

CISNET Lung Model Characteristics: Key Similarities and Differences
Date: 2025/04/18

Model Components	BC Cancer (BCCRI-LunCan)	BC Cancer (BCCRI-Smoking)	Erasmus-MC (MISCAN-Lung)	Georgetown University (GSBCM)	Mount Sinai	MD Anderson	MGH-ITA (LCPM)	CPAC-StatCan Oncosim-Lung	Stanford University (LCOS)	Yale University (YLCM)
Original purpose	Smoking Base Case	Evaluating LDCT screening	Primary and secondary prevention	Smoking Base Case	Evaluating LDCT screening	Evaluating primary and secondary prevention for LC	Evaluating LDCT screening	Evaluating LDCT screening and smoking cessation	Evaluating LDCT screening	Smoking Base Case
Type of model	Microsimulation	Microsimulation	Microsimulation	Macro-level	Microsimulation	Microsimulation combined with a Partially Observable Markov Decision Process	Microsimulation	Microsimulation	Microsimulation	Macro-level
Simulation of populations or trials/cohorts	Both	Both	Both	Populations	Both	Both	Both	Both	Trials/Cohorts	Populations
Smoking histories	Individual-level	Individual-level	Individual-level	Group-level	Individual-level	Individual level	Individual-level	Individual-level	Individual-level	Group-level
Dose-response model	TSCE	TSCE, Bach, PLCom2012, LCRAT	TSCE	TSCE, Knoke, Flanders, Doll	Logistic functions obtained from calibration	Risk models (Bach, PLCom2012, PLCO_ENGAGE)	Probabilistic by histology	PLCOall2014 plus radon-related risk	TSCE	TSCE, Knoke
Datasets used for dose-response parameter calibration	NHS/HPFS, US mortality	NHS/HPFS, US mortality	NHS/HPFS, SEER, NLST, PLCO	NHS/HPFS, US mortality	NLST, PLCO, Mount Sinai Data, VA data	SEER, PLCO, NLST	SEER, NLST, PLCO	Canadian Cancer Registry, PLCO	NHS/HPFS, US mortality	NHS/HPFS, US mortality
Histologic cell types	N/A	AD+BAC, SQ, SCLC, Other	AD+BAC+large cell, SQ, SCLC, ONSCLC	N/A	AD, AIS, large cell, SQ, SCLC, Other	AD, SQ, SCLC, Other	AD, AIS, large cell, SQ, SCLC, Other	SCLC, NSCLC	AD, large cell, SQ, SCLC, BAC	N/A
Stages	N/A	IA, IB, II, IIIA, IIIB, IV	IA, IB, II, IIIA, IIIB, IV	N/A	IA, IB, II, IIIA, IIIB, IIIC, IV	IA, IB, II, IIIA, IIIB, IV (Proposed TNM staging)	IA1, IA2, IB, II, IIIA, IIIB, IIIC, IV	I, II, IIIA, IIIB, IV (among NSCLC); limited (i.e., I-III), extensive (i.e., IV) (among SCLC)	Early (I-II), advanced (III-IV)	N/A
Stage progression	N/A	Backward model based on histology and stage at lung cancer incidence	Markov state-transition by histology	N/A	Based on tumour size and metastatic burden	Markov state-transition by histology, nodule type and sex	Based on tumour volume and metastatic burden	N/A	Based on tumour volume and metastatic burden	N/A
Screening sensitivity model	N/A	By stage and histology	By stage and histology	N/A	By size (mm) and histology	By stage, histology, sex, and nodule type	By size (mm) and location in lung (central/peripheral)	By screening round	By size (mm) and histology	N/A
Screening effectiveness	N/A	Cure model and earlier stage detection	Cure model	N/A	Cure model and earlier stage detection	Earlier stage detection based on tumour size	Earlier stage detection	Stage shift among NSCLC	Not stage-shift model	N/A
Positive nodule (non-lung cancer)	N/A	Implicit based on Lung-RADS	Implicit based on NLST	N/A	Explicitly modeled using current follow-up guidelines	Explicitly modeled using Lung-RADS; optimized using the ENGAGE framework	Explicitly modeled using Fleischner and Lung-RADS guidelines;	Implicit based on NLST or Lung-RADS	Explicit model of Lung-RADS guidelines	N/A

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follow-up algorithm							lung cancers diagnosed on follow-up are categorized as “non-screened-detected”			
Modeling of metastases	Implicit	Implicit	Implicit	Implicit	Explicit	Implicit (Proposed explicit based on TNM staging)	Explicit	Explicit	Explicit	Implicit
Tumor growth	N/A	N/A	N/A	N/A	Sigmoid	Gompertz	Gompertz	N/A	Exponential	N/A
Biomarkers	N/A	Proposed	Proposed	Proposed	Included	Proposed	Included	N/A	Proposed	N/A
OC mortality	US rates (CISNET-SHG)	Gompertz model of OC mortality calibrated to NLST/PLCO	US rates (CISNET-SHG)	US rates (CISNET-SHG)	US rates (CISNET-SHG)	Cox model of OC mortality calibrated to NLST/PLCO	Cox model of OC mortality calibrated to NLST/PLCO	Canadian mortality hazards from Canadian Vital Statistics Deaths Database	Gompertz model of OC mortality based on NLST calibrated model	US rates (CISNET-SHG)
Benign nodules modeled	N/A	No	No	N/A	Yes	Yes	Yes	No	No	N/A
Incidence	N/A	SEER, NLST, PLCO	SEER, NLST, PLCO	N/A	SEER, NLST, PLCO	SEER, NLST, PLCO	SEER, NLST, PLCO	Canadian Cancer Registry	SEER, NLST, PLCO	SEER
Stage, size, histology	N/A	SEER, NLST, PLCO	SEER, NLST, PLCO	N/A	SEER, NLST, PLCO	SEER, NLST, PLCO	SEER, NLST, PLCO	Canadian Cancer Registry	SEER, NLST, PLCO	N/A
Survival	N/A	SEER 18 2005–2012	SEER 18 2004–2010	N/A	SEER 18 2010–2021	SEER 17 2000–2021	SEER 18 2004–2013	Cancer Care Ontario	SEER 18 1988–2003	SEER
Mortality	US	US	N/A	NCHS	US	US	US	Canadian Vital Statistics Deaths Database	N/A	US
Tobacco Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Screening	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Treatment	No	Proposed	Proposed	No	Yes	Proposed	Yes	Yes	Proposed	Proposed

For additional details and supporting references for the models, Model Profiles are available at: <https://cisnet.cancer.gov/lung/#profiles-registry>.

Abbreviations: TSCE= Two-stage clonal expansion model; AD= Adenocarcinoma; BAC=Bronchioloalveolar carcinoma; SQ= Squamous cell; SCLC=Small cell lung cancer; ONSCLC=Other non-small cell lung cancer; AIS= Adenocarcinoma in situ; NHS=Nurses’ Health Study; HPFS=Health Professionals Follow-up Study; SEER=Surveillance, Epidemiology, and End Results; ; NLST=National Lung Screening Trial; PLCO=Prostate, Lung, Colorectal and Ovarian Cancer Screening Trial; NCHS, National Center for Health Statistics; OC=other-cause; SHG=Smoking History Generator