

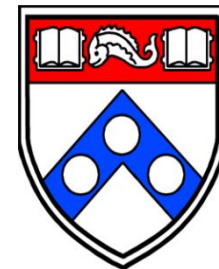
# Integrated Diagnostics

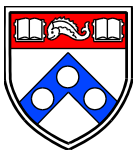
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Mitchell Schnall MD, PhD

Eugene P. Pendergrass Professor of Radiology

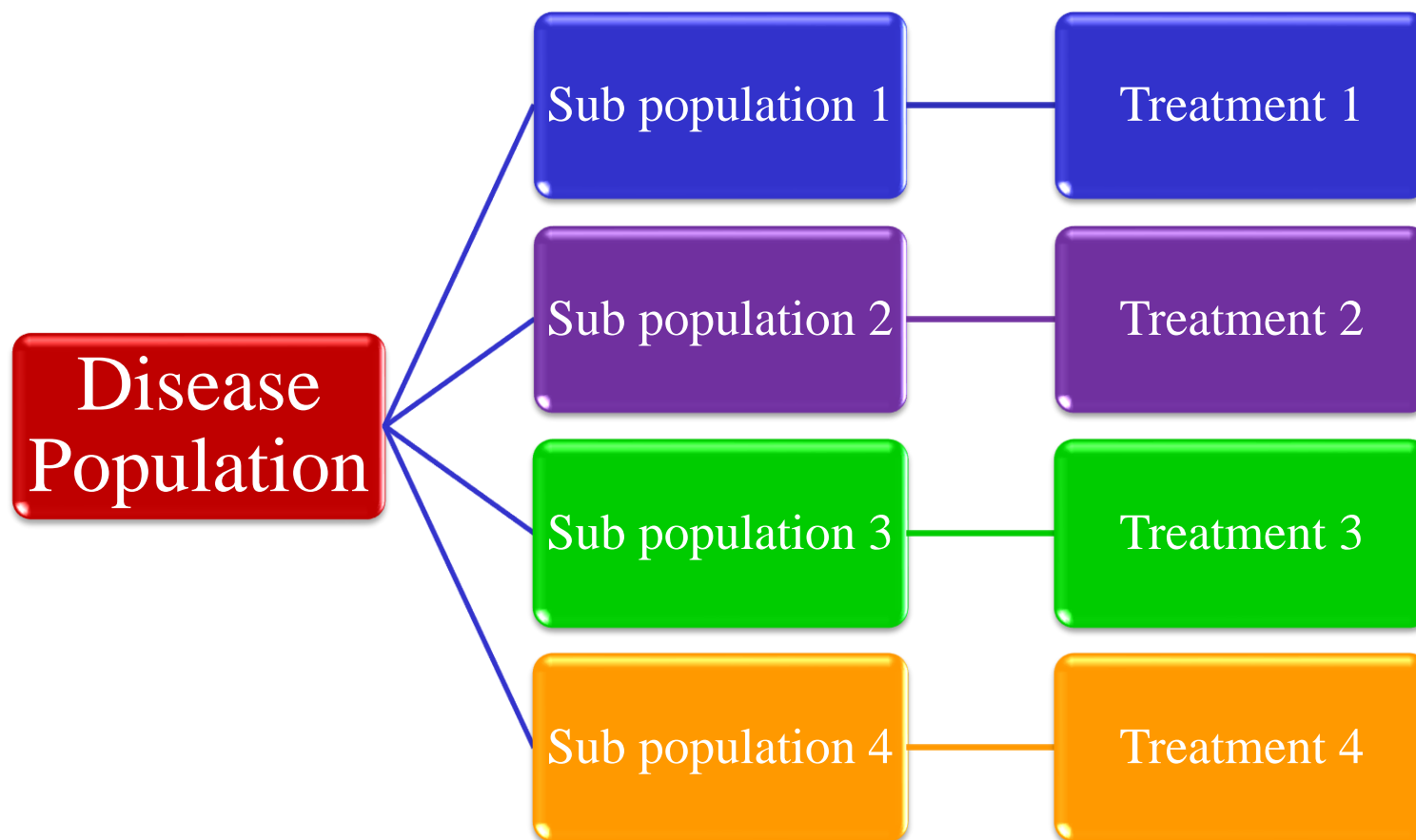
Perelman School of Medicine at the University of Pennsylvania





# Diagnostics Enables Precision Medicine

Takes advantage of information about each patient to fit them into sub-populations for a more precise approach to disease management





# Structure and biology across length scale

$10^1$

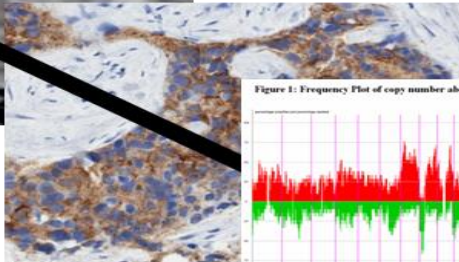
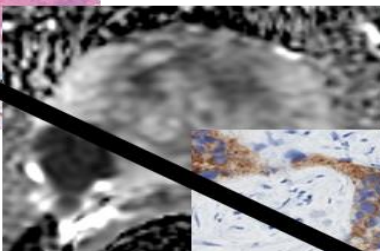
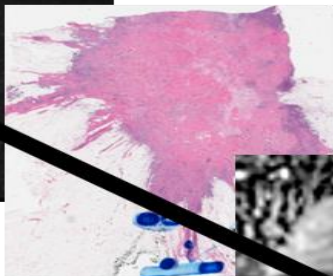
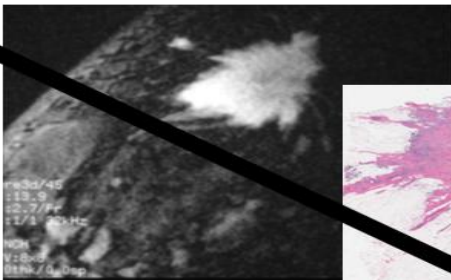
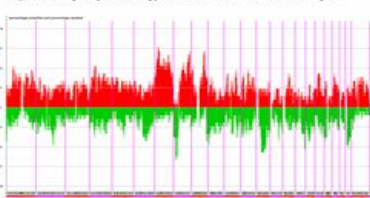


Figure 1: Frequency Plot of copy number aberrations for all 21 samples



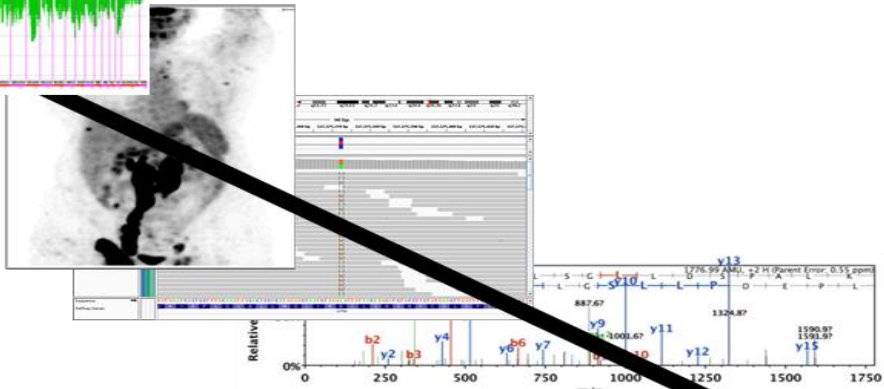
Radiology



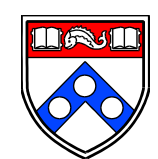
Pathology



“Omics”



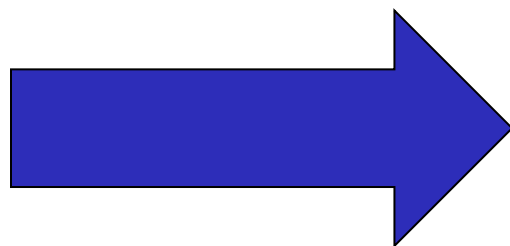
$10^{-10}$



# Vision for Diagnostics: The Cockpit



Diagnostics  
as an art



Lab

CT/MRI

Histo

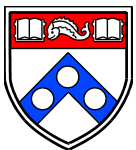
PET

Molec

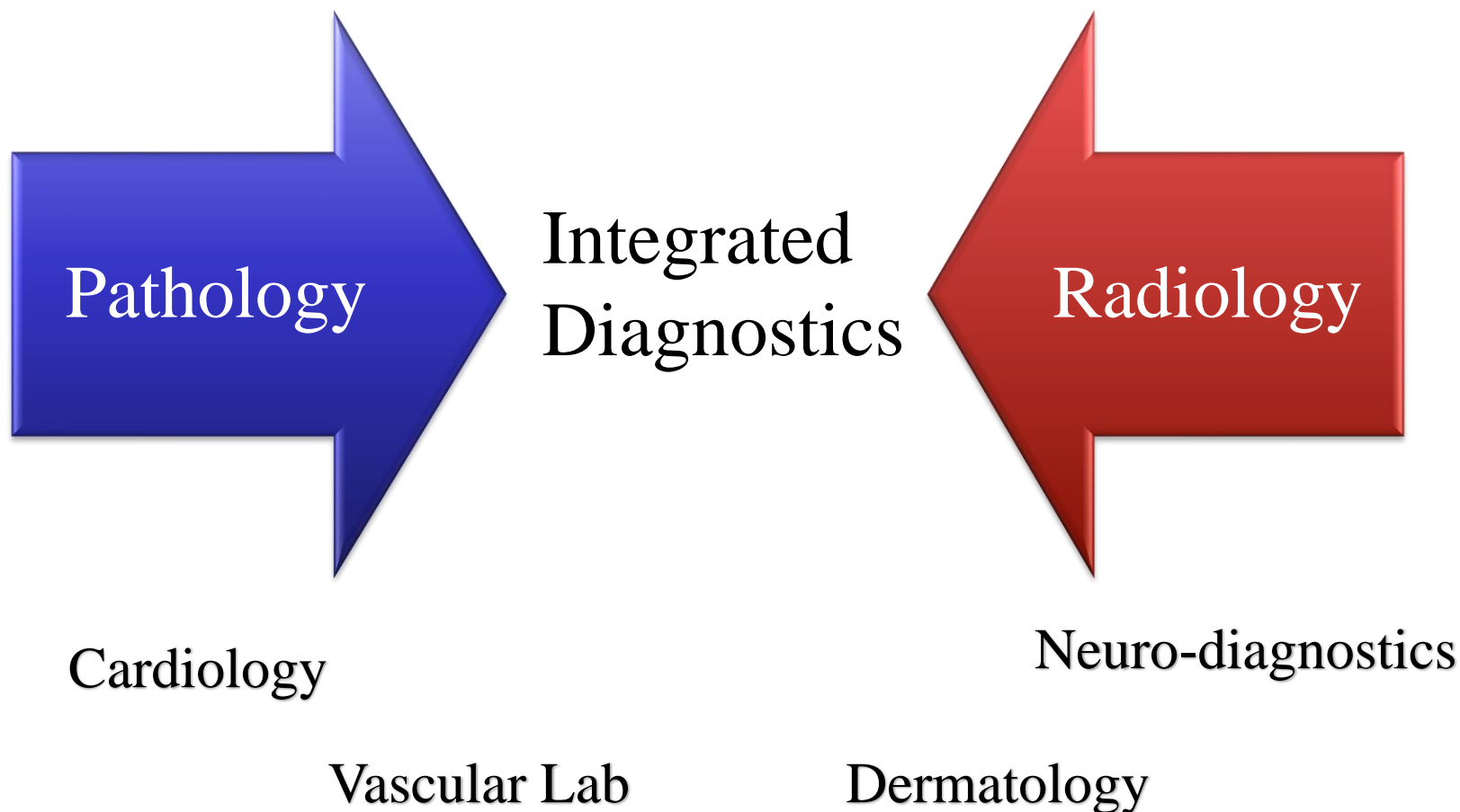
Omics

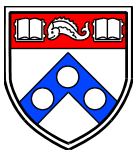


Diagnostics  
as data science

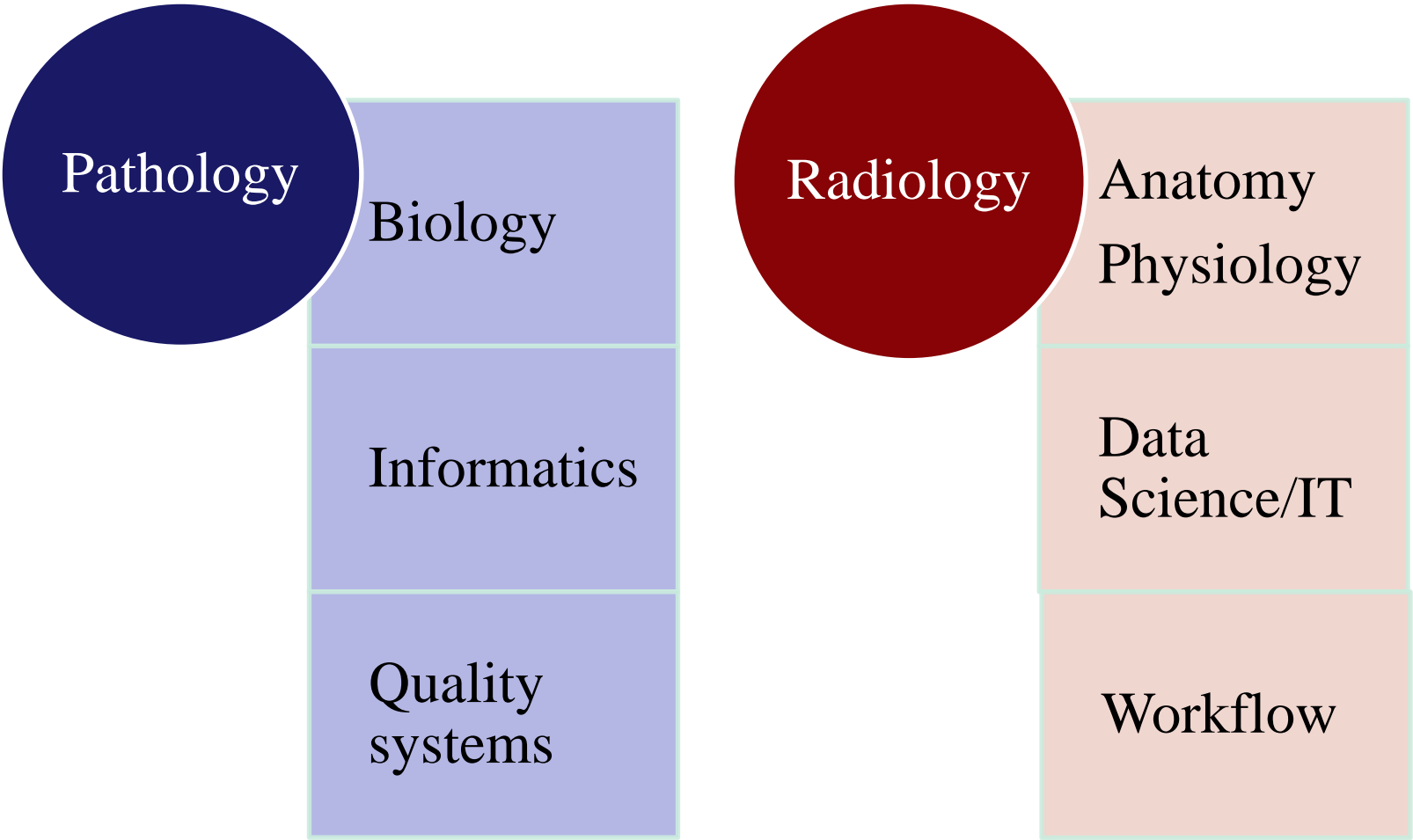


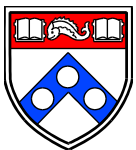
Pathology and Radiology are both dedicated to developing, managing and communicating diagnostic data and associated clinical implications





# Complementary strengths





# Tactical Approach

## Joint research

- Diagnostic data science, image analytics: improving efficiency
- Diagnostic outcomes: maximizing the yield
- Developing novel combined modality diagnostics

## Harmonize Systems

- Single medical record system
- Visualization / Analysis systems (PACS)
- Diagnostic decision support

## Education

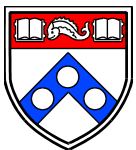
- Cross department house staff rotations
- Combined modality fellowship training
- Joint informatics / innovation fellowship

## Joint Clinical Activity

- Diagnostic Pathway development
- Diagnostic consultation services
- Co-locate services to promote interactions

## Integrated Activity

- Results communication/management
- Access/decision support
- IT/Billing/Marketing



# Shared PACS

Pr... ↓1

Date and time ↑2

Accession number

Modality

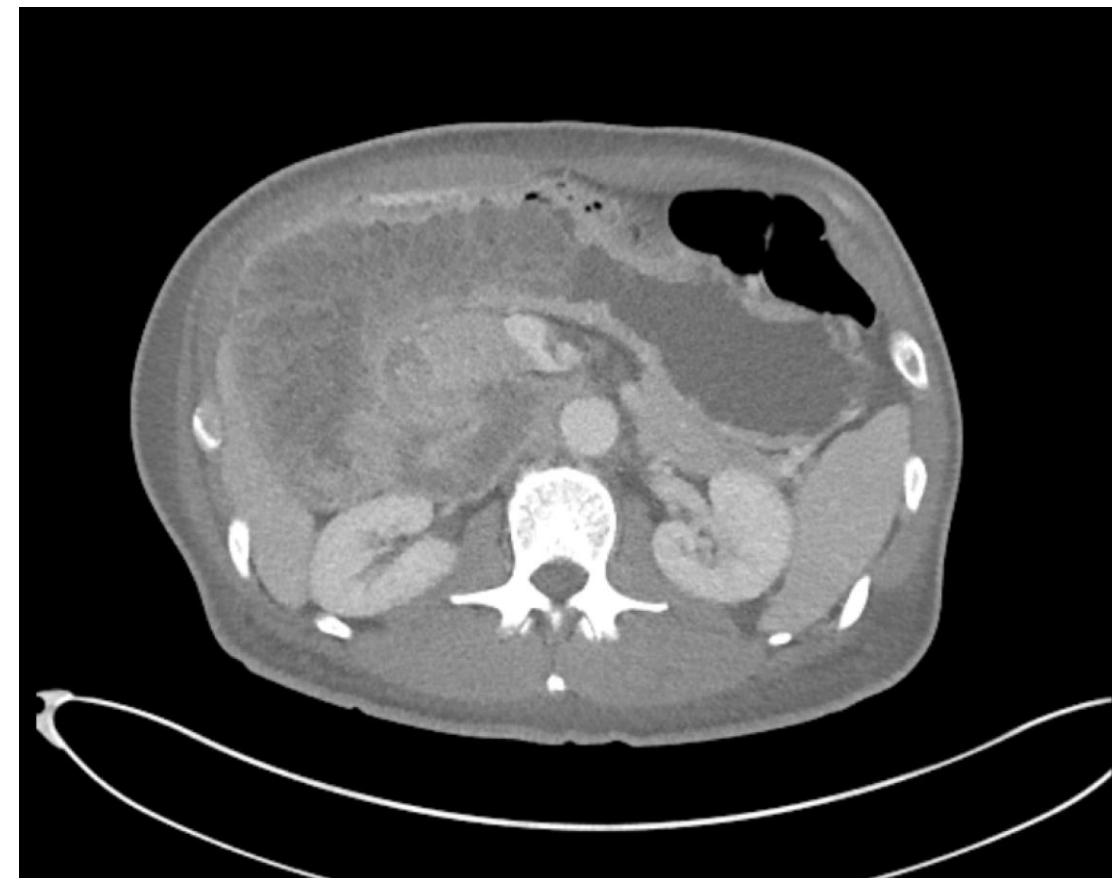
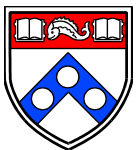
Body part

Description

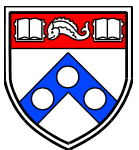
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<input type="checkbox"/>	[REDACTED] 020, 9:25 AM	[REDACTED] 564	CR	ABDOMEN	XR ABDOMEN 1 VIEW
<input type="checkbox"/> <input checked="" type="radio"/>	[REDACTED] 020, 1:36 PM	[REDACTED] 985	CR	ABDOMEN	XR ABDOMEN 1 VIEW
<input checked="" type="checkbox"/> <input type="radio"/>	[REDACTED] 2020, 2:22 PM	[REDACTED] 4125	XC	GI	GROSS PATHOLOGY GI

Images in [REDACTED] 4125





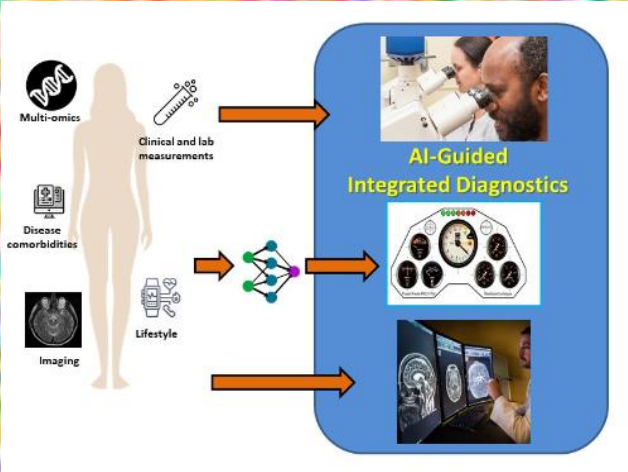




# Center For AI And Data Science For Integrated Diagnostics



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Integrated Diagnostics

**AI²D Center**

## Director



**CHRISTOS DAVATZIKOS, PHD**

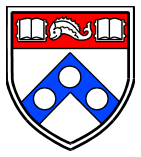
Wallace T. Miller Sr. Professor of  
Radiology

## Co-Director



**LI-SAN WANG, PHD**

Associate Professor of Pathology  
and Laboratory Medicine



# Summary

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- *Diagnostics is critical to precision medicine*
- *Radiology and Pathology have many similar operational and clinical challenges*
- *Radiology and pathology use complementary approaches to interrogating similar anatomy/biology*
- *Closer integration of Radiology and pathology will improve the diagnostic process.*

