Artificial Intelligence in Healthcare

BASICS AND APPLICATIONS

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STEERING COMMITTEE MEMBER, PHYSICIAN INNOVATOR

Agenda

- Basics of AI and Medical AI
- Applications of AI in Healthcare
- Health AI Initiatives
- Success Stories and Lessons Learned from AIMSS
- The Future is Bright! (or is it?)

Artificial Intelligence

- Development of computer systems/machines capable of performing tasks that typically require human intelligence
- Multiple subcategories of AI exist
  - Machine Learning
    - Supervised Learning
    - Unsupervised Learning
    - Reinforcement Learning
  - Deep Learning
    - Neural Networks
    - Convolutional Neural Networks
    - Generative Adversarial Networks
  - Natural Language Processing
  - Expert Systems
  - …

Medicine and AI

- Prevention
- Research
- Diagnosis
- Treatment

“To be a competent doctor, an AI system does not have to be the best doctor in the world. AI has to be better than only the worst graduating student in your class. Further, assuming a standard distribution curve, if AI is better than your average student, it is better than 50% of all doctors. Moreover, as seen from the references above, there are already systems that can perform several tasks better than some of the best, so AI is on track to achieve this.” - Masters (2019)

ELECTRONIC MEDICAL/HEALTH RECORDS (EMR/EHR)

MEDICAL IMAGES & VIDEOS (X-RAY, MRI, CT, PET)

MEDICAL SIGNALS (EEG, EMG, ECG, MEG)

GENETICS, OMICS (GENOMICS, PROTEOMICS, METABOLOMICS)

But you need data!

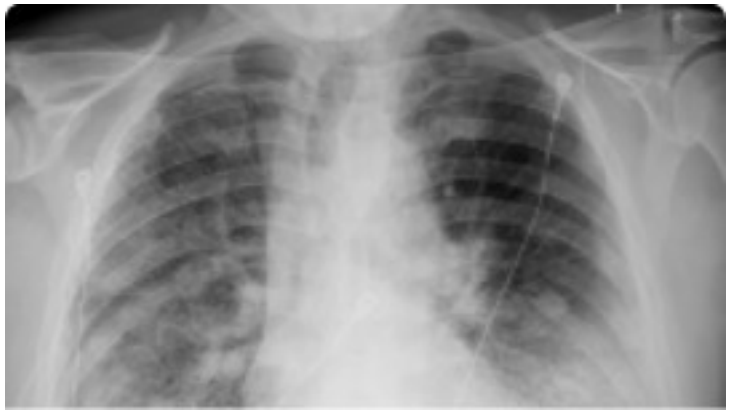
Considerations of using AI in healthcare

- Confidentiality/Patient Privacy
- Accuracy & Safety
- Mitigation of Bias
- Interpretability & Explainability
- Building Trust in the Healthcare Team & Patients
- Clinical Significance
- Cost-effectiveness & Scalability
- Responsibility

But there are lots of benefits!

- More personalized patient care
- More time spent caring for the patient rather than paperwork
- Early detection of pathology
- Detection of potential errors
- More efficient analysis of big datasets (omics, population data, outbreak management, etc.)
- Prediction of physical exams, lab tests, and interventions that are most helpful
- Remote monitoring & remote health
- Health sciences research

Actual Applications

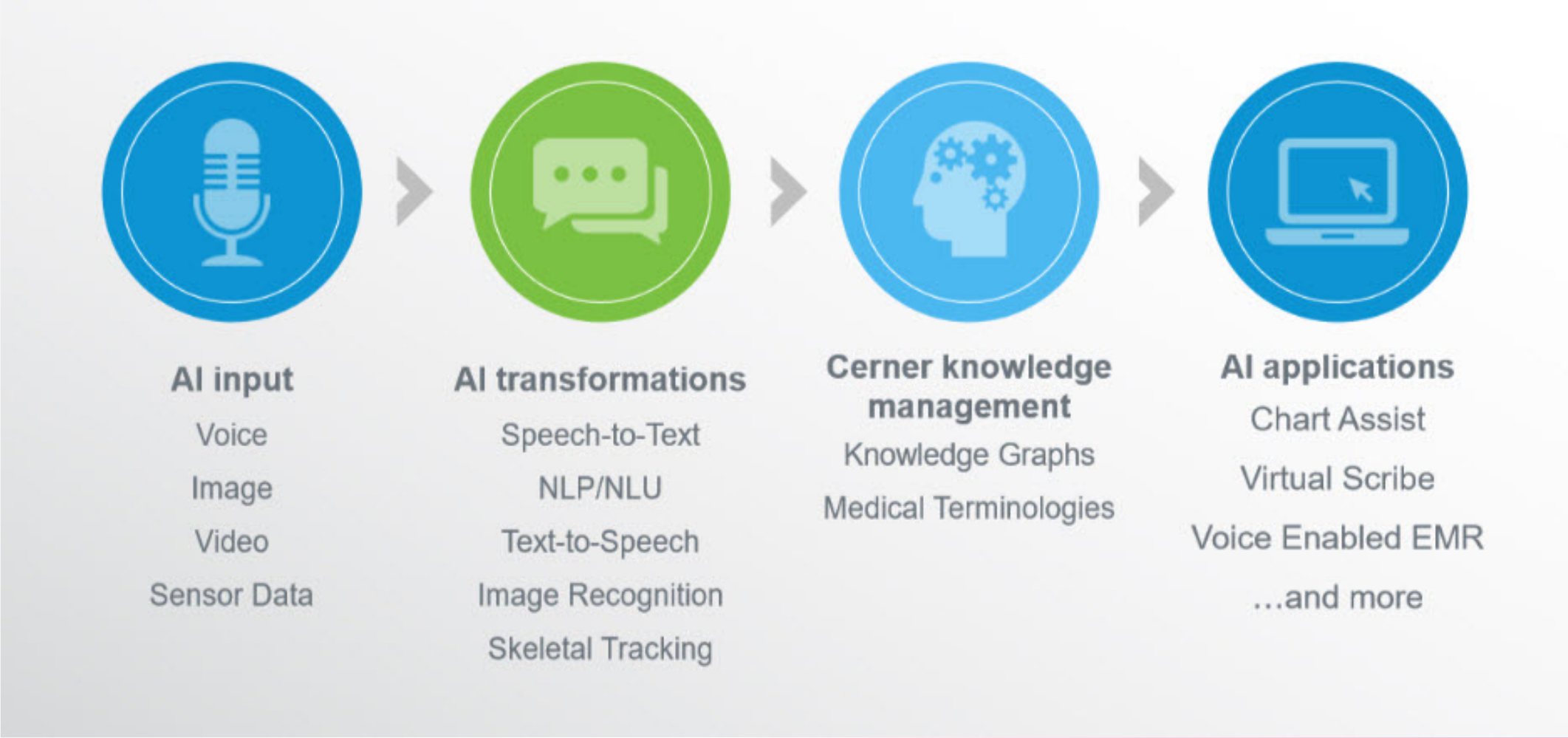


Pneumothorax

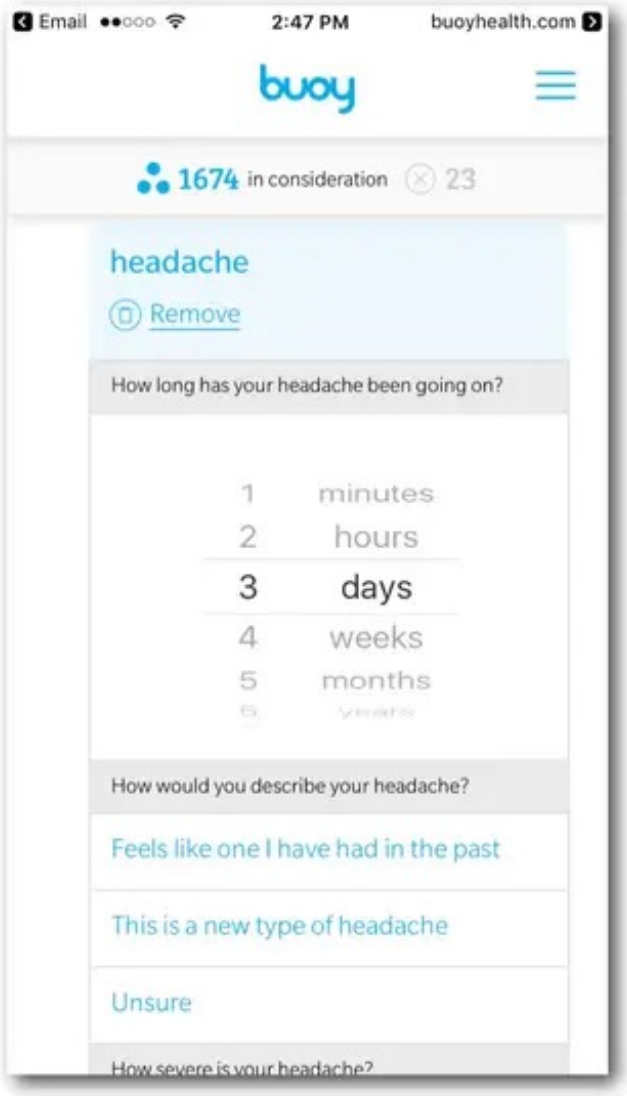
Diabetic Retinopathy

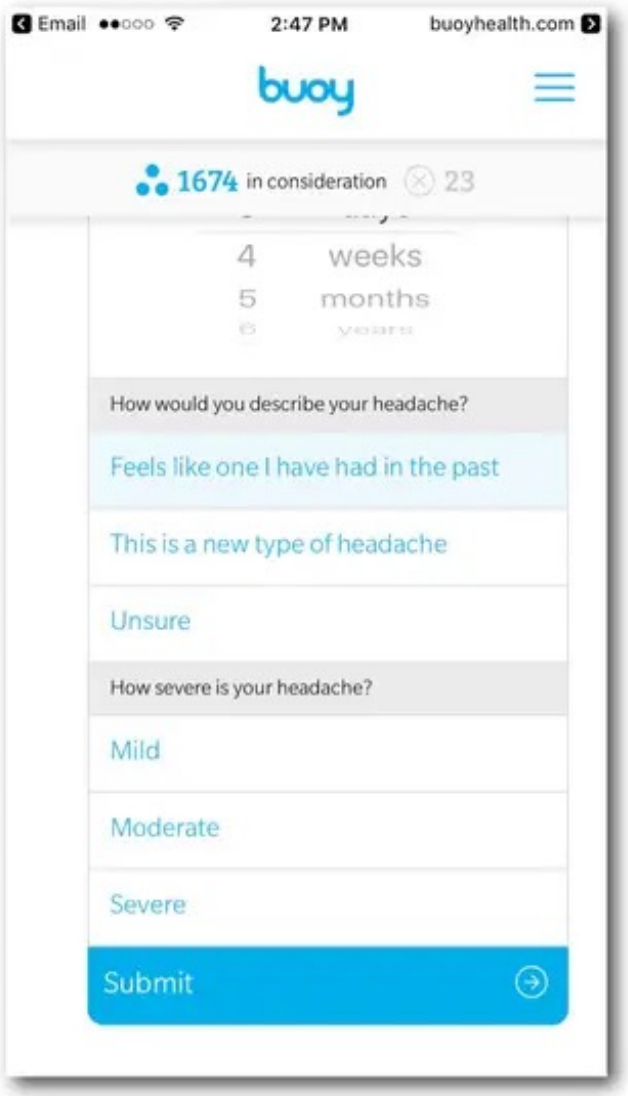
Drug Discovery

EMR/EHR

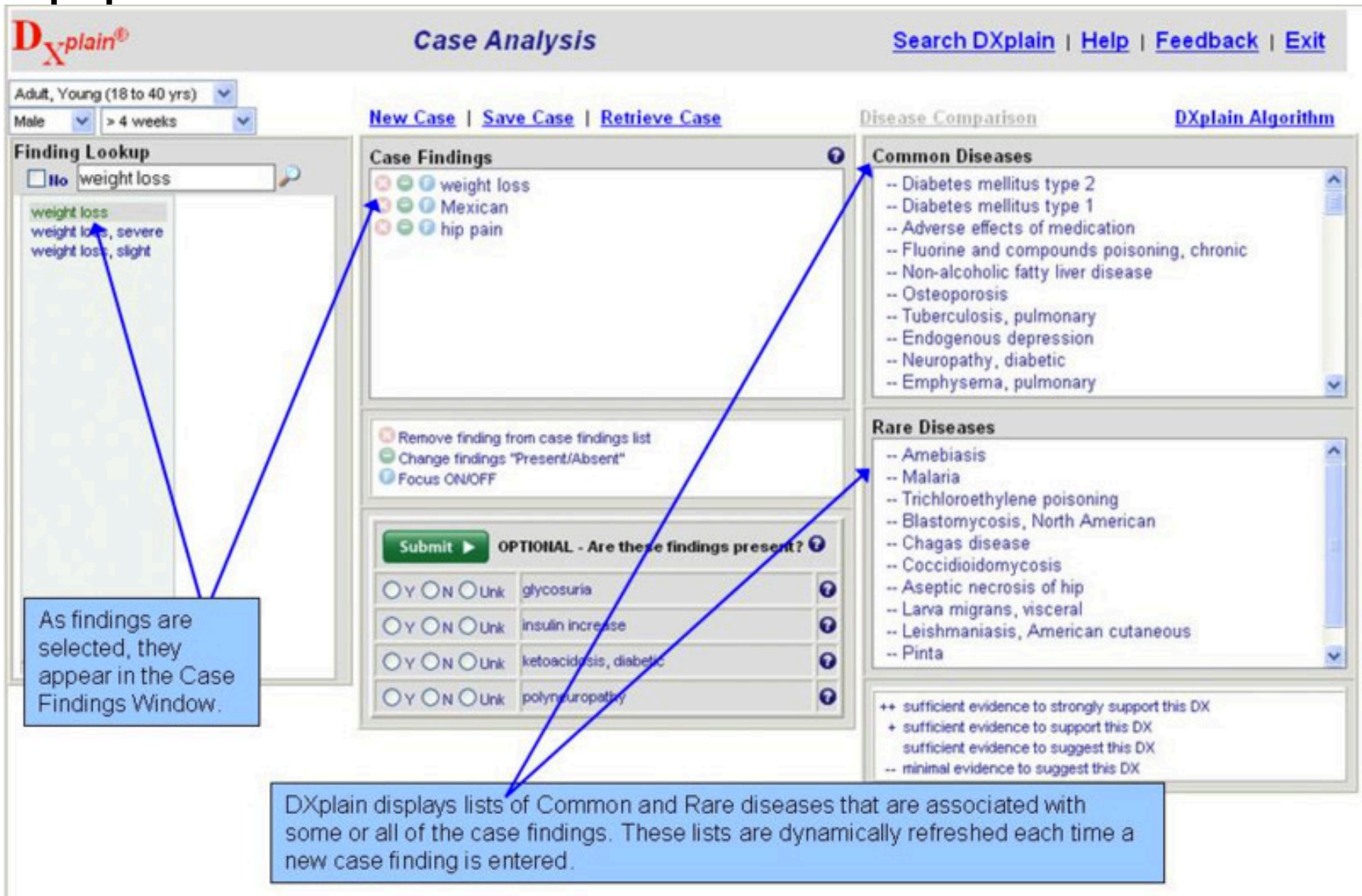

AI input
Voice
Image
Video
Sensor Data
AI transformations
Speech-to-Text
NLP/NLU
Text-to-Speech
Image Recognition
Skeletal Tracking
Cerner knowledge management
Knowledge Graphs
Medical Terminologies
AI applications
Chart Assist
Virtual Scribe
Voice Enabled EMR
...and more

Diagnosis Support





Diagnosis Support



Deciphering Discharge Summaries

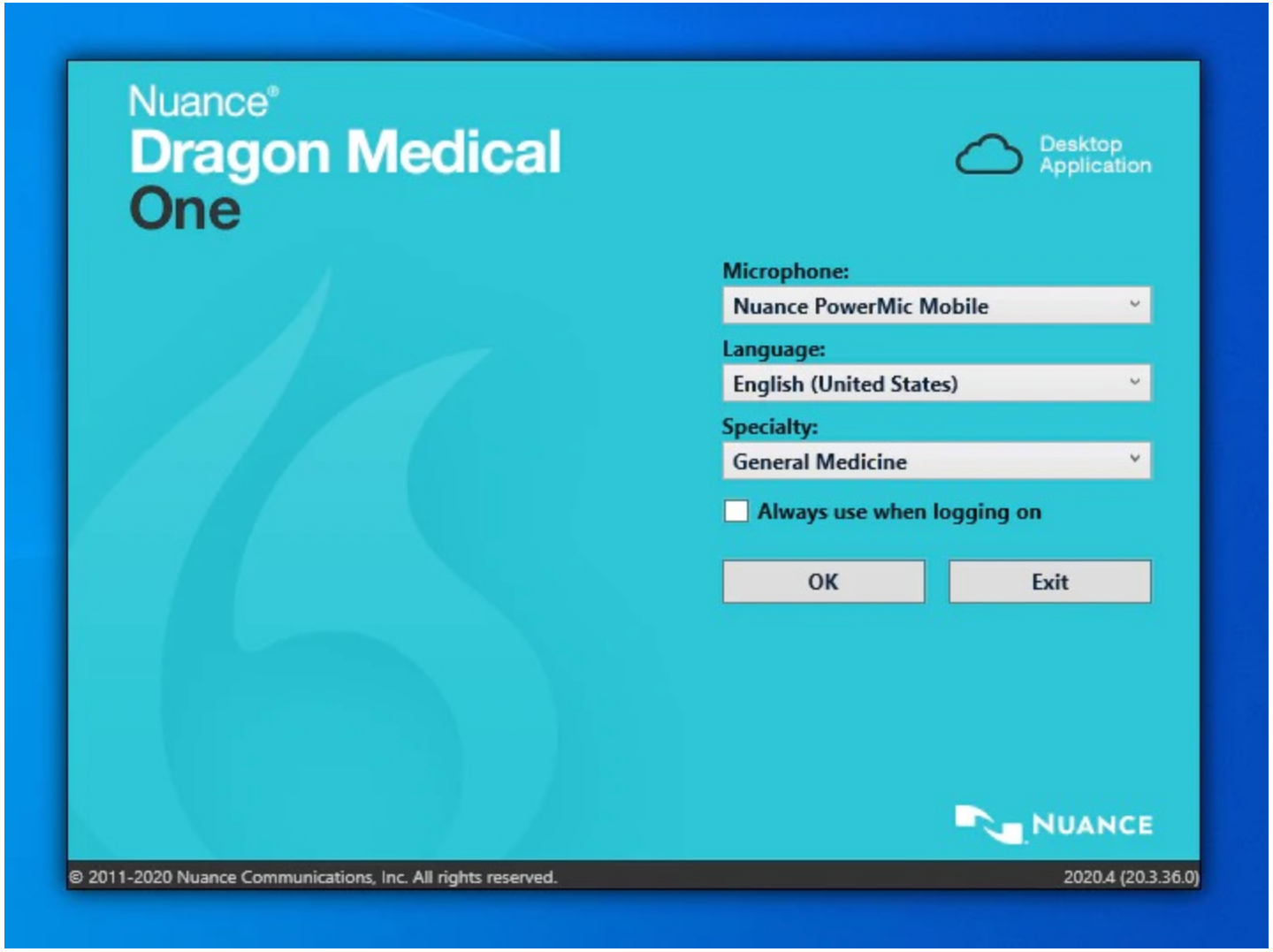
Original Note in Discharge Summary

Doppler of her carotid which showed 99% right internal carotid artery stenosis.

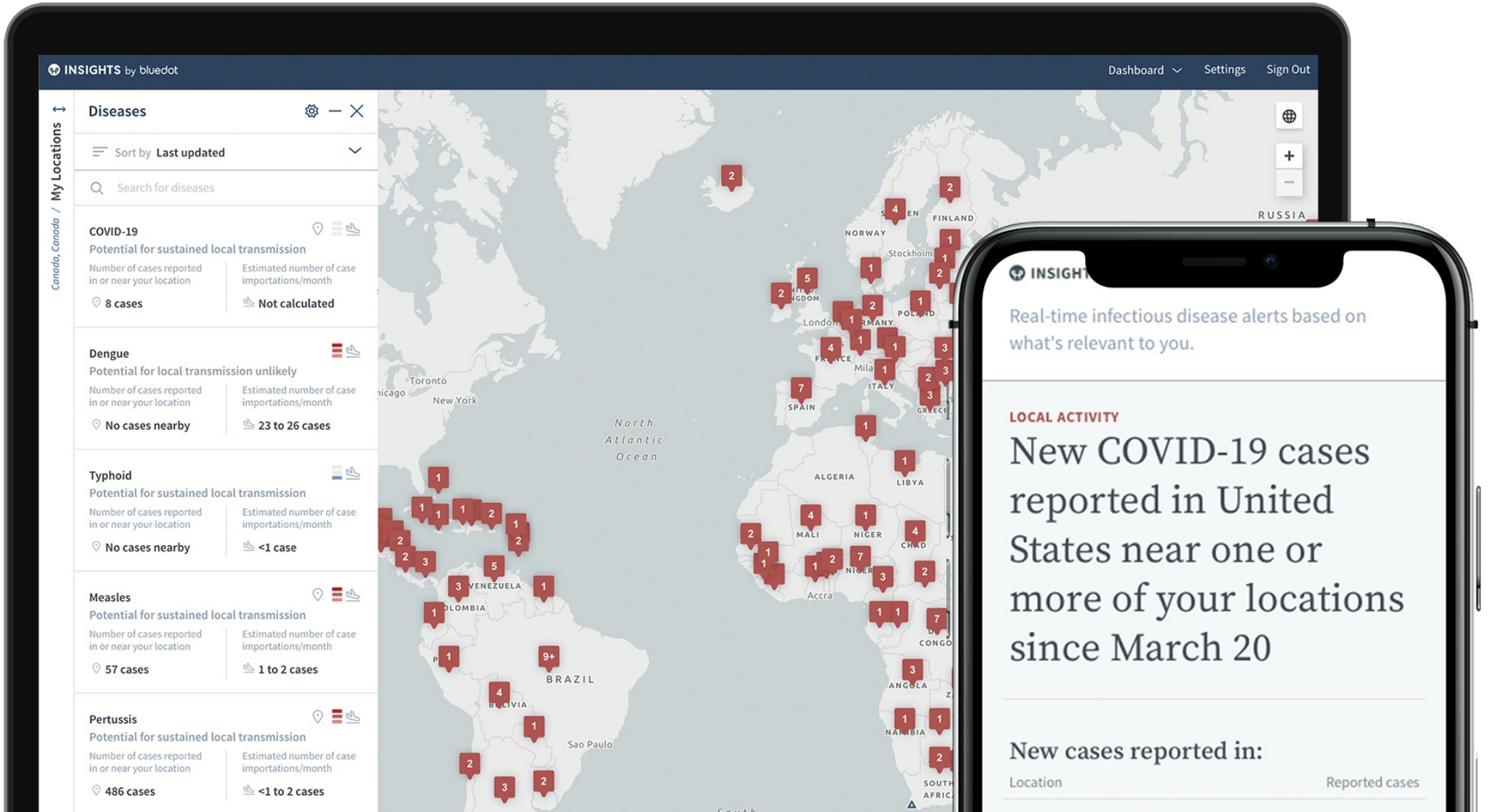
MedLEE Output

<***problem*** *v = "stenosis"*
code = "UMLS:C1261287_stenosis" *>*
<***bodyloc*** *v = "internal carotid artery" code = "UMLS:C0007276_internal carotid artery structure!UMLS:C1305387_entire internal carotid artery">*
<***region*** *v = "right"></***region***>*
<***code*** *v = "UMLS:C0226156_structure of right internal carotid artery" ></***code***>*
<*code v = "UMLS:C1278588_entire right internal carotid artery"></code></***bodyloc***>*
<***certainty*** *v = "high certainty"></***certainty***>*
<***measure*** *v = "99 %"></***measure***></***problem***>*

Transcription



Outbreak Prediction & Travel Support



Insert AIMSS

2019

- AIMSS UAlberta Established

2020

- 1st Annual Symposium, In-Person
  - 10 speakers, 15 booths, 110+ attendees

2021

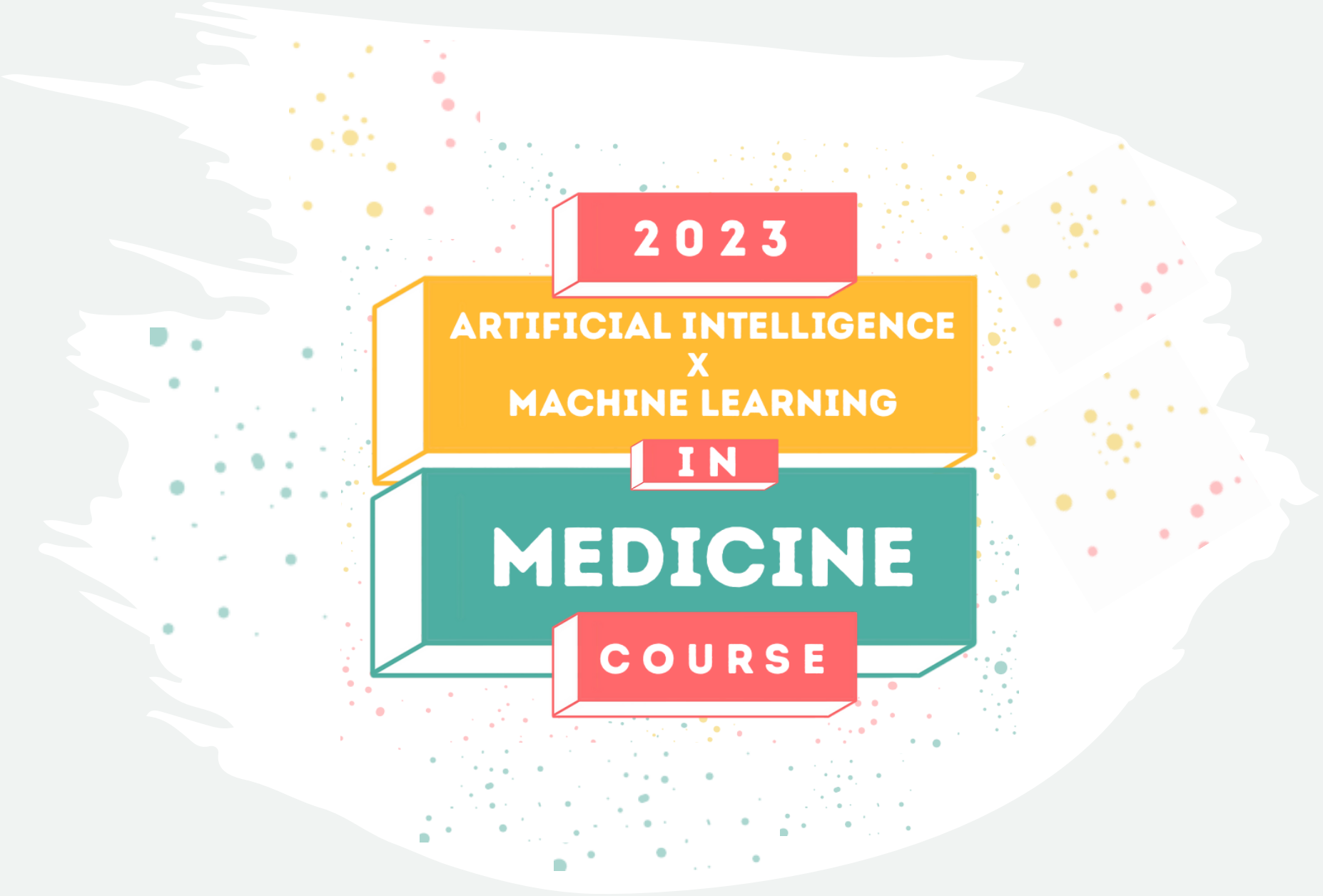
- AI in Medicine Introductory Curriculum
- North American Expansion
- 2nd Annual Symposium, Virtual
  - 9 speakers, 15 booths, 150+ attendees

2022

- 3rd Annual Symposium
  - Hybrid 3-day event featuring networking, workshops, student talks, industry booths and speaker series from world-renowned speakers
- AI in Medicine Course
- AI in Healthcare Hackathon
- AI-Generated Art Show
- AI in Healthcare Community Project

2023

- 4th AI in Healthcare Conference
  - Hybrid 3-day event featuring networking, workshops, student talks, industry booths and speaker series from world-renowned speakers
- Dually-accredited AI & ML in Medicine Course
- AI-Generated Art Show


2023
ARTIFICIAL INTELLIGENCE
X
MACHINE LEARNING
IN
MEDICINE
COURSE

SECTION A

THE BASICS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING TOOLS

SECTION B

INTRODUCTION TO PYTHON AND LIBRARIES

SECTION C

ARTIFICIAL INTELLIGENCE IN MEDICAL SPECIALTIES I

SECTION D

ARTIFICIAL INTELLIGENCE IN MEDICAL SPECIALTIES II

D.3. Case-based Learning and Wrap-Up

Learning Objectives (Students should be able to):

1. Describe how AI has been applied to the given study
2. Provide examples of how AI might transform the future of this discipline
3. Develop the ability to evaluate a medical AI paper

LECTURE SLIDES

Artificial Intelligence in Medicine Student Society

CERTIFICATE OF COMPLETION

To recognize the successful completion of the
Artificial Intelligence in Medicine Course
January - April 2023

Ehsan Misaghi
President
UAlberta AIMSS

Certific

2023 ARTIFICIAL INTELLIGENCE IN HEALTHCARE CONFERENCE

ITINERARY

BROUGHT TO YOU BY

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MARCH 10-12

ARTIFICIAL INTELLIGENCE IN HEALTHCARE

CONFERENCE ITINERARY

2023

Locations

- Alberta Machine Intelligence Institute, 10065 Jasper Ave Ave NW, Edmonton, AB
- Quartz Ballroom, Matrix Hotel, 10640 100 Ave NW, Edmonton, AB
- Foyer, Matrix Hotel
- Amber Room, Matrix Hotel

Friday, March 10
Mixer Night

- 17:00 Introductions
- 17:30 AI in Medicine Primer
- 18:00 Facilitated Networking
- 18:30 Dinner

Be sure not to miss our **KEYNOTE** *speaker*

DR. PATRICK PILARSKI

SATURDAY MARCH 11 11:00

Saturday, March 11

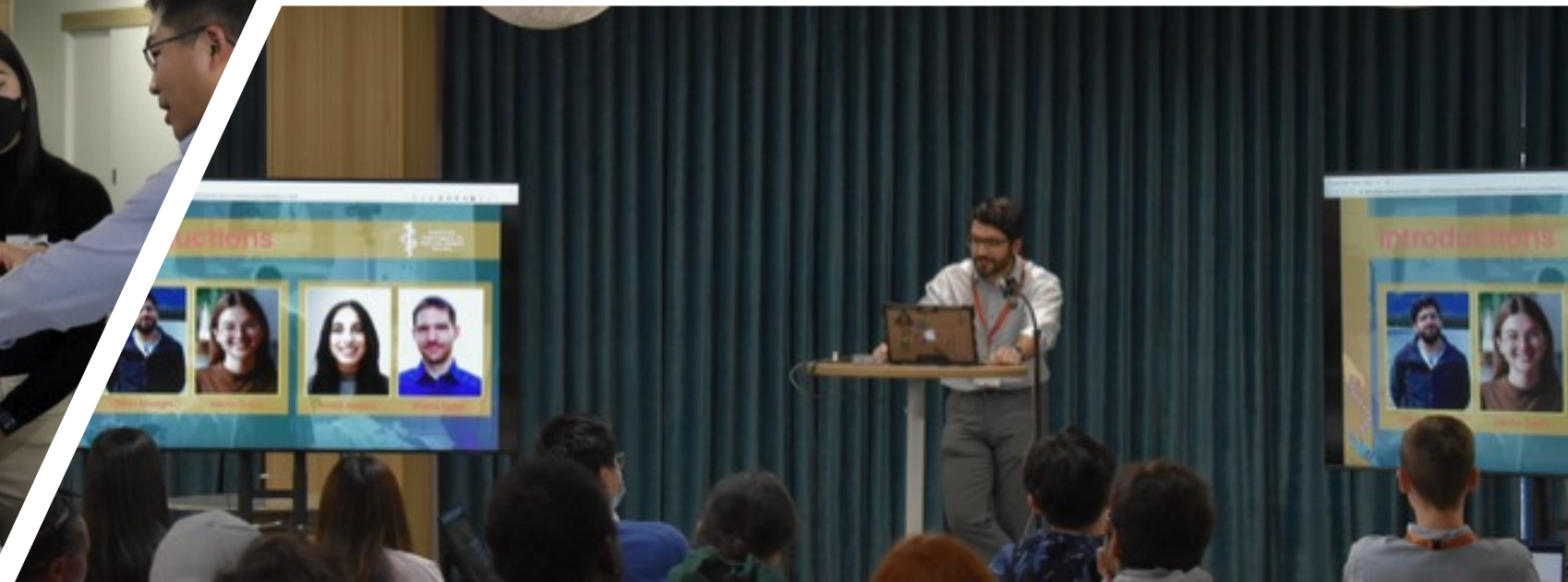
- 08:15 Registration & Breakfast
- 09:00 Opening Ceremony
- 09:30 ONLINE: Dr. Phedias Diamandis — AI in Neuropathology
- 10:00 IN-PERSON: Dr. Nazila Ameli — Two Applications of Machine Learning in Dentistry
- 10:30 Coffee Break — Posters & Booths
- 11:00 KEYNOTE: Dr. Patrick Pilarski — Redefining the Relationship Between Humans and their Assistive Technologies
- 12:00 Lunch — Posters & Booths
- 13:00 ONLINE: Dr. Bo Wang — Opportunities & Challenges of AI for Organ Transplantation
- 13:30 IN-PERSON: Dr. Yan Yuan — A Brief Overview of Machine Learning in Clinical Cancer Care
- 14:00 IN-PERSON: Dr. Eytan Wine — AI in GI: Using AI in Inflammatory Bowel Disease Research
- 14:30 Coffee Break — Posters & Booths
- 15:00 IN-PERSON: Dr. Jihyun Yun — AI for the most accurate radiotherapy of mobile tumors
- 15:30 ONLINE: Dr. Peter Campbell — AI in Retinopathy of Prematurity
- 16:00 Industry Panel — Dr. Robert Pilarski (Nanostics), Tim Tran (DrugBank), Randy Duguay (Health Groups)
- 17:00 Closing Remarks

Sunday, March 12

- 09:00 Registration & Breakfast
- 09:45 Opening Remarks
- 10:00 AI Ethics in Practice: Strategies for Governance and Deployment - Part I
- 12:00 Lunch
- 13:00 AI Ethics in Practice: Strategies for Governance and Deployment - Part II
- 14:00 Health Law, Ethics, Privacy and Fairness Panel discussion — Dr. Michael van Manen, Dr. Dillon Lemermeyer, Dr. Nidhi Hegde
- 15:00 Closing Ceremony

See you next year!


recognizing good boys


introductions


#AIHC2023
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- AIMSS is growing!
- Challenges still apply!
- Lots of new avenues now that we have breakthroughs!
- Regulatory landscape is about to change!
- We need to equip the next generation of healthcare providers and AI practitioners with tools that support them in building/using better AI!

AI in the Future of Healthcare

Stay in touch!

https://www.aimss.ca

ehsan@aimss.ca