Quantitative Imaging Workshop

NOVEMBER 2, 2023

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OSIC Mission

Be passionate in our quest to make **radical** progress on behalf of people living with fibrosing lung diseases, their families and caregivers.

Drive ecosystem innovation and efficiencies to deliver actionable solutions to clinicians.

- **Not-for-profit, co-operative** effort between academia, industry and philanthropy – **founded in 2017**
  - Academic institutions provide minimum 500 scans to receive access to entire database and consortium
  - Industry and Technology Partners - fee based
  - Patient organizations are free

- The largest and **most diverse, curated and integrated** ILD image and clinical database

- Accessible machine learning, imaging and pulmonology expertise

- Speed of progression achieved with the **open science model**
Imaging Is Vital for Clinical Progress in ILD

Imaging vs. FVC

- FVC (the current SOC) is a bad endpoint/metric of disease severity
  - Mechanistically uninformative
  - Lags behind changes in the lungs
- Imaging can be a less variable biomarker for disease progression and can allow quantification
- Imaging can play a major role in drug trial eligibility
  - Reducing drug trial cost and failed trials
  - Reducing chances of companies giving up
- Reduce lung biopsies and other unnecessary tests which burden the system and worse – cause patients distress
- Today’s tools can find patterns and with expertise, make meaning from the patterns
- Today’s tools can see things the human eye can’t

Almost 50% of screen failures in IPF drug trials are from misclassification of HRCT at central read
ILD Real World Diagnostic Challenge #1
Experts Often Cannot Agree

Deep learning for classifying fibrotic lung disease on high-resolution computed tomography: a case-cohort study

Summary
Background Based on international diagnostic guidelines, high-resolution CT plays a central part in the diagnosis of the correct clinical context, when high-resolution CT appearances are those of usual interstitial pneumonitis (UIP). A diagnostic algorithm for the automated detection of fibrotic lung disease on high-resolution CT images is proposed in this study, following the criteria of the 2011 American Thoracic Society/European Respiratory Society/American College of Chest Physicians/Japanese Respiratory Society/International Association for the Study of Lung Disease guidelines for diagnosis and management of idiopathic pulmonary fibrosis and the diagnostic criteria for idiopathic pulmonary fibrosis.

Probable UIP

Indeterminate

Alternative diagnosis
OSIC - Solving ILD Real World Diagnostic Problem #1

Experts Often Can’t Agree

- Prior Limitations
  - Insufficient number of CT scans available
  - Databases were primarily homogeneous
  - Limited collaborations
  - Generative AI needs lots of data

- OSIC Approach
  - Build the largest, most diverse and curated real-world dataset
    - From every region in the world
  - Cloud-enabled data handling and distribution
    - New OSIC Cloud launching November 13th
  - Help remove variability from image analysis
  - Search for novel biomarkers

- Learnings
  - Images alone are not enough. Curated datasets are vital for algorithm development
  - Real world data is important vs. pristine only
  - The front-end ecosystem needs more standards
    - Radiology
    - EMR
  - Pulmonologists need to be at forefront of understanding the input needs of the tools
ILD Real World Diagnostic Challenge #2
Identifying Progressive Disease

Once disease is established
It is currently not possible to reliably predict which patients will develop progressive fibrosis or remain stable using BASELINE information.

- Precious time wasted (more than 1 year)
- More lung biopsies (2%, 30-day mortality)
- Patient exposure to harmful medications
- Increased healthcare costs

SOFIA-based probabilities
- UIP: 0.9963
- PROB: 0.0036
- INDETER: 0.0001
- OTHER: 0.0000

Stable disease

Progressive fibrotic phenotype
OSIC - Solving ILD Real World Diagnostic Problem #2
Identifying Progressive Disease

OSIC Approach
- Ongoing refinement of clinical data needed for best algorithm output
  - Share, test, debate.....repeat
- Drive collection of longitudinal scans and data
- Artificial intelligence models for quantification of progression

Path Forward
- Begin more annotation of data
- Add other forms of data
  - Sound
  - Blood biomarkers
  - Clinical notes – NLP
  - Project OPUS
- Test member algorithms against a similar cohort
ILD Real World Diagnostic Challenge #3

Early detection of progressive fibrosing lung disease – symptom based diagnosis

- **Symptom Based Diagnosis**
  - Symptoms alert clinician
  - Established fibrosis on HRCT
  - Early intervention “opportunity” missed
  - Irrevocable lung function loss

- “It’s like diagnosing coronary artery disease after someone had a heart attack”
OSIC - Solving ILD Real World Diagnostic Problem #3
Early detection of ILD – symptom based

- **OSIC Approach**
  - Including lung cancer screening data into our cloud database for the purpose of ILA and ILD
  - Categorize the abnormalities and create algorithmic based biomarkers for ILA's and progressive ILD’s

- **Path Forward**
  - 10,000 Lung cancer screenings to be added by end of 2023 with ILA and ILD follow ups
  - Goal is 100,000 in 2024 with 40,000 committed
Something To Think About

The Data Scarcity Problem in Rare Disease – The Need for Generative AI and Synthetic Data
Thank you for inviting us to be here.

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