



État des lieux sur le dépistage du cancer bronchique en France : rationnel scientifique, indications.

Séminaire « dépistage » du CPHG - Le 4 avril 2024, Paris.



Pr. Sébastien Couraud
Hospices Civils de Lyon et Université Lyon 1
Chargé de mission Inter-Groupe « Prévention & dépistage »
Société de Pneumologie de Langue Française
sebastien.couraud@chu-lyon.fr

DECLARATION DES LIENS D'INTÉRÊT 2019 / 2024

Art. L.4113-13 du code santé publique

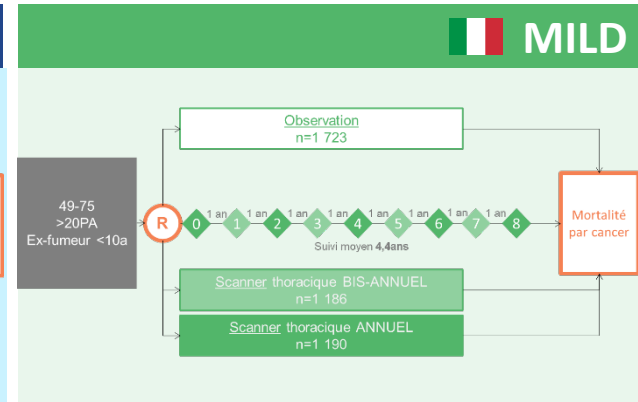
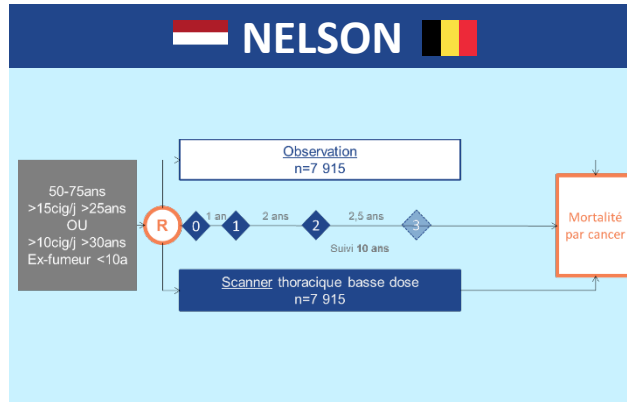
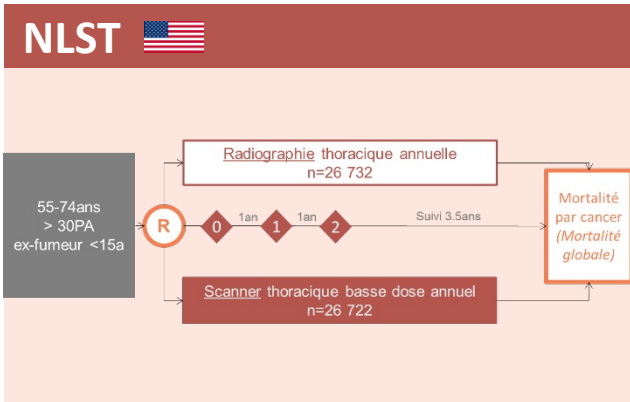
Pr. Sébastien Couraud – Mise à jour le 15/01/2024

Entreprise / Groupe	Congrès	Financement pour l'institution	Rémunération personnelle
ADENE		X	Membre bénévole du CA
AMGEN	X	X	X
ASTRA ZENECA	X	X	X
BD		X	
BMS	X	X	
BOEINGHER		X	X
CELLGENE		X	
CHUGAI	X	X	
HEALTH EVENT			X
JANSSEN	X	X	
Laidet	X	X	
Lilly		X	

Entreprise / Groupe	Congrès	Financement pour l'institution	Rémunération personnelle
MaaT Pharma			X
MSD		X	X
NOVARTIS		X	X
PFIZER		X	X
ROCHE		X	
SANOFI		X	X
SNCF			X
TAKEDA	X	X	
TRANSDIAG		X	
VOLITION		X	

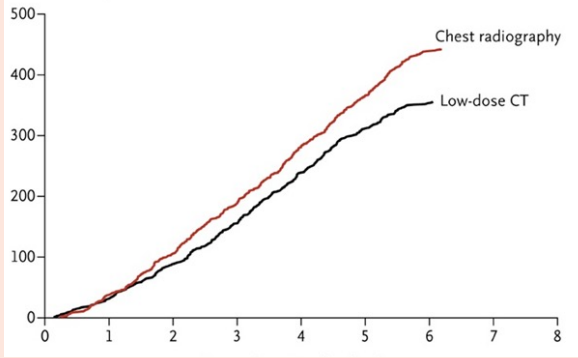
Déclaration exhaustive sur <https://dpi.sante.gouv.fr/>

Les trois essais positifs



Les trois essais positifs

NLST

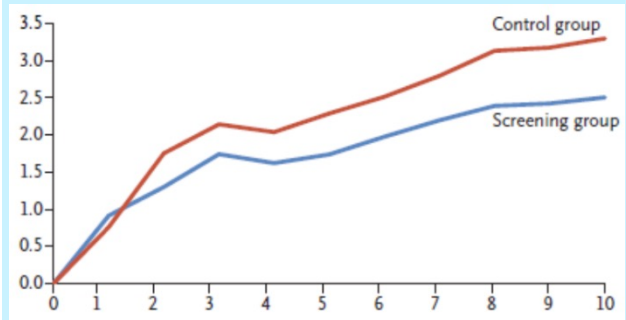


Année 6.5



-20%
(0.73-0.93)

NELSON

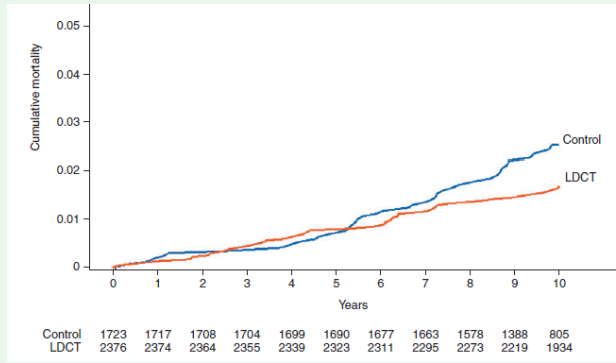


Année 10



-24%
(0.61-0.94)

MILD



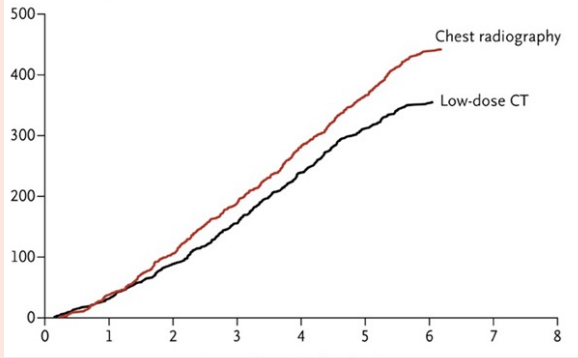
Année 10





-39%
(0.39-0.95)

Les trois essais positifs

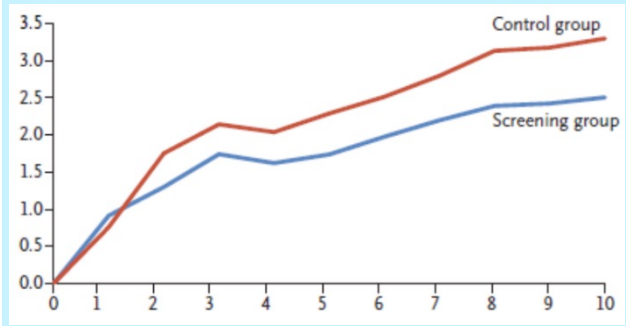
NLST





	Année 6.5	Année 12
	-20% (0.73-0.93)	-11% (0.80-0.99)
	-6,7% (0.86-0.99)	-3% (0.94-1.01)

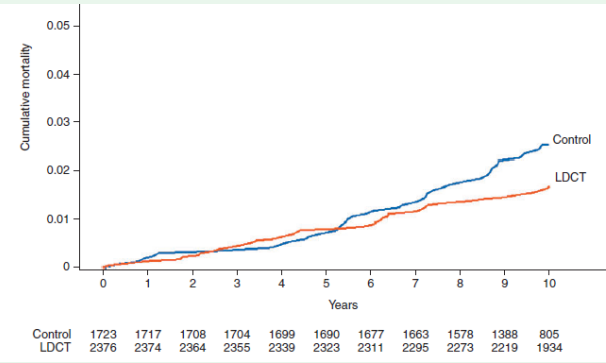
Mortalité **globale**


NELSON



	Année 7	Année 8	Année 9	Année 10	Année 11
	-21% (0.60-1.03)	-24% (0.60-0.97)	-24% (0.61-0.96)	-24% (0.61-0.94)	-22% (0.63-0.95)
	-54% (0.21-0.96)	-59% (0.19-0.84)	-48% (0.28-0.94)	-33% (0.38-1.14)	-22% (0.47-1.29)

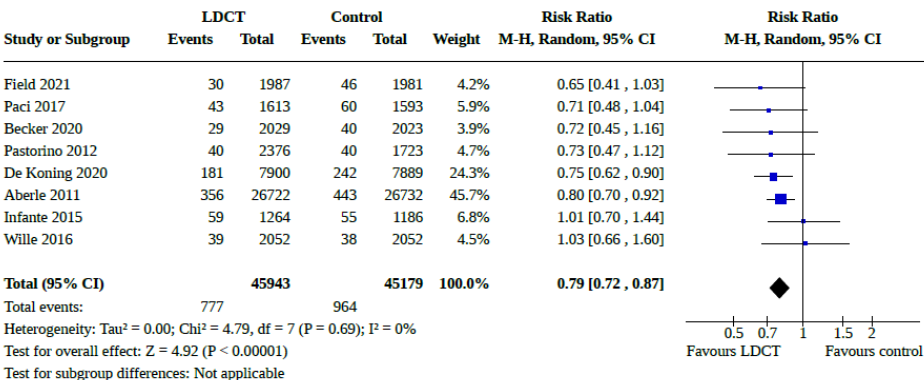
MILD



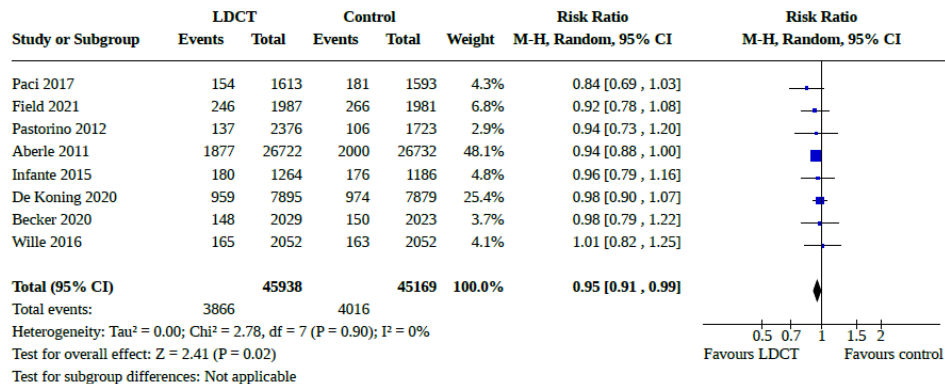
	Année 6.5
	-39% (0.39-0.95)

Méta-analyse Cochrane en faveur du dépistage

Analysis 1.1. Comparison 1: Primary outcome: lung cancer-related mortality, Outcome 1: Lung cancer-related mortality - planned time points



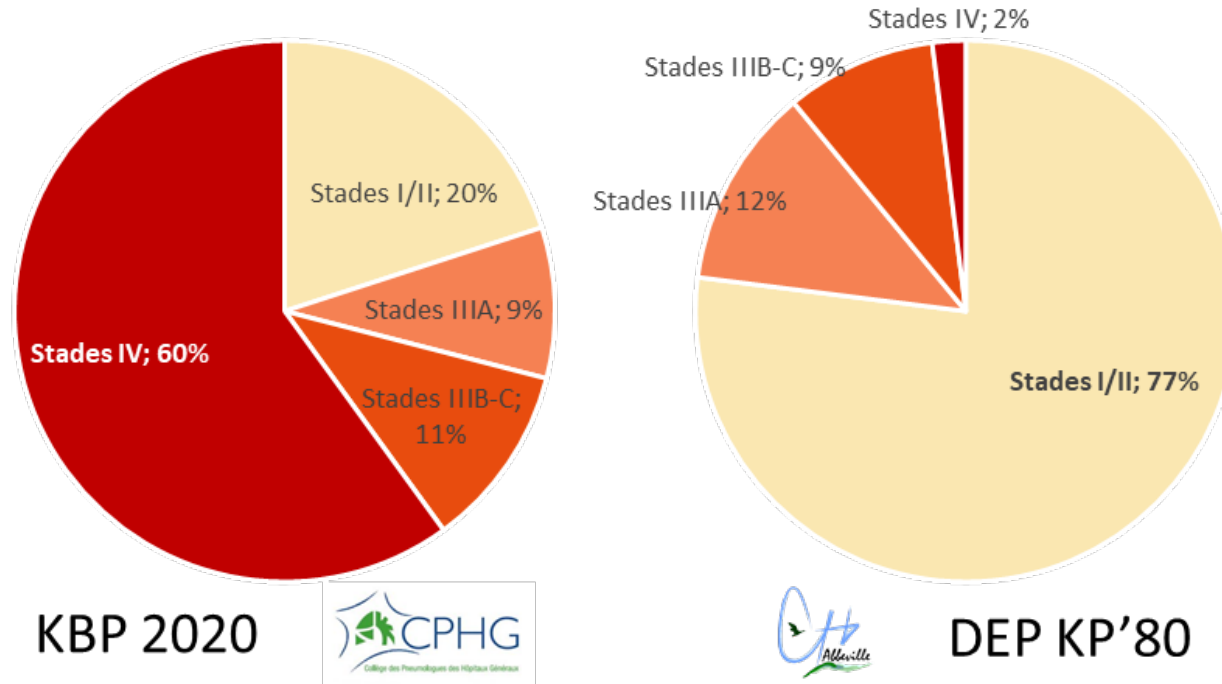
Analysis 3.1. Comparison 3: Secondary outcome: all-cause mortality, Outcome 1: All-cause mortality - planned time points (latest time points)



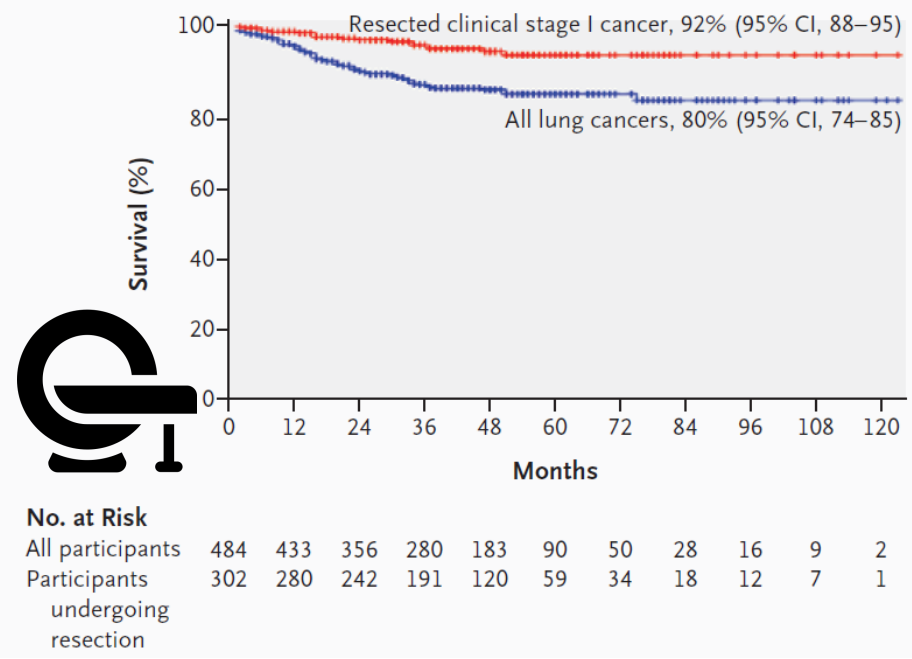
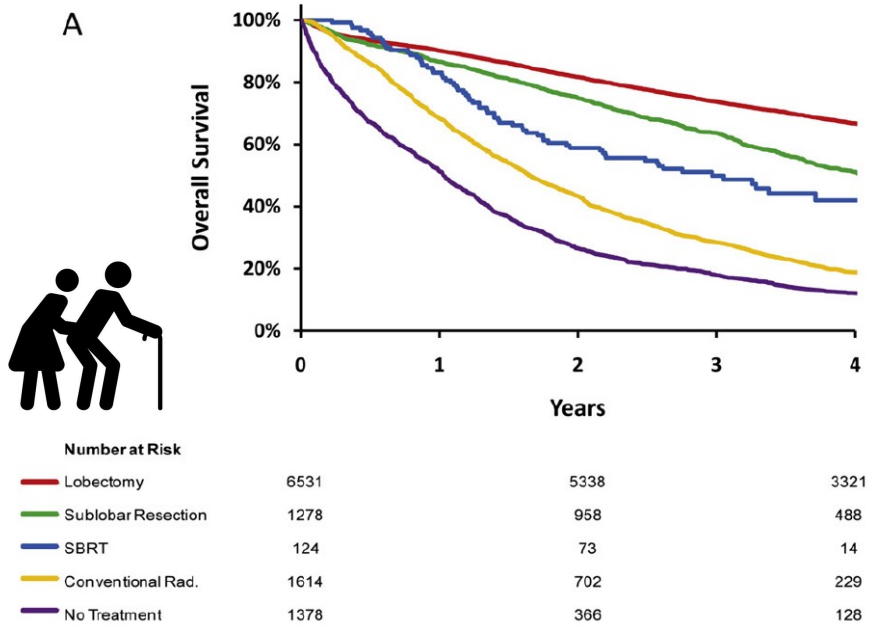
Réduction de la mortalité par cancer du poumon **-20%**



Réduction de la mortalité globale **-5%**



La chirurgie: traitement central des stades précoces



Shirvani SM, et al. *Int J Radiation Oncol Biol Phys.* 2012; 84(5):1060-1070
 HenschkeCI, et al. *N Engl J Med* 2006;355:1763-71.

Guidelines evolution

review

Annals of Oncology 33, 1-15, 2022
doi:10.1016/j.annonc.2022.01.001

From randomized trials to the clinic: is it time to implement individual lung-cancer screening in clinical practice? A multidisciplinary statement from French experts on behalf of the french intergroup (ICT) and the groupe d'Oncologie de langue française (GLF)

S. Couraud^{1,2,7}, A. B. Cortot^{8,1}, L. Grilleri^{4,1}, V. Mennecor^{5,1}, N. Girard^{6,8,1}, B. Bessaïe⁹, L. Brouchou¹⁰, O. Costantini¹¹, P. Frappo¹², G. P. Fomont¹³, L. Gutteri¹⁴, A. Khalil¹⁵, P. Lafitte¹⁶, F. Laurent¹⁷, S. Libert¹⁸, O. Mokriani¹⁹, E. Quaci²⁰, M.-P. Revel²¹, B. Stacht²², P.-J. Souquet²³, P. Thomas²⁴, J. Trédaniel²⁵, E. Lemaire²⁶, G. Zalcman^{1,2,4,5,6}, F. Barthelemy²⁷, & B. Milotrou^{28,29} on behalf of the French lung cancer screening statement taskforce³⁰

Background: Despite advances in cancer therapy, mortality is still high except in early-stage tumors, and screening remains a challenge. The randomized National Lung Screening Trial (NLST) compared low-dose computed tomography (LDCT) and chest X-ray, revealed a 20% decrease in lung-cancer-specific mortality. These results renewed numerous questions. The French Intergroup for Thoracic Oncology and the French-speaking oncology group formed an expert group to provide a pertinent evidence on screening modalities in France.

Methods: A literature review was carried out and transmitted to the expert group, which was divided into three working groups to tackle specific questions, with responses presented in a primary review. A writing committee drafted this article.

Results: The multidisciplinary group favored individual screening in France, when carried out as outlined in this article and after informing subjects of the benefits and risks. The target population involves subjects 50-74 years, who are smokers or have a 30 pack-year smoking history. Subjects should be informed about the benefits of quitting. Screening should involve LDCT (covering only specific nicotine), criteria for CT positivity and management algorithms for positive examinations are given.

Correspondence to: Dr S. Couraud, Respiratory Disease Department, Lyon University Hospital, 100 Avenue du Docteur Huchard, 69631 Pierre Bénite Cedex, France. Tel: +33 4 78 44 00 00; Fax: +33 4 78 44 00 00; E-mail: couraud@univ-lyon1.fr

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DIAGNOSTIC AND INTERVENTIONAL IMAGING FOR CANCER RISK ASSESS

Guidelines/Thoracic imaging

Intergroupe francophone de cancérologie thoracique, Société de pneumologie de langue française, and Société d'imagerie thoracique statement paper on lung cancer screening

Sébastien Couraud^{1,2,7}, Gilbert Ferretti³, Bernard Milleron⁴, Alexis Cortot⁵, Nicolas Girard⁶, Valérie Goussard⁷, François Laurent⁸, Olivier Lelou⁹, Elisabeth Quaci¹⁰, Marie-Pierre Revel¹¹, Marie Wislez¹², Virginie Westeel¹³, Gérard Zalcman¹⁴, Arnaud Scherperclée¹⁵, Antoine Khalil¹⁶

Background: Despite advances in cancer therapy, mortality is still high except in early-stage tumors, and screening remains a challenge. The randomized National Lung Screening Trial (NLST) compared low-dose computed tomography (LDCT) and chest X-ray, revealed a 20% decrease in lung-cancer-specific mortality. These results renewed numerous questions. The French Intergroup for Thoracic Oncology and the French-speaking oncology group formed an expert group to provide a pertinent evidence on screening modalities in France.

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REPUBLIQUE FRANÇAISE

INSTITUT NATIONAL DU CANCER

Janvier 2024

RECOMMANDATIONS ET PRÉFÉRENCES

DÉPISTAGE DU CANCER DU POUMON

Chronic obstructive pulmonary disease
Computed tomography
CT dose index
Detection and screening of early lung cancer with Novel imaging Technology and molecular assays
DIP XPRO
Digital Imaging and Communications in Medicine
DLST
Danish Lung Cancer Screening Trial
Dose-length product (DLP)
European Society of Radiology
GOLF
Group of Francophone Lung Cancer Specialists
Grand-glass opacity
Hague Accorded de Santé

© 2021 Published by Elsevier Masson SAS on behalf of Société Française de radiologie.

2012

55 – 74 yo

≥30 PY

Current / quit <15y

NELSON like

2021

50 – 75 yo

>15cig/d 25y / >10cig/d 30y

Curr. / quit <10y (15)

NELSON like

2024

50 – 75 yo

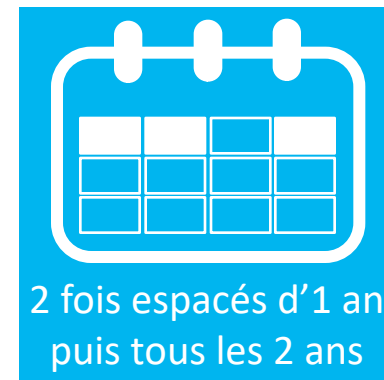
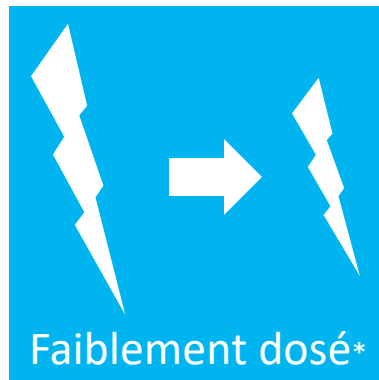
≥20PY or >15cig/d 25y / >10cig/d 30y

Curr. / quit <15y

NELSON like



COMMENT ?



***Indice de dose scannographique du volume (IDSV)** : $\leq 0,4$ mGy pour un sujet de poids < 50 kg ; $\leq 0,8$ mGy pour un sujet de 50 à 80kg ; $\leq 1,6$ mGy pour un sujet de plus de 80kg. ET **produit dose longueur (PDL)** < 100 mGy.cm (soit < 1.5 mSv).



50-75



≥ 20 PA

ou 15cig/j 25ans ou >10/j 30ans



**Actif ou sevré
depuis 15 ans**



QUI ?

**Comorbidités
sévères,
PS ≥ 2**

**Dyspnée de
repos,
symptômes
évocateurs**

**ATCD de
cancer suivi
< 5 ans**

**Scanner < 12
mois ou signes
respiratoires
infectieux**



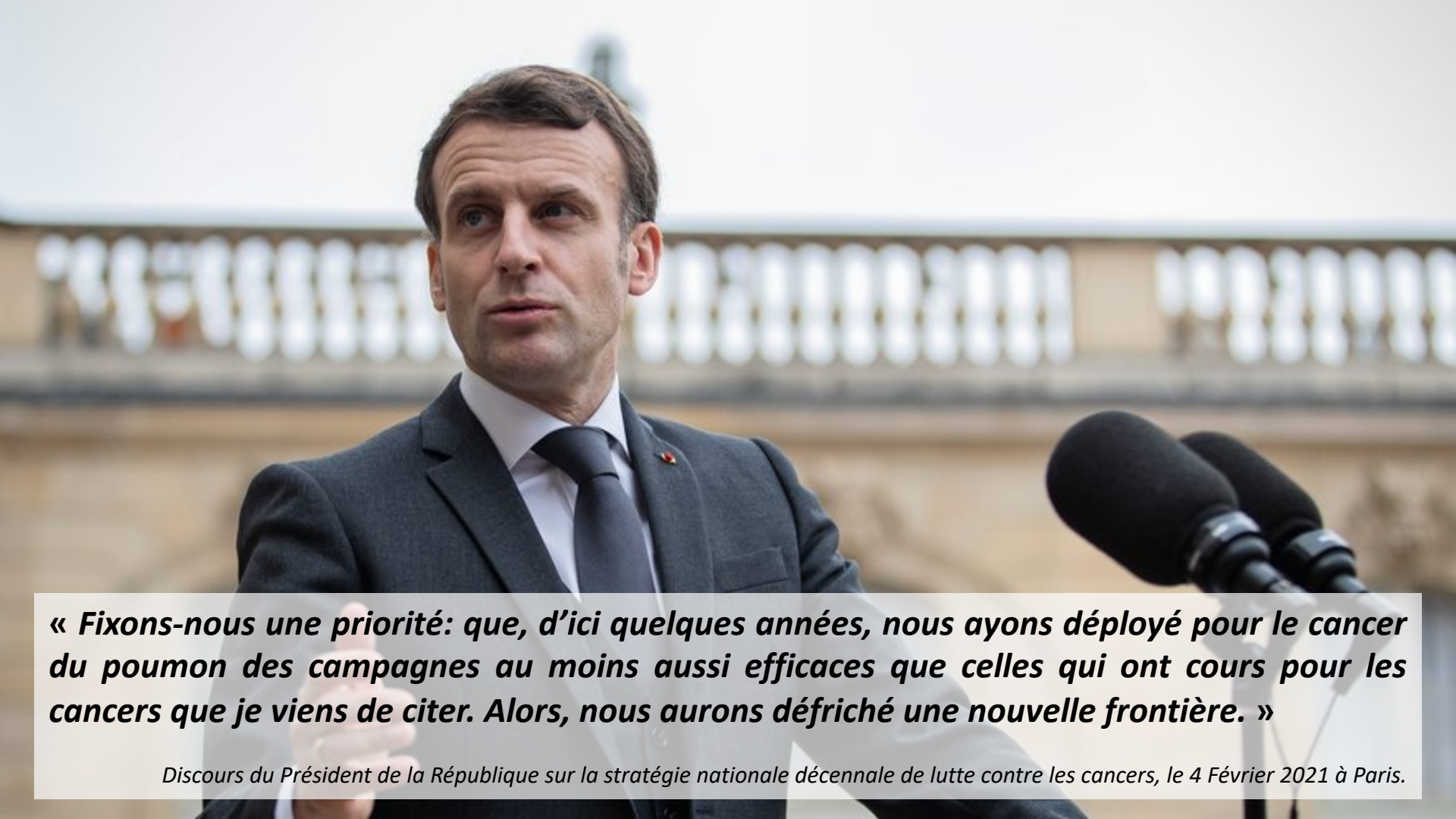
CRITÈRES DE SORTIE



Sevré > 15 ans

Acquisition
critère
d'exclusion

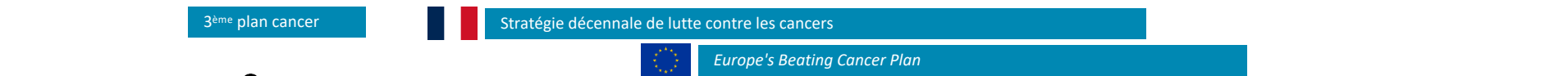
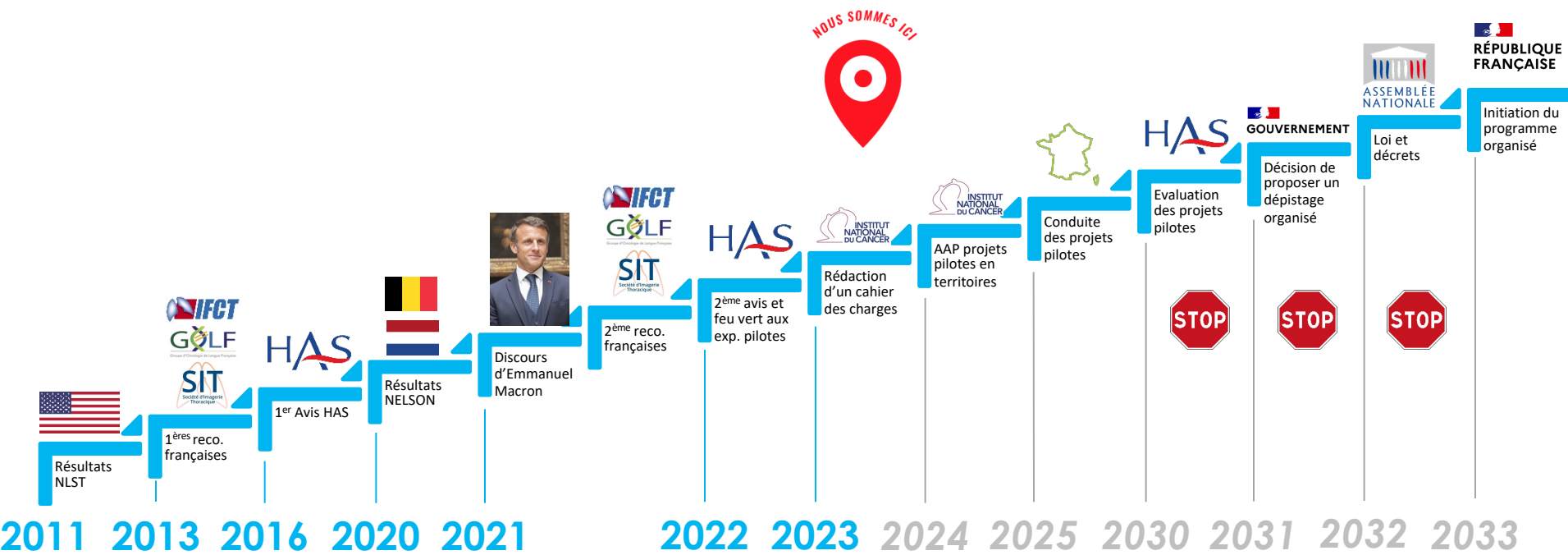
APRÈS AU MOINS 3 TOURS

A photograph of Emmanuel Macron, the President of France, speaking at a podium. He is wearing a dark suit, a white shirt, and a dark tie. He is looking slightly to his right. In the foreground, there are two black microphones on a stand. The background is a blurred stone building with a row of arched windows.















« Fixons-nous une priorité: que, d'ici quelques années, nous ayons déployé pour le cancer du poumon des campagnes au moins aussi efficaces que celles qui ont cours pour les cancers que je viens de citer. Alors, nous aurons défriché une nouvelle frontière. »

Discours du Président de la République sur la stratégie nationale décennale de lutte contre les cancers, le 4 Février 2021 à Paris.

Dépistage en France: ou en est-t-on ?



National and regional lung cancer screening program worldwide

	Countries/region	Years	Begin age	End age	Tobac.	Y since quit.	Other risk factors ?	Never smokers ?	Schedule
National	Poland 	20-23	50	74	≥ 20PY	≥15 Y	NO	NO	Annual
	Croatia 	20-24	50	75	≥ 30PY	≥15 Y	NO	NO	Annual & biennial
	Czechia 	22-26	55	74	≥ 20PY	-	NO	NO	Annual & biennial
	United Kingdom 	23→	55	74	Ever	-	PLCO _{m2012} + LLPv2	NO	Single
	Australia 	25→							
	USA 	15→	50	80 77→NA	≥ 20PY	≥15 Y	Radon, Professional, fam/per history, COPD, fibrosis, passive smoking	NO	Annual
	China 	09-18	40	74	≥ 20PY	-	YES	YES	Single
Regional	South Korea 	19→	55	74	≥ 30PY	≥15 Y	NO	NO	Biennial
	Taiwan 	22-30	45 (W) 50 (M)	74	≥ 30PY	≥15 Y	Pers/fam history, passive smoke, COPD, TB, cooking oils.	YES	Biennial
	Ontario 	21→	55	74	≥20 PY	-	NO	NO	Annual
	British Columbia 	22→	55	74	-	-	NO	NO	Annual & biennial
	Abu Dhabi 	18→	50	75	≥30 PY	≥15 Y	YES	NO	Annual
	Geiju 	14-18	40	74	≥20 PY	≥5 Y	YES	YES	Annual
	Barretos (Sao Paulo) 	19→	55	74	≥ 30PY	≥ 15 Y	NO	NO	Single (mobile)

“My Administration is also investing in screening and early detection services that are critical to diagnosing lung cancer in its beginning stages and saving lives. [...] We remain committed to increasing lung cancer screening rates for those most at risk.”

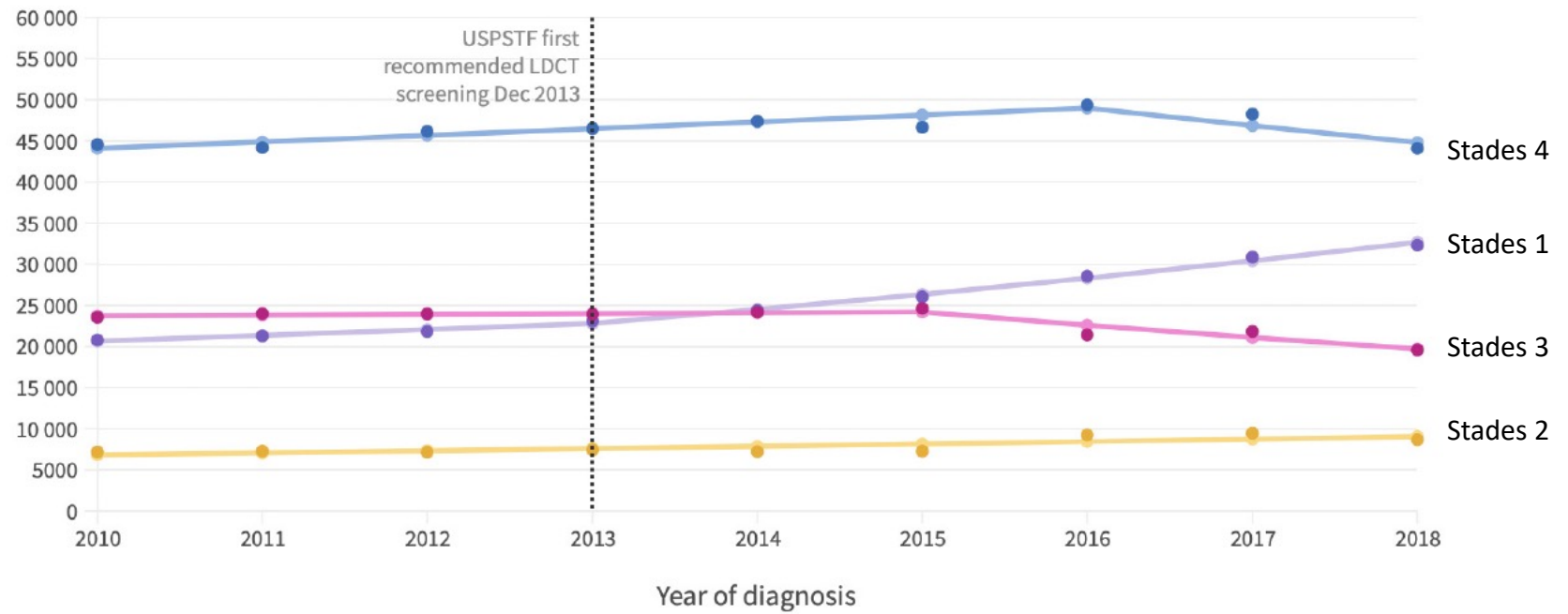
A Proclamation on National Lung Cancer Awareness Month, 2023; The white house, Oct, 31th, 2023

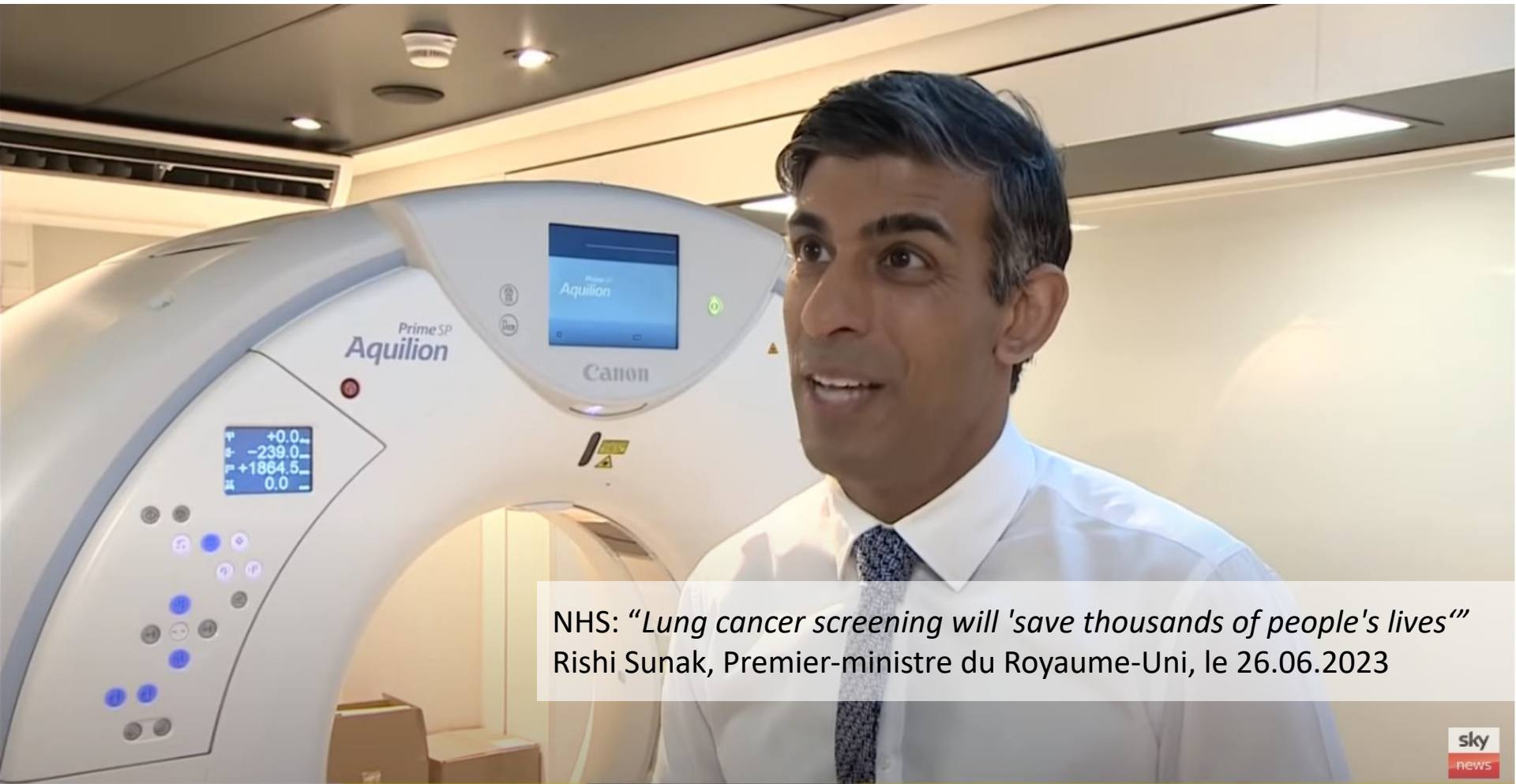


Effet du dépistage aux USA

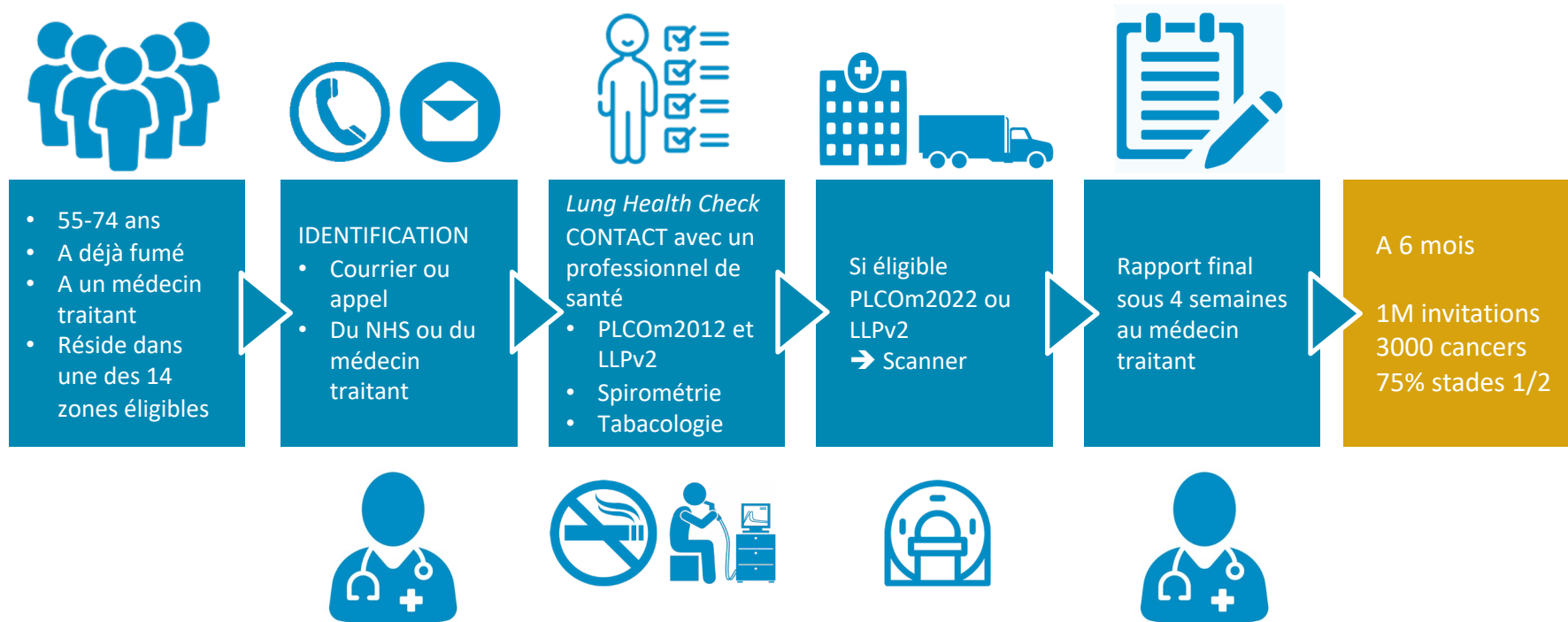
- Stage 1 (model)
- Stage 1 (raw)
- Stage 2 (model)
- Stage 2 (raw)
- Stage 3 (model)
- Stage 3 (raw)
- Stage 4 (model)
- Stage 4 (raw)

Number of patients diagnosed with NSCLC





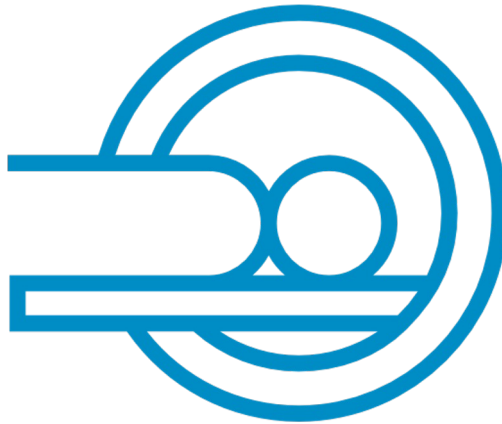
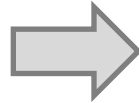
NHS: *"Lung cancer screening will 'save thousands of people's lives'"*
Rishi Sunak, Premier-ministre du Royaume-Uni, le 26.06.2023



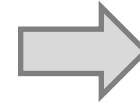
Pre-test
individualization



*Eligibility
assessment*



Intervention

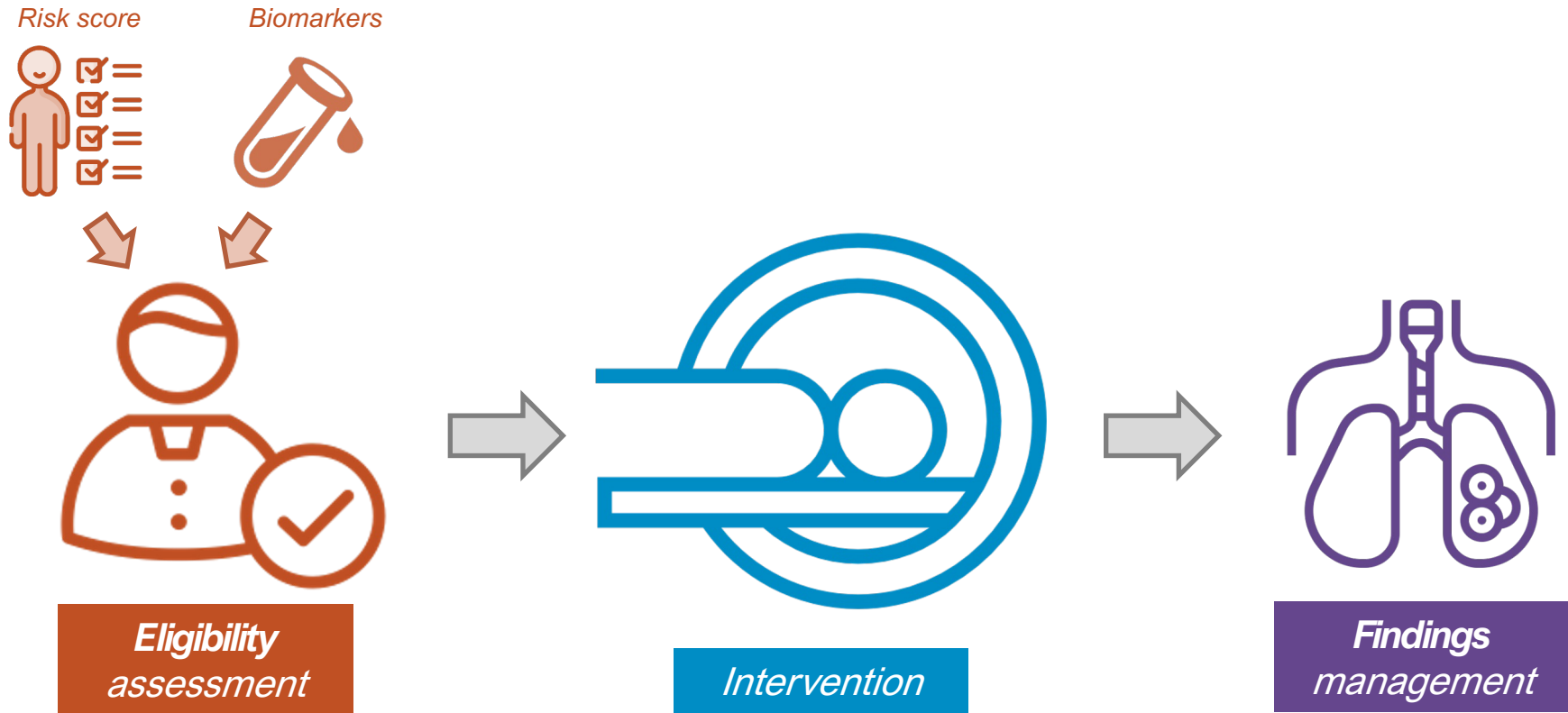


Post-test
individualization



*Findings
management*

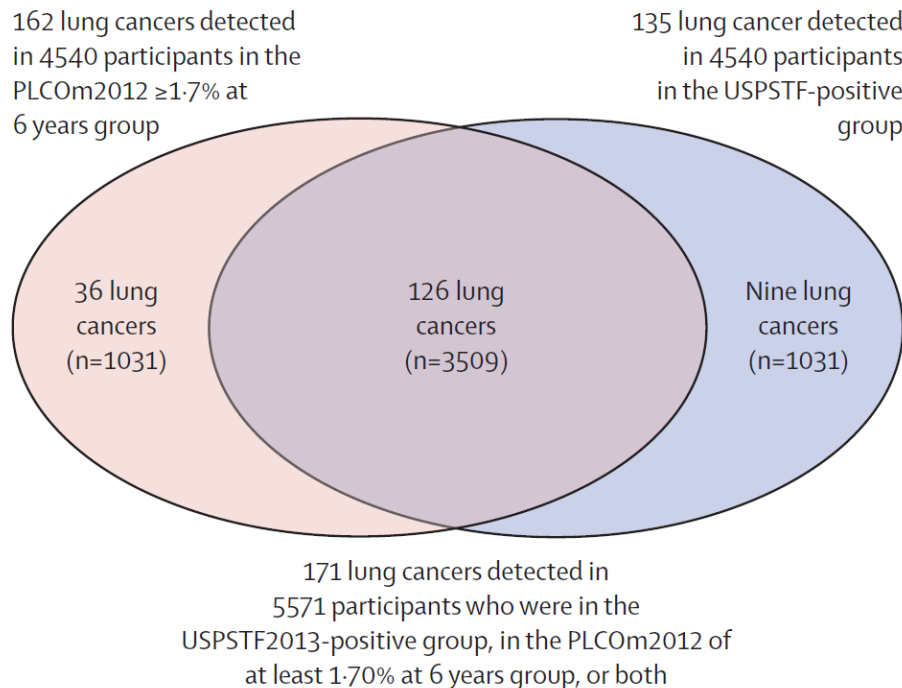
HOW to individualize lung cancer screening ?



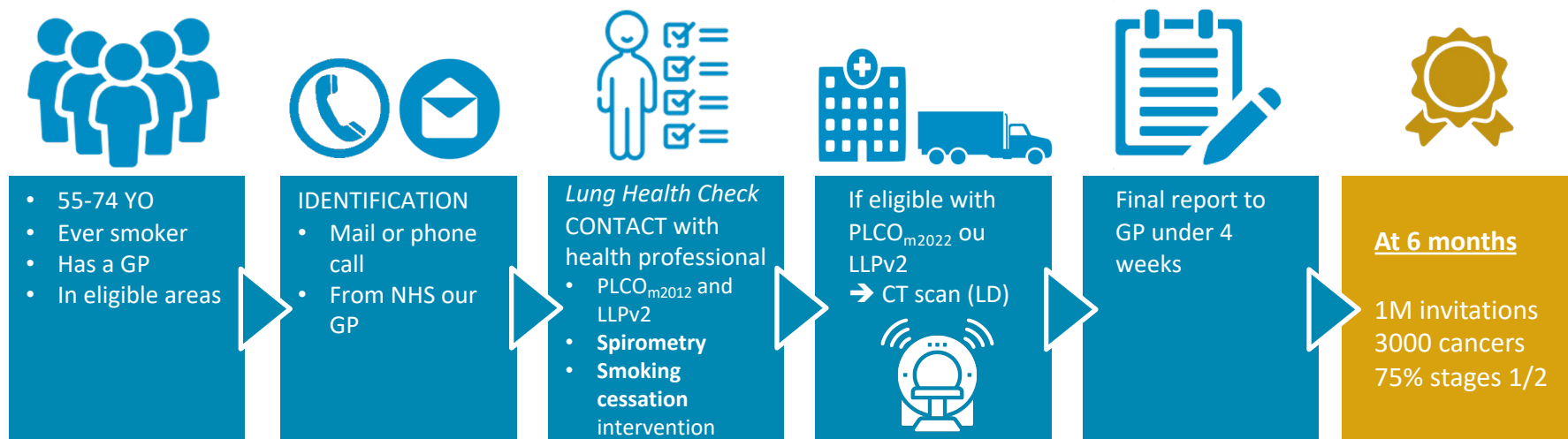
- Aim: Use clinical characteristics (exposome) to enrich eligible population with high-risk individuals without increasing the population to screen.



→ Decrease Number Needed to Screen



The UK lung health check program



- Aim: Use clinical characteristics (exposome) to enrich eligible population with high-risk individuals without increasing the population to screen.
→ Decrease Number Needed to Screen
- Main limitation: Introduce complexity in the eligibility process





Eligibility:

- All individual > 18yo
- No personal history of lung cancer



% lung cancer diagnosed:

Never smokers	Ever smokers
0,47%	0,63%

Kim YW, et al. *Eur Respir J* 2020; 56: 2000177

Eligibility (TALENT):

- 55-75 yo
- Never smoker or <10 PY (and YSQ >15)
- One among
 - Family history of lung cancer;
 - Passive smoke exposure;
 - History of TB or COPD;
 - cooking index ≥ 110 ; or cooking without ventilation



% lung cancer diagnosed: 2,6%

Chang GC, et al. *Lancet Respir Med*. 2023: S2213-2600(23)00338-7

Eligibility (FANSS):

- Female
- 40-74 yo
- Never smoker
- Asian descent

















% lung cancer diagnosed: 1,5%

Shum E et al. *ASCO* 2023

Asian descents \neq rest of the world 😊 !

National and regional lung cancer screening program worldwide

	Countries/region	Years	Begin age	End age	Tobac.	Y since quit.	Other risk factors ?	Never smokers ?	Schedule
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	British Columbia 	22→	55	74	-	-	NO	NO	Annual & biennial
	Abu Dhabi 	18→	50	75	≥30 PY	≥15 Y	YES	NO	Annual
	Geiju 	14-18	40	74	≥20 PY	≥5 Y	YES	YES	Annual
	Barretos (Sao Paulo) 	19→	55	74	≥ 30PY	≥ 15 Y	NO	NO	Single (mobile)

Personal picture adapted from <https://www.lungcancerpolicynetwork.com/interactive-map-of-lung-cancer-screening/> - Last update March, 21st 2024



Biomarkers may be an interesting option to individualize eligibility

ECLS study (auto-antibody, EarlyCDT)

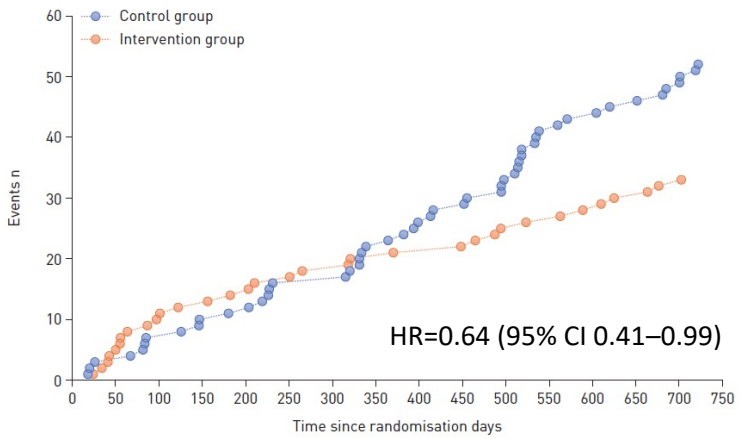
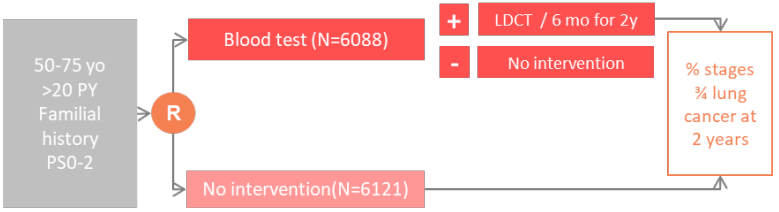
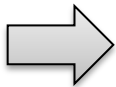
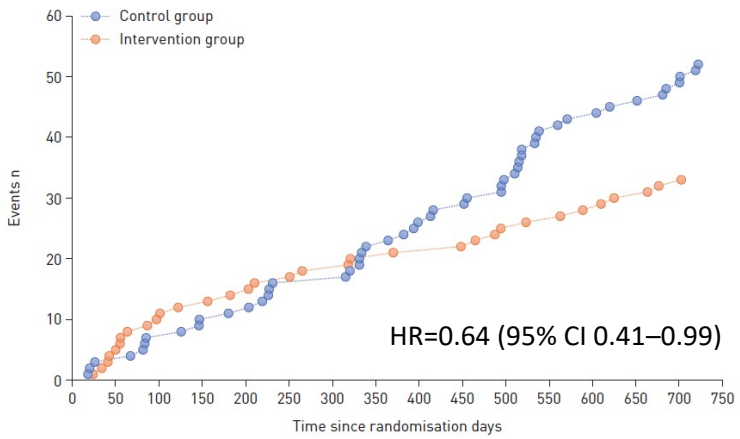
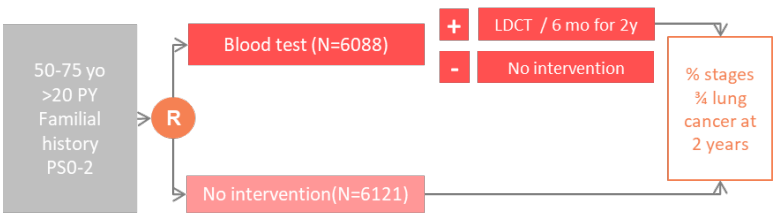


FIGURE 2 Primary outcome: diagnosis of stage III/IV/unspecified lung cancer 2 years after randomisation in the intervention and control arms.

Biomarkers may be an interesting option to individualize eligibility

ECLS study (auto-antibody, EarlyCDT)



IARC (Protein signature)

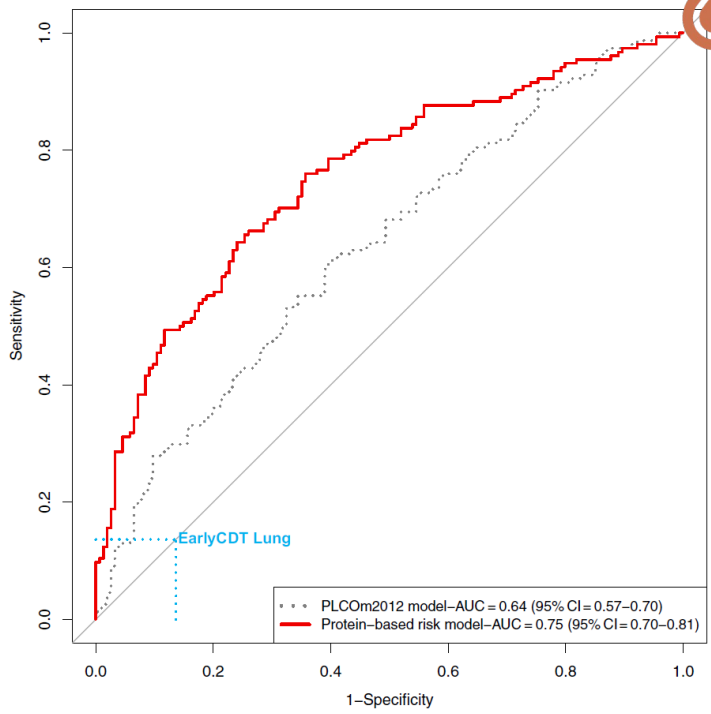
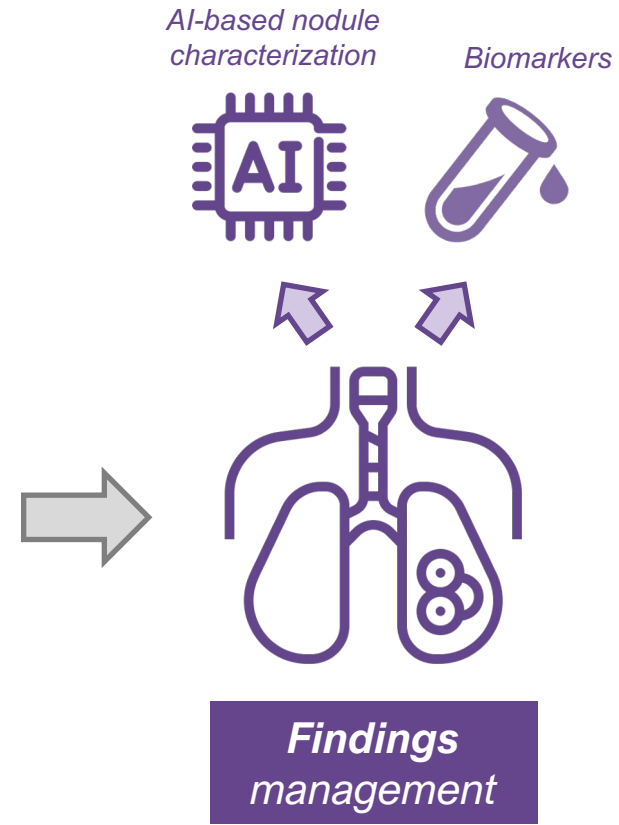
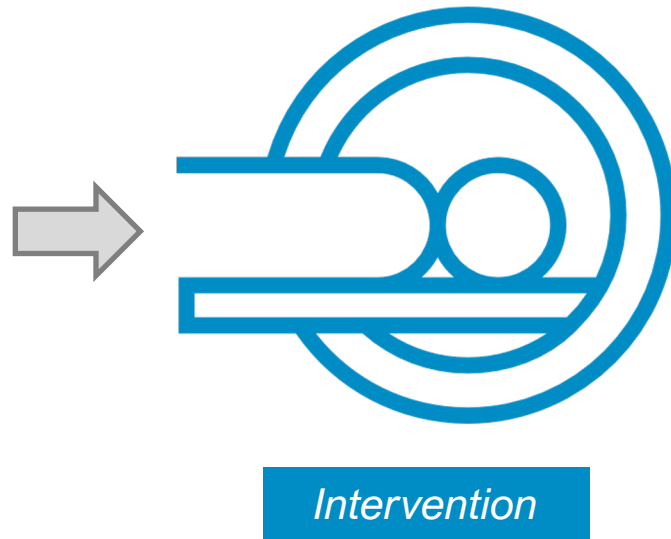


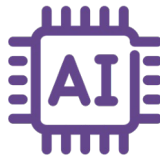
FIGURE 2 Primary outcome: diagnosis of stage III/IV/unspecified lung cancer 2 years after randomisation in the intervention and control arms.

Sullivan FM, et al. *Eur Respir J* 2021; 57: 2000670

➔ Best performance than EarlyCDT or PLCOm2012.

HOW to individualize lung cancer screening ?





Individualize test interpretation: from risk-score to automated model

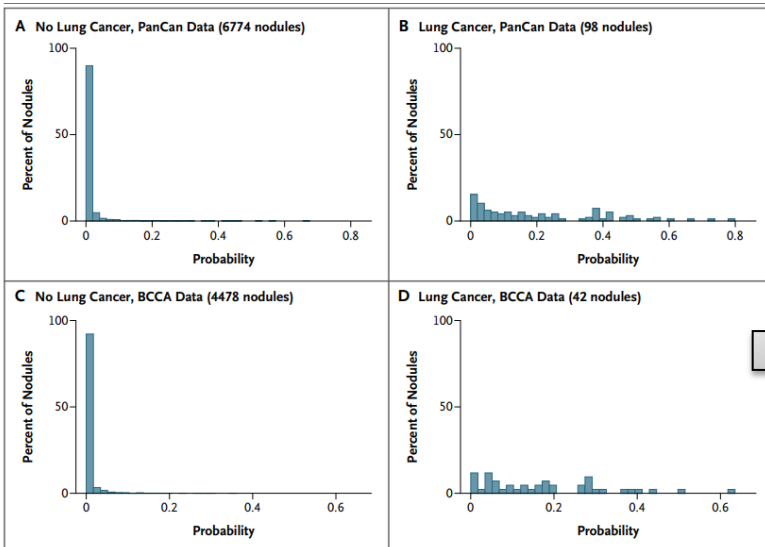


Figure 2. Distributions of Lung-Cancer Probabilities.
 The distribution of lung-cancer probabilities, based on the parsimonious model without spiculation, is shown among persons with lung cancer and those without lung cancer in the Pan-Canadian Early Detection of Lung Cancer Study (PanCan) and British Columbia Cancer Agency (BCCA) data sets. Perifissural nodules and nodules with any missing value in any predictor were not included in the calculation.

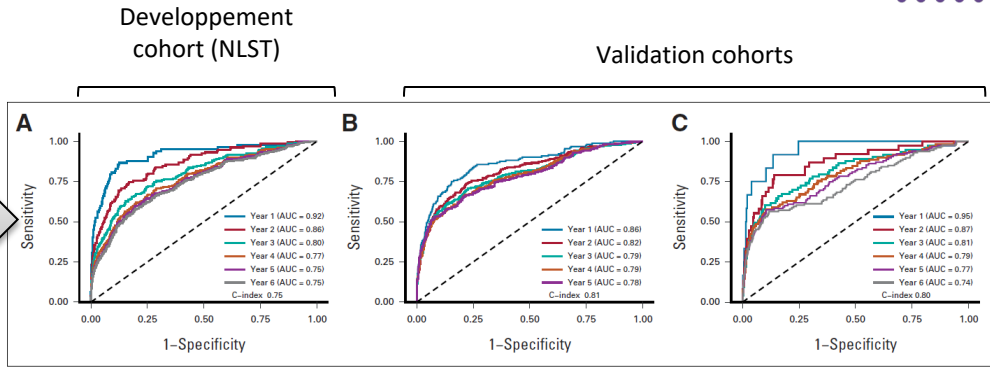
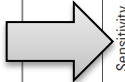


FIG 2. Receiver operating characteristic curves displaying Sybil’s ability to predict future lung cancer over 6 years following a single low-dose computed tomography from the (A) NLST, (B) MGH, and (C) CGMH test sets. CIs for each curve can be found in Table 1. AUC, area under the curve; C-index, concordance index; CGMH, Chang Gung Memorial Hospital; MGH, Massachusetts General Hospital; NLST, National Lung Screening Trial.

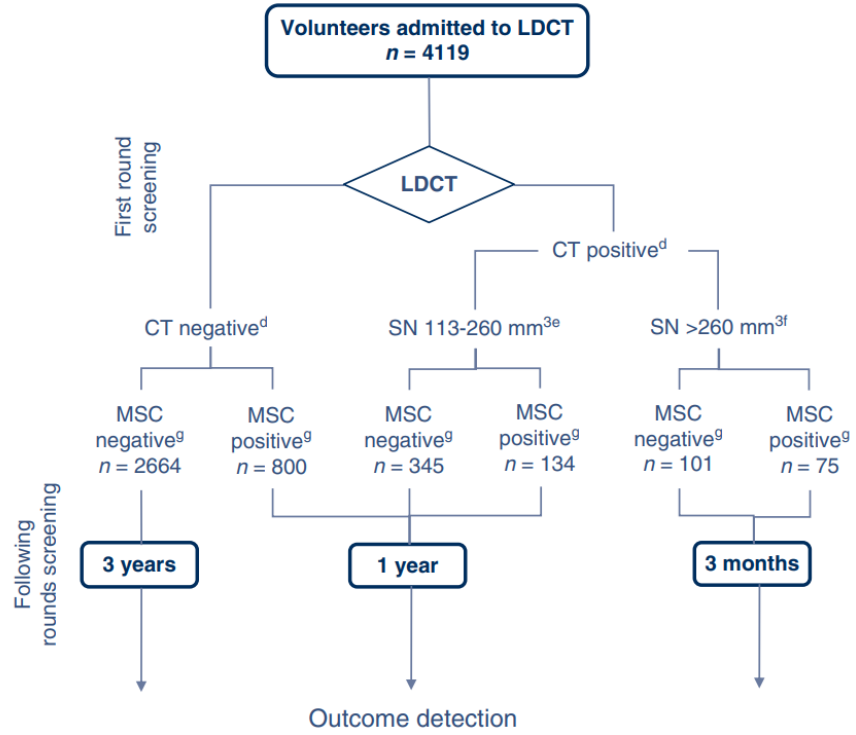
SYBIL

(no data input / no radiological annotation)

Datas in the model: Age, sex, family history of lung cancer, emphysema, nodule size, nodule type, nodule location, nodule count, spiculation

Biomarker for post-test individualization

Screening procedure



SN: Solid Nodule
MSC: Micro-RNA Signature

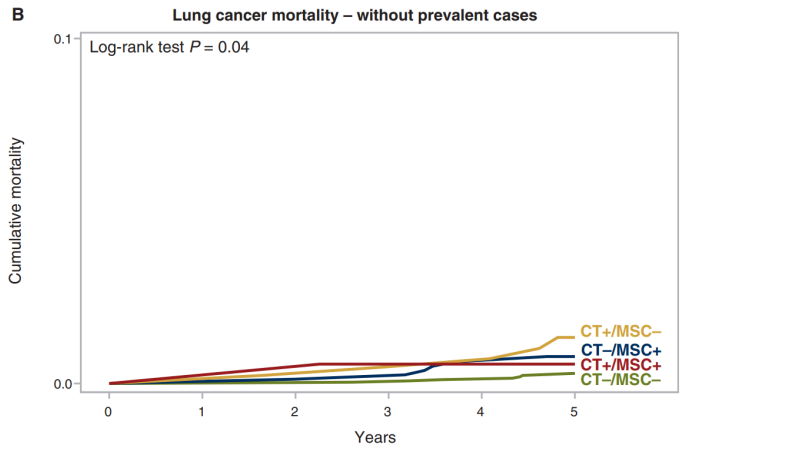
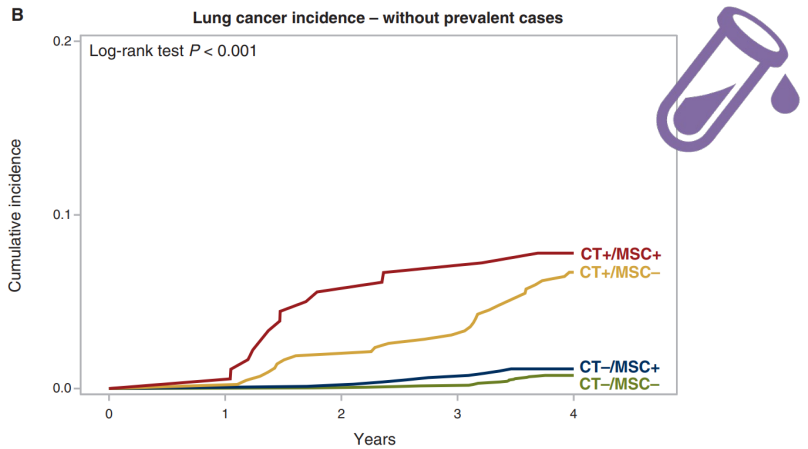
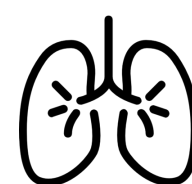
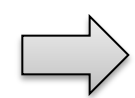


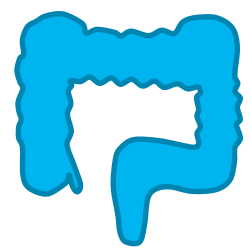


Table 2. Sensitivity and Specificity of the Cell-free DNA (cfDNA) Blood-Based Test for the Most Advanced Findings on Colonoscopy.*

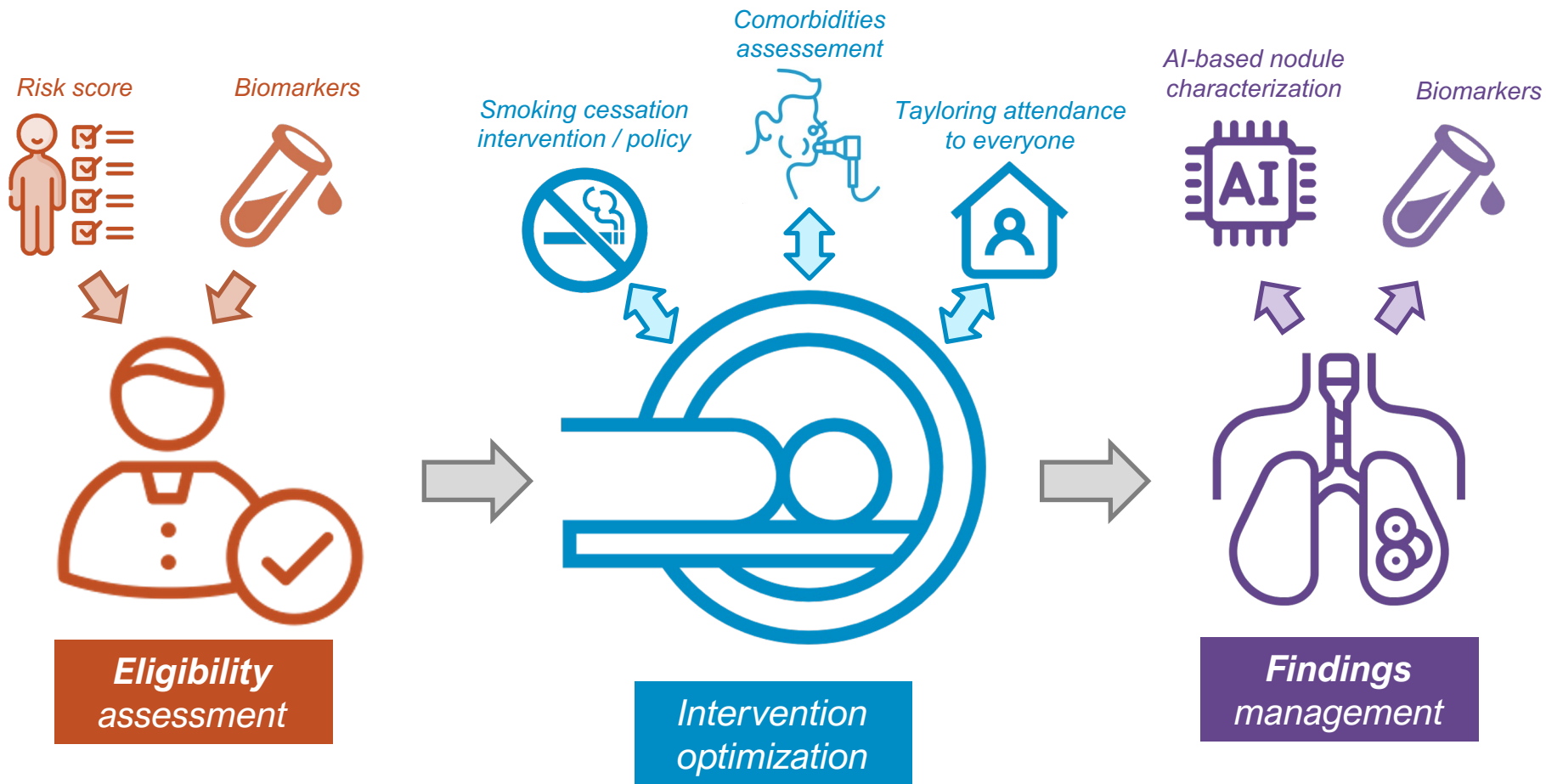
Variable	Most Advanced Finding on Colonoscopy <i>no.</i>	cfDNA Blood-Based Test	
		Positive Test <i>no.</i>	Sensitivity (95% CI) %
Colorectal cancer			
Any	65	54	83.1 (72.2–90.3)
Stage I, II, or III*	48	42	87.5 (75.3–94.1)
Advanced precancerous lesions†	1116	147	13.2 (11.3–15.3)
Specificity (95% CI)			
Nonadvanced adenomas, nonneoplastic findings, and negative colonoscopy	6680	698	89.6 (88.8–90.3)
Nonneoplastic findings and negative colonoscopy	4514	457	89.9 (89.0–90.7)



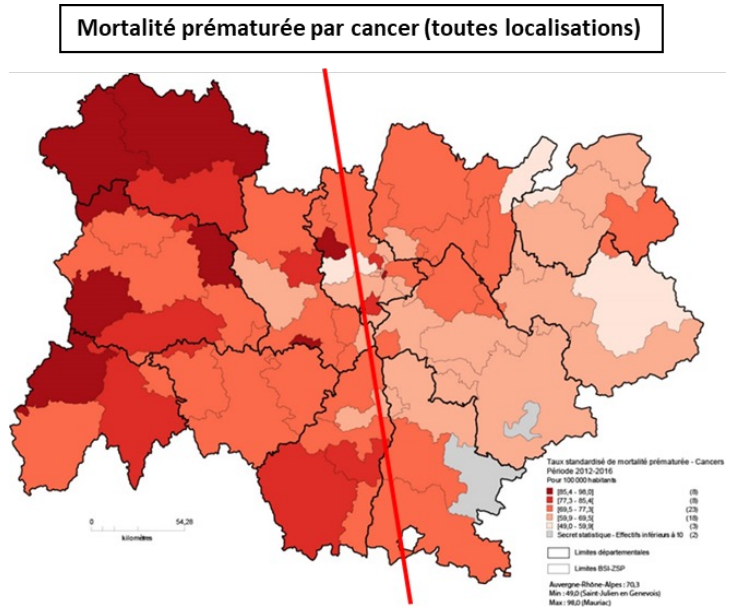
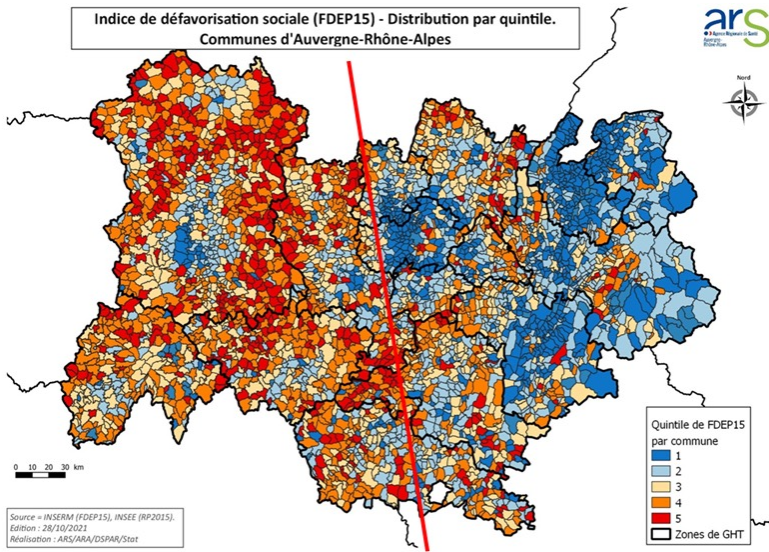
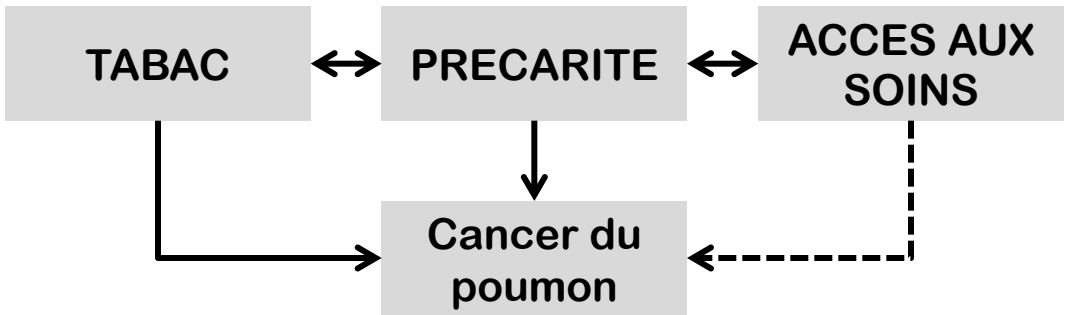
SHIELD trial
NCT05117840



HOW to individualize lung cancer screening ?



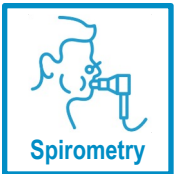
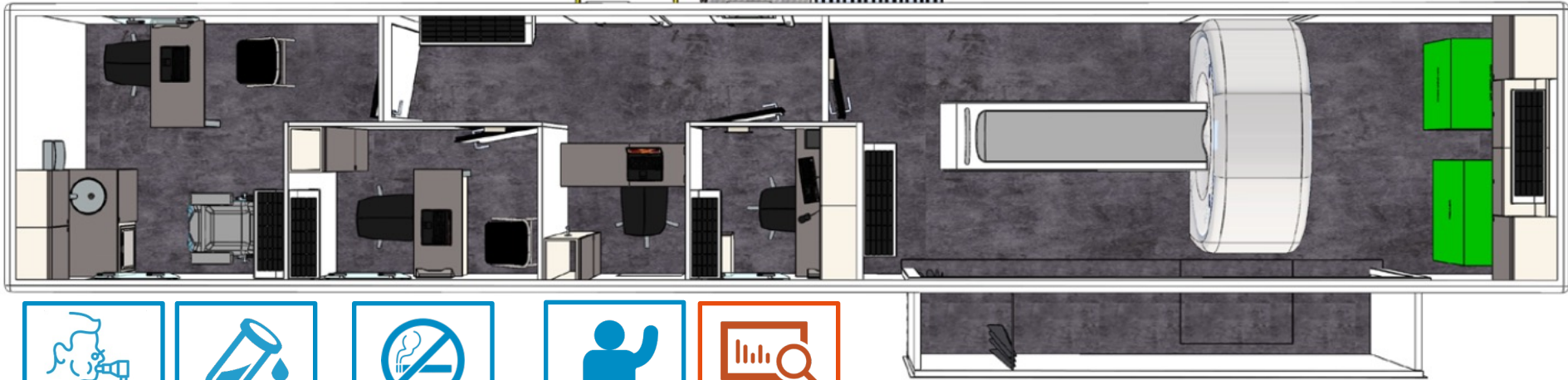
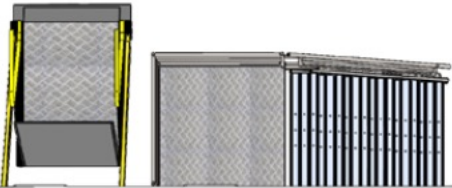
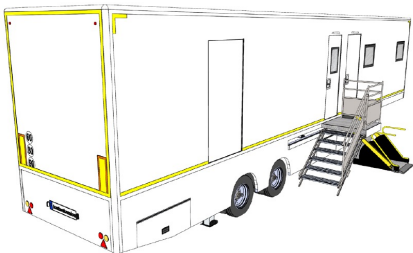
Le cancer du poumon: champion des inégalités



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 www.chu-lyon.fr ● www.pneumologie-lyonsud.fr

 sebastien.couraud@chu-lyon.fr

 (0033) 04 78 86 44 01

 @s_couraud ● @pneumo_LS

