The help of 3D virtual reality technology to cardiac physiology

Speaker: Xiang Li

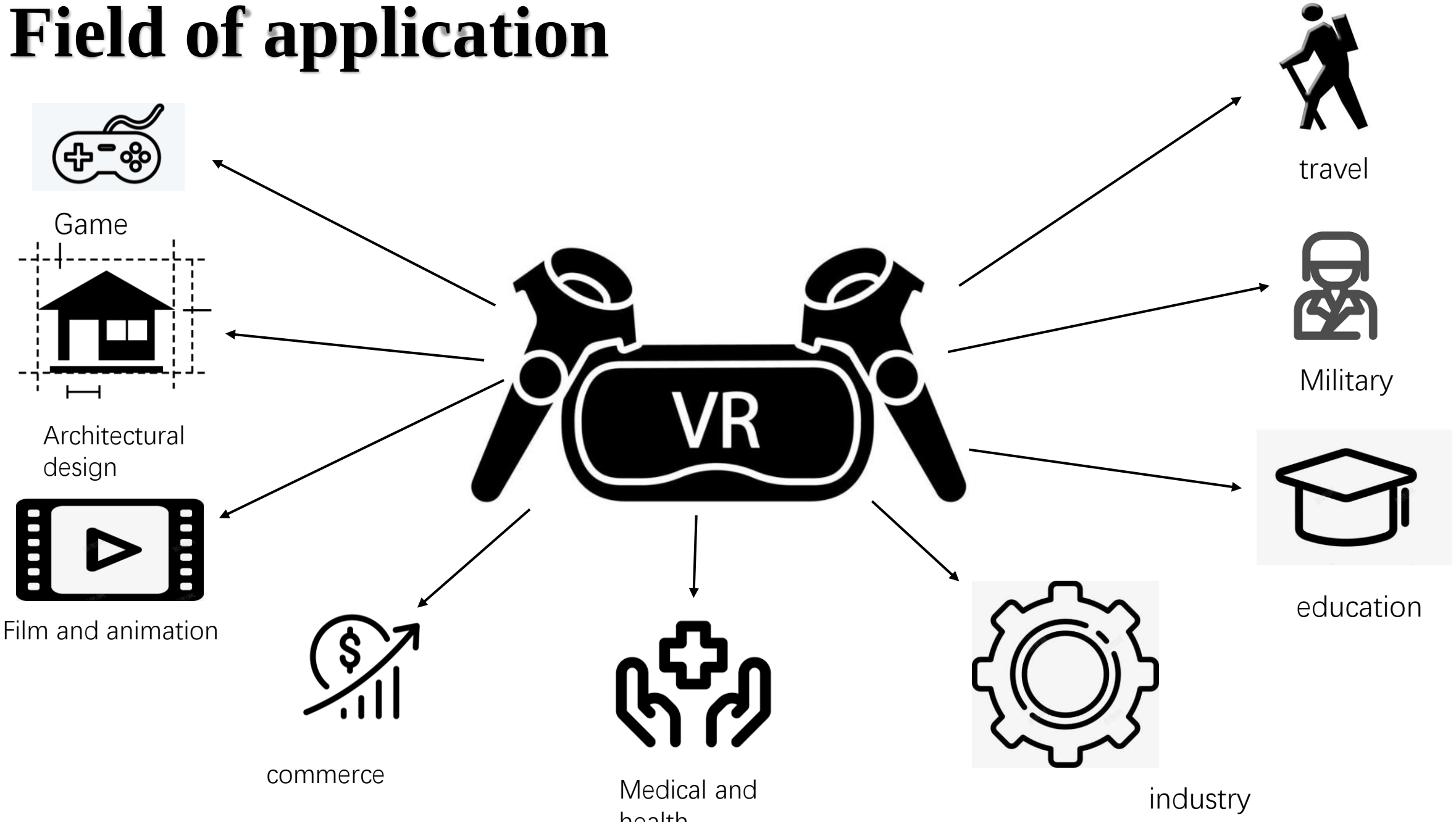
1. **Background**
2. **My direction**
3. **Future**

1. Background

Background---What is virtual technology

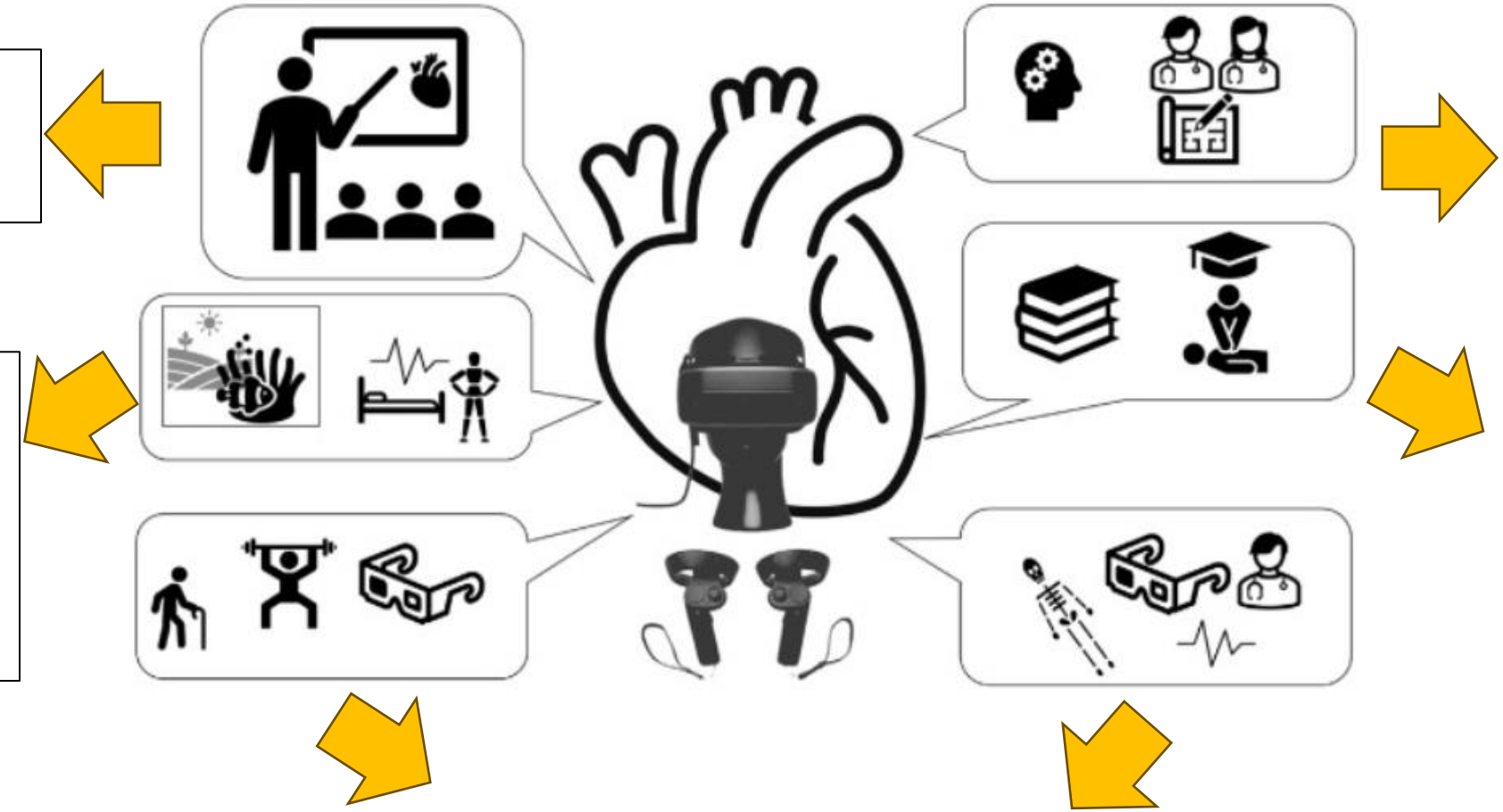
- **Virtual reality (VR)** is the use of computer technology to create simulated environments.
- Virtual reality places the user in a three-dimensional experience. Instead of looking at the screen in front of you, users are immersed in and interacting with the 3D world.

Field of application



How can VR help in cardiac medicine

CENTRAL ILLUSTRATION: Overview of Existing Applications of VR and AR for Patients and Health Care Specialists



Training of health care personnel

Used to prepare and plan specific interventional procedures

Distract the patient's attention during treatment and reduce the patient's anxiety

Educating patients on issues related to the disease

Follow-up and rehabilitation training of patients after treatment

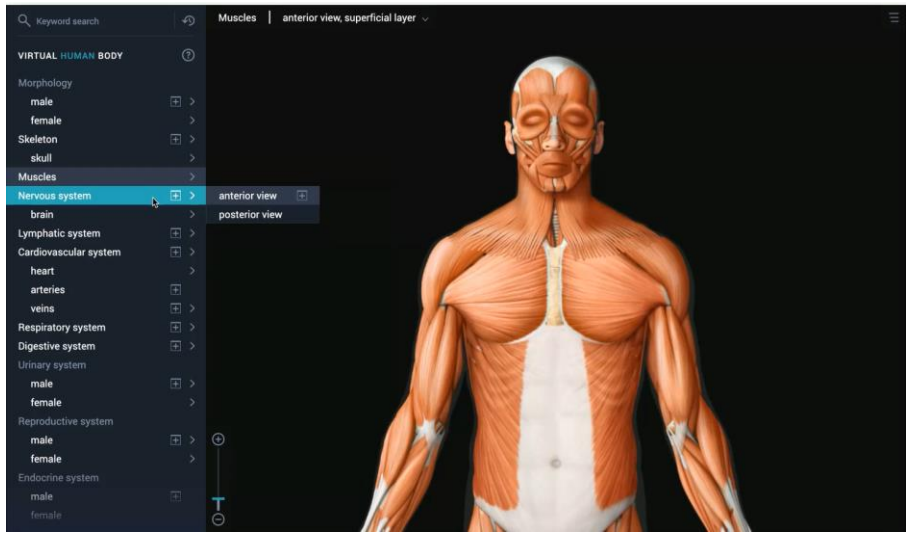
Virtual Human

Virtual Physiological Human
(VPH)

The study of "predictable multimodal physiological and pathological model" was first proposed

Virtual Human Body
(VHB)

Progress and prospect of static, multi-scale, multi-mode virtual biochemical and physiological human research on cells, tissues, organs, systems and other components of real human body



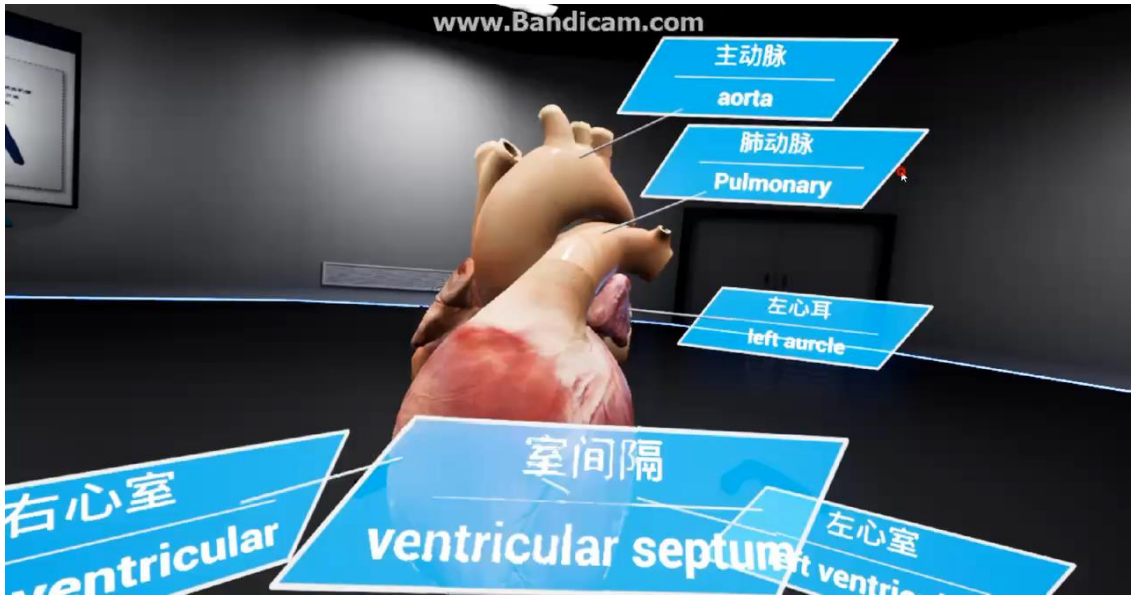
Virtual Standardized Patients
(VSP)

Virtual Standardized Patients for Objective Structured Clinical Examinations

2. My direction

My direction

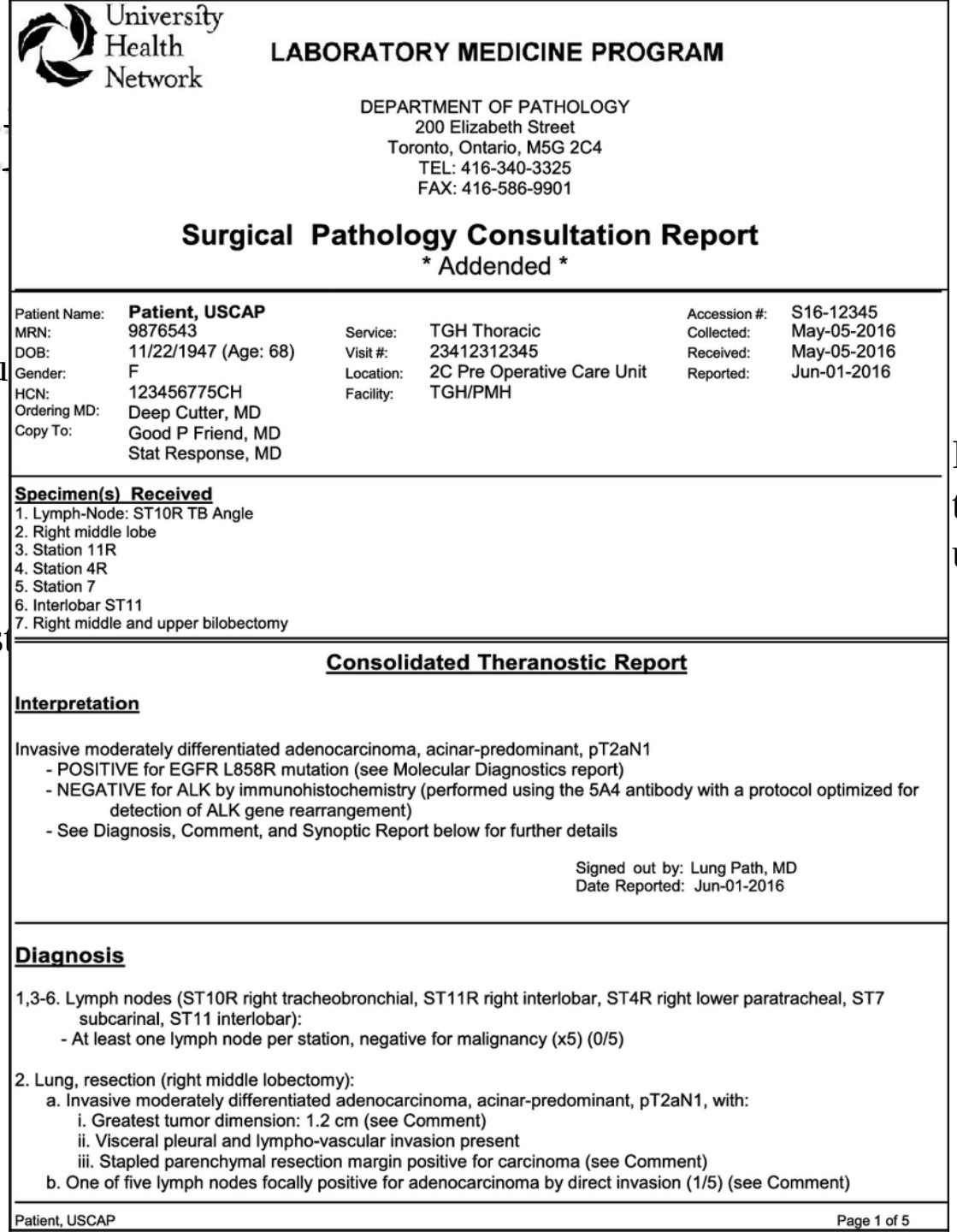
1. Help patients understand their current condition
2. Help patients know the course of medication and its effects
3. Help medical staff quickly know the patient's condition
4. To help interested people understand the physiology of the heart



My direct

Patients are not able to understand their own situ from a lot of data

Patients cannot underst the meaning of some disease names



University Health Network

LABORATORY MEDICINE PROGRAM

DEPARTMENT OF PATHOLOGY
200 Elizabeth Street
Toronto, Ontario, M5G 2C4
TEL: 416-340-3325
FAX: 416-586-9901

Surgical Pathology Consultation Report

* Addended *

Patient Name:	**Patient, USCAP**			Accession #:	S16-12345
MRN:	9876543	Service:	TGH Thoracic	Collected:	May-05-2016
DOB:	11/22/1947 (Age: 68)	Visit #:	23412312345	Received:	May-05-2016
Gender:	F	Location:	2C Pre Operative Care Unit	Reported:	Jun-01-2016
HCN:	123456775CH	Facility:	TGH/PMH		
Ordering MD:	Deep Cutter, MD				
Copy To:	Good P Friend, MD Stat Response, MD				

Specimen(s) Received

1. Lymph-Node: ST10R TB Angle
2. Right middle lobe
3. Station 11R
4. Station 4R
5. Station 7
6. Interlobar ST11
7. Right middle and upper bilobectomy

Consolidated Theranostic Report

Interpretation

Invasive moderately differentiated adenocarcinoma, acinar-predominant, pT2aN1
- POSITIVE for EGFR L858R mutation (see Molecular Diagnostics report)
- NEGATIVE for ALK by immunohistochemistry (performed using the 5A4 antibody with a protocol optimized for detection of ALK gene rearrangement)
- See Diagnosis, Comment, and Synoptic Report below for further details

Signed out by: Lung Path, MD
Date Reported: Jun-01-2016

Diagnosis

1,3-6. Lymph nodes (ST10R right tracheobronchial, ST11R right interlobar, ST4R right lower paratracheal, ST7 subcarinal, ST11 interlobar):
- At least one lymph node per station, negative for malignancy (x5) (0/5)

2. Lung, resection (right middle lobectomy):
   a. Invasive moderately differentiated adenocarcinoma, acinar-predominant, pT2aN1, with:
      i. Greatest tumor dimension: 1.2 cm (see Comment)
      ii. Visceral pleural and lympho-vascular invasion present
      iii. Stapled parenchymal resection margin positive for carcinoma (see Comment)
   b. One of five lymph nodes focally positive for adenocarcinoma by direct invasion (1/5) (see Comment)

Patients do not know the efficacy of drugs used to treat diseases

Model conception

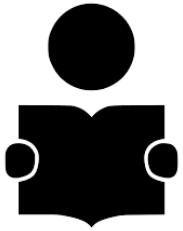
Medical report

Data conversion

Convert human body changes from data to 3D models

Drug efficacy and cycle changes

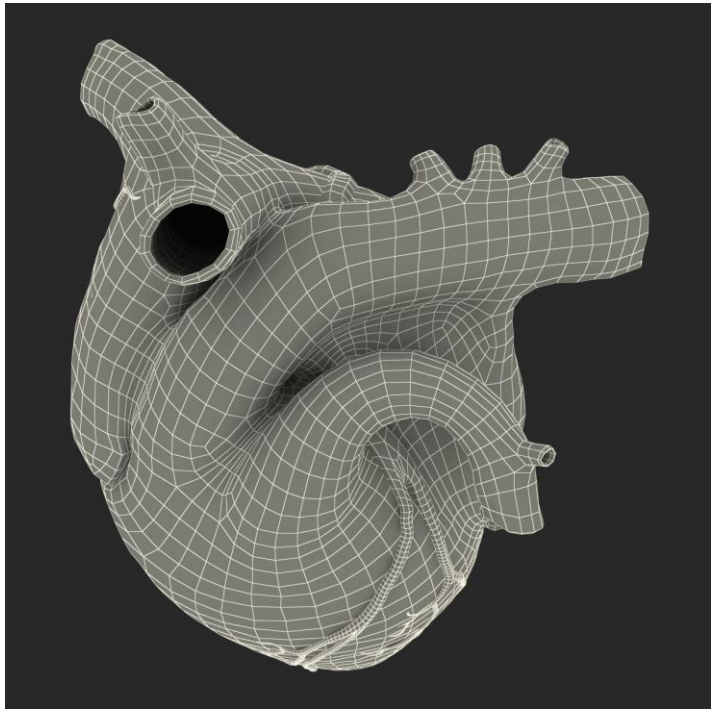
Disease awareness and feedback



Study

Challenge

Data conversion

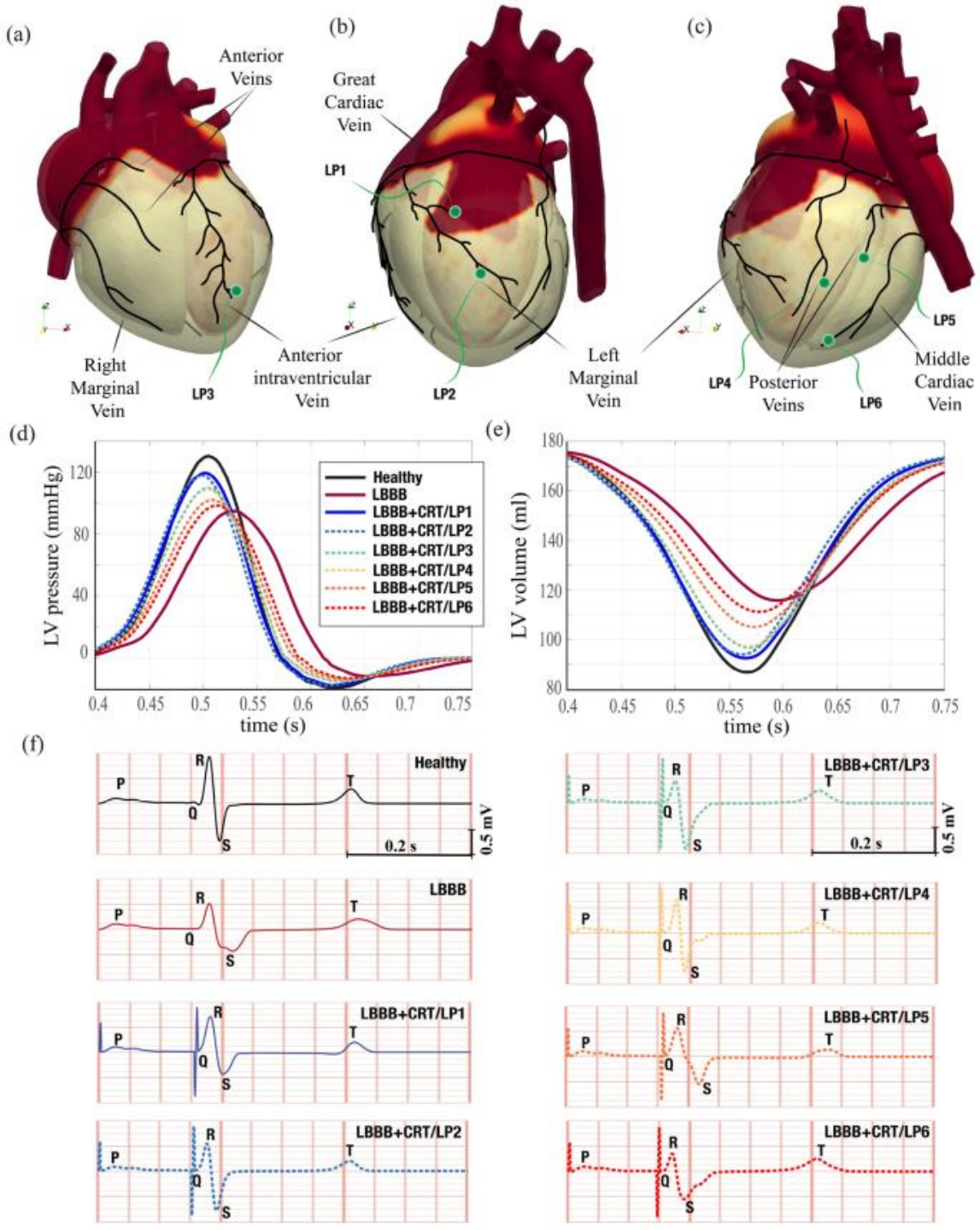


1.Reality
2.Timeliness

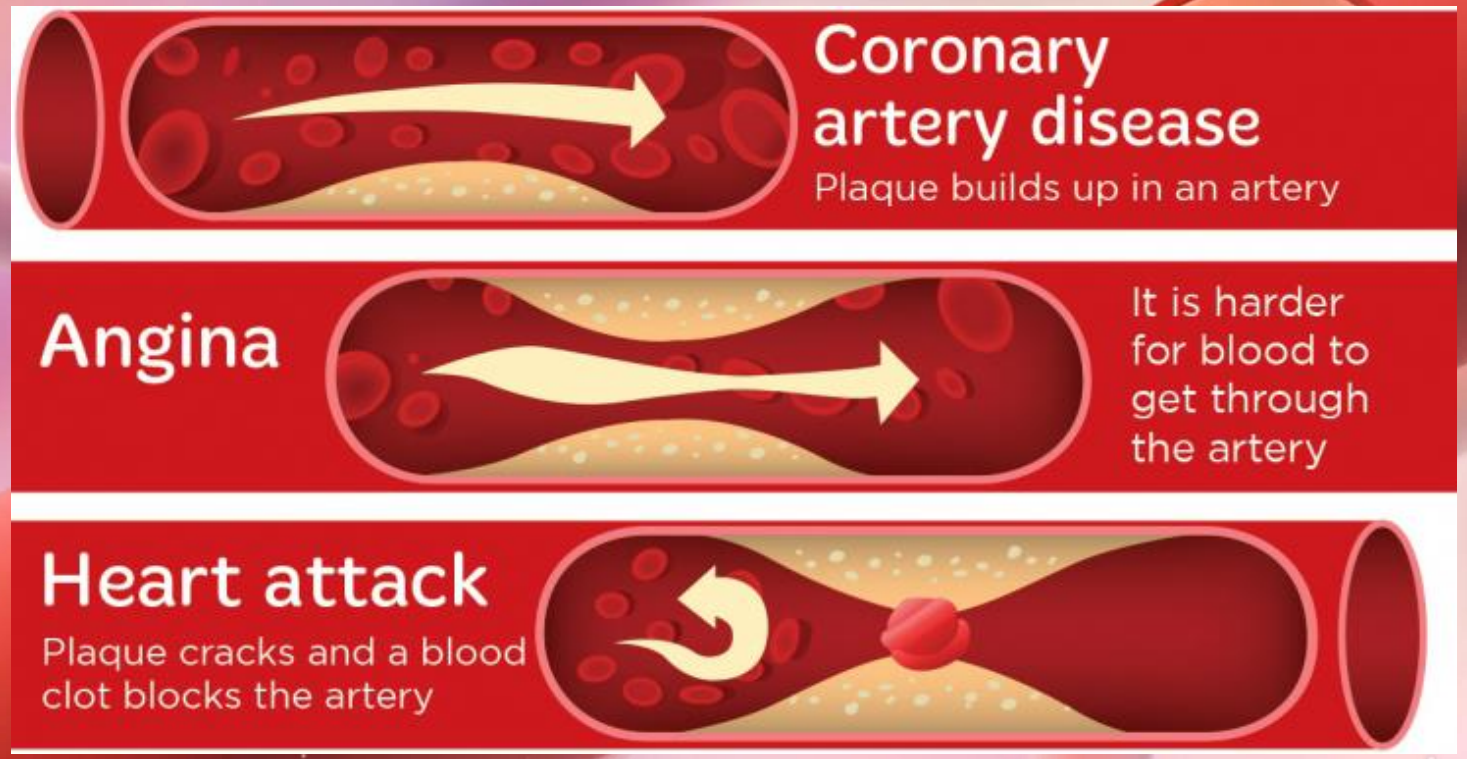
Digital cardiac atlases

An imaging database for computational modeling and statistical atlases of the heart

Through a variety of human data, such as electrocardiogram, blood pressure measurement, etc., to calculate the model in a standardized way, so as to achieve the digital twin, to ensure the reality and timeliness of the model.



3. Future


Coronary artery disease
Plaque builds up in an artery
Angina
It is harder for blood to get through the artery
Heart attack
Plaque cracks and a blood clot blocks the artery

Thank You