Dartmouth Health | Dartmouth Cancer Center
NORRIS COTTON CANCER CARE PAVILION
DARTMOUTH HITCHCOCK MEDICAL CENTER

Radiation Oncology Research Retreat
Saturday May 4, 2024, 7:30 a.m.-12:00 p.m.
Auditorium F, DHMC (WebEx optional)

Applied Medical Physics

Benchmarking Radiomic Features using Simulated Liver Lesions – Shrey S. Sukhadia, Abdibaset A. Bare & Marthony L. Robins

Cherenkov Imaged Bio-morphological Features Verify Patient Positioning with Deformable Tissue Translocation in Breast Radiotherapy – Yao Chen

UHDR Beamline Tools for FLASH-RT Research – Austin Sloop

Break (5 minutes)

Health Services & Policy Research

Funded Radiation Oncology Visiting Medical Student Electives: A Cross-Sectional Analysis – Alexys Gayne, BS & Colin McNamara, AB, FNP

Disparities in access to multidisciplinary cancer consultations and treatment for early-stage NSCLC patients: A SEER-Medicare analysis. – Erika Moen MS, PhD

Break (5 minutes)

Clinical and Translational Research

Leveraging transcriptomics in clinical oncology: Towards genomic radiotherapy dose-adjustment – Drew T. Bergman, BA

How AI and interpretable mathematical modelling will finally enable the promise of precision medicine - Simone Korsgaard Jensen

Machine Learning based Delivery accuracy predicting in Pencil Beam Scanning Proton Therapy – Ilakiya Raghavendiran

Revisiting a Comparative Analysis of Persistent Homology and Classic Radiomic Features/Exploring Radiomic Integration in Clinical Predictive Modeling for HCC – Jalen Crump

Dartmouth Health | Dartmouth Geisel School of Medicine | Dartmouth Engineering

10:46

03:28:58

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9. Acknowledgements

Physics team
- Yong Chen PhD
- Mark Newpower PhD
- Raghav Boopathy PhD

IT Team
- Shawn West
- Rajaram

- Jerry Jaboin MD PhD

Thank you everyone and Very special and sincere Thanks to Dr. Thoma
and the Dartmouth team !!!

The UNIVERSITY of OKLAHOMA

Ilakiya And Kabilan Unverified

The UNIVERSITY of OKLAHOMA

Machine Learning based Delivery accuracy predicting in Pencil Beam Scanning Proton Therapy

- Ilakiya R & Kabilan S

Dartmouth Research Retreat - 2024

Supervisor / Mentor:

Dr. Yong Chen, PhD DABR
Associate Professor,
Chief of Physics
Stephenson Cancer Center,
University of Oklahoma Health Science Center

Revisiting a Comparative Analysis of Persistent Homology and Classic Radiomic Features/Exploring Radiomic Integration in Clinical Predictive Modeling for HCC

JALEN CRUMP

CLEVELAND CLINIC, LERNER RESEARCH INSTITUTE, CLEVELAND, OH
LRI DEPARTMENT OF TRANSLATIONAL HEMATOLOGY AND ONCOLOGY RESEARCH

Acknowledgements

- I first want to thank Dr. Andrew Dhawan M.D., Ph.D, Dr. Jacob Scott, M.D., D.Phil, Dr. Arda Durmaz, Ph.D and the rest of the computational analysis team including Eashwar and Rowan for their continued assistance with this project
- I also want to thank Dr. Michael Bergen, M.D. for his input through the project.
- Lung project funded by U54 NIH Diversity supplement grant to an R01.

11:06

03:49:05

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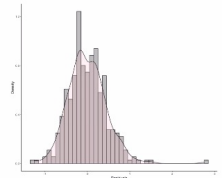
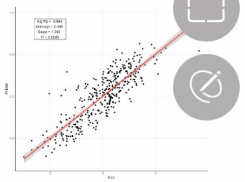
PHOM GLEANS MORE INFORMATION THAN TRADITIONAL RADIOMICS

- Is PHOM distinct from traditional radiomics?





Jay Crump Unverified

Acknowledgements
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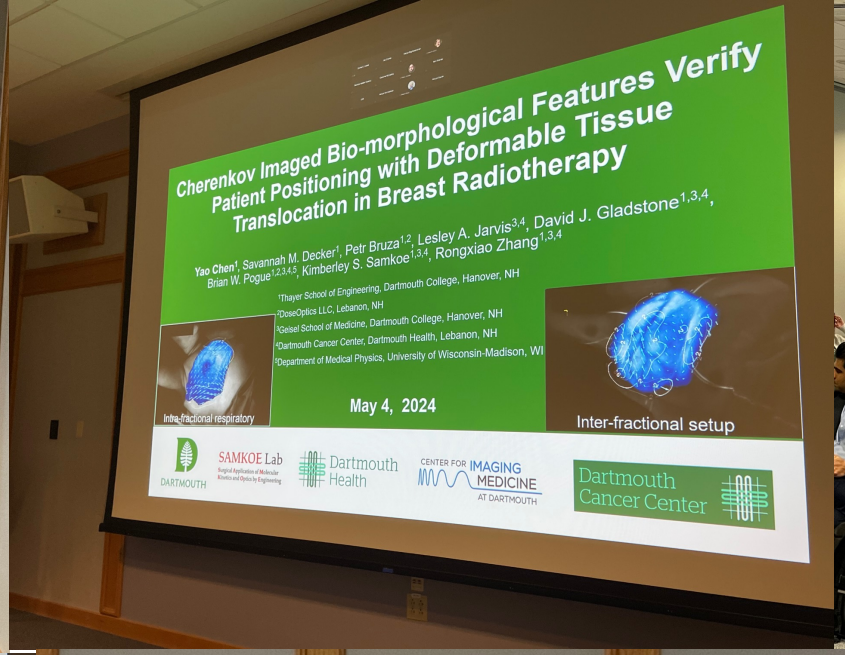
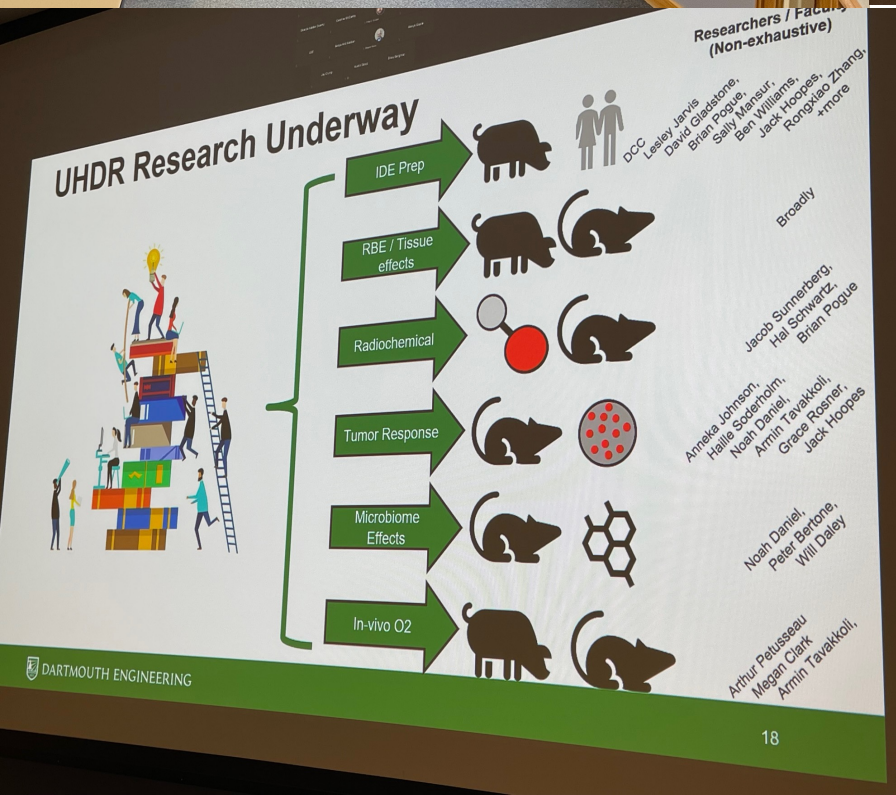
IntraOp


Cherenkov Imaged Bio-morphological Features Verify Patient Positioning with Deformable Tissue Translocation in Breast Radiotherapy
Yao Chen[1], Savannah M. Decker[1], Petr Bruza[1,2], Lesley A. Jarvis[3,4], David J. Gladstone[1,3,4], Brian W. Pogue[1,2,3,4,5], Kimberley S. Samkoe[1,3,4], Rongxiao Zhang[1,3,4]
[1]Thayer School of Engineering, Dartmouth College, Hanover, NH
[2]DoseOptics LLC, Lebanon, NH
[3]Geisel School of Medicine, Dartmouth College, Hanover, NH
[4]Dartmouth Cancer Center, Dartmouth Health, Lebanon, NH
[5]Department of Medical Physics, University of Wisconsin-Madison, WI
May 4, 2024
Intra-fractional respiratory
Inter-fractional setup
SAMKOE Lab
Dartmouth Health
CENTER FOR IMAGING MEDICINE AT DARTMOUTH
Dartmouth Cancer Center


UHDR Research Underway
Researchers / Faculty (Non-exhaustive)
IDE Prep
DCC Lesley Jarvis, David Gladstone, Brian Pogue, Sally Mansur, Ben Williams, Jack Hoopes, Rongxiao Zhang, +more
RBE / Tissue effects
Broadly
Radiochemical
Jacob Sunnerberg, Hal Schwartz, Brian Pogue
Tumor Response
Anneka Johnson, Hallie Soderholm, Noah Daniel, Armin Tavakkoli, Grace Rosner, Jack Hoopes
Microbiome Effects
Noah Daniel, Peter Bertone, Will Daley
In-vivo O2
Arthur Petusseau, Megan Clark, Armin Tavakkoli,
DARTMOUTH ENGINEERING
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Acknowledgements
David Gladstone
Petr Bruza
Brian Pogue
Jack Hoopes
Arthur Petusseau
Megan Clark
Jacob Sunnerberg
Rongxiao Zhang
Tianyuan Dai
Armin Tavakkoli
Noah Daniel
DARTMOUTH ENGINEERING
Dartmouth-Hitchcock NORRIS COTTON CANCER CENTER
SUN NUCLEAR corporation
IntraOp
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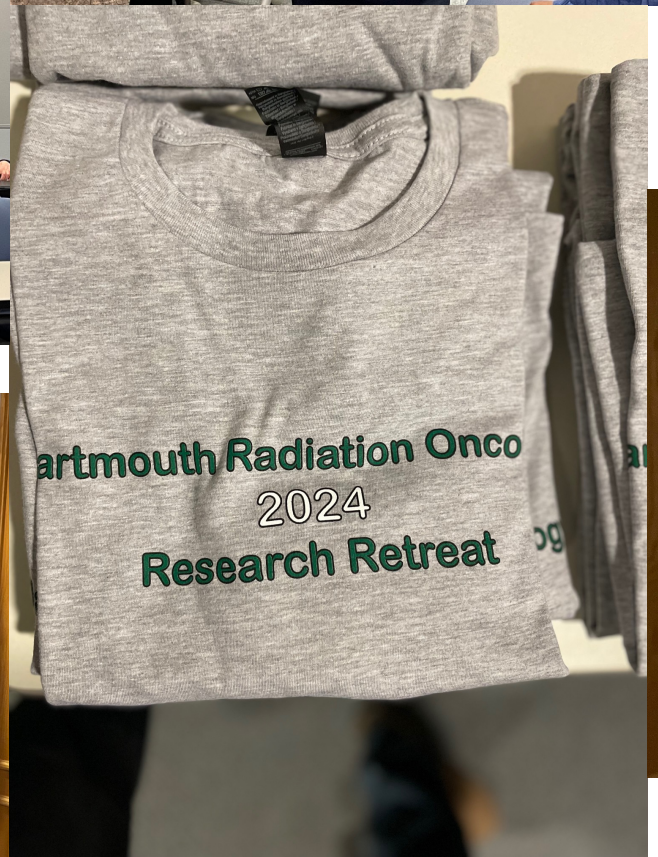
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Carrie D. Hertel
Malcolm Heard
Ilakiya Rajchawadiam
Skanda Kabilan Swamy
Caroline McCarthy
Philip E. Scherer
Jay Casey
CRT
Ilakiya And Kabilan
Drew Bergman
Ruth Tuttoilm

Our Mission
Our Vision
Hartland
WORLD DINNER
DOMINATION
BLACK

Our Mission
Our Vision
Values

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2024
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Radiation Oncology Research Retreat 2024
Disparities in access to multidiscip
cancer consultations and treatmer
early-stage NSCLC patients: A SE
Medicare analysis
Erika Moen, MS, PhD
Assistant Professor
Department of Biomedical Data Science
The Dartmouth Institute for Health Policy and Clinical Practice
Cancer Population Sciences Program
Areas of expertise: health services research, cancer, network analysis, biostatistics

DARTMOUTH
RO Network vulnerability map
Traditional RO supply map
Proportion of linchpin radiation oncologists
Moen et al. JAMA Netw Open, 2022

Leveraging transcriptomics in clinical oncology:
Towards genomic radiotherapy dose-adjustment
Drew T. Bergman[1,2], BA, Parth S. Shah[3,4], MD
[1]Geisel School of Medicine at Dartmouth
Dartmouth-Hitchcock Medical Center
[2]Department of Radiation Oncology & Applied Sciences
[3]Department of Pathology & Laboratory Medicine
[4]Department of Medicine
Dartmouth Health
Dartmouth GEISEL SCHOOL OF MEDICINE
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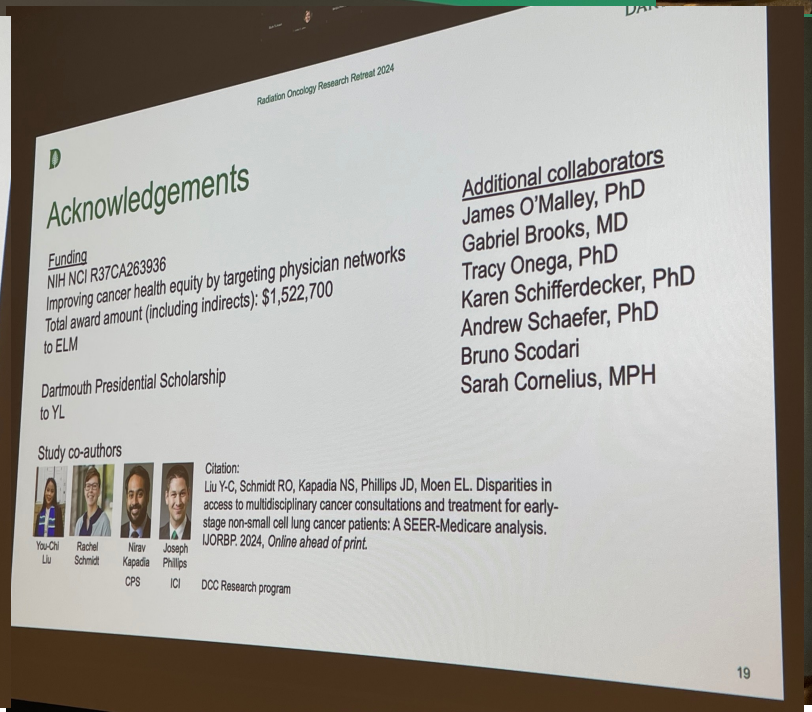
Radiation Oncology Research Retreat 2024
Acknowledgements
Funding
NIH NCI R37CA263936
Improving cancer health equity by targeting physician networks
Total award amount (including indirects): $1,522,700
to ELM
Dartmouth Presidential Scholarship
to YL
Additional collaborators
James O'Malley, PhD
Gabriel Brooks, MD
Tracy Onega, PhD
Karen Schifferdecker, PhD
Andrew Schaefer, PhD
Bruno Scodari
Sarah Cornelius, MPH
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Nirav Kapadia
CPS
Joseph Phillips
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Citation:
Liu Y-C, Schmidt RO, Kapadia NS, Phillips JD, Moen EL. Disparities in access to multidisciplinary cancer consultations and treatment for early-stage non-small cell lung cancer patients: A SEER-Medicare analysis. IJORBP. 2024, Online ahead of print.
DCC Research program
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Carrie D. Hertel
Malcolm Heard
Skanda Kabilan Swamy
Caroline McCarthy
CRT
Ilakiya And Kabilan
Drew Bergman

AI + First Priciples Mathematical Modelling

$$\frac{dL}{dt} = \overbrace{\lambda L\left(1-\frac{L}{K}\right)}^{Growth} - \overbrace{\eta L}^{Necrosis} \overbrace{-\gamma L \sum_{i=1}^{n} \delta(t-t_i)}^{Radiotherapy}$$

$$\frac{dN}{dt} = \eta L - \underbrace{\zeta N}_{Decay} + \gamma L \sum_{i=1}^{n} \delta(t-t_i)$$

Allows you to simulate future tumour growth for an individual

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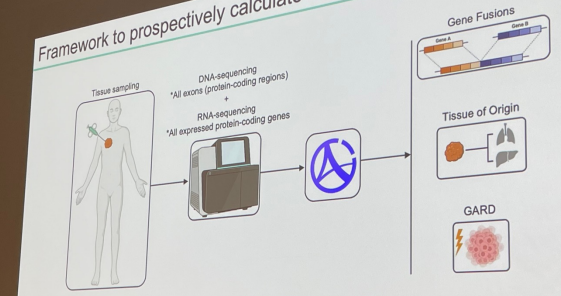
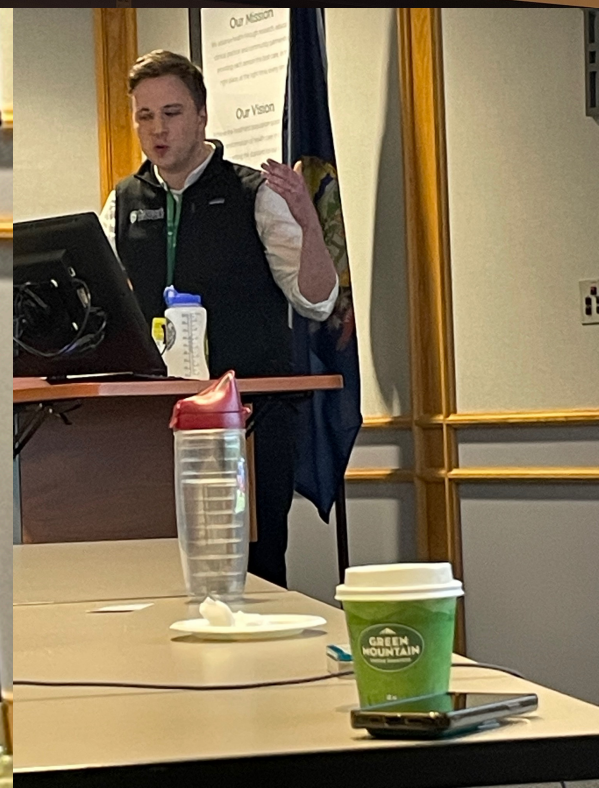
Framework to prospectively calculate RSI & GARD at DCC



Team

Simone Korsgaard Jensen
CEO

Ella Mi
CMO

Gediminas Pazera
CTO

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