WISH LIST FROM SOFTWARE VENDORS FOR CT LUNG CANCER SCREENING

Eliot Siegel, MD, FACR, FSIIM
Prof/Vice Chair IS Univ. Maryland
Chief Imaging VAMHCS
Patient Identification for Screening

- Search EMR for eligible patients
  - CMS Benefit eligibility criteria
  - Age 50-77 years
  - Asymptomatic with no signs or symptoms of lung cancer
  - Tobacco smoking history of at least 20 pack-years
  - Current smoker or one who has quit smoking within the last 15 years
- Consider retrospective AI application to previous CT studies
- Pull relevant patient information into ACR registry
  - DOB, actual pack year smoking history, whether signs/symptoms of lung cancer, NPI of ordering physician
- Use databases such as PLCO and NLST to identify patients with highest a priori risk to make screening more cost effective and higher yield
  - Pacific islanders with 6 fold greater risk of lung cancer than Hispanic patients
  - Other risk factors
EMR/HIS Ordering Template for Initial and Subsequent Annual LDCT lung cancer Screenings and Documentation in Beneficiary Medical Records

- Date of birth
- Actual pack – year smoking history (number)
- Current smoking status
  - For former smokers number of years since quitting
- Statement that beneficiary is without signs/symptoms of lung cancer
- National Provider Identifier of the ordering practitioner
CT Image Acquisition

• Optimize texture by using Deep Learning reconstruction rather than IR
• Consider reconstruction at higher matrix sizes, at least for clinical decision support
Access to Software

- Need to have flexibility to access AI software both locally and in the cloud
Integration

• Needs to be integrated with PACS or reporting workflow process
• Server onsite or in cloud should take all relevant CT studies and automatically do pre-processing as part of routine workflow
Functionality

- Software can take CT and find lung nodules but only small part of the total screening process
- Would like to get reason or level of certainty and benign vs. malignant
- Software should be interactive to allow agreement or lack of agreement
- Software should be based on similar patient population for identification of lung nodules which might depend on prevalence of disease, e.g. VA different from UMMS or Southwest
  - Continuous learning e.g. Berkman Sahiner FDA lecture
Functionality

• Second and third opinions have been shown to increase accuracy
  • Should have support for ensembles of AI programs that might do the same thing or might do complementary things
• Track change over time and identify progressive but very slow change and identify rapid change even if nodules are small
• Automatic software to follow up to determine whether recommendations have been followed by clinicians for additional studies and procedures and communication with patients or primary care providers
• Automatic ACR registry reporting
Conclusion

• IT is becoming increasingly critical to the success of today’s practice of radiology and is especially critical as we move to implement the complex process that is associated with Lung Cancer Screening

• Clinical decision support tools are evolving from the current state of the art to next generation and beyond systems that will allow us to take care of patients

• This will allow us to maximize the likelihood that our CT screening studies will save lives and reduce morbidity associated with lung cancer