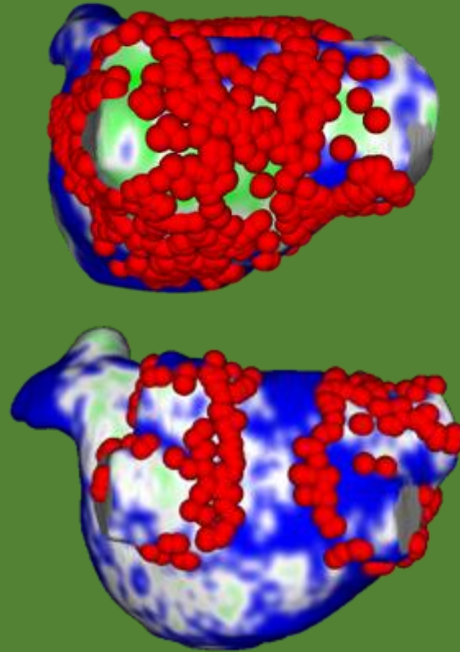
Disease
Fingerprints

Personalized Interventional Treatment of AF

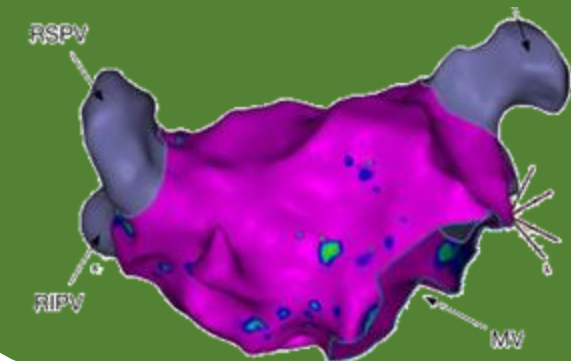
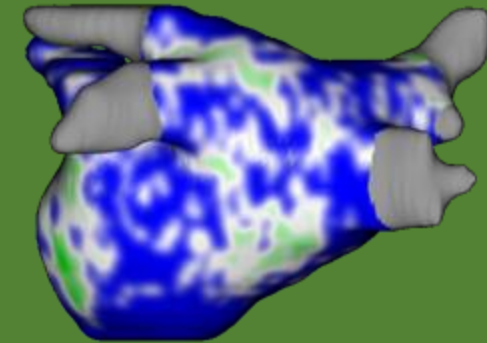
EMR

- 500+ parameters
- Demographics
- Lab history
- Vital history
- Medication history
- Procedural history

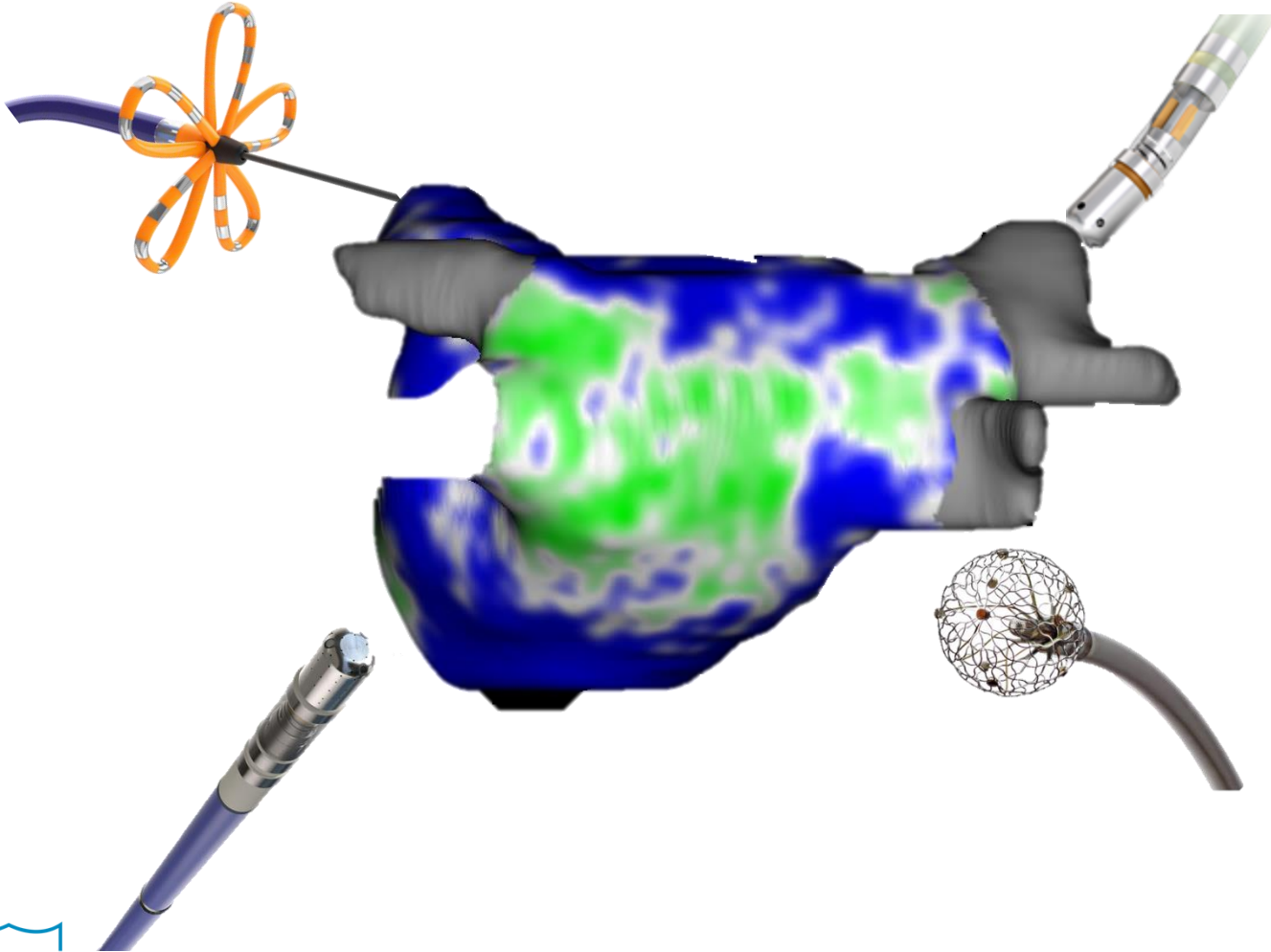
Operators



Imaging Parameters



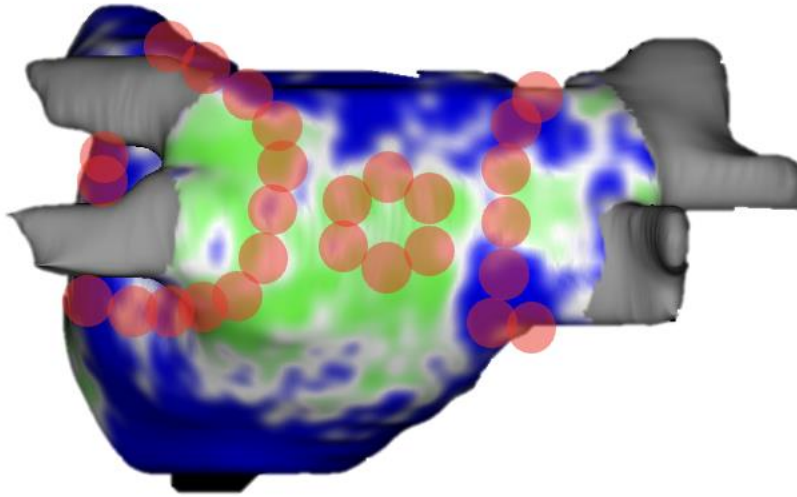
AIDA: AI Driven Procedure



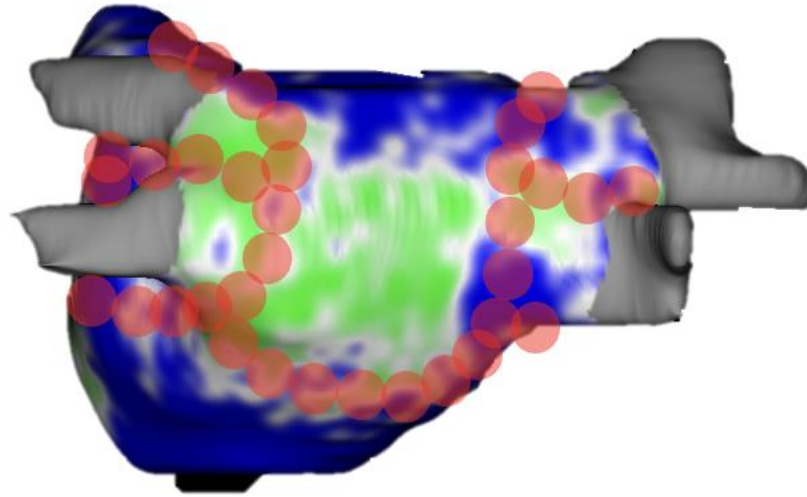
Based on Structural Information

- 500+ EMR parameters
- LA Volume
- Regionality
- Regional Shape
- Myopathy

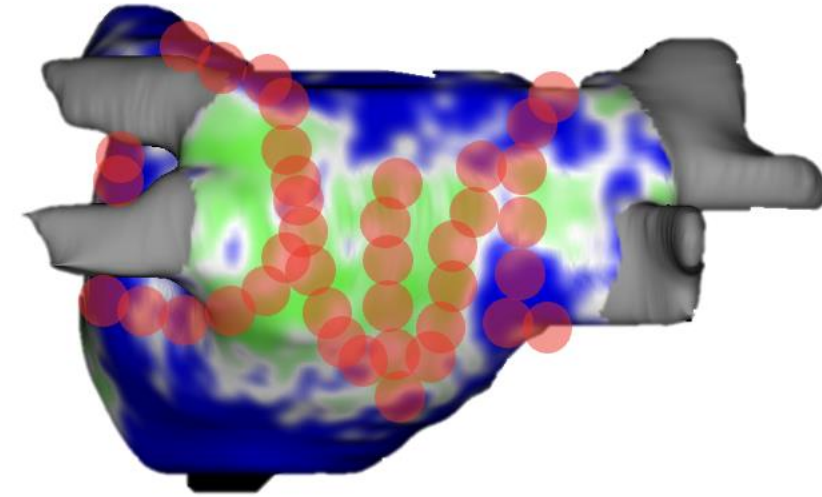
AIDA: AI Driven Procedure



John



Jake



Elena



Thank You