

CC Research Hospital Board

Dr. Leighton Chan, MD, MPH

Chief Scientific Officer/Scientific Director

NIH Clinical Center

May 23rd, 2023

AGENDA

- Personal History
- Vision and Goals
- Organization and Staffing
- Metrics of success
- RASCL Awards for Staff Clinicians
- Examples of CC Science

Chief Scientific Officer, NIH CC

- Acting CSO March 2023. Appointed CSO October 2024
- Dual Role
 - Report to CEO as the CC Scientific Director
 - Supervise all funded investigators, staff scientists, post-bacs, post-docs
 - Report to DDIR (Nina Schor) for all NIH Clinical Protocols
 - Scientific Review of all IRP clinical protocols
 - Compliance with reporting results to ClinicalTrials.gov

Background

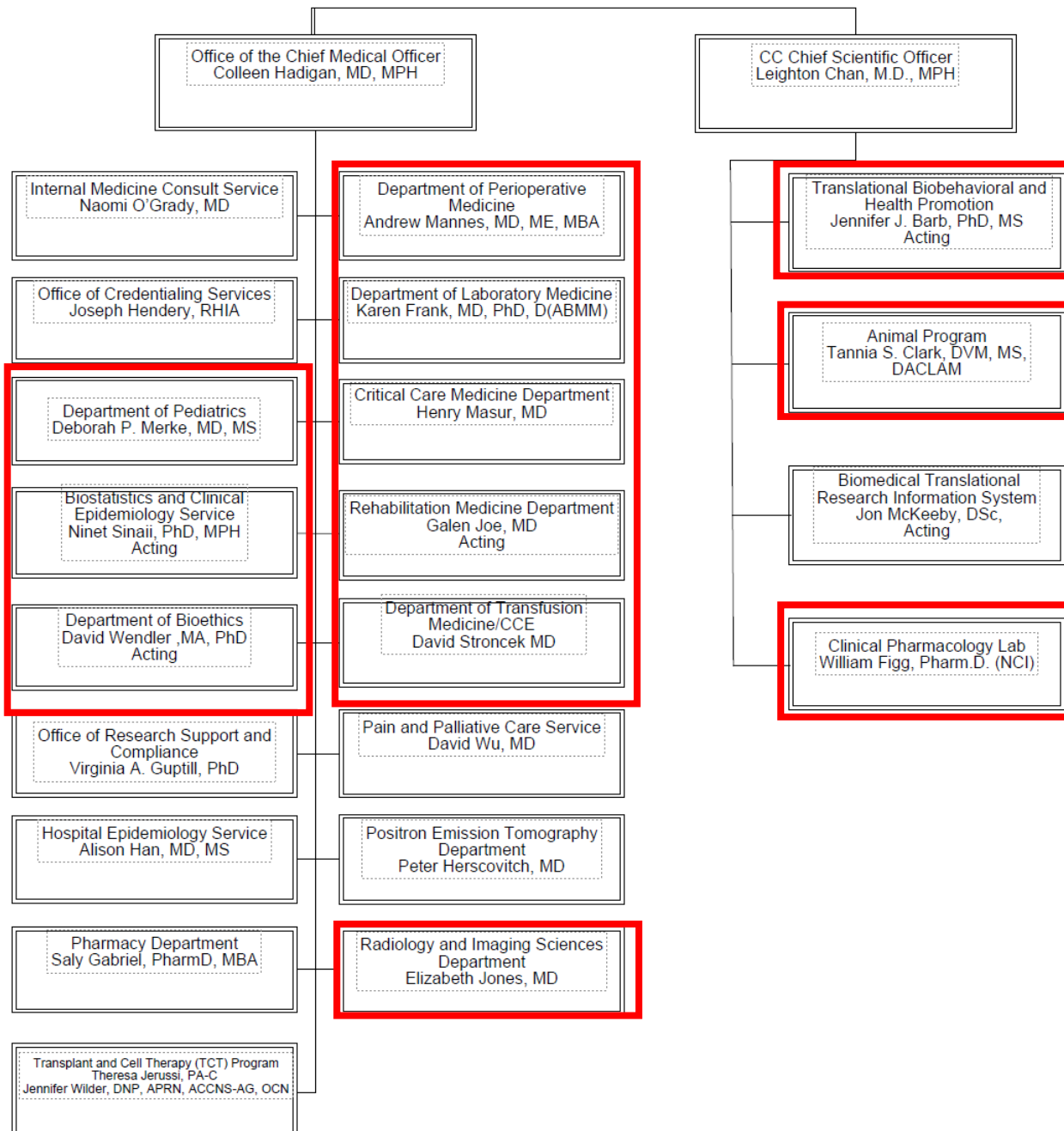
- Political Science Degree from Dartmouth College
- UCLA Medical School
- University of Washington 90-07
 - PM & R (Chief) Resident
 - RWJ Clinical Scholar Health Services Fellowship
 - Department of Rehabilitation Medicine Faculty
- Chief of RMD, NIH Clinical Center 2007-2024

Research Experience

- Clinical Trials, Natural History Studies, NLP AI large databases
- Pulmonary Rehab
 - Exercise in pulmonary hypertension, SLE, IPF, COVID
- TBI
 - TBI Natural History Study
 - Havana Syndrome
- 201 Pubs, 11 in *NEJM* and *JAMA*
- Elected to National Academy of Medicine 2007

Vision

- Embrace the new NIH Director's major aims
 - Improve population health by focusing on chronic diseases
 - Be ambitious, don't be afraid to fail
 - Maintain Safety and Transparency/Reduce use of animals in research
 - Ensure reliable results/Encourage Academic Freedom
- Use research resources to support the recruitment and retention of CC clinicians
- Demand Excellence
 - Translation – goal is to change clinical practice
- Enhance the utilization of the CC
- Limit the CC Research Budget to <5% of total CC Budget
- Retain NIH's standing as a top training ground for researchers and clinicians



12 Departments
receive funding

Number of funded CC Investigators-

16th out of 26 ICs for number of funded investigators

Investigators	CC	All ICs, n=26
Senior Investigators (tenured)	21	19 median
Senior Clinicians	9	1.5 mean
Senior Scientists	1	1.7 mean
Investigators (tenure track)	3	6 mean
Assistant Clinical Investigators (ACIs)	1	1.5 mean
Total	35	26

Research staff and students

- Staff Scientists 49
- Staff Clinicians 74*
- Research Students 102*
 - Post-Bacs 52
 - Doctoral 5
 - Post-Doc 27
 - Visiting Fellows 18

Metrics of success

- BSC Results – Vast majority are ranked “Outstanding”
 - Only 2 rated as “good” – these labs in process of being closed
- Tenure promotion
 - Chertow CCMD 2024
 - Calvo DLM 2025
 - Asada Bioethics (pending)
 - Kadri CCMD (pending)
- Peer Reviewed Papers published since Sept. 1, 2023
 - About 800 papers – 1.2 papers published/day
 - 18 in *NEJM, JAMA, Nature, Science*

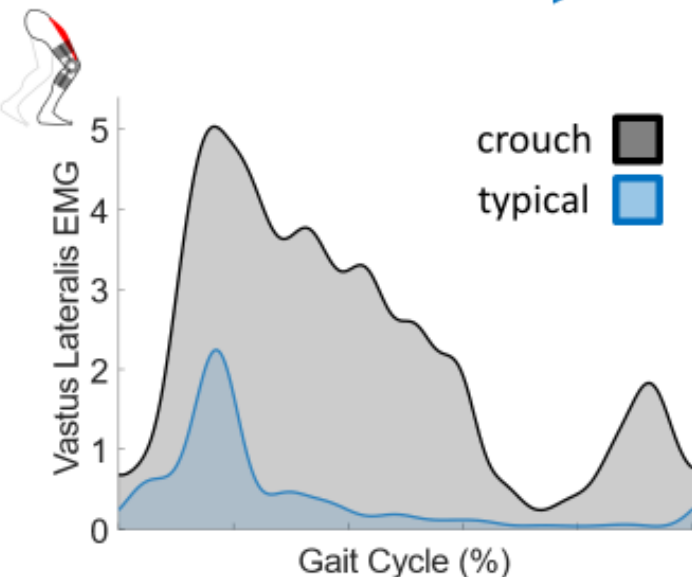
RASCL Awards – Incentivizing Staff Clinicians

- How to recruit and retain clinicians with NIH's low salary structure?
 - Provide CC Staff Clinicians funding for two-year projects
 - \$60K–\$100K/year
 - Prospective review by RASCL Grant Committee (5–7 CC SIs)
 - 30% success rate, 5–7 projects/year
 - Departments funded: CCMD, DTM, DLM, RADIS, Pain and Palliative Care, Peds, Bioethics

Exoskeletons in Children, PI: Thomas Bulea, CC-RMD

Problem: Crouch gait

- Worsens over time
- ~50% of children lose mobility in adulthood



NIH Intramural Research Program
Our Research Changes Lives

Solution: Robotic Knee Exoskeleton

2016 (NIH)



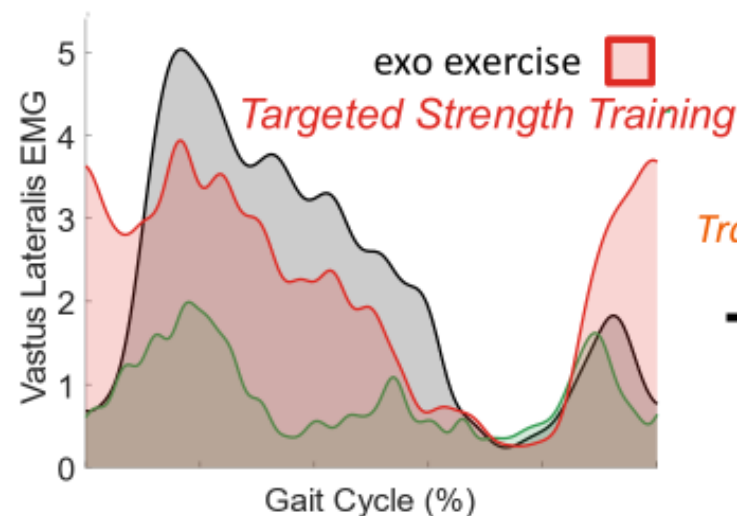
2019 (NIH)



2019 (CRADA: NIH & Bionic Power)



2024 (Commercially Available, FDA Approved Version)



Train New Walking Pattern (?)

12 weeks of training

Device Stream Output

Knee Angular Velocity (degrees)

ADL/Gait Phase

Foot Sensor

Physical Therapist

Participant

Parent

Engineer/Scientist

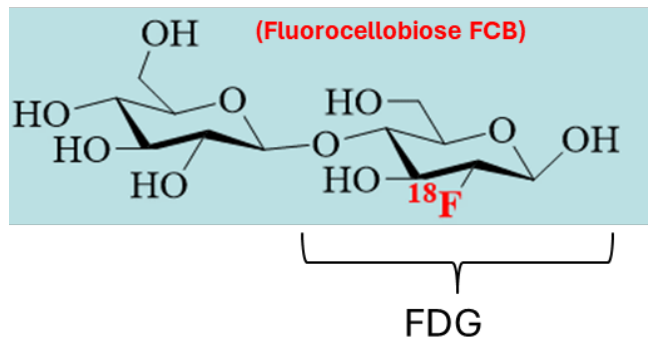
Novel Fungal-Specific PET tracer – Dr. Dima Hammoud Senior Investigator CC RADIS Dr. Rolf Swenson (NHLBI Chem and Synthesis Center)

- Fungal Infections cause 75K hospitalizations and 7K deaths in US every year
- Delayed diagnosis can be deadly
- Existing tests: too invasive or not specific

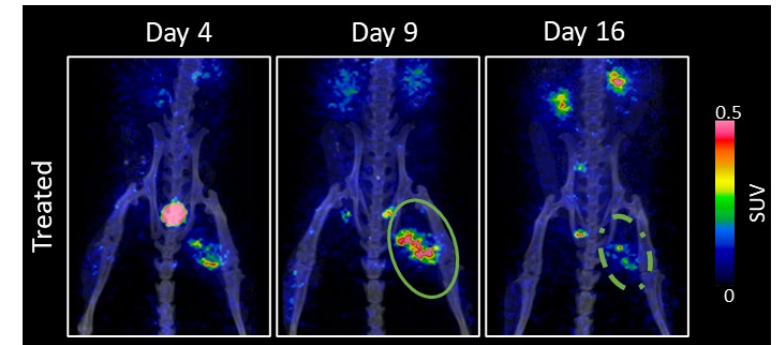
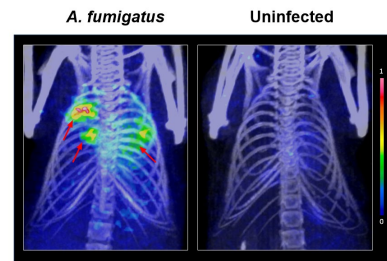
- PET scan are imaging tests that reveals metabolic function in tissues by use of a radioactive tracer.
- PET scanning- Non-invasive, widely available and can be linked to a CT or MRI.

Dr. Hammoud has created the first PET tracer that promises to assess fungal activity in tissue.

Cellobiose:
Cleaved by
A. F. &
Mucor
Mycosis

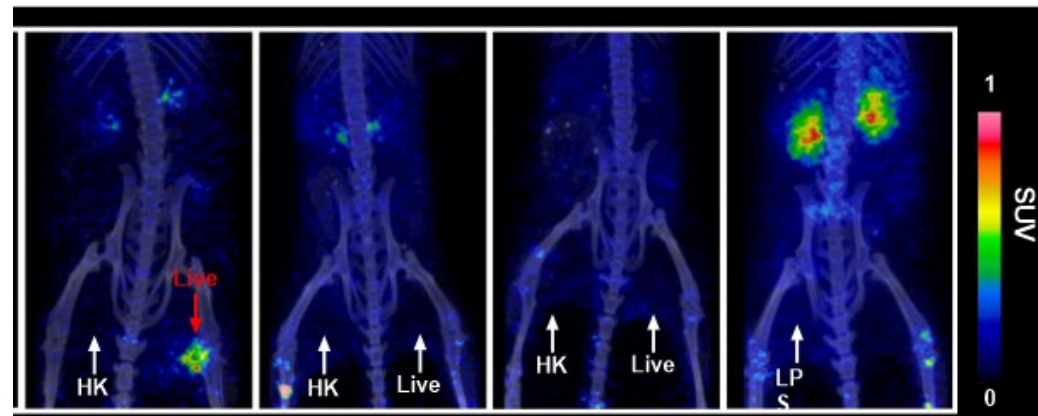


- Enzymatic radiosynthesis using FDG -synthesis time -1.5 h
- Yield- 60-70% Purity of ~99%
- Stability up to 4 hours



Voriconazole

A. fumigatus myositis *E. coli* myositis *S. aureus* myositis LPS myositis



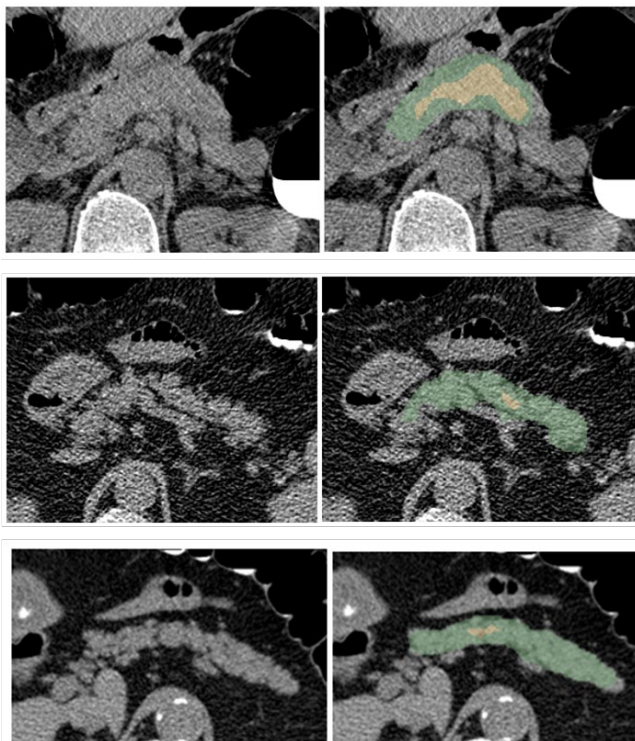
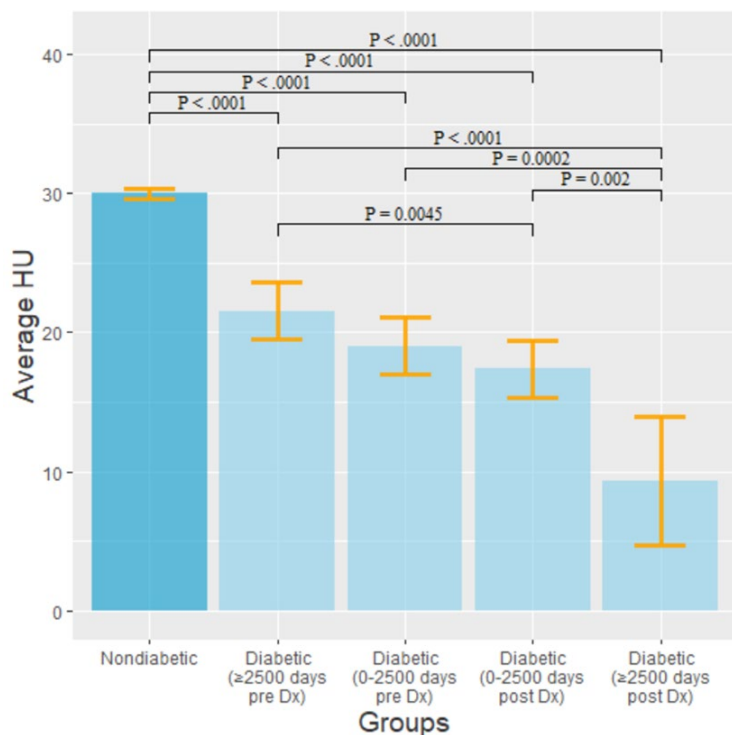
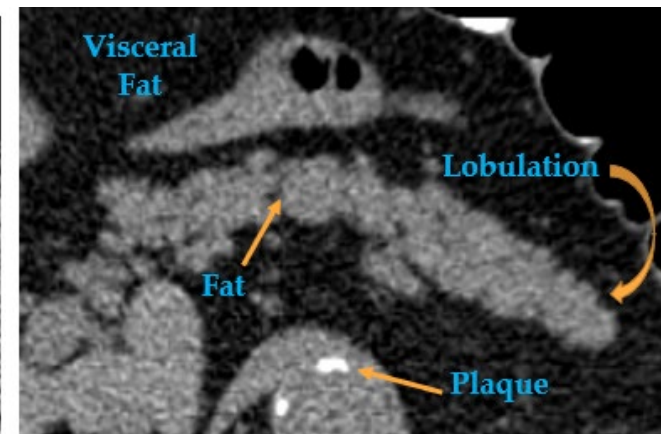
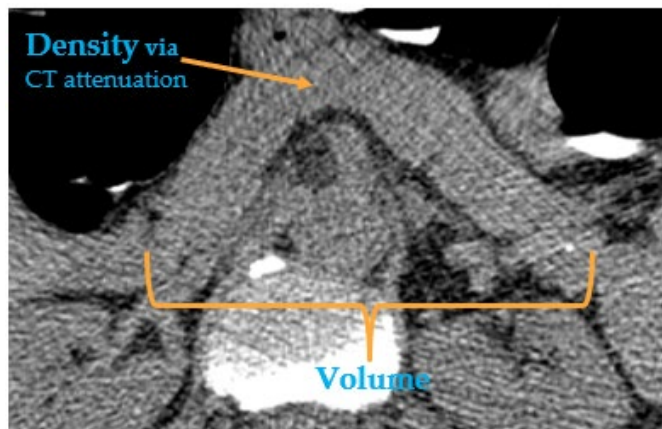
Next Steps:

- One dose/one species tox testing: 2 & 14-day in rats
- Human Trials 2025

Fully Automated Abdominal CT Biomarkers for Type 2 Diabetes Using Deep Learning

Dr. Ron Summers – RADIS

- Type 2 diabetes affected more than 38 million US adults in 2021.
- Almost 1 in 4 adults with diabetes (~8.7 million) are unaware.
- 97.6 million adults (~38% of all US adults) had prediabetes in 2021, only about half of them were aware .
- Some form of screening could be effective in combating this growing epidemic of diabetes by diagnosing it early
- CTs may be repurposed to screen for diabetes by using AI.



- 8992 non-contrast abdominal CT scans
- Deep learning-based pancreatic segmentation
- Patients with type 2 diabetes mellitus had lower pancreatic CT attenuation
- Models trained on these biomarkers were able to diagnose diabetes with (AUC) of 0.81–0.92.
- Significantly, the AI model could predict future diabetes almost 7 years before diabetes diagnosis.

Questions/Concerns?